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Application Document 11

Proposed Development (Onshore) Report to Inform Appropriate Assessment

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Acronyms and Abbreviations

AA	Appropriate Assessment
AEOI	Adverse Effects on the Integrity
AIS	Air Insulated Switchgear
AMSC	Approval of Matters Specified in Conditions
ARUP	Ove Arup and Partners Limited
BoCC	Birds of Conservation Concern
BTO	British Trust for Ornithology
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CO	Conservation Objective
cSAC	candidate Special Areas of Conservation
CTMP	Construction Traffic Management Plan
DE	Design Envelope
ECoW	Ecological Clerk of Works
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ESO	Electricity System Operator
EU	European Union
FUE	Follow Up Exercise
GIS	Gas Insulated Switchgear

GW	Gigawatt
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HND	Holistic Network Design
HRA	Habitats Regulations Appraisal
HVAC	Heating Ventilation and Air Conditioning
INNS	Invasive Non-Native Species
km	kilometre
kV	kilovolt
LGV	Light Goods Vehicle
LSE	Likely Significant Effect
m	metres
m^2	metres squared
m^3	metres cubed
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
Mm	millimetres
mm^2	millimetres squared
MMO	Marine Management Organisation
MPA	Marine Protected Area
MW	Megawatts
NESBReC	North East Scotland Biological Records Centre
NETS	National Electricity Transmission Network
OCT	Open Cut Trenching

OD	Outer Diameter
OFGEM	The Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
ONEC	Onshore Export Cable Corridor
OnTI	Onshore Transmission Infrastructure
OSPAR	Oslo and Paris Conventions
OWF	Offshore Wind Farm
PPP	Planning Permission in Principle
PRI	Public Road Improvements
pSAC	proposed Special Area of Conservation
pSPA	proposed Special Protected Area
QI	Qualifying Interest
RIAA	Report to Inform Appropriate Assessment
RLB	Red Line Boundary
SAC	Special Areas of Conservation
SCI	Special Conservation Interest
SGT	Super Grid Transformers
SPA	Special Protected Area
SPR	South Pathway Receptor
SSEN-T	Scottish and Southern Electricity Networks Transmission
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
SVC	Static VAR Compensator
TJB	Transition Joint Bays

UK	United Kingdom
VP	Vantage Point
WeBS	Wetland Bird Survey Data
WFD	Water Framework Directive
ZoI	Zone of Influence

1 Introduction

1.1 Overview

1.1.1.1 This Report to Inform Appropriate Assessment (RIAA) has been prepared by Ove Arup and Partners Limited (Arup) on behalf of Caledonia Offshore Wind Farms Limited (the Applicant) to support an application for Planning Permission in Principle (PPP) submitted to Aberdeenshire Council for the associated Onshore Transmission Infrastructure (OnTI) landward of Mean Low Water Spring (MLWS) that is required to export the power generated from the Caledonia Offshore Wind Farm (OWF) to the National Electricity Transmission Network (NETS).

1.1.1.2 The Caledonia OWF comprises Caledonia North and Caledonia South, collectively referred to as the Proposed Development (Offshore). The OnTI required to transfer the power from the Proposed Development (Offshore) to a connection to the NETS is referred to as the Proposed Development (Onshore).

1.1.1.3 The OnTI comprises underground cables from a Landfall Site on the Aberdeenshire coast to two co-located Onshore Substations in the proximity of New Deer. For the purposes of this document, the OnTI boundary will hereafter be referred to as the 'OnTI Red Line Boundary (RLB)'. Where discussed separately, the area within which the underground cables could be installed will be referred to as the 'Onshore Export Cable Corridor (ONEC)' and the Onshore Substations, as the 'Onshore Substations'.

1.1.1.4 The Habitats Regulations Appraisal (HRA) process required a Screening assessment of the Proposed Development (Onshore) in accordance with Article 6 of the Habitats Directive (Directive 92/43/EEC) (Council of the European Union (EU), 1992[1]) and Regulation 48 of the Conservation (Natural Habitats, &c) Regulations 1994 (herein referred to as the 'Habitats Regulations') (United Kingdom (UK) Government, 1994[2]). An Appropriate Assessment (AA) is required *"when a project, which is not directly connected with or necessary to the management of a European designated site, is likely to have a significant effect thereon, either in isolation or in combination with other plans and projects".*

1.1.1.5 A HRA Screening Report (Application Document 10: Proposed Development (Onshore) Habitat Regulations Appraisal Stage 1 Screening Report) for the Proposed Development (Onshore) (hereafter referred to as 'Screening Report'), was completed in November 2023 (Caledonia Offshore Wind Farm Ltd, 2023a[3]). The Screening Report concluded that the potential for likely significant effects (LSE), as a result of construction, exists on the qualifying features of the Moray Firth Special Protected Area (SPA). The Moray Firth SPA was therefore screened in for an AA and is the subject of this document.

1.1.1.6 This document is the second stage of the HRA process, created to inform the 'Competent Authority', Aberdeenshire Council, regarding the potential adverse effects of the Proposed Development (Onshore) on the Moray Firth SPA, as required under Regulation 48 (1) of the Habitats Regulation[2]. This document has been prepared in accordance with the Habitats Regulations. This document covers the proposed onshore construction and operation work for the Proposed Development (Onshore) and the effect this may have on the Moray Firth SPA.

1.1.1.7 All impacts related to the construction, operation and decommissioning of the offshore components of the Caledonia OWF are detailed within the Proposed Development (Offshore) RIAAs (Application Document 13: Caledonia North Report to Inform Appropriate Assessment and Application Document 14: Caledonia South Report to Inform Appropriate Assessment).

1.2 Legislative Context

1.2.1.1 The Habitats Regulation[2] apply to what shall be referred to in this document, as 'European Sites'. In Scotland, European Sites are defined as candidate Special Areas of Conservation (cSACs), designated Special Areas of Conservation (SACs), classified SPAs, proposed SPA's (pSPAs) and proposed SACs (pSACs). SACs and cSACs are designated to protect a variety of habitats and species of European importance. SPAs and pSPAs are designated to protect bird species of European importance and their associated habitats.

1.2.1.2 Ramsar sites are wetlands of international importance listed under the Ramsar Convention (Ramsar Convention, 1975[4]). As noted, in the HRA Handbook (Tyldesley and Chapman, 2013[5]) only competent authorities England and Wales should treat listed and proposed Ramsar sites in the HRA process. However, in the vast majority of cases Ramsar wetlands overlap with the boundary of SPAs.

1.2.1.3 Following the exit of the UK from the EU, the relevant regulations were amended to ensure the ongoing protection, conservation and reporting relevant to European Sites within the UK. The legislative requirements of this are summarised by Circular 6/1995 as amended June 2000 (Scottish Government, 2000[6]) and include, in paragraph 12:

1.2.1.4 "*The Regulations require that, where an authority concludes that a development proposal unconnected with the nature conservation management of a Natura 2000 (European) site is likely to have a significant effect on that site, it must undertake an appropriate assessment of the implications for the conservation interests for which the area has been designated*."

1.2.1.5 Under regulation 48 of the Habitats Regulation[2], this means that the Competent Authority has a duty to:

- determine whether the proposal is directly connected with or necessary to site management for conservation; and, if not,
- determine whether the proposal is likely to have a significant effect on the site either individually or in combination with other plans or projects; and, if so, then
- make an AA of the implications (of the proposal) for the site in view of that site's conservation objectives (CO).

1.2.1.6 COs for the European Sites are defined for the relevant QIs and the qualifying features. In its most general sense, a CO is the specification of the overall target for the species and/or habitat types for which a site is designated in order for it to contribute to maintaining or reaching favourable conservation status.

1.2.1.7 This duty is commonly executed by undertaking a HRA and extends, where appropriate, to plans or projects outwith the boundary of the European site in order to determine the plan or project implications on the qualifying interests that may be within the OnTI RLB.

1.2.1.8 If significant effects are unknown or likely, the Competent Authority can only agree to the proposal under Regulation 48 of the Habitats Regulations[2] after having ascertained by means of the AA that it will not adversely affect the integrity of the European Site and having first consulted and had regard to any representations made by NatureScot.

1.3 Screening for Habitats Regulations Appraisal

1.3.1 Source-Pathway-Receptor Model

1.3.1.1 The SPR model is used to assess where a potential effect may result by examining the source, its pathway and the receptor. These can be defined as follows:

- Source: The origin of a potential effect which may include characteristics of a project that have the potential to result in effects e.g. direct impacts such as loss of habitat;
- Pathway: How the potential effect may reach the receptor. These are identifiable links between the project and European Sites e.g. direct pathways such as physical proximity or hydrological connections; and indirect pathways such as disturbance to migrating species; and
- Receptor: The European site network and respective qualifying features. The potential sources and pathways of a potential effect may be dependent on the ecological condition and specific sensitivities of a receptor e.g. freshwater pearl mussel is sensitive to siltation in water.

1.3.1.2 European Sites are only at risk from significant effects where a SPR link exists between a proposed development and a European Site(s). This can take the

form of a direct impact (e.g., where the proposed development site and/or associated construction works are located within the boundary of the designated site(s), or an indirect impact where impacts occur outside the boundary of the designated site(s) and result in affecting the ecological receptors within (e.g., impacts to water quality which can affect riparian habitats at a distance from the impact source). Consideration is therefore given to the SPR linkage and associated risks between the OnTI RLB and European Sites.

1.3.1.3 The identification of risk does not automatically mean that an effect will occur, nor that it will be significant. The identification of these risks means that there is a possibility of environmental or ecological damage occurring. The level and significance of the effect depends upon the nature of the consequence, likelihood of the risk and characteristics of the receptor.

1.3.1.4 If there is a theoretical pathway between the works and a designated site, it is considered that the ZoI should encompass those European Sites for which there is a pathway with the Proposed Development (Onshore).

1.3.2 Screening Results

1.3.2.1 The Screening Report[3] identified seven European Sites within the Zone of Influence (ZoI), which was established within the Screening Report by analysing the sources, pathways and receptors (applying the Source-Pathway-Receptor [SPR] model) of the Proposed Development (Onshore), Figure 1-1 identifies the OnTI RLB and European Sites in proximity to the Proposed Development (Onshore). The Screening Report concluded that the following European Sites had the potential for LSE:

- The Moray Firth SPA;
- The Troupe, Pennan and Lion's Head SPA;
- The Ythan estuary, Sands of Forvie, and Meikle Loch SPA;
- The Sands of Forvie SAC;
- Reidside Moss SAC;
- Turclossie Moss SAC; and
- Ythan Estuary and Meikle Loch Ramsar.

1.3.2.2 Information relating to their qualifying features can be reviewed in the Screening Report[3].

1.3.2.3 The SPR methodology was used to determine the potential for LSE considering the magnitude and scale of effects of the Proposed Development (Onshore).

1.3.2.4 None of the European Sites are located within the OnTI RLB which, combined with the distances between the OnTI RLB and the European Sites, allowed for screening out of direct effects resulting from the Proposed Development's (Onshore) construction activities.

1.3.2.5 The Troupe, Pennan and Lion's Head SPA, Ythan Estuary and Meikle Loch Ramsar, Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Sands of Forvie SAC share hydrological connections with the Proposed Development (Onshore). Further investigation demonstrated that this pathway would not result in the potential for LSE due to the distance between the Proposed Development (Onshore) and the dilution factor of any accidental/unintentional release of sediment or pollutants into hydrologically linked watercourses. Therefore, these European Sites were screened out of further assessment.

1.3.2.6 Reidside Moss SAC and Turclossie Moss SAC do not share hydrological connections with the Proposed Development (Onshore). Indirect effects such as light pollution, sound, aerial emissions and the accidental/unintentional release of pollutants is anticipated to be attenuated over the distance between the Proposed Development (Onshore) and the SACs. Reidside Moss SAC is 4.5 kilometres (km) west and Turclossie Moss SAC is 12.5km east of the OnTI RLB. Therefore, these European Sites were screened out of further assessment.

1.3.2.7 Functionally linked land for the qualifying features of the Moray Firth SPA exists adjacent to the Proposed Development (Onshore). There is the potential for unintentional disturbance/destruction to these supporting habitats for the Moray Firth SPA. In addition, the presence of the hydrological link between the Proposed Development (Onshore) and the Moray Firth SPA via the North Sea introduces the potential for indirect effects through the unintentional/accidental release of sediment and/or pollutants during construction.

1.3.2.8 The outcome of the Screening Report[3] concluded that effects which have the potential to occur during construction of the Proposed Development (Onshore) comprise:

- Potential disturbance, damage, or destruction of foraging habitat used by the qualifying features supported by the SPA;
- Potential disturbance, damage, or destruction of suitable roosting sites used by the qualifying features supported by the SPA;
- The disturbance, damage, or destruction of breeding sites of the qualifying features located within the SPA;
- Potential disturbance, damage, or destruction of commuting or migratory features and habitats used by the qualifying features; and
- Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).

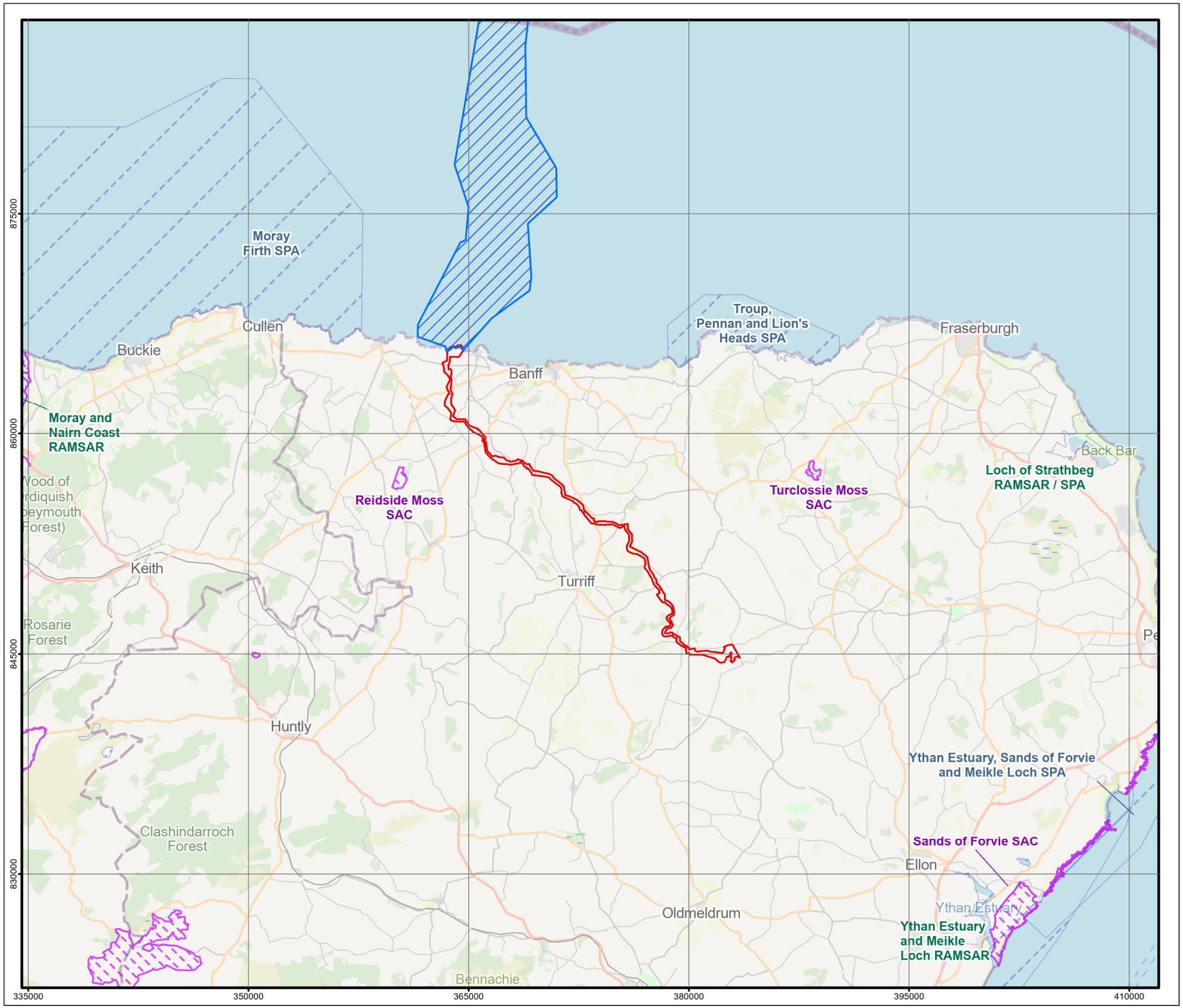
1.3.2.9 As a result of these potential effects on the qualifying features of the Moray Firth SPA from construction of the Proposed Development (Onshore), this European Site has been screened in for further assessment as part of the HRA process and is the subject of this RIAA. These effects are examined further within this document and, if necessary, appropriate mitigation shall be

identified to avoid Adverse Effects on the Integrity (AEOI) of the Moray Firth SPA.

1.4 Document Structure

1.4.1.1 This document is structured as follows:

- Section 2 provides an overview of the Proposed Development (Onshore);
- Section 3 describes the HRA methodology;
- Section 4 assesses the effects of the Proposed Development (Onshore) on the Moray Firth SPA;
- Section 5 establishes mitigation measures for these effects;
- Section 6 provides a summary of conclusions made in this document; and
- Section 7 provides a list of references.



Offshore Export Cable Corridor

Onshore Transmission Infrastructure Red Line Boundary

European Designation [Count]

RAMSAR Site* [0]

SAC - Special Area of Conservation [2]

SPA - Special Protection Area [2]

*No RAMSAR designated site located within 20km of Onshore Transmission Infrastructure Red Line Boundary.

0 3 6 9 12 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
03	30/08/2024	Approved	CW	NM	GS
02	25/07/2024	For Review	CW	NM	GS
01	17/05/2024	For Review	CW	NM	GS

CALEDONIA Offshore Wind Farm

ARUP

CONTRACTOR DRAWING NO: UKCAL1_ARP_WNF_ENV_MAP_00458

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GEODETIC PARAMETERS: OSGB36 / British National Grid (EPSG:27700)

DRAWING TITLE

Figure 1-1: HRA Stage 2 Appropriate Assessment

STATUS: Approved

SCALE: 1:350,000

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2 Proposed Development (Onshore) Description

2.1.1 Overview

2.1.1.1 The area within which the Proposed Development (Onshore) will be located is shown within Figure 1-1 and is identified as the OnTI RLB. The OnTI RLB is within the Aberdeenshire Council Local Authority area.

2.1.1.2 The OnTI RLB encompasses:

- **The Landfall Site**: the area from MLWS where the Offshore Export Cable Circuits are connected to the Onshore Export Cable Circuits via Horizontal Directional Drilling (HDD) ducts within Transition Joint Bays (TJBs) (buried box-like structures which house the jointing between the Offshore and Onshore Export Cable Circuits). The Landfall Site is located at a rocky bay named Stake Ness, 1km west of the village of Whitehills and approximately 5km west of Banff;
- **The ONEC**: where the Onshore Export Cable Circuits will be located which connects the TJBs at the Landfall Site to the Onshore Substation Site. The ONEC extends approximately 37km from Stake Ness to an area in the vicinity of the existing New Deer Substation;
- **The Onshore Substation Site**: comprising two co-located Onshore Substations located adjacent to the existing New Deer substation. Each substation aligns with the two project phases; and
- **The Onshore Grid Connection Cable Corridor**: connecting the Onshore Substation to the Grid Connection Point at the existing New Deer Substation (for Phase 1) (owned by Scottish and Southern Electricity Networks Transmission (SSEN-T), via up to two onshore cable circuits with a nominal voltage of 400 kilovolt (kV). This connection relates to Phase 1 of the Proposed Development only. The Onshore Grid Connection Cable Corridor for Phase 2 will be subject to a separate planning application.

2.1.1.3 The OnTI RLB also includes provision for temporary infrastructure associated with construction of the OnTI.

2.1.1.4 The OnTI RLB is situated in mainly agricultural land with smaller areas of forestry, ancient woodland, residential properties, and farm steadings in the surrounding area. The proposed Landfall Site is located within the Cullen to Stake Ness Site of Special Scientific Interest (SSSI), though cables will be installed beneath the designated site and construction compounds sited outside the SSSI. Notified natural features of the SSSI include outcrops of geological interest and its habitats including fens and lowland heathland. Land surrounding the Landfall Site is predominantly agricultural land, with sparse settlements and dwellings scattered throughout, connected by small local roads and tracks.

2.1.1.5 The ONEC runs from the cable jointing at the Landfall Site over approximately 37km before connecting into the Onshore Substation Site, located in proximity to the existing New Deer substation. Key crossings along the ONEC include watercourses such as the River Deveron, Class A roads including the A98, A97 and A947, and the Moray East OWF Onshore Export Cable Circuits.

2.1.1.6 Land uses within and surround the OnTI RLB is described in more detail in Volume 5, Chapter 2: Land Use of the Caledonia OWF Environmental Impact Assessment Report (EIAR) (Caledonia Offshore Wind Farm Ltd, 2024[7]).

2.1.2 Design Envelope Approach

2.1.2.1 At this stage in the Proposed Development (Onshore) design process, information on exact locations of the OnTI and the methods that will be utilised during construction have not been confirmed. This is as a result of the Proposed Development (Onshore) being in the early stages of the development process. This detail will be brought forward during the Approval of Matters Specified in Conditions (AMSC) stage following further design refinement, allowing Aberdeenshire Council as the determining authority to consider the detailed designs for approval.

2.1.2.2 As a result, a Design Envelope (DE) approach has been adopted. The DE identifies the main components of the Proposed Development (Onshore) and a range of design parameters. In line with the use of a DE approach it should be noted that the eventual built Proposed Development (Onshore) may differ from the scenarios considered within topic assessments but will not exceed the DE parameters considered therefore this assessment represents the worst-case scenario.

2.1.3 Grid Connection Point

2.1.3.1 The Applicant has entered into a Bilateral Connection Agreement and Construction Agreement with National Grid Electricity System Operator (ESO) that provides the Proposed Development with a Grid Connection Point to the NETS at a proposed new substation called Greens (formerly known as New Deer 2). In the Holistic Network Design (HND) study, which sought to identify the optimum approach to connecting offshore wind farms to the NETS, National Grid ESO published that the Grid Connection Point for 1500 megawatt (MW) of the Proposed Development's capacity would connect to the NETS at the existing New Deer substation, with the balance of 500MW to be confirmed in a secondary publication, the HND Follow up Exercise (FUE). The Applicant proceeded with its development activities on this basis. In March 2024 National Grid ESO published the HND FUE, which identified that balance of 500MW of the Proposed Development's capacity would connect to the New Deer Area.

2.1.3.2 It is anticipated that the Proposed Development will connect the first phase to the existing New Deer substation, with the second phase connecting to Greens substation. This remains subject to ongoing detailed network design being conducted by National Grid ESO and Scottish and Southern Energy Networks Transmission (SSEN-T), in consultation with the Applicant.

2.1.3.3 This EIA does not consider the Onshore Grid Connection Cable Corridor for the Proposed Development's second phase, which will be required to connect the Onshore Substation to Greens. This is because the preferred location of the Greens substation was only confirmed in late January 2024[i]. Resultingly, the design of the 400kV connection for the Proposed Development's second phase from the Onshore Substation into Greens is still under development. For further information on how this has impacted the site selection process, please see Caledonia OWF EIAR Volume 1, Chapter 6: Site Selection and Alternatives[7].

2.1.4 Phased Approach

2.1.4.1 To make efficient use of the available grid capacity, the Applicant is seeking to retain the flexibility to deliver the OWF generation capacity across two phases. Aligned with this, the Proposed Development (Onshore) is seeking to consent construction works in the following areas:

- Phase 1: Landfall Site, ONEC, 1 x Onshore Substation and Onshore Grid Connection Cable Corridor; and
- Phase 2: Landfall Site, ONEC, 1 x Onshore Substation and Onshore Grid Connection Cable Corridor.

2.1.4.2 The two onshore phases will be brought forward under one of the following construction scenarios:

- **Sequential** – Construction of Phase 1 a gap of up to five years and then the build out of Phase 2; and
- **Concurrent** – Construction of both phases post 2030 at the same time. This scenario may be progressed if external factors make it the most economical, timely and least impactful solution. For example, to address any potential situation where there is a delay to the NETS reinforcement works impacting the first phase of works.

2.1.4.3 The Applicant is also exploring the feasibility of undertaking targeted enabling works for Phase 2 at Phase 1. The following scenario has been included in the assessment (where it is deemed to be material) to ensure it has been assessed should it be possible to implement:

- **Enabling** – Construction of Phase 1 and enabling works for Phase 2 including HDD at the Landfall Site, trenching of ONEC, laying of ducts and construction of the platform for substation 2. A gap of up to five years and

[i] See Proposal of Application Notice on the Aberdeenshire Council planning portal, ref: ENQ/2024/0139.

the remaining Phase 2 construction works of a cable pull at the Landfall Site, installation of haul road, cable pull along the ONEC and construction and electrical commissioning of the Phase 2 Onshore Substation.

2.1.4.4 Refer to Caledonia OWF EIAR Volume 1, Chapter 5: Proposed Development Phasing (Caledonia Offshore Wind Farm Ltd, 2024[7]) for further details.

2.1.5 Summary of Key Components and Design Parameters

2.1.5.1 The OnTI RLB is comprised of the Landfall Site, the ONEC, the Substation Site and Onshore Grid Connection Cable Corridor connecting to the Grid Connection Point, for Phase 1. This document will provide further details on these components and their design parameters. An outline description of the Proposed Development (Onshore) design parameters is provided in Table 2-1.

Table 2-1: Summary of the OnTI RLB.

Design Element	Design Envelope
Landfall Site	
Offshore Export Cable Circuits and HDD Ducts	**Offshore Export Cable Circuits** Maximum of four cables installed (two for Caledonia North and two for Caledonia South) with and outer diameter (OD) of up to 330 millimetre (mm). Maximum length of cable: 180km for Caledonia North and 150km for Caledonia South. **HDD Ducts** Maximum of four ducts installed with an OD of up to 330mm. Length of each HDD duct: 464 metre (m) Maximum depth of each HDD duct: 17.2m Up to four TJBs (one TJB per export cable). Dimensions for each TJB: 6.5 m (L) x 2.5 m x 2.3 m (D). Total permanent land take of approximately 65 metre squared (m^2).
Onshore Export Cable	
Onshore Export Cable Circuits (Landfall Site to the Onshore Substation Site)	Up to four cable trenches, each with four 220-275kV cable circuits. **Voltage**

Design Element	Design Envelope
	Maximum voltage of up to 275kV **Onshore Export Cable Circuits Length** Approximate length: 37km **Onshore Export Cable Route (Corridor Working Width)** 100m wide Onshore Export Cable Route. **Burial Depth** 1m target burial depth to top of cable. **Cable Specification** Four onshore cable circuits laid in separate cable trenches. Each cable circuit comprises three single core power cables laid in trefoil formation. Each power cable has a nominal cross-sectional area of 2500 millimetres squared (mm^2).
Cable Joint Bays	The number of joint bays is dependent on the continuous length of the ONEC and the manufacturing specification of the cable supplier. It is assumed the Onshore Export Cable Circuits will have a total 50 joint bay locations spaced at 800m along the ONEC. Indicative excavation dimensions: 8.8m (Length) x 4.8m (Width) x 2.3m (Diameter). Estimated maximum excavated volume: 97 metres cubed (m^3) per joint bay. Burial depth: 2.3m.
Onshore Substations	**Onshore Substation Details** Two Onshore Substations, will be co-located within the same Onshore Substation Site. Both could comprise of Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS). **Total Onshore Substation Site Dimensions (of both co-located Substations):** Length: 400m; Width: 250m, total area of 100,000m^2 Maximum height: 15m Maximum construction compound area of 250 x 120, 30000m^2. Total Onshore Substation Site area: 120,000m^2 (including Sustainable Drainage System (SuDS) and access roads).

Design Element	Design Envelope
Onshore Grid Connection Point Cables	**Voltage** Up to 400kV **Onshore Grid Connection Cable Circuits Length** 300m cable length from Onshore Substation Site to Grid Connection Point for Phase 1 at the existing New Deer Substation. **Onshore Grid Connection Cable Route (Corridor Working Width)** Maximum Onshore Grid Connection Cable Route width of 100m. **Burial Depth** 1m cable trench depth to top of cable.

2.2 Construction

2.2.1 Landfall Site

2.2.1.1 At the Landfall Site, up to four Offshore Export Cable Circuits will come to shore and will be connected to the Onshore Export Cable Circuits via four TJB buried beneath the ground.

2.2.1.2 Each TJB will be set in the ground, covered over, and consist of an underground concrete box-like structure which houses the cable joints, connecting the Offshore Export Cable Circuits with the Onshore Export Cable Circuits.

2.2.1.3 The final selection of the TJB dimensions depends on ground conditions and TJB component sizes. At each TJB there will be a link box and communications box pit with a manhole cover to allow for maintenance access during the Proposed Development (Onshore)'s operational lifespan.

2.2.1.4 The landfall installation methodology will be HDD, requiring an estimated construction compound of approximately 20,000m^2. Installation will involve drilling and installing four ducts (one for each Offshore Export Cable Circuit) from the drilling pit within the construction compound out to the seabed beyond MLWS. Subject to further ground study and detailed engineering, each duct will have an indicative length of 464m and maximum depth of 17.2m and the ducts are expected to be spaced approximately 30m apart.

2.2.1.5 The HDD process uses a drilling head controlled from the rig to drill a pilot hole along a pre-determined profile to the HDD exit point. The pilot hole is then widened using sequentially larger drilling heads until the hole is wide enough to accommodate the cable ducts. Drilling mud, typically including a lubricant such as bentonite (a non-toxic, inert natural clay material), is pumped to the drilling head to stabilise the borehole, recover drill cuttings and

ensure the borehole does not collapse. Once the drilling operation has taken place, the ducts are pulled through the drilled holes. Once the Offshore Export Cable Circuits have been pulled through the ducts, the HDD exit pits will either be backfilled using side-cast material or left to naturally backfill.

2.2.2 Onshore Export Cable Circuits

2.2.2.1 The Onshore Export Cable Circuits will be installed using predominantly Open Cut Trenching (OCT) techniques to bury the cable circuits in trenches. Varying ground conditions will require differing installation methods to excavate the trenches.

2.2.2.2 For linear features along the cable route such as watercourses, roads and existing cables, crossing methods will range from OCT to trenchless crossing techniques such as HDD. Minor watercourses, ditch crossings and Class B roads are anticipated to be crossed via OCT with trenchless methodologies to be used at the following crossing types:

- Existing onshore export cable circuit crossings;
- Class A roads and adjacent drains;
- Protected woodlands;
- Major watercourses (including the River Deveron);
- Water Framework Directive (WFD) waterbodies; and
- Salmonoid watercourses.

2.2.2.3 The precise order and timescales in which the Onshore Export Cable Circuits are installed will be determined at a later stage depending on the construction programme and phasing scenario adopted, as described in Caledonia OWF EIAR Volume 1, Chapter 5: Proposed Development Phasing[7]. It is presumed that the installation of the Onshore Export Cable Circuits will progress in sections, with connections from one section to the next made via Cable Jointing Bays. Broadly, the process will follow cable trenching, duct installation, cable pull through and reinstatement.

2.2.2.4 Works to install all four Onshore Export Cable Circuits will be contained within an Onshore Export Cable Route with activities progressing across multiple work locations. Included within the working corridor are areas for cable trenching, haul roads and laydown areas for construction plant.

2.2.2.5 It is estimated that primary construction compounds will be required approximately every 10km along the ONEC, with smaller satellite compounds required approximately every 2.5km. These numbers and sequencing represent a worst case which has been identified as part of the initial design exercise. The final number will be determined during detailed design and specified in subsequent AMSC applications.

2.2.2.6 Establishing construction compounds alongside site access (including Public Road Improvements (PRIs) where required) will be followed by erecting temporary fencing along the margins of the working corridor and preparing the work sites, including haul road construction. Vegetation will be cleared, and topsoil stripped and stored before the cable trenches and jointing pits for the Cable Joint Bays are excavated and ducts installed along the cable corridor. Following installation of the ducts and jointing pits, the export cables will be pulled through the ducts.

2.2.2.7 Construction activities for all phases may include:

- 1) Establish primary construction compounds and site access points, which may include PRIs where required;
- 2) Site preparation including fencing and haul road construction;
- 3) Establish satellite construction compounds;
- 4) Excavate trenches, install ducts and reinstate. Excavate jointing pits;
- 5) Carry out any HDD works;
- 6) Pull Cables, joint cables and reinstate jointing pits;
- 7) Testing and Commissioning;
- 8) Remove the haul road and reinstate previous ground conditions;
- 9) Demobilisation of satellite compounds; and
- 10) Demobilisation of construction compounds.

2.2.2.8 If feasible, some enabling works for Phase 2 may take place at Phase 1, including HDD works. Please refer to Caledonia OWF EIAR Volume 1, Chapter 5: Proposed Development Phasing[7].

2.2.3 Onshore Substations

2.2.3.1 The precise order and timescale in which the Onshore Substations will be constructed will be determined at a later stage depending on the construction programme and phasing scenario adopted. Refer to Caledonia OWF EIAR Volume 1, Chapter 5: Proposed Development Phasing[7].

2.2.3.2 Broadly, construction of the Onshore Substations will involve the following:

- Pre-construction surveys: Surveys may include pre-construction archaeological surveys, ecology surveys, hydrology surveys, geotechnical and ground stability surveys. The requirement for specific surveys will be established at detailed design and secured through planning conditions;
- Site establishment: Activities will include establishing the contractors' compound area (cabins, welfare facilities, stores, fuel facilities, etc), securing the site boundary, and topsoil stripping and formation of bunds. Temporary access roads will be constructed from the existing road network into the Onshore Substation Site. The access roads will be suitable for use

by heavy construction vehicles and for transporting the substation equipment;

- Civil enabling works: Works will be undertaken to prepare the site for the heavy equipment required for the construction of the foundations for the transformers and other buildings. This will include subsoil excavation to formation level to form a level platform across the site, creation of temporary drainage systems such as attenuation ponds and bunds and breaking out of rock if found to impact on platform level;
- Civil construction works: Foundation works will be undertaken for the transformers and buildings. Foundations are anticipated to be concrete, although piling may be required depending on ground conditions;
- Onshore Substation construction works: Construction and installation of drainage systems, infrastructure trenches, roads and hard standing areas and building superstructures;
- Installation and commissioning. Substation equipment will be delivered and installed using cranes and jacks to lift the equipment into place. Once in place the substation equipment is connected, tested and commissioned; and
- Landscaping. Remediation works and landscape planting for visual mitigation and ecological enhancement.

2.2.4 Construction Compounds, Material Storage and Laydown Areas

2.2.4.1 There is a requirement for construction compounds, laydown areas and material storage areas to construct the Proposed Development (Onshore). These are summarised in Table 2-2 below.

Table 2-2: Indicative Construction Compound Dimensions.

OnTI	Indicative Dimensions
Landfall Site	Maximum dimensions: 100m x 200m, 20,000m^2.
ONEC	Main Compounds: 75m x 50m, 3,750m^2 located every 10km on average. Satellite Compounds: 30m x 15m, 450m^2 located every 2.5km on average.
Onshore Substations	Maximum dimensions: 250m x 120m, 30,000m^2.

2.2.4.2 Temporary laydown will also be required in addition to the construction compounds. These would be used to receive, potentially assemble and temporarily store construction equipment. As part of the Onshore Export Cable Circuits installation, temporary laydown areas will be contained in the Onshore Export Cable Route within the ONEC.

2.2.4.3 It is expected that any excavated materials will also be stored within the OnTI RLB and as a result material storage areas will be required. Precise locations for materials storage will be determined at detailed design.

2.2.4.4 Temporary laydown and materials storage areas will be prepared in a similar manner to temporary access roads, by removing vegetation and stripping and storing the topsoil and subsoil material. Soil and vegetation will be reinstated following completion of construction works.

2.2.5 Construction Traffic

2.2.5.1 Construction of the Proposed Development (Onshore) will generate traffic on the local road network. This will include Heavy Goods Vehicles (HGV) and Light Goods Vehicles (LGVs). Indicative construction traffic movements and potential resulting effects based on a worst-case construction scenario are discussed in Caledonia OWF EIAR Volume 5, Chapter 9: Traffic and Transport [7].

2.2.5.2 An Outline Construction Traffic Management Plan (CTMP) has also been prepared and submitted as part of the PPP application, see Caledonia OWF EIAR Volume 7E, Appendix 9-2: Outline Construction Traffic Management Plan[7]. The CTMP will be finalised as designs are progressed and submitted to Aberdeenshire Council in advance of construction of the Proposed Development (Onshore). The CTMP will include details of delivery timings for plant and equipment, vehicle access routes, restrictions to timing of vehicle movements, construction signage and car parking arrangements as well as any other key requirements.

2.2.6 Working Hours

2.2.6.1 Core working hours for construction of the OnTI will be typical working hours of 7am to 7pm Monday to Friday and 7am to 12pm on Saturday. Certain works such as HDD may have to be undertaken outside of normal working hours with the potential for 24 hours working required. Any instances of works being undertaken outside of normal working hours will be agreed with Aberdeenshire Council's Environmental Health Officer (EHO).

2.2.7 Construction Access

2.2.7.1 There is a requirement for several temporary access roads to facilitate delivery of key plant and construction equipment to install the OnTI. The location of these access roads will be determined at detailed design.

2.2.7.2 For all access roads, local pre-existing infrastructure such as road networks, farmer tracks and utility access roads have been considered as first priority and will continue to be utilised through detailed design to minimise the construction of new roads. Some of these assets will need to be upgraded to accommodate the OnTI construction activities.

2.2.7.3 Access roads will be prepared by removing vegetation and stripping the soils before capping with crushed rocks. PRIs may also be required where necessary to allow for abnormal indivisible load vehicles such as substation equipment deliveries, and cable drum deliveries.

2.2.7.4 In addition to temporary access roads, two haul roads, to accommodate works across each potential phase, within the Onshore Export Cable Route 100m working area will be required to facilitate cable laying. Temporary access roads and haul roads along the length of the Onshore Export Cable Route will be designed to have an indicative width of 5m. This indicative width comprises a standard width of a single-track road to permit one way HGV movements as well as passing bays to allow vehicles meeting along the haul road to pass safely.

2.2.8 Outline Construction Environmental Management Plan

2.2.8.1 An outline Construction Environmental Management Plan (CEMP) which sets out the framework to be applied for construction environmental and waste management procedures has been prepared and submitted as part of this PPP Application, see Caledonia OWF EIAR Volume 7, Appendix 10: Outline Construction Environmental Management Plan[7]. Topic specific mitigation, management and monitoring measures during construction are also provided within each respective chapter of Caledonia OWF EIAR Volume 5: Proposed Development (Onshore)[7]. A detailed CEMP will be submitted to Aberdeenshire Council for approval prior to the Proposed Development (Onshore) construction commencing.

2.2.8.2 The detailed CEMP shall set out the procedures which will be adhered to, as to ensure appropriate management of all activities with the potential to adversely affect the environment. This will cover, but not necessarily be limited to, the following environmental issues during construction of the Proposed Development (Onshore):

- Noise and vibration;
- Dust and air pollution;
- Surface and ground water;
- Ecology and ornithology (including protection of habitats and species);
- Agriculture and land use (including protection of livestock and land);
- Cultural heritage;
- Waste;

- Pollution prevention and response (for both land and water); and
- Site operations (including maintenance of the construction compound, working hours and safety of the public).

2.2.8.3 The CEMP will incorporate Environmental Management Plans (e.g., Site Waste Management Plan, Materials Management Plan) and the working procedures which correspond to the environmental mitigation described within this EIAR[7] and how the Applicant will implement and monitor this mitigation.

2.2.9 Indicative Construction Programme

2.2.9.1 The Proposed Development (Onshore) is being brought forward across two phases of works to accommodate different grid connection dates as a result reinforcement of the NETS. These phases will be delivered under one of three possible construction scenarios (Sequential, Enabling and Concurrent). The total indicative construction durations for each scenario are:

- Sequential: 7 years;
- Concurrent: 5 years; and
- Enabling: 6 years.

2.2.9.2 Caledonia OWF EIAR Volume 1, Chapter 5: Proposed Development Phasing[7] provides a more detailed justification for delivering the Proposed Development in a phased manner and a description of the possible OnTI construction scenarios.

2.2.9.3 An indicative construction programme for one phase of construction activities under the sequential scenario summarising typical construction activities and their durations is outlined is outlined below in Figure 2-1. This construction programme is a representation of works required to deliver the Proposed Development (Onshore) and is presented irrespective of anticipated grid connection dates.

Indicative Construction Programme for 1 Phase of Works			Year 1				Year 2				Year 3				Year 4			
Indicative Construction Activity	Duration	Phase	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Commence construction	3 Months	Phase 1																
Build 1x substation	36 Months																	
Route enabling works and cable laying within Onshore Export Cable Corridor	18 Months																	
Landfall installation including HDD activities and TJB installation	6 Months																	
Commissioning and electrical testing of onshore substation	6 Months																	
Cable joining, termination and testing of Onshore Export Cable Circuits	6-12 Months																	
Reinstatement and landscaping	6-12 Months																	

Figure 2-1: Indicative Construction Scenario for One Phase of Construction Works.

2.2.9.4 Several permutations to the above programme and how the two phases of development are constructed may arise depending on the outcome of grid reinforcement activities and the resultant construction scenario adopted by

the Applicant. For example, under the Sequential scenario the below programme would occur once over 3.5 years, with a potential gap of up to five years followed by the same activities and durations in a subsequent phase. Under the Enabling scenario, the below activities would also include enabling works in the first phase over 3.5 years, thereby reducing the overall construction durations of the second phase to 2.5 years. Under the Concurrent scenario, all of the OnTI below would be built out in one single phase of construction, resulting in a slightly longer single phase of 5 years, but an overall shorter construction programme.

2.3 Operation and Maintenance

2.3.1 Onshore Substations

2.3.1.1 The Applicant is required to divest the transmission infrastructure under the Electricity (Competitive Tender for Offshore Transmission Licences) Regulations 2015 (UK Government, 2015[8]) which is a competitive tender process managed by The Office of Gas and Electricity Markets (OFGEM). As a result, at operation stage the OnTI will be transferred to an Offshore Transmission Owner (OFTO) who will become responsible for its enduring operation. As a result of the potential need for the project to be delivered in two phases and the need to divest the OnTI, two separate OFTOs may be responsible for Operation and Maintenance of each phase of the OnTI.

2.3.1.2 It is anticipated that the Onshore Substations will be unmanned and operate 24 hours a day, 7 days a week. Typical operational activities for the normally unmanned substation will include:

- Annual inspection and maintenance:
  - System health check (Supervisory Control and Data Acquisition, control and protection);
  - Partial discharge/thermographic surveys; and
  - Statutory inspection and maintenance (fire systems, transformer water mist system, lifting equipment, Heating, Ventilation and Air Conditioning systems).
- Primary equipment inspection and maintenance:
  - Super Grid Transformers (SGT's), acoustic enclosures and auxiliary transformers;
  - Shunt reactors, acoustic enclosures;
  - Harmonic filters; and
  - GIS (partial discharge, gas checks etc).
- Miscellaneous checks:
  - Inspection of direct current battery/chargers;

- Closed Circuit Television, telephone, security maintenance;
- Lighting and small power;
- Switchboards;
- Metering;
- Building management system;
- Gates;
- SuDS and drainage maintenance; and
- Landscape management (fences, gates, weed killing, drainage, roads and surfaces.).

2.3.1.3 Permanent access to the Onshore Substation Site will likely be from the south, sharing an access from the main road with the existing New Deer substation. The exact location of this road will be determined through consultation with landowners and Aberdeenshire Council at detailed design and will be subject to subsequent consents under AMSC applications.

2.3.1.4 In addition the reinstatement of the permanent access for a residential property immediately to the west of the Onshore Substation Site will be required. The location of this access will be subject to discussions with the landowner and agreement with Aberdeenshire Council. The access route will maintain the existing crossing of the Burn of Asleid.

2.3.1.5 It is anticipated that there would be weekly operational vehicles movements under normal operation, with more frequent movements during planned maintenance or repair works.

2.3.1.6 Although minor items of equipment will be replaced as and when required, no major refurbishment works at the Onshore Substations are currently envisaged during the design life. If a major equipment failure occurs it may be necessary to replace the faulty major equipment.

2.3.1.7 No major refurbishment works at the Landfall Site and Onshore Export Cable Circuits are currently envisaged during the design life. If a cable failure occurs it may be necessary to replace the section of faulty cable.

2.3.1.8 The anticipated operational lifespan of the Onshore Substations is 35 years.

2.3.2 Landfall Site and Onshore Export Cable Circuits

2.3.2.1 It is anticipated that the Onshore Export Cable Circuits will be in continuous operation. TJBs at the landfall and Cable Joint Bays will be backfilled, and land reinstated to existing ground level with the only visible permanent works being the ground level access to link box and communications box pit. It is not anticipated that any permanent access roads for routine maintenance will be required following construction reinstatement. Similarly, no permanent access is anticipated along the ONEC following reinstatement. Access regimes

are likely to be in the form of landowner agreements to drive over land and use existing tracks should maintenance be required.

2.3.2.2 There will be routine maintenance activities at the Onshore Export Cable Circuits and Onshore Grid Connection Export Cable Circuits including periodic visual inspection of the link boxes, TJBs and Cable Joint Bays (typically bi-annually) including checking for faults, water penetration, corrosion of joints and cables and structural conditions. No major refurbishment works at the Landfall Site and Onshore Export Cable Circuits are currently envisaged during the design life. If a cable failure occurs it may be necessary to replace the section of faulty cable

2.4 Decommissioning

2.4.1.1 The decommissioning phases will commence when the operational lifetime of the Proposed Development (Onshore) ends.

2.4.1.2 At the time of decommissioning, it is likely that all underground equipment and the Onshore Substations foundations will remain in-situ. Above ground equipment at the Onshore Substation Site will be cleared and the site reinstated. It is considered that the environmental effects of this approach to decommissioning will be less than those arising from the breakup and removal of all infrastructure. A decommissioning plan will be submitted and agreed with the relevant authorities close to the OnTI's end of life. Any applicable new legislation or guidelines published prior to decommissioning will be considered in relation to any design of mitigation prior to decommissioning taking place. The operational lifespan of each phase may differ depending on when they are constructed, therefore the decommissioning of the OnTI could happen independently for each phase. This information will be included in the decommissioning plan when submitted to the relevant authorities.

2.5 Life Extension and Repowering

2.5.1.1 The DE includes an anticipated operational lifespan of the Proposed Development (Offshore) of up to 35 years. At the end of the Proposed Development's lifespan, there will be an assessment of the viability for life extension or repowering versus decommissioning. If life extension or repowering was deemed feasible, an assessment process would be completed at a later stage seeking relevant consents (not included as part of the current EIA/application process), this would include consideration of extending the operational lifespan of the Proposed Development (Onshore) or partial decommissioning and repowering.

2.6 Key Assumptions

2.6.1.1 The key assumptions that have been made in this report regarding the Proposed Development (Onshore) are as follows:

- Construction for the Proposed Development (Onshore) is expected to begin in 2027, with offshore construction beginning in 2028, and the first power being generated in 2030. These dates are not final but estimates, as shifting of timescales may be necessary depending on real world events;
- The exact decommissioning date has yet to be confirmed however, is expected to be decades after first delivery of electricity;
- All works, including the laying of cabling and pipes associated with the Proposed Development (Onshore), will fall within the OnTI RLB of the Proposed Development (Onshore) (as shown in Figure 1-1);
- Piling will only be undertaken when no other options are available (for example, pilling may be required for substation foundations);
- An Outline CEMP will support the Proposed Development (Onshore) PPP application, which will then be added to and consolidated into a detailed CEMP at the AMSC stage;
- The CEMP will be a live document, with measures monitored during the construction phase to ensure their suitability and effectiveness;
- The CEMP will be put in place for the duration of the works. This will include ecology specific measures, such as, but not limited to:
    - Restrictions and targets for specific work activities to limit noise and vibration;
    - Buffers surrounding sensitive habitats where construction activities are occurring;
    - Control of dust and air quality for construction and decommissioning works; and
    - Working methodologies such as covering open excavations or providing ramps to stop mammals becoming trapped and biosecurity measures to reduce the spread of Invasive Non-Native Species (INNS).
- Where the EIAR assessment identifies that an aspect of the Proposed Development (Onshore) is likely to give rise to significant environmental effects, secondary mitigation measures, above and beyond any embedded mitigation or design changes, will be incorporated into the assessment process to avoid or reduce significant effects;
- Onshore Export Cable Circuits will be buried using techniques which will minimise disturbance to sensitive areas (i.e., river crossings for WFD watercourses and salmonid watercourses);
- A CTMP will be drafted to cover site traffic movements for the duration of construction and decommissioning works;
- During its operational phase, it is considered unlikely that the Proposed Development (Onshore) will impact local air quality due to a low number of vehicle trips associated with maintenance and monitoring of structures;

- Dust and air quality legislation and best practices may change by the time decommissioning works commence, therefore decommissioning strategies have not been created yet. However, the Proposed Development (Onshore) will make it such that impacts from dust and air quality are managed appropriately during decommissioning; and
- Core construction working hours will be discussed and confirmed with stakeholders prior to the construction phase of the Proposed Development (Onshore). There is the potential for some disruption from lighting during night working.

3 The Habitats Regulations Appraisal Process

3.1 Overview

3.1.1.1 This RIAA has been created to inform the Competent Authority, Aberdeenshire Council, regarding the potential effects of the Proposed Development (Onshore) on the Moray Firth SPA, as required under the Habitats Regulations[2] (Figure 3-1).

3.1.1.2 The Competent Authority, Aberdeenshire Council, carries out the AA with advice from NatureScot. The Applicant should provide sufficient information to enable the Competent Authority to carry out the assessment.

3.1.1.3 This RIAA shall examine the potential impacts and effects in depth and review the COs of the Moray Firth SPA against these potential impacts.

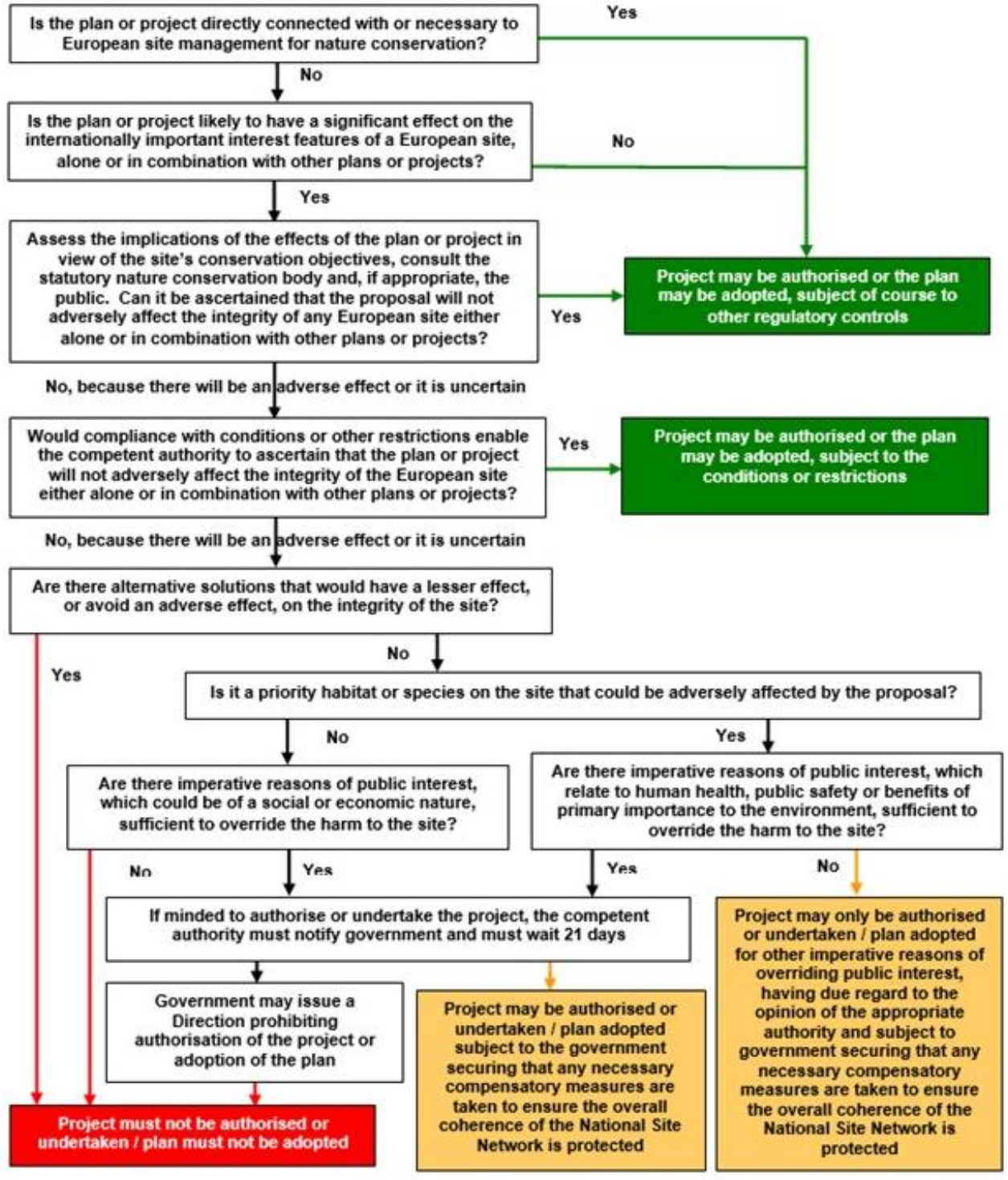

Figure 3-1 Flowchart of the Habitats Regulation Appraisal Process (Tyldesley and Chapman, 2013[5])

3.2 Guidance

3.2.1.1 The following guidance documents have supported the production of this document:

- European Commission (2000) Communication from the Commission on the precautionary principle (European Commission, 2000[9]);
- European Commission (2007) Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC (European Commission, 2007[10]);
- International Workshop on Assessment of Plans under the Habitats Directive (IWAPHD) (2011) Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive (IWAPHD, 2011[11]);
- Scottish Government (2013). Habitats Regulations Appraisal – development plans: advice sheets (Scottish Government, 2013[12]);
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine (Version 1.2– Updated April 2022) (CIEEM, 2022[13]);
- European Commission Environment Directorate-General (2019) Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General, 2019[14]);
- The Habitat Regulations Assessment Handbook (Tyldesley and Chapman, 2013[5]);
- European Commission (2021) Assessment of plans and projects in relation to Nature 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2021[15]);
- NatureScot (2024). Habitats Regulations Appraisal (HRA) (NatureScot, 2024a[16]); and
- Scottish Natural Heritage (2018) Habitats Regulations Appraisal (HRA) on the Moray Firth. A guide for developers and regulators (Scottish Natural Heritage, 2018[17]).

3.3 Data Sources

3.3.1.1 The data reviewed to inform this document comprises:

- British Trust for Ornithology (BTO) (BTO, 2024a[18]) including Wetland Bird Survey data (WeBS) (BTO, 2024b[19]);
- NatureScot SiteLink (NatureScot, 2024b[20]);
- National Biodiversity Network (NBN) Atlas (NBN, 2024[21]);

- North-east Scotland Biological Records Centre (NESBReC) (NESBReC, 2023[22]);
- Scotland's Environment Map (Scottish Government, 2024[23]);
- Caledonia Offshore Wind Farm Ltd (2024) Caledonia OWF EIAR Volume 7E, Appendix 3-7: Wintering Bird Survey Report (Caledonia Offshore Wind Farm Ltd, 2024c[24]); and
- Caledonia Offshore Wind Farm Ltd (2023). Onshore EIA Scoping Report, Chapter 7 Terrestrial Ecology and Biodiversity[8].

3.4 Methodology

3.4.1.1 This document aims to provide:

- Assessment of Effects – the Proposed Development (Onshore) and its potential impacts are to be assessed against the COs of the Moray Firth SPA to determine whether it is likely to result in adverse effects on the European Site's integrity; and
- Mitigation Measures – If necessary, mitigation measures will be identified which can ameliorate any AEOI of the Moray Firth SPA.

3.4.2 Assessment of Effects

3.4.2.1 Where a plan or project is likely to undermine the COs, it must be considered as a LSE upon that European Site. The assessment of effects stage determines whether the potential impacts identified using the SPR method could result in a LSE.

3.4.2.2 From establishing the ZoI using the SPR method, focusing on the relevant qualifying features of European Sites which may be at risk of LSE arising, the potential impacts of the Proposed Development (Onshore) are assessed against the COs of the relevant qualifying features to determine if a LSE may occur as a result of implementation. Within this assessment, factors such as type, extent, duration, intensity, timing, probability and in-combination effects of the potential impact, as well as the vulnerability of the qualifying features concerned.

3.4.3 Mitigation Measures

3.4.3.1 After establishing the elements of the Proposed Development (Onshore) which are likely to result in an adverse effect to a European site, mitigation measures are proposed to ameliorate such effects.

4 Assessment of Effects

4.1 Introduction

4.1.1.1 This section assesses the effects of the potential impacts of the Proposed Development (Onshore) on the COs of the Moray Firth SPA.

4.2 Qualifying Features of the Moray Firth SPA

4.2.1.1 The Moray Firth SPA has been designated to protect 10 species of inshore wintering waterfowl, non-breeding and breeding European shags (*Gulosus aristotelis*), and their supporting habitats (NatureScot, 2022[25]). By doing so it contributes to the Scottish, UK and Oslo and Paris Conventions (OSPAR) Marine Protected Area (MPA) networks, the conservation of the wider marine environment around Scotland, and progress towards good environmental status within the North-East Atlantic marine region.

4.2.1.2 Table 4-1 provides a summary of the qualifying features (i.e. Special Conservation Interest (SCIs)) within the Moray Firth SPA, their condition within the European Site (where known) based on the latest NatureScot Site Condition Monitoring assessment (NatureScot, 2024c[26]), and their broader conservation status.

Table 4-1: SCIs and Status for the Moray Firth SPA[25].

SCI	Percentage (%) of Great Britain Population	SCI Condition at Site	Assessment Date	UK Conservation Status (Stanbury et al., 2021[27])	European Region Conservation Status (BirdLife International, 2021[28])
Common eider (*Somateria mollissima*) non-breeding	2.90	Favourable Declining	08/03/2020	Amber	Endangered
Common goldeneye (*Bucephala clangula*) non-breeding	4.50	Unfavourable Declining	08/03/2020	Red	Least Concern
Common scoter (*Melanitta nigra*)	5.50	Favourable Maintained	08/03/2020	Red	Least Concern

SCI	Percentage (%) of Great Britain Population	SCI Condition at Site	Assessment Date	UK Conservation Status (Stanbury et al., 2021[27])	European Region Conservation Status (BirdLife International, 2021[28])
non-breeding					
European shag (*Gulosus aristotelis*) breeding and non-breeding	5.95 (breeding) 10.20 (non-breeding)	Unfavourable (breeding) Favourable Maintained (non-breeding)	01/07/2015 18/02/2007	Red	Declining
Great northern diver (*Gavia immer*) non-breeding season	5.80	Favourable Maintained	08/03/2020	Amber	Least Concern
Greater scaup (*Aythya marila*) non-breeding	17.90	Unfavourable Declining	08/03/2020	Red	Least Concern
Long-tailed duck (*Clangula hyemalis*) non-breeding	45.50	Favourable Declining	08/03/2020	Red	Least Concern
Red-breasted merganser (*Mergus serrator*) non-breeding	1.80	Favourable Maintained	08/03/2020	Amber	Near Threatened
Red-throated diver (*Gavia stellata*) non-breeding	1.90	Favourable Maintained	08/03/2020	Green	Least Concern

SCI	Percentage (%) of Great Britain Population	SCI Condition at Site	Assessment Date	UK Conservation Status (Stanbury et al., 2021[27])	European Region Conservation Status (BirdLife International, 2021[28])
Slavonian grebe (*Podiceps auratus*) non-breeding	3.90	Favourable Maintained	08/03/2020	Red	Near Threatened
Velvet scoter (*Melanitta fusca*) non-breeding	59.50	Unfavourable Declining	08/03/2020	Red	Vulnerable

4.3 Conservation Objectives of the Moray Firth SPA

4.3.1 Overview

4.3.1.1 There are site-specific COs for each of the qualifying features, detailed information regarding targets and attributes for each of the qualifying features are included with the conservation and management advice for Moray Firth SPA[25].

4.3.1.2 The COs, which includes site-specific advice and information on the qualifying features that form part of this SPA, are provided in summary in this section.

4.3.2 Conservation Objectives

CO 1. To ensure that the qualifying features of the Moray Firth SPA are in favourable condition and make an appropriate contribution to achieving favourable conservation status.

4.3.2.1 Achieving favourable conservation status is defined within the conservation and management advice for Moray Firth SPA[25].

CO 2. To ensure that the integrity of the Moray Firth SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature.

4.3.2.2 Appraisals of projects should focus on understanding their impact on site integrity, particularly ensuring the favourable condition of all waterfowl

species and not hindering the recovery potential of qualifying features, such as the European shag. The project is not expected to restore site integrity, but to maintain conditions that do not prevent or reduce the recovery of the qualifying features.

4.3.2.3 Temporary impacts on COs resulting from projects can only be permitted where there is a high degree of certainty that the qualifying features will be able to quickly recover from the impact and that impacts do not prevent the ability of unfavourable features to fully recover in the long-term.

4.3.2.4 In relation to the Moray Firth SPA and its qualifying features, the effects of environmental change (climate change) are relevant. Context for these environmental changes is detailed in the conservation and management advice for Moray Firth SPA[25]. These effects should be taken into account when considering projects as additional pressures may reduce the protected features' resilience to climate change, and conversely climate change impacts may start to hinder their ability to recover from human activities. These impacts are not anticipated as a result of the Proposed Development (Onshore).

CO 2a. The populations of qualifying features are viable components of the site.

4.3.2.5 In the Moray Firth SPA, this means that overwinter survival should not significantly decrease for non-breeding birds and birds that have overwintered on this site should have good enough body condition to be able to migrate to their breeding grounds and breed successfully. For breeding European shag, the viability of the species within the Moray Firth SPA is intrinsically linked to their ability to access and use breeding habitat in areas of functionally linked land beyond the site.

4.3.2.6 "*This CO is considered to be met if the conditions to support all the species' essential behaviours and activities are in place. This includes:*

- *avoiding effects within and beyond the site that could prevent or reduce the ability of the populations of qualifying features to recover;*
- *avoiding effects within and outside the site that could lead to a permanent reduction in the populations of qualifying features through mortality, injury, or impacts caused by disturbance, displacement, barrier effects or reduction in mobile prey resources;*
- *maintaining the species' ability to use all areas of importance within the site (to be considered under Conservation Objective 2b); and*
- *maintaining access to, and availability of, supporting habitats and prey within the site (to be considered under Conservation Objective 2c)"*[25].

4.3.2.7 The site-specific COs state that "*All qualifying features are protected throughout the whole site, throughout the year. This means that irrespective of the season for which they are designated, the qualifying features are*

protected during both their breeding and non-breeding seasons when using the SPA"[25].

4.3.2.8 In relation to projects which may have the potential to generate activities that interact with the qualifying features "*Temporary short-term changes in the populations due to human activity may be considered not to compromise the COs within the site provided it can be demonstrated that the populations of any affected qualifying features can fully recover. Factors limiting the recovery of the qualifying features include average generation times, population growth rates, availability of prey, and timing and duration of the activity around vulnerable stages of their life cycles (e.g. moulting or chick-rearing period). Direct mortality can arise from pollution. Indirect mortality can arise from reduction of prey or prey-supporting habitats (e.g. harvesting; physical removal of or damage to seabed; nutrient enrichment; changes to water temperature, salinity, or flows; introduction of INNS; pollution). Indirect mortality can arise from reduced ability to capture or access prey arising from (e.g. increased water turbidity or displacement from foraging areas)"*[25].

CO 2b. The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species.

4.3.2.9 This CO seeks to ensure that the qualifying features can continue to use and access all areas within the Moray Firth SPA used for feeding, breeding, moulting, roosting, loafing, shelter and other maintenance activities.

4.3.2.10 Any changes in distribution are most likely to be the result of disturbance events. Disturbance events can include noise, light, sound, vibration, trampling, presence of people, animals and structures, as well as displacement and barrier effects on the species. The type of disturbance, its duration and the area over which the qualifying features are likely to be affected are important considerations in any assessment of disturbance.

4.3.2.11 Direct displacement can arise from barriers off-site that reduce or prevent movement to and between foraging and roosting locations and visual disturbance (e.g. associated with vehicle or vessel movements). Indirect displacement can arise from loss of or damage to prey or prey-supporting habitats (e.g. through harvesting; physical removal of or damage to seabed; nutrient enrichment; changes to water temperature, salinity, or flows; INNS; and pollution).

4.3.2.12 'Significant disturbance' should be interpreted as:

4.3.2.13 "*…disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term"*[25].Disturbance events to all qualifying features can result in curtailed feeding times, displacement from foraging and roosting areas, adoption of avoidance responses, and the disruption to incubation and chick-rearing behaviours. Further information is provided on these events in the conservation and management advice for Moray Firth SPA[25]. Ensuring safe movement within and between areas used for foraging,

roosting and other maintenance behaviours (see CO 2c) is important to meet the energetic demands for winter survival and to achieve or maintain body condition required to support subsequent migration and successful breeding.

CO 2c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the Moray Firth SPA.

4.3.2.14 This CO seeks to maintain the current extent, quality, and distribution of supporting habitats within the OnTI RLB as well as ensure a sufficient food supply within the OnTI RLB. It also recognises however, that the populations of breeding European shag using the Moray Firth SPA are in unfavourable condition and that this may, in part, be due to a reduction in prey causing declines at the breeding colonies.

4.3.2.15 The qualifying features require suitable habitat for shelter, roosting, foraging, loafing, moulting and other maintenance activities. The variety, quality, abundance, and availability of food resources on which the qualifying features depend is important for ensuring adult fitness, survival, and breeding success (including for over-wintering species). The supply of food resources is supported by environmental processes.

4.3.2.16 Supporting habitats refer to the characteristics of the seabed and water column relevant to their use by the qualifying features. Supporting processes relates to wider oceanographic processes (e.g. up-welling, tidal flows, hydrological movements) which may be necessary for the habitat, and thus affects nutrient cycling and prey distribution.

4.3.2.17 All potential impacts on the seabed and water column are considered within the Proposed Development (Offshore) RIAA (Application Document 13: Caledonia North Report to Inform Appropriate Assessment and Application Document 14: Caledonia South Report to Inform Appropriate Assessment).

4.4 Understanding the SCIs of the Moray Forth SPA

4.4.1.1 The SCIs of the Moray Firth SPA are listed in the subsequent sections with their corresponding information regarding their estimated population size, conservation status and sensitivity to disturbances.

4.4.1.2 The following sections reviewed scientific literature to determine the status and known behaviours for each of the SCIs for the Moray Firth SPA. This informs the assessment in Section 4.5.2.31 of the potential for the Proposed Development (Onshore) to disturb, damage or destroy any of the SCIs and their associated habitats.

4.4.2 Common eider

4.4.2.1 Common eider is listed under the amber list of the Birds of Conservation Concern (BoCC) (Stanbury et al., 2021[27]). The species is recorded all year around as a resident breeder and winter visitor in the UK, with 37,000 breeding pairs and 86,000 individuals in winter (Woodward et al., 2020[29]). Scotland has a breeding population of 20,000 nesting females and 64,500 individuals in winter (Forrester et al., 2012[30]).

4.4.2.2 This sea duck breeds around the coasts of northern Britain but can be seen further south during the winter months. British breeding eider are at the southern edge of a wider breeding range and make relatively short migrations during the non-breeding season (BTO, 2024c[31]).

4.4.2.3 The distribution of breeding eiders has changed in the UK over the last 50 years. In western Scotland and Shetland, the population size and range has decreased possibly due to predation, conflict with mussel farms and oil-pollution. The overall winter range size has remained largely unchanged between 1981/84 – 2007/11 (Balmer et al., 2013[32]) however the UK winter population has decreased by 31% from 1995/96 to 2020/21[31].

4.4.2.4 Eiders are sea ducks associated with marine habitats during both the breeding and non-breeding seasons. This ground nesting species favours shoreline habitats and islands, but some birds are known to nest up to 3km inland (Snow and Perrins, 1998[33]). The nest is composed of a slight hollow lined with available material, and large quantities of small feathers and down, and is often under the shelter of a rock or vegetation (Beuth et al., 2017[33]). They exhibit natal philopatry, with females often returning to their birthplace to breed. This has led to the development of kin-based social structures and cooperative breeding behaviours, such as shared rearing of ducklings[34]. Evidence from North America also exhibits a high site fidelity to wintering areas (Merkel and Mosbech, 2008[34]).

4.4.2.5 All year round, eiders feed very close to the coast in water up to 3m deep, primarily on molluscs and crustaceans[3133], although this species roosts in open water away from feeding areas in shallow water where they are less likely to be disturbed (Merkel and Mosbech, 2008[35]).

4.4.2.6 Common eiders can habituate to some types of human activity (e.g. pedestrians and aircraft) and this species can tolerate relatively high levels of human disturbance. It has been noted that the presence of OWFs does not affect eider distribution (Dierschke, Furness and Garthe, 2016[36]) however they can react strongly to the presence of wind turbines (Larsen and Guillemette, 2007[37]). Boating activity, particularly boats that are moving quickly through eider foraging, roosting and moulting areas, have been shown to cause disturbance (Merkel, Mosbech and Riget, 2007[38]; Jarrett et al., 2018[39]; Dehnhard et al., 2020[40]).

4.4.2.7 In the UK, eider has the potential to be disturbed on breeding grounds as well as on foraging and roosting grounds during the non-breeding season. A buffer

zone of 100-200m is suggested to protect nesting eider and a buffer zone of 200-500m is suggested to protect roosting and foraging birds during the non-breeding season from pedestrian disturbance as well as disturbance from watercraft in nearshore waters (Goodship and Furness, 2022[41]).

4.4.3 Common goldeneye

4.4.3.1 Common goldeneye is listed under schedule 1 (during the close season) of the Wildlife and Countryside Act 1981 (as amended) (UK Parliament, 1981[42]) and the red list of BoCC[27]. This species is a resident/migrant breeder and passage/winter visitor in the UK, with 200 breeding pairs and 21,000 individuals in winter[29]. Scotland has a population of 150 breeding pairs and 10,000-12,000 individuals in winter[30].

4.4.3.2 The goldeneye has increased substantially from a single-figure breeding population in the 1970s with most of the current UK population breeding in Scotland (Eaton, 2021[43]). BTO data shows the UK winter population has decreased by 55% from 1995/96 to 2020/21 while its winter range has not changed. The drivers behind the initial colonisation of Scotland are unclear but the subsequent increases may have been aided by the provision of nest boxes within its core range in Scotland (Dennis and Dow, 1984[44]). Predation by pine marten's (*Martes martes*) has been identified as the most important factor affecting breeding success (BTO, 2024d[45]) and there are also concerns about the possible impact of the expanding non-native Mandarin duck (*Aix galericulata*) population through competition for nest sites (Cosgrove, 2003[46]). There is currently no evidence of any negative impact on the population from these or other factors although the population trend has not been monitored since 2010[43].

4.4.3.3 As a predominately winter visitor, wintering birds join the breeding population from September onwards and are thought to be mostly birds from the Scandinavian breeding population. Individuals can be seen widely in winter, occupying both coastal and inland sites for feeding and roosting. They congregate at communal roost sites overnight and separate to their feeding grounds[41]. Goldeneyes also roost on open water at the coast, on standing water or on rivers (Duncan and Marquiss, 1993[47]). In some foraging and roosting areas goldeneye may be susceptible to human disturbance, especially from water-based leisure activities such as fishing and boating (Laursen et al., 2017[48]) (Tuite et al., 1984[49]) (Holloway, 1997[50]) (Hume, 1976[51]) (Campbell and Milne, 1977[52]). Goldeneye can also be sensitive to hunting pressures particularly during the winter when food may be scarce (Evans and Day, 2002[53]).

4.4.3.4 Goldeneye is a cavity nesting species with a preference for habitats around freshwater lakes, pools, rivers and deep marshes; this species will readily breed in nest boxes[4144] (Mallory and Weatherhead, 1993[54]) (Mallory et al., 1998[55]). This species feeds during the daytime primarily on molluscs,

crustaceans and insect larvae depending upon locality and season[41]. During the breeding season goldeneyes exhibit relatively low to moderate flushing distances in response to human disturbance, likely in part due to the lack of visual stimuli inside cavities[54] (Ruddock and Whitfield, 2007[56]).

4.4.3.5 In the UK, goldeneye has the potential to be disturbed on breeding grounds as well as on foraging and roosting grounds during the non-breeding season. As a hole nesting species, goldeneye may be less likely to be disturbed when on the nest. A buffer zone of 100-150m is suggested to protect nesting goldeneye and a buffer zone of 150-800m is suggested to protect roosting and foraging birds during the non-breeding season from pedestrian and boating disturbance[41].

4.4.4 Common scoter

4.4.4.1 Common scoter is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[41] and the amber list of BoCC[27]. The species is a resident/migrant breeder and passage/winter visitor in the UK, most abundant in winter but can be seen throughout the year, with early returning breeders appearing from July onwards (BTO, 2024e[57]). In the UK, this species only breeds in Scotland, where it is restricted to the Flow Country of Caithness and Sutherland, larger lochs in Inverness-shire and Perthshire, and to a few scattered loughs in western Ireland[32]. Most breeding sites are in remote moorlands[41].

4.4.4.2 52 breeding pairs are found in Scotland, declining from an estimated 95 breeding pairs in 1995 with 135,000 individuals wintering across the UK[29]. The UK winter population has increased by 95% from 1995/96 - 2020/21 and their winter range has also expanded by 40% in Britain between 1981-84 and 2007-11. Scotland has a winter population of 25,000-30,000 individuals[30]. The population trend, and hence the drivers of change, are unclear for this species at present. Due to the low numbers of breeding common scoters in Scotland and the remote habitats in which they are found, the potential for disturbance from human recreational activities during the breeding season is limited. Common scoters are known to be strongly site faithful and may continue to attempt breeding at historical sites despite an increased risk of human disturbance (Robson, 2017[58]). Foraging and resting common scoter present on freshwater lochs have been noted to be relatively tolerant of human presence and tend to flush only if a boat approaches rapidly and or suddenly.

4.4.4.3 Outside the breeding season, common scoter is rarely seen on land. Although this species may use freshwater lakes on migration, the majority of birds moult and overwinter at sea. During the winter, common scoters roost communally at sea. They also periodically loaf on water during the day and, rarely, on islets or sandbanks (Cramp and Simmons, 1977[59]). Due to their distance from land during the non-breeding season, the potential for human

recreation disturbance is limited. Common scoter is known to be particularly sensitive to human activities in marine areas including through the disturbance effects of ship and helicopter traffic[29] (Garthe and Hüppop, 2004[60]; Schwemmer et al., 2011[61]; Furness and Wade, 2012[62]; Bradbury et al., 2014[63]; Kaiser et al., 2006[64]). Common scoter may flush from boats that are over 3km away[64] and this species is likely to be at risk of disturbance or displaced from habitats as a result of operational OWFs[29]. Evidence of avoidance of OWF has been noted for common scoter and velvet scoter[63].

4.4.4.4 In the UK, common scoter has the potential to be disturbed on breeding grounds as well as on foraging and roosting grounds during the non-breeding season. Depending on the level of habituation to disturbance, a buffer zone of 300-500m is suggested to protect nesting common scoter during the breeding season from pedestrian and boating disturbance. For activities with a high potential for visual and audial disturbance (e.g. construction and operation of heavy machinery), a buffer zone ≤800m may be necessary[41]. In marine areas during the non-breeding season, a large buffer zone between 1 to 4km may be necessary to protect foraging and roosting birds from shipping disturbance[41].

4.4.5 European shag

4.4.5.1 European shag is listed under the red list of BoCC[27]. This species is a resident breeder in the UK recorded throughout the year at suitable coastal locations with a breeding population of 18,000 pairs which increases to 110,000 individuals in winter (BTO, 2024f[65]). The European shag is found almost exclusively in marine habitats where it is restricted to inshore waters. The species breeds exclusively around UK shores during the summer months, showing high nesting site fidelity, and does not move far from its breeding grounds during the winter with the highest densities in northern and western Scotland (JNCC, 2022[66]).

4.4.5.2 BTO data indicates that numbers increased by around 21% between 1969–70 and 1985–88 but dropped by around 27% between 1985–88 and Seabird 2000 (1998–2002)[65]. Annual monitoring suggests that there has been a further decline since Seabird 2000 and hence the population is believed to be well below the level in 1969–70 with the UK winter population decreasing by 8% from 2010/11 – 2020/21[66].

4.4.5.3 The annual monitoring data indicates that mass mortality during prolonged periods of severe weather in some winters strongly affects breeding abundance (Harris and Wanless, 1996[67]), and increased frequency of such events due to climate change may potentially be driving population declines[65]. Analysis of year-round diet between 1985 and 2014 suggests that reductions in sandeel abundance have also resulted in diet changes throughout the year and hence changes in sandeel abundance and of other prey species could potentially also have an impact on the population[65].

4.4.5.4 Coastal oil pollution poses another threat to the species through direct mortality and more significantly, through indirect ecosystem effects reducing prey availability (Wanless and Harris, 1997[68]; Velando et al., 2005[69]). Local habitat loss to commercial developments and illegal trawling strongly affects the species and the benthonic communities on which it feeds (Aguilar and Fernandez, 1999[70]). Bycatch is major cause of mortality, with significant numbers being trapped in gillnets annually[6869]. Overfishing is another threat to critical prey populations (Velando and Freire, 2002[71]).

4.4.5.5 The species occupies marine habitats but does not usually occur far from land (Humphreys et al., 2016[72]). European shag shows a strong preference for rocky coasts and islands with adjacent deep, clear water, and forages over sandy and rocky seabeds (Nelson, 2005[73]). It also prefers sheltered fishing grounds such as bays and channels, although it generally avoids estuaries, shallow or muddy inlets and fresh or brackish waters[68].

4.4.5.6 At the Isle of May, Scotland, over 90% of foraging occurred within 13km of the colony, and the maximum distance recorded was 17km (Wanless et al., [74]). Foraging individuals visited more than one area during a trip, often feeding at sites several kilometres apart[74]. Birds were often found feeding in areas of strong tidal flow[74]. In some areas, the birds' foraging range is considerably less than 20 km; the small number of birds breeding at Hirta, Scotland, all appeared to forage within a 2km radius (BirdLife International, 2000[75]). Similarly, birds were only present within 3km of North Rona, Scotland[75]. It is noted that European shag can be present in high numbers in areas where regular marine activity takes place, including very close to piers and harbours. The species typically take flight or dive in response to approaching vessels and are less likely to swim evasively. Disturbance responses and flight rates were comparatively low compared to other seabirds within 200-300m[72]. A buffer zone of at least 300m could be suggested to protect nesting European shag in the breeding season as well as roosting and foraging birds during the non-breeding season from both pedestrian and boating disturbance but a larger buffer zone may be required for noisy activities in heavily disturbed areas (e.g. construction and operation of heavy machinery).

4.4.6 Great northern diver

4.4.6.1 Great northern diver is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the amber list of BoCC[27]. The species is a winter visitor in the UK, as it migrates south from arctic breeding grounds, typically arriving during October until March the following year[41] (BTO, 2024g[76]). Some non-breeding individuals stay off the northern coasts in summer (RSPB, 2024a[77]) and there are scarce records of this species breeding in the UK (The Wildlife Trusts, 2024[78]). Scotland has one possible breeding record and up to 3,000 individuals in winter[30]. The coastal waters around the UK hold an internationally important wintering population of approximately 4,400

individuals[29] and this species is also occasionally recorded on inland wetland areas and some larger reservoirs[32].

4.4.6.2 In winter, great northern divers spend a high proportion of daylight hours foraging[78] and so it may be difficult to distinguish between behaviours of diving to avoid nearby boats and diving to hunt for food. During the non-breeding season, great northern divers at sea have been identified as having a high vulnerability to disturbance by boats[62]. The species are quite likely to swim or dive in the 200-300m distance band from a passing ferry and may also swim (but very rarely fly) out of the path of ferries up to 4km away (Mendel et al., 2008[79]).

4.4.6.3 In the UK, the species has the potential to be disturbed, particularly by boat traffic, on foraging and roosting grounds at the coast during the non-breeding season. Any increase in energy costs caused by disturbance may influence body condition and therefore potentially influence overwinter survival[41]. A minimum buffer zone of 100-350m is suggested to protect non-breeding great northern diver from pedestrian and watercraft disturbance[41].

4.4.7 Greater scaup

4.4.7.1 Greater scaup is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the red list of BoCC[27]. The species is a scarce breeder and winter visitor in the UK, with up to one breeding pair and 6,400 individuals in winter[29]. Scotland has 4,000-8,000 individuals in winter[32]. Scaup begin arriving in Scotland as early as September from breeding grounds in Iceland, Scandinavia and western Russia (BTO, 2024h[80]) where they winter on shallow coastal waters generally less than 10m deep as well as sheltered bays, estuaries and brackish waters; it can also be found inland on large lakes and reservoirs[33]. The greatest numbers of wintering birds are found along the coast of northern and western Britain, one its wintering strongholds including the Moray Firth[32].

4.4.7.2 Greater scaup's UK winter population has decreased by 66% between 1995/6 - 2020/21 while its winter range has expanded by 57% over a similar period from 1981–84 to 2007-11 with gains in some coastal areas, including the Moray Firth and at inland sites (Natural England, 2012[80]). This contrasts with a UK wide population reduction since a massive decline in Scottish wintering population in 1970s[32]. Research suggests this decline is associated with the pollution of the coastal waters they utilise[81] as well as increased disturbance from recreational activities from 1990 onwards may have reduced the amount of available wintering habitats, especially daytime roosts (European Commission, 2009[82]).

4.4.7.3 Individuals begin to head back to their breeding grounds in March. Breeding occurs in the UK only sporadically, only involving one or two pairs in any given year[80]. In the past there have been several breeding records in Scotland

particularly in base-rich or brackish waters in Orkney and the Outer Hebrides, but none since at least 1989[80].

4.4.7.4 Greater scaup are omnivorous diving ducks feeding and forages over sandy or muddy substrates in shallow waters, regularly feeding at night predominantly on molluscs with large food items brought to the water's surface to be eaten[80]. They tend to flock together to roost on the sea during the day (Marchowski et al., 2015[83]; Rare Breeding Birds Panel (RBBP), 2020[84]).

4.4.7.5 In the UK, human disturbance has been identified as one of the key threats to this species (Furness, 2016[85]) and greater scaup at sea have been identified as having a high vulnerability to disturbance by boats[29]. It has been identified that greater scaup are highly sensitive to human disturbance and boat activity in coastal areas[79]. During migration to and from breeding grounds, mixed species flocks of diving ducks, including greater scaup, feeding on staging grounds at Lake Erie in North America, are frequently disturbed by human activity (Knapton et al., 2000[86]). It is suggested that during spring and autumn migration, minimum buffer zones of 450m should be used to protect rafting diving ducks from boating activity (Havera et.al., 1992[87]).

4.4.7.6 In the UK, greater scaup has the potential to be disturbed on roosting and foraging grounds at the coast during the non-breeding season. Due to the scarcity of breeding greater scaup in the UK, this species is unlikely to be encountered on breeding grounds by humans. A buffer zone of 150-450m is suggested to protect roosting and foraging scaup during the non-breeding season from pedestrian and boating disturbance[41].

4.4.8 Long-tailed duck

4.4.8.1 Long-tailed duck is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the red list of BoCC[27]. The species is a scarce breeder and winter visitor to the UK, arriving from their arctic breeding grounds as early as October and reaching their peak numbers in mid-November before departing the following April and May (BTO, 2024i[88]).

4.4.8.2 BirdTrack data estimates that around 14,000 birds spend the winter in the UK however, they tend to occur well offshore in deep waters, so the numbers detected from the shore may give a misleading impression of distribution and abundance. According to the BTO, the UK winter population has decreased by 16% from 1995/96 – 2020/21[88]. No clear evidence is present to indicate which factors (if any) is most likely to have driven these population changes.

4.4.8.3 Most of those wintering in the UK do so in the north, around Shetland, Orkney and north-east Scotland[88]. The species does not breed in the UK, but protection of their wintering sites is important, due to their vulnerability to oil pollution at sea (RSPB, 2024b[89]).

4.4.9 Red-breasted merganser

4.4.9.1 Red-breasted merganser is listed under the amber list of BoCC[27]. This species is resident breeder and winter visitor to Britain, which is present all year round, with a breeding population of 1650 pairs that rises to 11,000 individuals in winter (BTO, 2024j[90]). In winter, this species is widely distributed around the coast of Britain, with distinct concentrations off western Scotland, the Northern Isles, north Wales and the Solent[90]. In the breeding season they are more concentrated in the Scottish Isles, northwest Scotland, northern England and northwest Wales[90].

4.4.9.2 BTO data shows that the UK winter population has decreased by 44% from 1995/6 – 2020/21 while their winter range has increased by 14.4% between 1981-4 and 2007-11[90]. Population trends are unclear but the breeding range has also decreased by 28% since 1968–72[32] which may contribute to the declining winter population. There is also the potential impact from licenses to control fish-eating birds to reduce potential economic losses from fish eating birds, like the red-breasted merganser[72] (del Hoyo, Elliot and Sargatal, 1992[91]; Kear, 2005[92]). The level of impact from direct persecution is currently unknown (Craik, Pearce and Titman, 2025[93]). It may also be threatened by accidental entanglement and drowning in fishing nets[92]. Alterations to its breeding habitats by dam construction and deforestation, and habitat degradation from water pollution could represent threats[91]. The species is susceptible to avian influenza and may be threatened by future outbreaks of the virus (Melville and Shortridge, 2006[94]).

4.4.9.3 Its diet consists predominantly of small, shoaling marine or freshwater fish[91], as well as small amounts of plant material and aquatic invertebrates[91 92] (Johnsgard, 1978[95]). The species is gregarious during the winter and on migration[95], flocks of up to a hundred or more occurring in suitable sites during the autumn although it travels in much smaller flocks during the spring[90]. Most of this species winters at sea, frequenting both inshore and offshore waters, estuaries, bays and brackish lagoons[91], but showing a preference for clear, shallow waters not affected by heavy wave action[95]. It will also utilise large freshwater lakes on passage (Madge & Burn, 1988[96]) and gently flowing rivers in spring, with greater densities on the lower reaches of rivers (Gregory, Carter and Baillie, 1997[97]).

4.4.9.4 In the UK, red-breasted merganser has the potential to be disturbed on breeding grounds as well as on foraging and roosting grounds during the non-breeding season. It is noted that red-breasted mergansers have a high degree of behavioural sensitivity to disturbance from marine traffic with disturbance responses recorded 75% of the time when boats passed within 250-500 m but only 29% of the time at distances greater than 500m (Gitings and O'Donoghue, 2016[98]). Red-breasted merganser were also observed flushing at distances of up to 1.5 km from the boats[98]. A buffer zone of 500m could be suggested to protect roosting and foraging birds during the non-breeding season from both pedestrian and boating disturbance but a larger buffer zone

may be required for noisy activities in heavily disturbed areas (e.g. construction and operation of heavy machinery).

4.4.10 Red-throated diver

4.4.10.1 Red-throated diver is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the green list of BoCC[27]. The species is recorded all year round as it's a migrant/resident breeder and passage/winter visitor in the UK (BTO, 2024k[99]). The breeding population of up to 1,550 pairs is joined by a larger number of birds during the winter months totalling up to 21,500 individuals[41]. The Scottish population has up to 1,500 breeding pairs and over 2,270 individuals in winter[41].This species has a restricted breeding distribution within the UK, favouring small lochs and lakes close to the sea, bog pools in open moorland, blanket bogs or open and wet peatland habitats in the north and west of Scotland[33 99]. In the non-breeding season, red-throated divers are found around the UK's entire coastline, usually on inshore marine waters along sheltered coasts and only rarely occurring inland on freshwater bodies[33].

4.4.10.2 Red-throated divers wintering in UK marine waters are amongst the most sensitive species to anthropogenic disturbances and known to show strong avoidance of operational OWF. As the species is highly mobile, individuals are likely to encounter OWFs frequently during migration and wintering and are thus affected in several staging areas (Nehls, 2018[100]).

4.4.10.3 In the UK, red-throated diver has the potential to be disturbed on breeding grounds as well as on foraging and roosting grounds (particularly by boat traffic) at the coast during the nonbreeding season. Depending on the level of habituation to disturbance, a buffer zone of 500-750m is suggested to protect breeding red-throated diver from pedestrian and boating (on breeding lochs) disturbance[56]. For activities with a high potential for visual and audial disturbance (e.g. construction and operation of heavy machinery), a buffer zone ≤900m may be necessary[41]. In marine areas during the nonbreeding season, a large buffer zone ≤1km may be necessary to protect foraging and roosting birds from shipping disturbance[41].

4.4.11 Slavonian grebe

4.4.11.1 The Slavonian grebe is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the red list of BoCC[27]. The species is a resident breeder and winter visitor in the UK[41], with 28 breeding pairs and 995 individuals in winter[41]. Scotland had an estimated 30-80 breeding pairs100 which has since declined and a winter population of up to 500 individuals[41]. In winter, individuals occur close inshore around the coasts of Scotland, with concentrations in sheltered Scottish waters such as the Northern Isles, northwest Scotland, the Moray Firth, the Firth of Forth and Loch Ryan[41].

4.4.11.2 BTO data shows a significant decrease in the UK winter population by 23% between 1995/6 - 2020/21 (BTO, 2024l[101]). In a similar period, their wintering range has expanded by 67.8% from 1981-84 to 2007-11. The British breeding population is restricted to a few lochs in the eastern highlands of Scotland[41]. It is possible the declining breeding population is contributing to a declining wintering population with immigration from other Arctic breeding areas becoming necessary to maintain the Scottish population (RBBP, 2023[102]). No clear evidence is present to indicate which factors (if any) is most likely to have driven these population changes[101].Breeding Slavonian grebes can be relatively tolerant of human presence and although they are threatened by predation at nests and by flooding and wave damage, human disturbance of nesting birds is not considered to be a threat (Forrester, Andrews and McInerny, 2007[103]). Lake selection for breeding may be influenced by human disturbance; in particular bank-anglers, whose presence may keep grebes off eggs for extended periods (Thom, 1986[104]). It has been noted that Slavonian grebe breeding lochs tend to be located hundreds of metres from roads and houses suggests an indication of human disturbance[104].

4.4.11.3 In the non-breeding season, Slavonian grebes move to sheltered coastal inshore waters up to 10-20m in depth including sheltered bays, lagoons and estuaries, joining immigrants from other Arctic breeding areas[33] (Wernham et al., 2002[105]). The species has shown to overwinter in areas which are known to be busy with fishing activities including vessel traffic and aquaculture practices. Evidence would suggest that the species has a tolerance to such activities (Upton, Williams and Williams, 2018[106]; Jackson, 2018[107]).

4.4.11.4 Flushing distances of individual birds depends on the extent of habituation and tolerance of disturbance in different areas[56]. Slavonian grebe is known to have a very high sensitivity to boat disturbance and very likely to fly away from a ferry at a distance of 200-300m[41]. Slavonian grebes can be absent from areas where regular marine activity takes place; in response to marine activity, the evasive flights of Slavonian grebes are longer/further than for other species[41].

4.4.11.5 In the UK, Slavonian grebe has the potential to be disturbed on its breeding grounds, although, due to the scarcity of breeding Slavonian grebes in the UK, human disturbance is more likely on roosting and foraging grounds at the coast during the non-breeding season. A minimum buffer zone of 150-350m is suggested to protect both breeding and nonbreeding Slavonian grebe from pedestrian disturbance[41].

4.4.12 Velvet scoter

4.4.12.1 Velvet scoter is listed under schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[42] and the amber list of BoCC[27]. The species is a passage/winter visitor in the UK (BTO, 2024m[108]). They begin arriving on UK

waters during late summer and undertake a post-breeding moult. As the autumn progresses these early birds are joined by more individuals and numbers continue to build through the winter as more birds move south from the Scandinavian and arctic Russian breeding grounds[108]. WeBS data reveals that a small number of Scottish bays and estuaries hold the majority of wintering velvet scoter in the UK[108]. Numbers can fluctuate between years, but the UK wintering population has been estimated to number just over 3,000 individuals[108]. This population has decreased by 57% from 1995/96 - 2020/21 while their winter range has increased by 56% from 1981–84 to 2007-11[108]. Some gains may reflect improved coverage but increases in Shetland and the Firth of Forth and the losses in Orkney are probably genuine[108].

4.4.12.2 Literature on velvet scoter with regards to its behaviour and responses to disturbance is limited but similar to that for common scoter with the caveat this species is far scarcer[41]. As a result, it can be assumed that in the UK, velvet scoter has the potential to be disturbed in marine areas during the non-breeding season, with a large buffer zone between 1 to 4km being necessary to protect foraging and roosting birds from shipping disturbance[41].

4.5 Baseline Data

4.5.1 Desk Study

4.5.1.1 Ecological records from the past ten years were sourced for the desk study as part of the Scoping Report (Chapter 7: Terrestrial Ecology and Biodiversity[7]) and Caledonia OWF EIAR Volume 7E, Appendix 3-7: Wintering Birds Survey Report[24]. No records were collected from dates older than ten years as they are unlikely to be representative of current conditions and species assemblages.

4.5.1.2 The following SCIs for the Moray Firth SPA were identified from BTO WeBS data from 2016-2022 across five sites which were within 10km of the OnTI RLB. The data from these five sites was analysed to understand how land in the surrounding area may be used by SCIs for the Moray Firth SPA. The closest of these five sites was Boyndie Bay approximately 1km east of the Landfall Site:

- Red-throated diver (25 records);
- Common eider (159 records);
- Long-tailed duck (956 records);
- Common goldeneye (591 records);
- Red-breasted merganser (12 records); and
- European shag (667 records).

4.5.1.3 No records of great northern diver, greater scaup; Slavonian grebe, common scoter and velvet scoter were identified within the ZoI of the Proposed Development (Onshore) over the previous ten years by the desk study.

4.5.2 Field Surveys

Extended Phase 1 Habitat Surveys

4.5.2.1 The extended phase 1 habitat surveys were completed from May 2023 to October 2023 from walkovers of the land within the Proposed Development (Onshore). Refer to Caledonia OWF EIAR Volume 5, Chapter 3: Terrestrial Ecology and Biodiversity and Volume 7E, Appendix: 3-1: Biodiversity Enhancement Report[7] regarding the habitats present within the OnTI RLB.

Wintering Birds - Vantage Point Surveys

4.5.2.2 Vantage point (VP) surveys were undertaken from November 2022 to March 2023. At the time of undertaking these surveys the Proposed Development (Onshore) was at an early design stage and a preferred Landfall Site had not yet been selected. Therefore, these surveys were focused on the potential landfall locations of the offshore export cables.

4.5.2.3 The surveys initially covered ten potential landfall locations with 20 VP locations. During the season, the Proposed Development (Onshore) identified a preferred Landfall Site, as discussed in Section 2.2.1, and therefore the survey scope was narrowed to focus on this area.

4.5.2.4 VP surveys were carried out at the Landfall Site between October 2023 and March 2024. The location of the VP is illustrated in Caledonia OWF EIAR Annex 1 of Volume 7E, Appendix 3-7: Wintering Bird Survey Report[24].

Wintering Birds – Transect Surveys

4.5.2.5 Transect survey visits were carried out on five transects once a month between October 2023 and March 2024.

4.5.2.6 Dedicated walking transects were undertaken in two areas, referred to as the Transect 1 and Transect 5. Transect 1 covered the Landfall Site and ran south in a loop to approximately 2km inland (refer to Figure 3-7.1 within Caledonia OWF EIAR Annex 1 of Volume 7E, Appendix 3-7: Wintering Bird Report Survey Report[24]). This transect covered the coast and the VP. Transect 5 covered the Onshore Substation and suitable terrestrial habitat within the OnTI RLB in this area.

4.5.2.7 An additional three walked transects (Transect 2, 3 and 4) were undertaken as part of the driving transects. These three transects were walked where fields were not visible from the road due to topography or vegetation.

4.5.2.8 The remainder of the OnTI RLB was surveyed using driving transects. It was split into two areas, referred to as Driving Transect 1 and Driving Transect 2.

Driving Transect 1 covered all the OnTI RLB from Transect 1 to the River Deveron. Driving Transect 2 covered the remainder of the OnTI RLB from the River Deveron to Transect 5. The transect routes are shown in Figure 3-7.1 provided in Caledonia OWF EIAR Volume 7E, Appendix 3-7, Annex 1: Supporting Figures[24].

Breeding Birds

4.5.2.9 Breeding bird transect surveys were carried out along nine transect routes once a month between April and August 2024 in pre-determined sections of the OnTI RLB.

4.5.2.10 No species listed as breeding qualifying features of the Moray Firth SPA were recorded during the survey period.

4.5.2.11 Further details on the breeding bird survey results can be found in Caledonia OWF EIAR Volume 7E, Appendix 3-4: Breeding Bird Survey Report.

Field Survey Results

4.5.2.12 Upon completion of the Phase 1 habitat surveys carried out in 2023, it was identified that over 70% of the habitats within the OnTI RLB were arable fields, with a further 20% comprising grassland habitats. This is considered representative of the wider landscape of the area which supports an abundance of suitable habitat for wintering birds.

4.5.2.13 As highlighted in Section 4.4, the Moray Firth SPA SCIs depend on sheltered coastal habitats during the non-breeding season as well as nearby inland watercourses, waterbodies, and associated wetland habitats during the breeding season. The only habitats which could support feeding and roosting areas for the SCIs were intertidal habitats identified at the northern extent of the OnTI RLB, along the coastline. Very few wetland or freshwater habitats were identified within the OnTI RLB.

4.5.2.14 Field survey data for the wintering bird surveys showed that Moray Firth SCIs were only recorded within and adjacent to the OnTI RLB at the Landfall Site from Transect 1 and VP 1, with no records of the SCIs from the other transects.

4.5.2.15 Those species identified within the OnTI RLB at the Landfall Site include ground observations of common eider, European shag, great northern diver, long-tailed duck, red-throated diver as well as fly over observations of common scoter and red-breasted merganser. Outside the OnTI RLB but still within 1km of it, there were observations of common eider, common scoter, European shag, great northern diver, long-tailed duck, red breasted merganser, and red throated diver.

Common eider

4.5.2.16 14 counts of common eider were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These

observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Most of the observations were demonstrating loafing and feeding behaviour while those flying over were travelling either west or east along the coastline.

4.5.2.17 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site, with a peak count of eight individuals and a total abundance of 55[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Most of the birds were demonstrating loafing and feeding behaviour while those flying over were travelling either west or east along the coastline. Several records were recorded within the OnTI RLB and those outside the OnTI RLB were located as far as 780m north-east.

Common scoter

4.5.2.18 Three counts of common scoter were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These observations only recorded singles of the species, feeding on open water along the coastline with one count of a common scoter flying west over the Landfall Site.

4.5.2.19 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site with a peak count of 6 individuals and a total abundance of 16[24]. These observations recorded singles either feeding on the open water or flying east within 1km of the OnTI RLB. One flock of common scoter was also observed flying east approximately 1.1km north of the OnTI RLB.

European shag

4.5.2.20 18 counts of European shag were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Loafing, perching, roosting and feeding behaviours were observed while those flying over were travelling in a multitude or directions, largely following the coastline. Those observations recorded within or adjacent to the OnTI RLB were all demonstrating feeding behaviour.

4.5.2.21 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site, with a peak count of eight and total abundance of 76[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. All of the observations were demonstrating feeding behaviour while those flying over were travelling either west or east along the coastline and a few flew inland over the Landfall Site. Several records were recorded within the OnTI RLB and

those outside the OnTI RLB were located as far as 200m north and north-east of the OnTI RLB.

Great northern diver

4.5.2.22 One count of great northern diver was identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. This observation recorded a single great northern diver in flight travelling along the coastline within 100m of the OnTI RLB.

4.5.2.23 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site, with a peak count of one individual and a total abundance of seven[24]. These observations recorded singles and pairs of the species, feeding on open water and intertidal habitats along the coastline within 100m of the OnTI RLB. A single great norther diver was also observed flying along the coastline within 150m of the OnTI RLB.

Long-tailed duck

4.5.2.24 11 counts of long-tailed duck were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These observations recorded a single and flocks of the species flying either west or east along the coastline within 100m of the OnTI RLB.

4.5.2.25 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site, with a peak count of 16 individuals and a total abundance of 125[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Most of the observations were demonstrating loafing and feeding behaviour while those flying over were travelling either west or east along the coastline. Several records were recorded within the OnTI RLB including a single male loafing on an inland waterbody approximately 700m from the coastline. Those outside the OnTI RLB were located as far as 1.2km north of the OnTI RLB.

Red-breasted merganser

4.5.2.26 Four counts of red-breasted merganser were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Loafing and feeding behaviours were observed while those flying over were travelling either west or east along the coastline. Those observations recorded within or adjacent to the OnTI RLB were all in flight, at the most 100m from the OnTI RLB.

4.5.2.27 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site with a peak count and total abundance of one[24]. This single

observation recorded a single of the species demonstrating feeding behaviour within the OnTI RLB before flying along the coastline.

Red-throated diver

4.5.2.28 Six counts of red-throated diver were identified from VP surveys during the wintering bird survey effort from November 2022 to March 2023[24]. These observations recorded a singles, pairs and flocks of the species feeding on open water and intertidal habitats along the coastline as well as flying either west or east along the coastline within 100m of the OnTI RLB.

4.5.2.29 Wintering bird surveys from October 2023 to March 2024 recorded this species exclusively from Transect 1 and VP 1 along the coastline around the Landfall Site, with a peak count of two individuals and a total abundance of 26[24]. These observations recorded singles, pairs and flocks of the species, congregating on open water and intertidal habitats along the coastline. Most of the observations were demonstrating loafing and feeding behaviour while those flying over were travelling either west or east along the coastline. Several records were recorded within the OnTI RLB while those outside the OnTI RLB were located as far as 1.2km north.

SCIs not identified during field surveys

4.5.2.30 Slavonian grebe, greater scaup, velvet scoter, and common goldeneye were not identified during the wintering bird surveys undertaken from November 2022 to March 2023 and October 2023 to March 2024[24].

4.5.2.31 As a result of the field survey data it could be concluded that the supporting habitat to the Moray Firth SPA SCI species is focused around the Proposed Development's (Onshore) Landfall Site.

4.6 Assessment of Effects of the Potential Impacts of the Proposed Development (Onshore)

4.6.1.1 As established by the survey data and BTO records, potential effects to the SCIs of the Moray Firth SPA are anticipated to be localised around the Landfall Site from Transect 1 and VP 1. The habitats covered by the survey in this area were found to be support relevant SCIs of the Moray Firth SPA.

4.6.1.2 There is no overlap of the Moray Firth SPA with the OnTI RLB. The boundary of the SPA is located approximately 6.8km from the OnTI RLB at its closest point.

Potential disturbance, damage, or destruction of foraging habitat used by the qualifying features supported by the SPA

4.6.1.3 No SCIs of the Moray Firth SPA were identified by desk study or field survey results within the landward side of OnTI RLB. The habitats of mainly agricultural land with smaller areas of forestry, ancient woodland, residential properties, and farm steadings do not coincide with the foraging habitat

requirements of the SCIs of the Moray Firth. Therefore, the proposed construction within this area is not anticipated to result in any disturbance, damage or destruction of foraging habitat used by the SCIs of the Moray Firth SPA.

4.6.1.4 For several of the SCIs of the Moray Firth SPA, namely eider, long-tailed duck, red throated diver, red breasted merganser and shag, the most important location within the OnTI RLB is within the coastal waters adjacent to Stake Ness. Outside the OnTI RLB (more than (>) 100m from the proposed Landfall Site) records of eider, common scoter, great northern diver, long tailed duck, red breasted merganser, red throated diver and shag were obtained. All records outside the OnTI RLB were within the coastal environment where species were observed within the water. It is anticipated that the aforementioned SCIs within the water were foraging and/or commuting. Eider and common scoter dive for their food, foraging along the seafloor for clams, mussels, crabs, and other invertebrates. Long-tailed duck and velvet scoter are diving ducks, foraging underwater for their prey. The red-breasted merganser is found foraging mainly in shallow waters with submergent vegetation, although they also forage in deep waters, if there is an abundance of their fish prey. The Slavonian grebe selects lakes that have small fish and, to a lesser extent, clear water, which would make pursuit hunting easier. The greater scaup can be seen foraging during the breeding season on lakes, rivers, salt bays and estuaries. Shags have a wider foraging habitat within coastal and estuarine zones, typically diving no deeper than 50m within 20km of their colony with a diet of small fish and crustaceans.

4.6.1.5 With construction of the Offshore Export Cable Circuits taking place entirely within the terrestrial zone at Stake Ness, there will be no damage or destruction of the foraging habitat within the coastal zone for the Proposed Development (Onshore). The visual, human presence and vehicle-associated disturbance from the Proposed Development (Onshore) (primarily in the form of the HDD and associated with the Onshore Export Cable Route) is considered to be limited and short-term, potentially 6-12 months.

4.6.1.6 The nature of the HDD at Landfall Site is anticipated to generate noise levels that could have the potential to cause SCIs to temporarily displace the coastal zone should they be present. Whilst this noise may generate temporary displacement/disturbance to species, HDD works will be short term and temporary, and any effects will be fully reversible.

4.6.1.7 Best practice mitigation in the form of a CEMP, and other landfall specific embedded mitigation as detailed within Caledonia OWF EIAR Volume 5, Chapter 8: Airborne Noise and Vibration, to reduce the potential for adverse effects upon the SCIs of Moray Firth SPA arising from this potential impact during construction is recommended in Section 5. With the implementation of this mitigation, there are no anticipated adverse effects arising during the construction of the Proposed Development (Onshore) to foraging sites of the qualifying features of the SPA.

4.6.1.8 There are no anticipated adverse effects arising during the operation of the Proposed Development (Onshore) to foraging sites of the qualifying features of the SPA.

Potential disturbance, damage, or destruction of suitable roosting sites used by the qualifying features supported by the SPA

4.6.1.9 The majority of the works including the construction at the Landfall Site and cabling works around the Landfall Site will be completed in neutral grassland and agricultural fields used for growing cereal crops which is not suitable breeding habitat for the SCIs of Moray Firth SPA. Therefore the majority of works will not cause any damage to roosts or disturbance to roosting birds.

4.6.1.10 High energy infralittoral rock habitat is located at the coastline edge of the OnTI RLB bounded by a band of neutral grassland, inclining upwards to agricultural land farmed for cereal and non-cereal crops. The typical roosting habitats of the Slavonian grebe, long-tailed duck, goldeneye and red breasted merganser are found in sheltered, low energy environments including estuaries, sheltered bays, saltmarsh etc opposed to exposed high energy environments. Great northern diver and red throated diver are more likely to be found roosting within a less exposed environment than present within the OnTI RLB, such as the Inner Moray Firth.

4.6.1.11 European shag, velvet scoter and common scoter and to a lesser degree, common eider, do have the potential to roost along the rocky shoreline adjacent to the Landfall Site as these species are accustomed to high energy environments, preferring rocky outcrops and islands above the tide line to roost on. Both velvet and common scoter species typically rest on the open water, in bays, estuaries and inlets opposed to roosting upon rocky habitats. Given their physiological make-up, both scoter species are more adapted to the open water environment and their short legs, positioned far back on their bodies, make walking awkward. Therefore, they are not anticipated to roost upon the rocky shoreline within the Landfall Site.

4.6.1.12 Construction of the Landfall Site through HDD is anticipated to occur from the landward side within the agricultural fields, extend below the rock surface of the high energy infralittoral rock and out into the marine zone. No damage or destruction of the rock habitat is anticipated as a result.

4.6.1.13 Given the nature of the HDD, there is potential that species dependent upon the high energy infralittoral habitat may be temporarily displaced through the operation of the HDD where noise and vibration effects could occur. This is anticipated to be restricted to European shag, common eider, velvet scoter and common scoter given their habits on or near rocky environments. The potential effects are anticipated to be minor in nature however, given the area that the proposed HDD works will cover at the Proposed Development (Onshore). There is an abundance of alternative suitable roosting habitat closer to the SPA for the SCIs, so should works result in temporary

displacement, it is anticipated that species will only travel a short distance and the Proposed Development (Onshore) would therefore not result in an adverse effect in consideration of the SPAs COs.

4.6.1.14 Mitigation to reduce the potential for adverse effects upon the SCIs of Moray Firth SPA arising from this potential impact during construction is recommended in Section 5.

4.6.1.15 There are no anticipated adverse effects arising during the operation of the Proposed Development (Onshore) to roosting sites of the qualifying features of the SPA.

The disturbance, damage, or destruction of breeding sites of the qualifying features located within the SPA

4.6.1.16 As previously stated, there is no spatial overlap between the Moray Firth SPA and the OnTI RLB.

4.6.1.17 European shag typically breed at rocky shorelines, islands, sea stacks and areas with ledges for nesting. During the field surveys, there we no records of this species displaying breeding behaviours at the Landfall Site. However, as there is suitable habitat for breeding within the OnTI RLB, there is the potential that European shag could utilise the area. There will be no loss of habitat or damage to the rocky shoreline from the HDD or the associated cable laying works at the Landfall Site. HDD works are anticipated to occur beneath the rocky shoreline and emerge on the landward side within the grassland habitats. At worst, it is anticipated that the noise and visual disturbance from the presence of both machinery and personnel on site may result in temporary disturbance and/or displacement to this species. It is envisaged that the species shall quickly recover from this temporary impact, as it is previously stated (Section 4.4) that European shag show a habituation to human activities and have quite short disturbance distances.

4.6.1.18 Best practice mitigation to reduce the potential for adverse effects upon the SCIs of Moray Firth SPA arising from this potential impact during construction is recommended in Section 5.

4.6.1.19 There are no anticipated adverse effects arising during the operation of the Proposed Development (Onshore) to breeding sites of the qualifying features of the SPA.

Potential disturbance, damage, or destruction of commuting or migratory features and habitats used by the qualifying features

4.6.1.20 The north-east coastline of Scotland, where the Proposed Development (Onshore) is located, hosts a number of SPA and Ramsar sites for qualifying features found within the Moray Firth SPA. The movement of bird species between sites is plausible, given that the qualifying features of the Moray Firth are found also within Buchan Ness to Collieston Coast SPA (European shag),

Ythan Estuary, Sands of Forvie and Meikle Loch SPA (common eider), Loch of Straghbeg SPA (goldeneye), Cromarty Firth SPA (red-breasted merganser, scaup) and Moray and Nairn Coast SPA (red-breasted merganser). There is potential that species commute between these designated sites.

4.6.1.21 Field survey records have established that singular records and flocks of the qualifying features of the SPA were recorded within the OnTI RLB. European shag, common scoter, red-throated diver and common eider were all recorded displaying feeding or commuting behaviours. During construction works, both taking into consideration the HDD works and associated cable laying works, there is potential that temporary disturbance and/or displacement may occur upon the species that migrate/commute between sites. There shall be no damage or destruction to the commuting or migratory features of the qualifying features as construction and operation shall occur within the landward section of the OnTI RLB.

4.6.1.22 It is anticipated that during construction works the relevant qualifying species will continue to commute, whether via swimming within the marine area or flying overhead, albeit at potentially further distances due to the presence of machinery and personnel. However there is a vast amount of suitable habitat within which these species can commute and migrate. The evidence presented in Section 4.4 highlights the disturbance distances of each species and their habituation to human activities. The evidence supports that while there may be temporary disturbance and/or displacement of the species, it will be contained to the period of construction on-site. It is anticipated that species shall recover from the impact and it will not prevent their ability to commute between sites.

4.6.1.23 Best practice mitigation to reduce the potential for adverse effects upon the SCIs of Moray Firth SPA arising from this potential impact during construction is recommended in Section 5.

4.6.1.24 There are no anticipated adverse effects arising during the operation of the Proposed Development (Onshore) to breeding sites of the qualifying features of the SPA.

Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill)

4.6.1.25 There is a risk of accidental pollution from construction activities. Pollution incidents may impact birds through contamination. This could adversely affect breeding behaviour and success, and in some rare cases be fatal.

4.6.1.26 The use and movement of machinery, the storage of fuels and fluids and the presence of drilling oils or other lubricants necessary for the functioning of construction works, all present the potential for an accidental release of pollutants/contaminants to surface water in-situ. Dust arising from construction activities and associated movements of traffic also has the potential to occur.

4.6.1.27 HDD is proposed for the Landfall Site, a trenchless method of installing underground pipelines and cables in a shallow arc along a prescribed bore path using a surface launched drilling rig. There is anticipated to be minimal surface disturbance during its operation however, there is the risk of drilling fluids returning to the surface. In the unlikely event that these drilling fluids are intercepted by surface water flows following rainfall, there is a risk that they may enter the rocky shore environment and into the sea.

4.6.1.28 In the low probability event that a small pollution spill was to occur, arising from the HDD works or from machinery leaks, there is the possibility that this could be intercepted by surface water pathways following rainfall. In addition to dust arising from the movement of machinery, this and any pollutants transported by water flows may settle on the rocky shore habitat and potentially enter the marine waters in appropriate conditions. The habitat is frequented by both European shag and common eider, and as such there is the potential that this could indirectly effect both species. In terms of contaminants entering the marine water, it is anticipated that due to the high energy nature of the environment, that any such pollutants would be readily dispersed and diluted to background levels. In the unlikely event that a substantial pollution event occurs, there is the potential that SCIs of the Moray Firth foraging within the area may ingest contaminants. As contaminants enter the water column and/or rocky shore habitats, these may be absorbed through organisms including algae, bivalves, plankton etc which can form the base of the food chain for several species. These contaminants may progress up the food chain and inadvertently affect species including European shag, common eider, velvet scoter, red-throated diver etc.

4.6.1.29 Best practice mitigation to reduce the potential for adverse effects upon the SCIs of Moray Firth SPA arising from this potential impact during construction is recommended in Section 5.

4.6.1.30 There are no anticipated adverse effects arising during the operation of the Proposed Development (Onshore) to the qualifying features of the SPA.

4.7 In-Combination Assessment

4.7.1.1 The purpose of this assessment is to identify, examine and evaluate the potential for in-combination effects arising from the Proposed Development (Onshore) and other projects and/or plans that may overlap on a temporal or spatial level.

4.7.1.2 Whilst an effect identified upon its own may not give rise to an adverse effect, it is necessary to consider the cumulative effect which results from the combination of a plan or project with other plans or projects in view of the site's COs.

4.7.1.3 In undertaking the in-combination assessment for the Proposed Development (Onshore), it is important to bear in mind that other projects and plans under consideration vary in terms of their current status and therefore the extent to

which they will potentially contribute to an in-combination impact alongside the Proposed Development (Onshore). For example, some projects that are still at the consenting stage may not gain consent or end up being developed, whereas there is increased certainty of the potential for in-combination effects with projects that have been or are in construction.

4.7.2 Identification of Other Projects and Plans Requiring Consideration in the HRA

4.7.2.1 Regarding potential in-combination effects on the qualifying features of the Moray Firth SPA, projects were identified based on their potential to overlap on the temporal and spatial levels of the Proposed Development (Onshore).

4.7.2.2 The potential for in-combination effects upon the qualifying features of the European Sites identified within the document was assessed based on their potential foraging and commuting ranges. Any projects and/or plans occurring within the range of qualifying features was considered for potential in-combination effects in Table 4-2. This is considered as part of the ZoI for the in-combination assessment.

4.7.2.3 Projects and plans within the ZoI of the Proposed Development (Onshore) were identified through a search of the following planning portals:

- Marine Scotland License viewer (Scottish Government, 2024[109]);
- Aberdeenshire Council Planning Portal (Aberdeenshire Council, 2024l[110]) and
- Scottish Government Energy Consents Unit (Scottish Government, 2024[111]).

4.7.2.4 Projects identified to have the potential for in-combination effects are presented in Table 4-2. A conclusion on whether in-combination effects have the potential to exist are provided in Table 4-2.

Table 4-2: In-Combination Assessment of Projects and Plans within the ZoI of the Proposed Development (Onshore).

Project	Status	Distance from Proposed Development (Onshore)	Dates of Construction (if applicable)	Spatial Overlap with the Proposed Development (Onshore)	Temporal Overlap with the Proposed Development (Onshore)	In-Combination Assessment
Moray West Offshore Wind farm (Onshore) [ii]	Consented 2022 (Onshore elements constructed)	Approximately 2km west	Ongoing, anticipated to conclude 2024	×	×	The project was subject to HRA AA concluding in no LSE alone or in combination to the qualifying features of the Moray Firth SPA. Construction at landfall site is anticipated to conclude in early 2024. No temporal or spatial overlap between the Moray West Offshore Wind farm (Onshore) and the Proposed Development (Onshore) is anticipated. No in-combination effects anticipated.
Green Volt Offshore Wind farm (Onshore)	Consented 2024 (Onshore elements)	Approximately 50km south-east		×	Potential temporal overlap	The Project was subject to a HRA Appraisal concluding in no LSE alone or in combination. Given there is no spatial overlap between the project and the Proposed Development (Onshore) and the distance between both, no in-combination effects are anticipated.
Broadshore Offshore Wind farm	In Planning	65km north-east	Unknown	×	Unknown	The project is currently in the early stages of design. The project has been subject to a HRA Screening. The Moray Firth SPA has been in screened in for potential LSE during operation and maintenance and the project is due to be assessed for adverse effects

[ii] Moray West Export Cable was commissioned after the in-combination assessment was undertaken, and therefore has been included as part of this list.

Project	Status	Distance from Proposed Development (Onshore)	Dates of Construction (if applicable)	Spatial Overlap with the Proposed Development (Onshore)	Temporal Overlap with the Proposed Development (Onshore)	In-Combination Assessment
						through AA. There are no LSE anticipated through construction. Given that the project is in the early design and planning and factoring in the distances between both projects, it is considered highly unlikely that the projects will overlap on a temporal scale to result in in-combination effects on the SCIs of Moray Firth. No in-combination effects are anticipated.

5 Mitigation Measures

5.1.1.1 Best practice mitigation measures as secured by conditions attached to the PPP have been identified in Table 5-1.

Table 5-1: Recommended Mitigation for the Proposed Development (Onshore).

Best Practice Mitigation Measure		Applicable Indirect Effect
Implementation of a CEMP	Implementation of a CEMP with appropriate pollution control measures and industry standard guidance for construction surface water management.	Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).
	Dust management plan developed and implemented as part of a CEMP including standard dust suppression measures.	Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).
	Surface Water Drainage Strategy developed and implemented as part of a CEMP.	Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).
	Standard industry practice and mitigation measures, comprising relevant Pollution Prevention Guidelines and Construction Industry Research and Information Association (CIRIA) guidance will be followed to reduce any potential risks of pollution.	Potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).
	Works associated with Landfall Site construction activities will avoid any works in the intertidal environment and will reduce the potential for disturbance in the high energy infralittoral habitat	Potential disturbance, damage, or destruction of foraging habitat used by the qualifying features supported by the SPA. Potential disturbance, damage, or destruction of suitable roosting sites used by the qualifying features supported by the SPA.
Ecological Clerk of Works	A suitably qualified Ecological Clerk of Works (ECoW) will be employed for the duration of construction to ensure that the SCIs of the Moray Firth SPA are safeguarded. The role of the ECoW will be defined in detail within the CEMP. This role will include the monitoring of bird activity within proximity of the Landfall Site and HDD works to	All indirect effects outlined within Section 4.5.2.31.

Best Practice Mitigation Measure	Applicable Indirect Effect
understand whether works are adversely affecting the qualifying features of the Moray Firth SPA and be able to take remedial action if this is the case.	

5.1.1.2 Where the onshore construction activities have the potential to impact the marine environment, the mitigation is identified in the Offshore RIAAs and secured through offshore consents.

5.1.1.3 Following the inclusion of all best practice mitigation measures in Table 5-1, it is concluded that there is no potential for an adverse effect on the qualifying features of the Moray Firth SPA as a result of the Proposed Development (Onshore) alone or in-combination with other plans and projects.

5.1.1.4 Consequently, it is concluded that there is no potential for an AEOI of the Moray Firth SPA.

6 Summary and Conclusions

6.1 Summary

6.1.1.1 This document aims to provide the relevant information for the competent authority regarding the potential for AEOI of European sites resulting from the implementation of the Proposed Development (Onshore).

6.1.1.2 The HRA Screening[3] identified one SPA, the Moray Firth SPA, and its associated qualifying features where LSE could not be ruled out. This European Site was taken forward for further assessment in this document.

6.1.1.3 Potential for effects arising from the Proposed Development (Onshore) consisted of:

- potential disturbance, damage, or destruction of foraging habitat used by the qualifying features supported by the SPA;
- potential disturbance, damage, or destruction of suitable roosting sites used by the qualifying features supported by the SPA;
- the disturbance, damage, or destruction of breeding sites of the qualifying features located within the SPA;
- potential disturbance, damage, or destruction of commuting or migratory features and habitats used by the qualifying features; and
- potential for death of the qualifying features by construction related pollutants (e.g., accidental chemical spill).

6.1.1.4 The COs of the qualifying features were consulted in the examination of the potential effects upon the qualifying features of the Moray Firth SPA.

6.1.1.5 Without mitigation, LSE of the Moray Firth SPA cannot be ruled out. Mitigation outlined in this document to be included in the Proposed Development (Onshore) comprises best practice measures and standard mitigation to avoid significant effects resulting from the identified pathways.

6.2 Conclusion

6.2.1.1 In order for the HRA process to comply with the requirements of Article 6(3) the Habitats Directive[1], an AA undertaken by the competent authority must include an examination, analysis, evaluation, findings, conclusions and a final determination. The information in this report will, along with all other submissions and observations received following public consultation, will enable Aberdeenshire Council to perform its statutory function in this regard.

6.2.1.2 A project alone and in-combination assessment was undertaken which concluded, with the provision of mitigation, that there is no potential for an

adverse effect on the qualifying features of the Moray Firth SPA as a result of the Proposed Development (Onshore) alone or in-combination with other plans and projects.

6.2.1.3 This RIAA has examined and analysed, in light of the best scientific knowledge with respect to the relevant European sites, the sources and pathways for effect, and how these may result in adverse effects on the identified qualifying features and therefore the integrity of European Sites.

6.2.1.4 Best practice mitigation measures are set out within this report so that AEOI of European sites will be avoided during the implementation of the Proposed Development (Onshore) either alone or in combination with other plans or projects.

6.2.1.5 Accordingly, in the professional opinion of the authors of this report, whilst it has been acknowledged that there is the potential, in the absence of mitigation, for the Proposed Development (Onshore) to have the potential for LSE on European Sites, with the implementation of the mitigation measures outlined in this RIAA, the integrity of the European Sites assessed will not be adversely affected.

6.2.1.6 This document will be updated once the detailed design has been finalised, which shall include detailed methodology, locations and a programme of works for the detailed planning application.

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