GREEN VOLT

Green Volt Offshore Windfarm

Offshore Environmental Impact Assessment Report

Non-Technical Summary

Revision history

Revision	Date	Description	Prepared	Checked	Approved
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Acronyms

Acronym	Description
BEIS	Department for Business, Energy and Industrial Strategy
CES	Crown Estate Scotland
CO_2	Carbon Dioxide
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EPS	European Protected Species
FTE	Full Time Equivalent
FUE	Follow Up Exercise
GHG	Greenhouse Gas
GW	Gigawatt
HDD	Horizontal Directional Drilling
HMR	Helicopter main route
HND	Holistic Network Design
HRA	Habitat Regulations Appraisal
INTOG	Innovation and Targeted Oil and Gas
km	Kilometre
MHWS	Mean High Water Springs
MPA	Marine Protected Area
MS-LOT	Marine Scotland Licensing Operations Team
m/s	Metres per Second

MW	Megawatt
NETS	National Electricity Transmission System
NGESO	National Grid Electricity System Operator
nm	Nautical Mile
NMP	National Marine Plan
NRA	Navigational Risk Assessment
NTS	Non-Technical Summary
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSP	Offshore Substation Platform
OTNR	Offshore Transmission Network Review
O&M	Operation and Maintenance
PAC	Pre-Application Consultation
PMF	Priority Marine Feature
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SSEN	Scottish and Southern Electricity Networks
SSP	Semi-submersible platform
UK	United Kingdom
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

Glossary

Term	Description
Applicant	Green Volt Offshore Windfarm Ltd.
Archaeology Exclusion Zone	A buffer around the known extents of individual sites of archaeological material present on the seabed, or around geophysical anomalies for which the available evidence suggests that there could be archaeological material present on the seabed within which no construction activities can occur.
Buzzard	Buzzard Platform Complex.
Buzzard Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to Buzzard Platform Complex.
Green Volt Offshore Windfarm	Offshore windfarm including associated onshore and offshore infrastructure development (Combined On and Offshore Green Volt Projects).
Horizontal Directional Drilling	Mechanism for installation of export cable at landfall.
Inter-array cables	Cables which link the wind turbines to each other and the offshore substation platform.
Landfall Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to landfall.
Mean High Water Springs	At its highest and 'Neaps' or 'Neap tides' when the tidal range is at its lowest. The height of Mean High Water Springs (MHWS) is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides).
Moorings	Mechanism by which wind turbine generators are fixed to the seabed.
NorthConnect Parallel Export Cable Corridor Option	Landfall Export Cable Corridor between NorthConnect Parallel Landfall and point of separation from St Fergus South Export Cable Corridor Option.
NorthConnect Parallel Landfall	Southern landfall option where the offshore export cables come ashore.
Offshore Development Area	Encompasses i) Windfarm Site, including offshore substation platform ii) Offshore Export Cable Corridor to Landfall, iii) Export Cable Corridor to Buzzard Platform Complex.
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the Landfall or to the Buzzard Platform Complex.
Offshore infrastructure	All of the offshore infrastructure, including wind turbine generators, offshore substation platform and all inter-array and export cables.
Offshore substation platform	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from landfall to the onshore substation.

Project	Green Volt Offshore Windfarm project as a whole, including associated onshore and offshore infrastructure development.
Safety zones	An area around a structure or vessel which must be avoided.
St Fergus South Export Cable Corridor Option	Landfall Export Cable Corridor between St Fergus South Landfall and point of separation from NorthConnect Parallel Export Cable Corridor Option.
St Fergus South Landfall	Northern landfall option where the offshore export cables come ashore.
Windfarm Site	The area within which the wind turbine generators, offshore substation platform and inter-array cables will be present.

1 Introduction

1. This document is the Non-Technical Summary (NTS) of the **Offshore Environmental Impact Assessment (EIA) Report** for offshore environmental topics of the Project (in this instance the Project refers to the offshore elements of the Green Volt Offshore Windfarm only, up to Mean High Water Springs (MHWS)). The onshore elements are assessed in a separate **Onshore EIA Report**. Together, the Combined On and Offshore Green Volt Projects form the Green Volt Offshore Windfarm project as a 'whole'/'whole project'.

2. The purpose of this NTS is to act as a **Figure 1.1** high-level stand-alone document to provide an overview of the Offshore Development Area and the site selection process, and the main findings of the **Offshore EIA Report** in non-technical terms.

3. The **Offshore EIA Report** describes the potential offshore environmental impacts from the Project and assesses the significance of their effect. It considers impacts that may arise from construction, operation and maintenance (O&M) activities and decommissioning of the Project. The assessment also considers potential cumulative effects in combination with other offshore projects currently being constructed or in the development planning stage. For further information, the full **Offshore EIA Report** should be referred to.

4. Potential onshore environmental effects are assessed in the **Onshore EIA Report**, which will submitted to Aberdeenshire Council in June 2023. Further information is provided in **Section 4.**

1.1 Overview of the Project

5. The Project is a proposed floating offshore wind farm located 80 km east of the Aberdeenshire coast in the North Sea, with an indicative generating capacity of 490 to 560 megawatts (MW). The location of the Project is shown in **Figure 1.1**.

6. The Project will provide oil & gas platforms in the Outer Moray Firth with renewable electricity, harnessed from the proposed wind farm. Whilst Outer Moray Firth platforms will have the potential to use Green Volt's electricity, a key target for the Project is the electrification of the Buzzard oil and gas platform complex (Buzzard). Buzzard is a large, relatively new facility with high power demand. Focusing the initial design around the decarbonisation of Buzzard provides an exciting opportunity to maximise potential emission savings, whilst offering a nearby connection point for other oil and gas installations looking to decarbonise their onboard power generation.

7. With an operational target date of 2027, the Project enables 500,000 tonnes of CO_2 per year to be mitigated, including at least 300,000 tonnes of CO_2 from oil and gas assets in the area. Any surplus power produced could be transmitted onshore to the National Grid.

8. The Windfarm Site covers an area of 116 km^2 and will comprise up to 35 wind turbine generators (WTGs) on floating substructures, inter-array cables and any required cable protection. The Project will have one offshore substation platform (OSP) which will be located in the Windfarm Site.

9. The Project will have two offshore export cables – the first to electrify Buzzard (approximately 20 km away – the Buzzard Export Cable Corridor), and the second to bring excess electricity to shore where the Project will be connected to the National Grid (Landfall Export Cable Corridor).

10. Two locations (with a total of four landing point options) are under consideration for the landfall for the Landfall Export Cable Corridor; St Fergus South located north of Peterhead, and NorthConnect Parallel located south of Peterhead.

11. The key offshore components comprise:

- wind turbine generators;
- substructures and foundations;
- mooring and anchoring;
- one OSP;
- inter-array cables;
- up to two export cables to Buzzard; and
- up to two export cables to landfall.

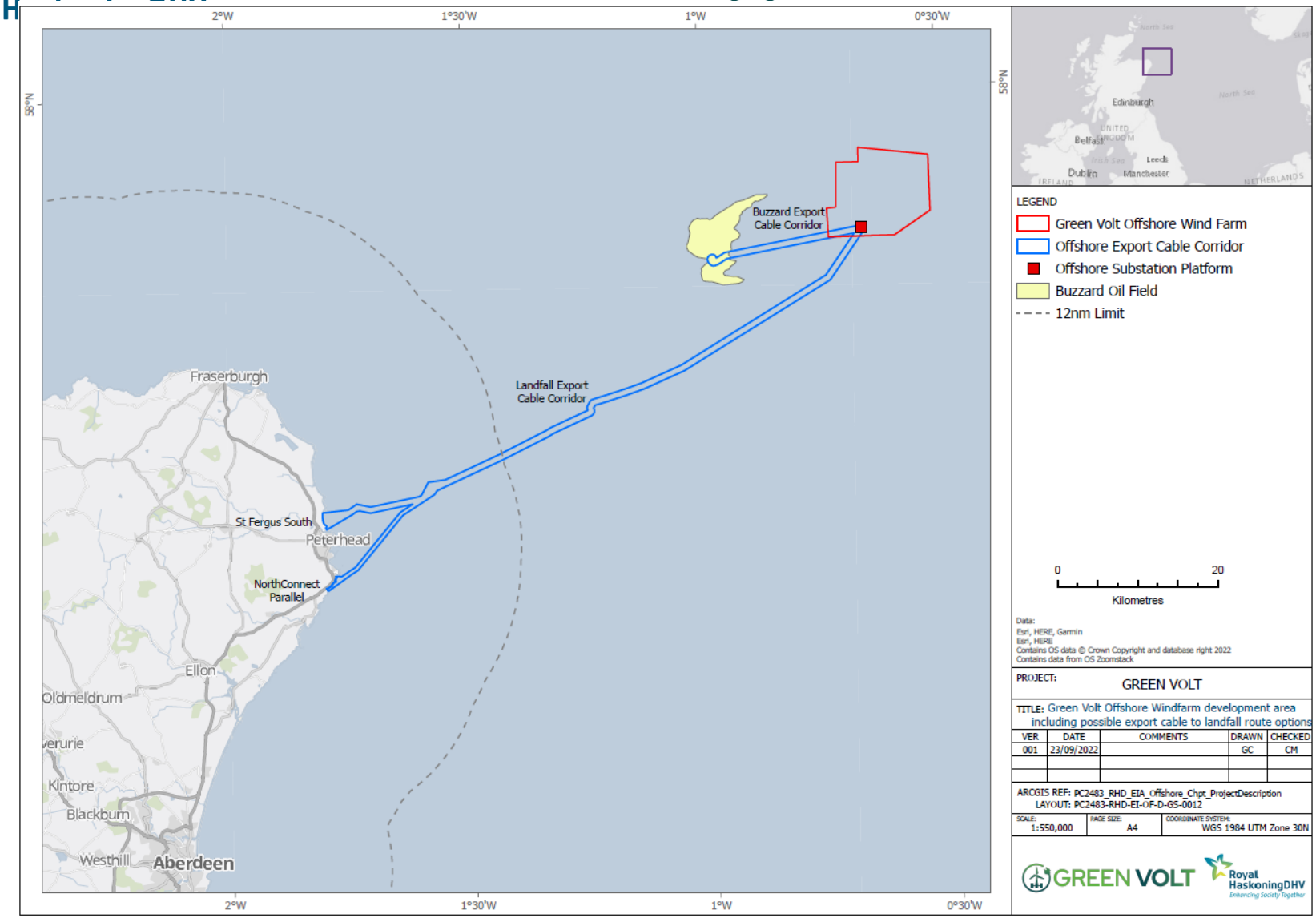

Figure 1.1 Green Volt Offshore Windfarm location and Offshore Export Cable Corridors

1.2 Who is Developing the Project?

12. The Project is being developed by Flotation Energy Ltd (Flotation Energy) and Vårgrønn AS (Vårgrønn). Flotation Energy and Vårgrønn have formed the dedicated company, Green Volt Offshore Windfarm Ltd. (the Applicant), to progress the development of the Combined On and Offshore Green Volt Projects.

13. Flotation Energy is an independent Scottish offshore wind development company, headquartered in Edinburgh, United Kingdom (UK). Founded in 2018, the company is pioneering the deployment of both floating and fixed offshore wind in Scotland, the UK and Internationally. Flotation Energy's UK projects include:

- Green Volt Offshore Windfarm (this development) (Floating);
- Morecambe Offshore Windfarm (480 MW offshore wind, awarded as part of the England and Wales Round 4 auction) (Fixed Foundation);
- White Cross Floating Windfarm (100 MW offshore wind, southwest England) (Floating); and
- Cenos Offshore Windfarm (1.4 GW, ~200km east of Aberdeen, Central North Sea) (Floating).

14. The company is also active in Europe and internationally, with a total offshore wind development pipeline of over 10 gigawatt (GW) capacity. Flotation Energy is determined to play a central role in the transformation to renewable energy to confront the climate crisis, making a significant contribution to Scotland's 2045 net zero target and the North Sea Transition Deal goal to reduce offshore emissions by a minimum of 50% by 2030.

15. Vårgrønn is a growing agile offshore wind company and established as a joint venture between Italian energy major Eni Plenitude and the Norwegian private equity manager and offshore energy serial entrepreneur HitecVision. Vårgrønn aims to develop offshore wind across Northern Europe.

1.3 The Need for the Project

16. The UK requires a range of energy generation infrastructure to ensure it has a secure and affordable energy supply and can meet its binding commitments to addressing climate change and adopting renewable technologies as a significant proportion of its energy generation mix.

17. Offshore wind, as a source of renewable energy, offers Scotland a wide range of benefits from an economic growth, energy security and decarbonisation perspective. The Project presents an opportunity to demonstrate decarbonisation of existing oil and gas facilities in the Outer Moray Firth and has the potential to make a significant contribution to both reducing carbon dioxide (CO_2) emissions and securing renewable energy supply. With a minimum nominal capacity of 490 MW and potential to reach 560 MW, when operational in 2027 it will make a significant contribution to the UK Net Zero Challenge by enabling 500,000 tonnes of carbon dioxide (CO_2) per year to be mitigated, including 300,000 tonnes of CO_2 from the electrification of oil and gas assets in the area.

18. The incorporation of floating offshore wind technologies into the Project will also present an opportunity for the Scottish floating offshore wind industry to further develop the existing maritime infrastructure and support the creation of highly skilled jobs in Scotland. Furthermore, the development of the Project will help provide social, economic and environmental benefits to Scotland, the UK and globally.

1.4 Consent and Regulatory Requirements

19. The purpose of the **Offshore EIA Report** is to provide the necessary information and outcome of the EIA undertaken as required by:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended);
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended); and
- The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

20. The EIA process provides a systematic tool for assessing and examining the potentially significant effects of a development on the physical, biological and human environment. It enables the identification of mitigation and management measures to ensure that the development is sustainable and allows for opportunities for beneficial effects to be identified. It also gives consultees the opportunity to participate in decision-making procedures through the consultation process.

21. The main aim of the **Offshore EIA Report** is to ensure that the consent granting authority (Scottish Ministers in this context) makes their decision in full knowledge of any effects on the offshore environment.

22. The information presented in the **Offshore EIA Report** is required to support an application by the Applicant to acquire the following offshore consents for the Project:

- A s.36 consent under the Electricity Act 1989 to allow for the construction and operation of the offshore wind farm and transmission works;
- A marine licence under the Marine and Coastal Access Act 2009 for the commencement of marine activities at the Project's wind farm site, located beyond 12 nautical miles from the coast;
- A marine licence under the Marine and Coastal Access Act 2009 for the section of export cable from 12 nautical miles from the coast to the wind farm site;
- A marine licence under the Marine and Coastal Access Act 2009 for the section of export cable between the wind farm site and the Buzzard Platform Complex; and
- A marine licence under the Marine (Scotland) Act 2010 for the section of export cable which is within 12 nautical miles of the coast.

23. Additional marine and European Protected Species (EPS) licences will be required to undertake pre-construction site investigation surveys, piling activities, and clearance of unexploded ordnance (UXO).

24. In addition to the **Offshore EIA Report**, a **Habitats Regulations Appraisal** (**HRA**) has been carried out in line with the Habitats Directive (transposed in Scotland through the Habitats Regulations 1994 and the Offshore Habitats Regulations 2017), with findings presented in the **Report to Inform an Appropriate Assessment** (**RIAA**).

1.5 Site Selection and Assessment of Alternatives

25. Site selection for the Project has been influenced by the following key factors:

- Crown Estate Scotland's (CES) Innovation and Targeted Oil and Gas (INTOG) Decarbonisation Leasing Round;
- Identification of at least one suitable offshore oil and gas platform to supply power to;

- Scotland's National Marine Plan (NMP);
- Marine Scotland's Offshore Wind Energy - Draft Sectoral Marine Plan: Strategic Environmental Assessment (SEA);
- Department for Business, Energy and Industrial Strategy (BEIS) / Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) Offshore Energy Strategic Environmental Assessment (SEA);
- Initial Plan Framework Sectoral Marine Plan for Offshore Wind for INTOG; and
- NMP / environmental sensitivity data.

26. The siting, design and refinement of the Project have taken account of environmental, physical, commercial and societal considerations and opportunities as well as engineering requirements. This is with the aim of identifying sites that will be environmentally acceptable, deliverable and able to achieve consent, whilst also enabling decarbonisation within the oil and gas industry.

1.5.1 Identification of the Windfarm Site

27. In addition to considering wind resource, safety and engineering aspects, potential sites were identified in considering potential distances to surrounding oil platforms that had significant power requirements (demand) and long-term future operational life spans (at least 15 years).

28. The Buzzard Platform Complex (Buzzard) (consisting of four platforms) was identified as a suitable target for electrification. Two sites as candidates for installation of a floating offshore wind farm were considered in detail: the decommissioned Ettrick and Blackbird oil and gas field (20 km from Buzzard) and the decommissioned Buchan oil and gas field (50 km from Buzzard). However, it was subsequently noted that, a new oil production development will be located at the old Buchan oil field rendering this site unsuitable.

29. The Ettrick and Blackbird site was therefore chosen as the most suitable site for the Project with key advantages including:

- Located 20 km away from Buzzard, minimising cable route length;
- Availability of historic environmental, geophysical and geotechnical datasets;
- Favourable wind, water depth, seabed and environmental conditions, including no designated sites and ornithological (bird) datasets showing relatively lower bird activity than sites closer inshore;
- Limited shipping and fishing activity;
- Site located 80 km from shore, minimising visual impacts and allowing for increased wind resource.

30. The initial Windfarm Site boundary presented in the Project's **Offshore Scoping Report** (Royal HaskoningDHV, 2021) (**Appendix 1.2** of the **Offshore EIA Report**) was defined by the oil and gas lease block area for Ettrick and Blackbird, to ensure the Windfarm Site was located entirely within the long-term brownfield site where water depth and geological survey data was available.

31. Since scoping, the Windfarm Site area has been reduced by 20%. Key design considerations for the current layout have to date been influenced by geophysical and geotechnical seabed characteristics, stakeholder engagement (particularly with the commercial fisheries), and avoiding existing oil and gas infrastructure on the seabed.

1.5.2 Grid Connection

32. Through discussions with the National Grid Electricity System Operator (NGESO) alongside Scottish and Southern Electricity Networks (SSEN) Transmission Plc, the Project was offered a grid connection at the New Deer 400 kV substation (located 35 km from the potential landfall sites).

33. In July 2020 UK government launched the Offshore Transmission Network Review (OTNR) which was tasked with developing a strategy to co-ordinate interconnectors and offshore networks for wind farms and their connections to the onshore National Electricity Transmission System (NETS). As part of this review NGESO have developed the Holistic Network Design (HND) to coordinate offshore generators. This process is ongoing and will be subject to a Follow Up Exercise (FUE) which is expected to provide final confirmation of the connection location of the Project.

1.5.3 Offshore Export Cable Corridor and Landfall Locations

34. The landfall location for the Landfall Export Cable Corridor has not yet been determined; however, two principal areas are currently under consideration: St Fergus South Landfall option located north of Peterhead, and NorthConnect Parallel Landfall option located south of Peterhead.

35. The final decision on landfall location will be determined following a detailed evaluation of the potential routes from the landfall options and New Deer, which will be presented within the **Onshore EIA Report**. Key considerations will include avoiding populated areas, acceptance of landowners, avoidance of sensitive features, and minimising the length of Onshore Export Cable Corridor.

36. For either location, Horizontal Directional Drilling (HDD) will be used to take the cable from the jointing pit onshore to a location approximately 750 m offshore to the transition pit.

37. A large majority of the Landfall Export Cable Corridor will follow the currently consented NorthConnect HVDC Interconnector route to the north Aberdeenshire coast allowing the Project to benefit from collaboration and data sharing with NorthConnect.

38. Although crossing the Southern Trench Marine Protected Area (MPA), the Landfall Export Cable Corridor avoids the key designated benthic features of the protected site. The route also benefits from minimising the number of cable and pipeline crossings and avoidance of disposal sites and oil and gas infrastructure whilst utilising suitable seabed conditions.

1.6 The Environmental Impact Assessment (EIA) Process

39. The EIA considers all relevant topics under three general areas of physical environment, biological environment and human environment. The topics to be included in the EIA were agreed with Marine Scotland Licensing Operations Team (MS-LOT) and other stakeholders through the scoping process, with MS-LOT providing a **Scoping Opinion** in April 2022 (**Appendix 1.1** of the **Offshore EIA Report**)

40. Open and extensive consultation with communities, stakeholders, and statutory bodies has been undertaken since late 2019, in order to inform and help shape the EIA processes of the offshore works for the Project. The results of consultation to date have informed the approach to each assessment, as well as the alternatives considered and the site selection process.

41. For each topic, a detailed description of the current offshore baseline (existing environment) of the Offshore Development Area has been identified, through a combination of desk-based studies, consultation and site-specific surveys.

42. All potential offshore impacts of the construction, operation or decommissioning of the Project have been identified and an assessment made on the significance of each potential effect using a standardised approach by EIA specialists.

43. Where the impact assessment identifies that an aspect of the Project is likely to give rise to significant environmental effects, mitigation measures are proposed to avoid effects or reduce them to acceptable levels and, if possible, to enhance the environment. Mitigation will be agreed through ongoing consultation with the relevant authorities.

44. The process also considers:

- Inter-relationships, where impacts to one receptor can have a knock-on impact on another (for example an impact on a fish population may lead to reduced prey for birds and marine mammals);
- Cumulative impacts, where the Project will be considered alongside the predicted impacts of other projects in the nearby area (for example another offshore wind farm); and
- Transboundary impacts, where activities in other countries may be impacted (for example shipping routes and fishing activities).

1.7 Consultation

45. The Applicant has undertaken extensive community and stakeholder consultation to inform the Project design, in particular the site selection. The Applicant has reviewed consultation received during informal and formal consultation and, in light of the feedback, has made a number of key decisions in relation to the Project design in order to deliver an environmentally sustainable project. This includes refining the Windfarm Site from 144 km^2 to 116 km^2:

- by removing the southeast corner of the Windfarm Site to reduce overlap with areas of importance for commercial fishing;
- by removing a north-eastern area of the Windfarm Site to ensure the footprint is within the revised INTOG area.

46. Consultation is a key feature of the EIA process, and continues throughout the lifecycle of a project, from its initial stages through to consent and development. Regular and targeted discussion with regulators and other stakeholder bodies through various means has been undertaken since early stages of development.

47. Following submission of the Section 36 and marine licence applications, there will be a period of formal consultation where stakeholders will be provided with the opportunity to comment on the **Offshore EIA Report**.

48. Consultation on refinements to the proposed Project's site selection and layout has been undertaken through the informal and formal pre-application stages. This includes the formal submission of the **Offshore Scoping Report** in November 2021 (**Appendix 1.2** of the **Offshore EIA Report**) and the formal Pre-Application Consultation (PAC) event in September 2022 (the **Appendix 6.2** of the **Offshore PAC Report**).

1.7.1 Pre-Application Consultation (PAC) Event

49. The PAC event was held in accordance with The Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013 and was held online with a virtual exhibition in line with Marine Works and Marine Licensing (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 as a result of the COVID-19 pandemic. Despite the PAC process formally applying to works within 12 nm only, stakeholders were also invited to comment on all offshore aspects of the Project during the PAC process.

50. Stakeholders with potential interest in the Project were identified by the Applicant and invited to attend the virtual exhibition and live question and answer sessions held via the Green Volt Offshore Windfarm website in September 2022. In addition to the live events, an online exhibition was available

on the Green Volt website from 15th September 2022 and stakeholders were encouraged to provide feedback by the end of the PAC consultation period 20/31 October 2022. However, feedback forms and a static (pdf) version of the exhibition, at least, will continue to be available on the Green Volt website https://greenvoltoffshorewind.com/

51. Feedback received during the PAC process (via email and during the live event) included concerns/notes regarding the use of similar areas of marine space as other projects in the North Sea, impacts to surf on the east coast of Scotland, and impacts to catch rates for shellfish and mackerel. A number of questions were posed enquiring about potential rock deposits, number of vehicular trips and when the landfall site will be chosen.

1.8 Structure and Content of the Offshore EIA Report

52. The **Offshore EIA Report** considers all the offshore elements of the proposed Project. The **Offshore EIA Report** is comprised of two volumes:

- Volume 1: **Offshore EIA Report** Chapters (chapter list shown in **Table 1.1**)
- Volume 2: Appendices (presented in **Table 1.2**)

Table 1.1 Offshore EIA Report Chapter Overview – Volume 1

Section	Chapter Number(s)	EIA Technical Chapter
Introductory Chapters	1	Introduction
	2	Need for the Project
	3	Policy and Legislative Context
	4	Site Selection and Assessment of Alternatives
	5	Project Description
	6	EIA Methodology
Physical Environment	7	Marine Geology Oceanography and Physical Processes
	8	Marine Sediment and Water Quality
Ecological Environment	9	Benthic Ecology
	10	Fish and Shellfish Ecology
	11	Marine Mammal Ecology
	12	Offshore and Intertidal Ornithology
Human Environment	13	Commercial Fisheries
	14	Shipping and Navigation
	15	Offshore Archaeology and Cultural Heritage
	16	Aviation and Radar
	17	Industry and Other Marine Users
	18	Climate Change
	19	Socioeconomics, Tourism and Recreation
Conclusions	20	Transboundary Impacts and Cumulative Impacts
	21	Summary

Table 1.2 Offshore EIA Report Appendix Overview – Volume 2

Appendix Number(s)	Appendix Title
1.1	Scoping Opinion
1.2	Offshore Scoping Report
3.1	Offshore Habitats Regulations Appraisal Screening Report
4.1	Landing Point Feasibility Study
5.1	Major Accidents and Disasters Screening
5.2	Unexploded Ordnance Survey Specifications
5.3	Unexploded Ordnance Threat and Risk Assessment
5.4	Unexploded Ordnance Risk Mitigation Strategy
6.1	List of Consultees
6.2	Pre-Application Consultation Report
7.1	Export Cable Route EIA Data Acquisition Survey Report
7.2	Benthic Analysis
8.1	Habitat Assessment Report
9.1	Underwater Noise Technical Report
9.2	EMF Assessment Report
11.1	Marine Mammal Cumulative Impact Assessment Screening
12.1	Offshore and Intertidal Ornithology Baseline Technical Report
12.2	Offshore Ornithology Displacement Analysis
12.3	Offshore Ornithology: Collision Risk Modelling
12.4	Comparative Analysis of the Design-Based Method and MRSea Modelling using Green Volt Survey Data
12.5	Colony Counts and Derived Breeding Populations used in Assessments
12.6	Offshore Ornithology Population Viability Analysis
12.7	Method Review Paper – Applicability of SeabORD for Green Volt
13.1	Overview of Historic Landings
14.1	Navigational Risk Assessment
15.1	Archaeological Assessment of Geophysical and Hydrographic Data
15.2	Outline Written Scheme of Investigation (WSI) (Offshore)
16.1	Aviation Impacts Review
18.1	Embodied Emissions in Materials
20.1	Cumulative Impact Assessment Screening List
20.2	Oil and Gas Decommissioning Plans
21.1	Commitments Register

2 Description of the Project

2.1 Wind Turbine Generators

53. The Applicant is considering conventional three blade, horizontal axis WTGs with capacity between 14 to 16 MW.

54. The maximum height of the WTG (to blade tip) is 264 m, with a minimum clearance between the MHWS and lowest point of the blade of 22 m. The WTGs will have their own control system and will operate in wind speeds between 3 and 28 metres per second (m/s). At speeds above 28 m/s, the WTGs will shut down to prevent damage. The WTGs are also designed to rotate to face the wind (yaw function) so that the amount of wind energy generated can be maximised.

55. To maximise the ability to harness wind energy, WTGs will be positioned at minimum 1,540 m from any other WTG. The final layout of the WTGs is unconfirmed, and will be decided as part of the detailed design phase post-consent, considering seabed characteristics, environmental and other constraints.

56. In order to retain flexibility in the design of the Project, three different floating substructures and anchorage designs are being considered. The floating substructures will be moored to anchors on the seabed in order to maintain the position of the WTG.

- Semi-Submersible Platform (SSP): The SSP is secured to the seabed using a catenary mooring system attached to drag embedment anchors. The semi-submersible floating platform will provide buoyancy to support the floating WTG and counteract the overturning momentum from the high wind speeds. The semi-submersible floating platform comprises three or four vertical columns of 14 m diameter, inter-connected with a truss structure composed of main beams, connecting columns and bracings.
- Semi-Submersible Barge: A damping barge consists of a square ring-shaped hull fitted with a large central opening called a damping pool. The dampening effect of the oscillating water column in the damping pool allows for a relatively compact design with a shallower draught. The mooring arrangement is as per the semi-submersible using either a catenary or semi-taught system with 3 - 6 mooring lines connected to drag embedment anchors or suction pile anchors.
- Tension Leg Platform: This option is secured using vertically moored tendons attached to the seabed using a suction piled anchor system.

57. An example of the three options for floating substructures is given in **Figure 2.1**.

58. No driven pin piling anchorage methods are being considered for use with any of the three options.

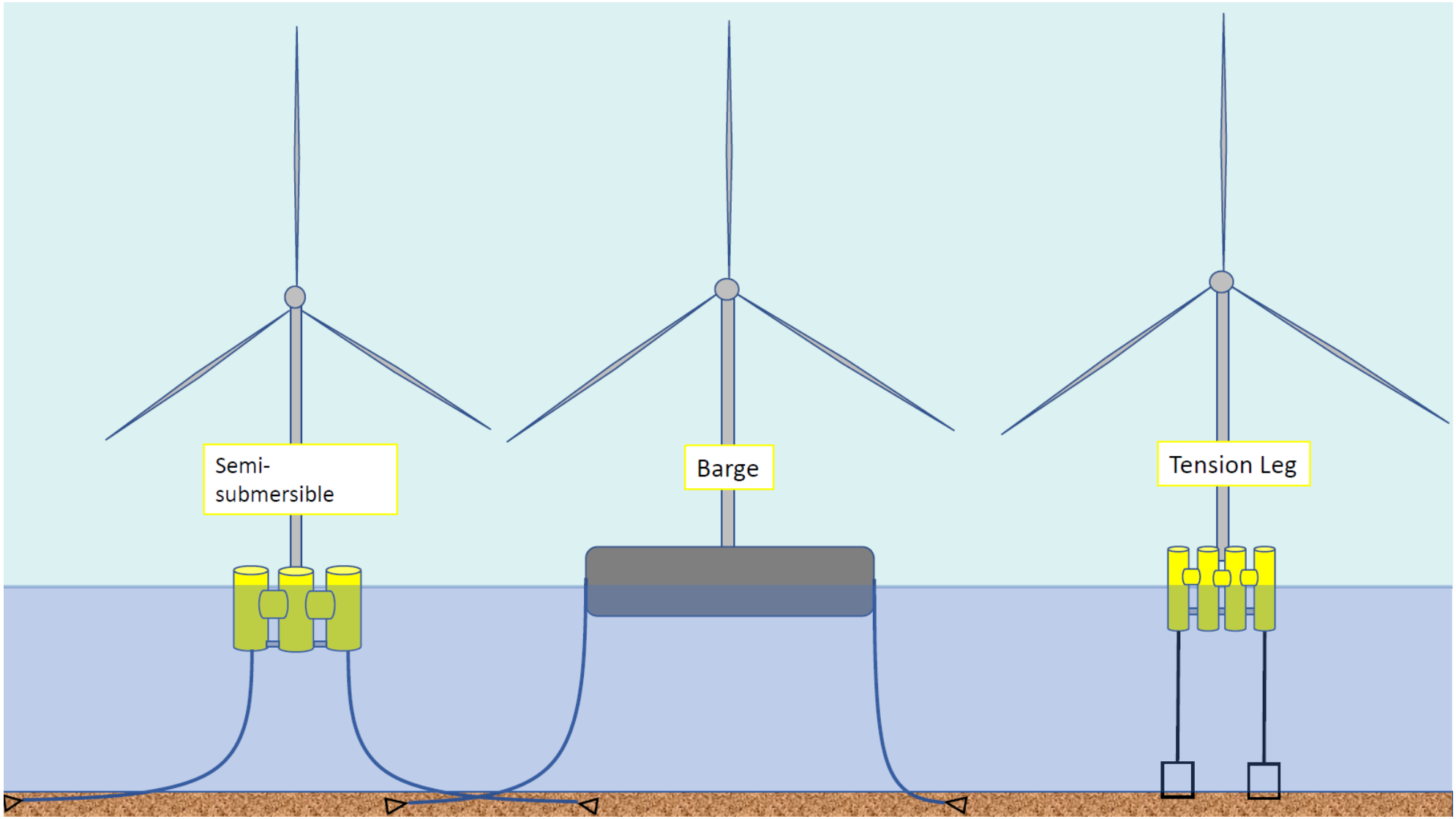

Figure 2.1 Figure showing three different substructure options. Option 1: Semi-Submersible Platform, option 2: Semi-Submersible Barge and option 3 – Tension Leg Platform

2.2 Offshore Substation Platform (OSP)

59. The Project will have a single OSP, located in the Windfarm Site. The OSP will transform the electricity generated by the WTGs to a higher voltage that can be transported to Buzzard and to shore via the Offshore Export Cables.

60. The OSP is anticipated to be supported on a jacket substructure. This will either be a 4-legged jacket which is pile driven into the seabed, or a suction piled jacket with four piles at each jacket.

2.3 Offshore Cables

61. The inter-array cable network transports the electricity generated from the WTGs and connects it to the OSP. The inter-array cables may be buried with trenching, jetting, ploughing and mechanical cutting methods, or covered with external protection (rock deposits or concrete mattresses) where this is not possible. The total length of the inter-array cable network is dependent on the final WTG layout, with a maximum length of 134 km. The inter-array cable layout will also be influenced by ground conditions, electrical losses, installation limitations, environmental constraints and economic factors.

62. The Offshore Export Cables will export electricity from the OSP to Buzzard (a maximum of 30 km cable length) and to the Scottish mainland (a maximum of 120 km cable length). The Offshore Export Cables will be buried where possible, using ploughing or jetting methods. Where the Offshore Export Cables come ashore at landfall, they will be installed beneath the surface of the seabed by HDD. If there are sections of the cables that cannot be buried or require additional protection, then post-lay burial, rock deposits or mattressing will be used. The final choice of cable installation method will be decided during the detailed design phase which will occur after the consent application is submitted.

2.4 Indicative Construction Programme

63. One of the main advantages of floating offshore wind substructures is that a considerable amount of the offshore site construction activity can take place onshore in port construction zones before the fully assembled units are towed out to site. The duration of floating offshore wind turbine construction activities is significantly shorter than that of traditional fixed foundation wind turbines. The WTGs are expected to be installed in 2027 with the assumption that one substructure and corresponding floating turbine can be assembled and towed out to site each week.

64. Initial onshore fabrication and offshore construction is planned to start in Q1 of 2025. Construction is scheduled to take three years, with the aim of connecting Buzzard to the UK grid by Q4 2027 and thus beginning the Project's operational phase.

65. **Figure 2.2** provides an indicative programme for construction.

		2023				2024				2025				2026				2027			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Site investigation Pre-Construction	Engineering Surveys																				
Offshore Substructure Installation (incl. moorings)	Offshore Substructure Installation and Commissioning																				
Offshore Construction	WTG Assembly and Pre-Commissioning																				
	WTG Commissioning																				
	HDD																				
	Substation Piles Jacket & Topside Installation																				
	Export Cables Installation																				
	Array Cables Installation and Pull in																				

Figure 2.2 Indicative Construction Programme

66. Following completion of the construction phase, the Project will enter the O&M phase, with anticipated lifetime of 35 years. Scheduled and unscheduled monitoring and maintenance of offshore infrastructure will be required throughout this phase. O&M activities will be based out of a purpose-built onshore O&M Marine Control Centre. Scheduled works on the WTG and offshore electrical infrastructure will include annual or bi-annual maintenance, statutory inspection and routine inspection, visits. When necessary, retrofitting and upgrading works may also take place.

67. Throughout the Project lifespan, a Decommissioning Programme will be reviewed and updated every 5 years. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning activities. The overall Project Timeline, from conception to operation is shown in **Figure 2.3.**

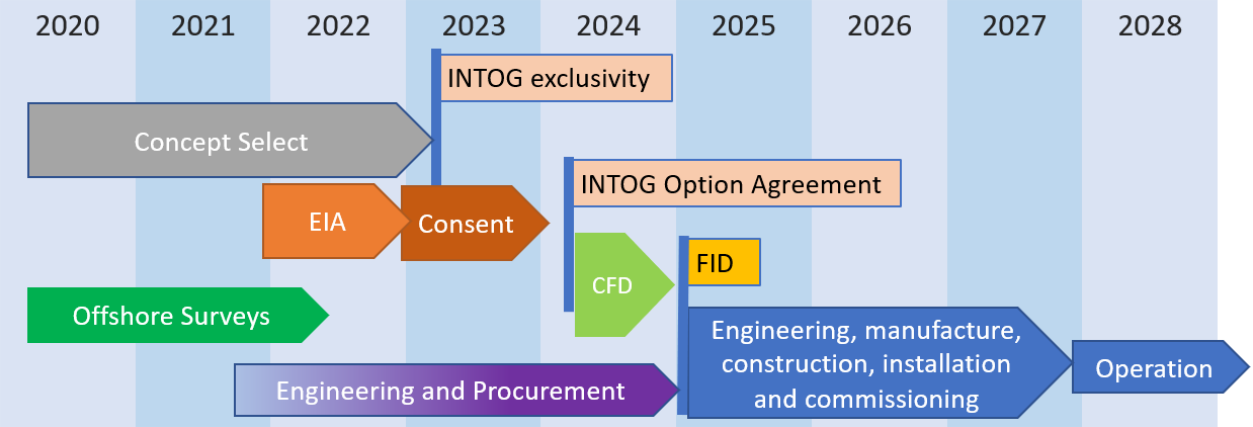

Figure 2.3 Green Volt Project Timeline[1]

3 Topics Considered in the Environmental Impact Assessment

68. The **Offshore EIA Report** covers a wide range of physical, ecological and human environmental topics for which potential impacts have been assessed. Many of these technical assessments are related to each other and these links are highlighted within the **Offshore EIA Report**.

69. The topic assessments within the **Offshore EIA Report** have been undertaken in accordance with MS-LOT's **Scoping Opinion** (see **Appendix 1.1** of the **Offshore EIA Report**). Each of these topics have been summarised as part of this NTS.

70. A description of all mitigation measures and Project commitments is presented in **Appendix 21.1: Commitments Register.**

71. **Figure 3.1** presents the Offshore Development Area in relation to designated sites which have been considered throughout the EIA.

[1] *CfD defines the Contracts for Difference (CfD) scheme, which is the government's main mechanism for supporting low-carbon electricity generation. Renewable generators in the UK that meet the eligibility requirements can apply in an auction round. Successful developers of renewable projects enter into a private law contract with the Low Carbon Contracts Company (LCCC), a government-owned company. Developers are paid a flat (indexed) rate for the electricity they produce over a 15-year period; the difference between the 'strike price' (a price for electricity reflecting the cost of investing in a particular low carbon technology) and the 'reference price' (a measure of the average market price for electricity in the GB market).*

FID defines Financial Investment Decision

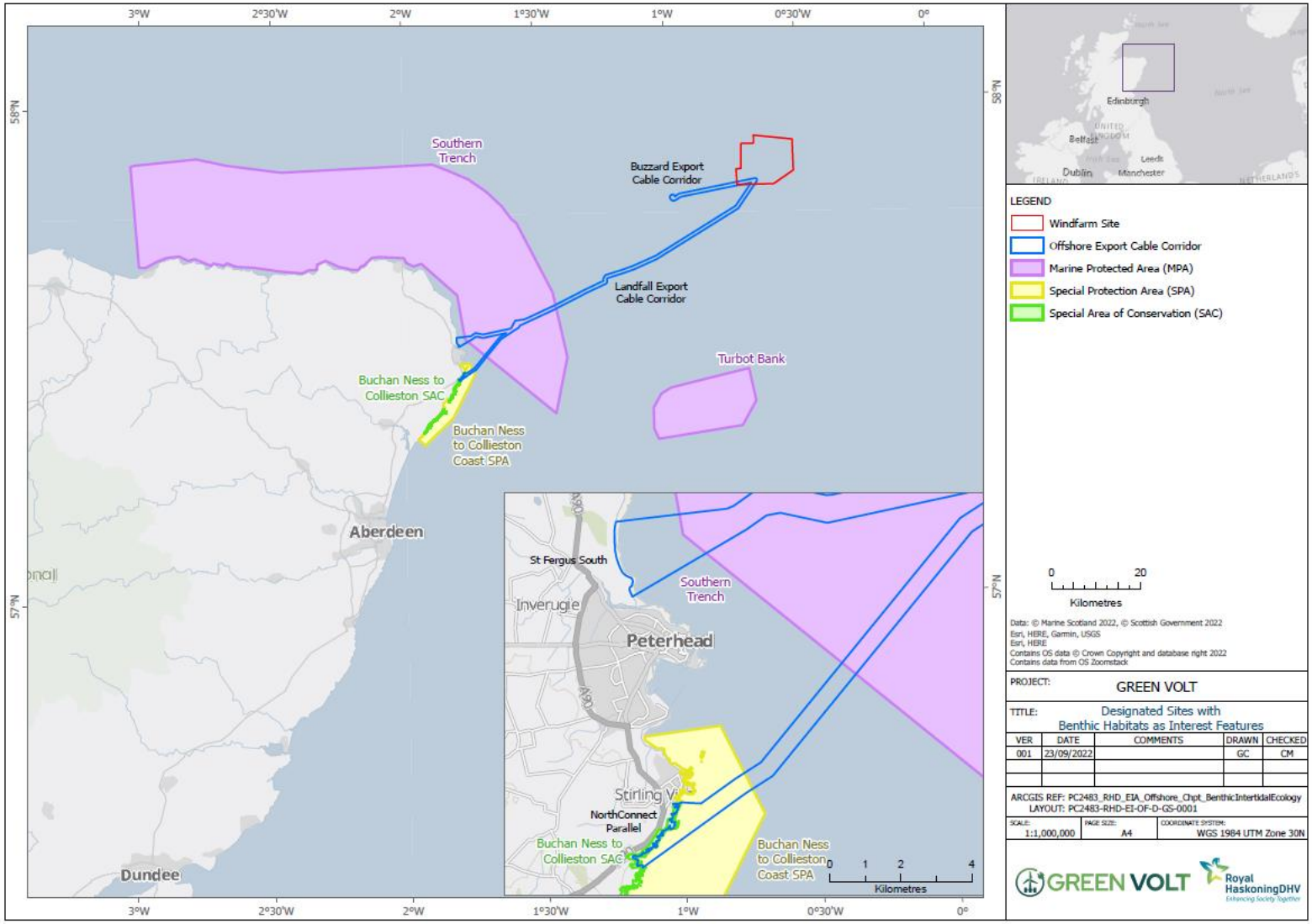

Figure 3.1 Designated Sites and Offshore Development Area

3.1 Marine Geology, Oceanography and Physical Processes

72. This section describes the marine geology, oceanography and physical processes of the Project and provides an assessment of the potential effects arising from the construction, O&M and decommissioning phases. The geographical scope of the assessment principally includes the seabed within and adjacent to the Landfall Export Cable Corridor inshore of 12 nm and the two potential landfall options. In addition, three specific matters pertaining to the Windfarm Site itself have been considered, including increase in suspended sediment concentration due to installation/removal of cables within the Windfarm Site; scour; and changes in the water column structure within the Windfarm Site and along the Offshore Export Cable Corridors.

73. A desk-based assessment of geological data, project-specific bathymetric and seabed grab samplings surveys, and other publicly available environmental information acquired for other developments in the region was undertaken to characterise the geology and geomorphology of the seabed and metocean conditions. At the proposed landfall options, projections of future coastal change and sea-level rise were used alongside geological and topographic data to characterise the coastal environment, including geology, geomorphology, littoral sediment transport and coastal defences. The full baseline description of the Windfarm Site is given in **Appendix 1.2** of the **Offshore EIA Report**.

74. As HDD will be used at the proposed landfalls, there will be no impact from construction, O&M or decommissioning on the geology and geomorphology of the seabed between the coastline and the HDD exit point. The HDD length will be between 1,000 and 1,300 m from the shoreline. Therefore, any impacts on the wave, tidal or sediment regimes will be negligible and no interruptions to littoral sediment transport along the shore are expected, meaning nearby designated geodiversity or conservation sites will not be affected.

75. Seabed morphology and sediments between the HDD exit point and 12 nm will be directly affected during cable installation. However, the effects will be short-lived, localised and recoverable over time, and the significance of effect is deemed negligible.

76. Part of the Offshore Export Cable Corridor passes through the Southern Trench MPA (**Figure 3.1**) which contains areas of mud of high geodiversity value. Careful site selection ensured that these muds were avoided by the Offshore Export Cable Corridor so that the mud would not be affected by cable installation (see **Offshore EIA Report** for further information on site selection). An increase in suspended sediment concentration during cable installation may affect the Southern Trench MPA. However, the MPA is not sensitive to localised deposition of muddy sediments meaning the significance of effect is negligible.

77. The presence of cable protection measures across short sections of the Offshore Export Cable Corridor will have a permanent footprint on the seabed during the O&M phase until decommissioning. The effect of cable protection measures on wave, tidal and sediment regimes will be localised and of small magnitude, and in the highly dynamic nearshore environment, any change will be negligible in comparison to prevailing conditions. Given the low sensitivity and high recoverability of the seabed impacted, the overall significance of effect is negligible.

78. Within the Windfarm Site, the disturbance of seabed sediments through the catenary action of mooring lines is expected to be highly localised, small scale and only occur during large storm events. While this could occur throughout the O&M phase, the significance of effect is deemed to be negligible. As wind turbines will be located in water depths between 100 and 115 m, there is unlikely to be sufficient wave or tidal current velocities to cause significant scour around foundations of mooring anchors and the significance of effect is deemed to be negligible through the O&M phase.

79. Changes in water column stratification due to the presence of structures and alterations to near-surface wind speeds are not expected as the extent of infrastructure below the water line is small for

each wind turbine. In addition, seasonal changes in stratification are driven by temperature, rather than metocean processes (including wind-generated waves). Therefore, there will be no effect on regional-scale patterns of seasonal stratification.

80. No cumulative or transboundary impacts in relation to marine geology, oceanography and physical processes between the Project and other activities, have been identified.

3.2 Marine Sediment and Water Quality

81. Current speeds and extreme tidal current surges for the Windfarm Site are not strong enough to mobilise recently deposited sediments (associated with oil and gas subsea infrastructure).

82. The Windfarm Site was historically used by the oil and gas industry. Any chemicals used and discharged by the oil and gas industry must be permitted by the regulator after completion of a chemical risk assessment and an environmental assessment to demonstrate that there will be no significant environmental effects. The Decommissioning Programme for Ettrick and Blackbird and site surveys record no drill cuttings piles or oil-based muds on site, with no significant environmental effects anticipated now or in the future.

83. Sediment grain size is important to inform assessment of the risk of contamination because finer grained materials (silts and clays) function as a sink for contaminants and therefore have a greater potential to retain contaminants than larger grained materials. The seabed in the Windfarm Site is sand and muddy sand and the Buzzard Export Cable Corridor is predominantly sand. The Landfall Export Cable Corridor predominantly consists of gravelly sand and slightly gravelly sand with gravel close to the shore.

84. A site-specific survey undertaken at the Windfarm Site, in addition to desk-based resources, showed that the levels of contaminants surveyed are typical of background levels of hydrocarbon inputs in areas of historic oil and gas exploration, such as the North Sea.

85. Potential impacts during construction are associated with an increase in suspended sediment concentrations due to installation of turbine substructure, inter-array cables, OSP foundations and the Landfall Export Cable Corridor; suspended solids concentrations due to works at the landfall; and the re-suspension of sediment-bound contaminants causing a deterioration in water quality in these locations. No effects were assessed as significant for the construction phase.

86. During O&M, there may be similar impacts associated with suspended sediment concentrations due to sweeping by catenary moorings suspending these surficial sediments and maintenance activities. The effects of these impacts were assessed to be not significant. An additional operational impact includes changes in water column stratification due to the presence of Windfarm structures and changes to surface wind speeds, however, due to the limited extent of infrastructure below the waterline and no measurable changes to wind-sea states (generated by near-surface wind speeds) there is no effects associated with this effect.

87. For decommissioning, the effect of increase in suspended sediments and deterioration of water quality was assessed to be not significant. No cumulative or transboundary impacts were identified.

3.3 Benthic Ecology

88. Benthic ecology relates to the habitats and their communities of animals and plants inhabiting the seafloor. Some benthic habitats and species are protected under national and international legislation.

89. Seabed surveys of benthic habitats and species were carried on the Ettrick and Blackbird sites between 2006 and 2012, providing historical data to show trends of how the benthic community has potentially changed over the years. Surveys commissioned for the **Offshore EIA Report** have been

carried out on the Offshore Development Area in two separate surveys: in 2021 the area beyond 12 nm from shore was surveyed (the area surrounding the Windfarm Site and part of the Offshore Export Cable Corridor); and in 2022 the Offshore Development Area within 12 nm of shore was surveyed (Offshore Export Cable Corridor). These surveys identified that the Offshore Development Area is composed of habitat types that are relatively common and widespread in this area of the North Sea. Some habitats and species of conservation importance (referred to as Priority Marine Features (PMFs)) were found in the Study Area. The 'Seapens and Burrowing Megafauna' habitat was identified in the Windfarm Site and is a component of the PMF 'burrowed mud', although this habitat is common and widespread in this area of the North Sea. Burrowed mud is a component of the Southern Trench MPA, but none of this habitat type was identified in the section of the MPA crossed by the Offshore Export Cable Corridor. Some small aggregations of ross worm *Sabellaria spinulosa* were identified, however these aggregations were not considered substantial enough to be considered reef forming (biogenic reefs are protected under Annex I of the Habitats Directive).

90. The assessment considered the value and sensitivity of the benthic communities and habitats present and considered how they may be affected by the range of activities occurring throughout the lifespan (construction, O&M and decommissioning). Effects mainly relate to activities which interact with the seabed (such as cable burial), causing direct loss of benthic habitat, and disturbance of the sediment which becomes suspended and redeposited, leading to burial and smothering of benthic species with low mobility. The assessment determined that given the short term and localised nature of effects of from these activities, there would not be significant effects on benthic habitats and species.

91. Other effects considered are the potential for contaminants in the sediment to be resuspended, the potential introduction of marine invasive non-native species, permanent loss of habitat and introduction of hard substrate (operation) and removal of hard substrate (decommissioning), the impacts on benthic communities from increased currents surrounding infrastructure on the seabed (scour) and electromagnetic fields (EMF) generated from cables. The assessment determined that none of these would have significant effects on benthic ecology. Potential cumulative impacts (effects of similar impacts from multiple projects or plans on a single receptor) are also assessed as not significant.

3.4 Fish and Shellfish Ecology

92. Fish and shellfish are broad categories, comprising a diverse range of species with numerous life-strategies. Various types of fish and shellfish are found within the Offshore Development Area, including commercially important species such as Nephrops (Norway lobster), king scallop, brown crab and lobster haddock, herring and whiting; other species are of conservation importance, including Atlantic salmon, lampreys, European eel, herring and sandeel. Some species also play important ecological roles as key links in food webs, such as sandeels which are an important prey resource for seabirds and marine mammals.

93. Species with low mobility and close association with the seabed are potentially vulnerable to localised effects associated with the Project such as physical disturbance and habitat loss; increased suspended sediments and sediment re-deposition; and re-mobilisation of contaminated sediments and sediment redistribution. Of particular sensitivity in this regard are shellfish that live on, or in, the seabed. Given the temporally and spatially limited extent of these impacts during construction, O&M and decommissioning, and also taking into account the distribution of shellfish populations across the wider region, these potential effects are assessed to be not significant.

94. Effects on the spawning grounds of sandeel and herring, which spawn in close association with the seabed (and are therefore more sensitive to disturbance and smothering) were assessed as not significant. This is due to the limited spatial extent of impacts associated with the Project, the fact that construction activities will only occur for a limited time in any one location, and the wide extent of spawning grounds beyond the range of impact.

95. Fish and shellfish are also potentially sensitive to EMF and noise. Worst case noise levels have been modelled for Project activities during construction, O&M, and decommissioning. As the Project is a floating wind farm, piling is only under consideration to be used for the offshore substation installation, and underwater noise generated during construction is therefore greatly reduced compared to a conventional fixed-foundation wind farm. Based on modelling of underwater noise, effects will not be significant for any species.

96. EMF around export cables during operation has the potential to cause behavioural impacts on electrosensitive species. Some sharks and rays use electrical signals for prey detection, whilst some migratory fish, such as Atlantic salmon, may use field to aid navigation during migrations and may have some electrosensitivity. These groups are therefore considered to be of higher sensitivity to EMF. Modelling has been undertaken for the EMF around the Offshore Export Cables during operation, and taking into account the mitigating effect of burying cables, no significant effects of EMF are predicted.

97. The introduction of foundation structures and anchors, and the potential for this new hard substrate habitat to cause changes in biological communities within the Offshore Development Area has also been assessed. The effects are considered to be not significant due to the limited extent of hard substrate introduced.

98. Based on the findings described above, the potential for the Project to effect Designated Sites (via impacts to fish from those sites travelling through the Project) has also been assessed as not significant.

99. Given the limited duration and range of impacts found for the Project, no significant cumulative effects with the Salamander Floating Windfarm and Acorn Carbon Capture and Storage Site, both of which have construction periods that may overlap with the Project's construction. Similarly, no significant cumulative effects of the Project are assessed for O&M, or decommissioning.

3.5 Marine Mammals

100. Marine mammals include whales, dolphins, porpoises and seals. The most regularly occurring marine mammals in the vicinity of the Offshore Development Area include harbour porpoise, bottlenose dolphin, white-beaked dolphin, Atlantic white-sided dolphin, Risso's dolphin, minke whale, humpback whale, grey seal and harbour seal. All species of whale, dolphin and porpoise are protected under the Habitats Directive either individually or through the designation of Special Areas of Conservation (SACs) (**Figure 3.1**).

101. Potential impacts on the Moray Firth SAC, which is designated for bottlenose dolphin, have been assessed as part of the **HRA**, the results of which are presented in the **RIAA**. Minke whale is a primary interest feature associated with the Southern Trench MPA, which is assessed in the **Offshore EIA Report**.

102. One of the main potential impacts of the Project on marine mammals is underwater noise produced during construction from, for example, geophysical surveys, UXO clearance and piling of foundations of the OSP. Underwater noise sources during operation are from operational wind turbines (noise transmitted down moorings), maintenance activities, such as repairs and replacement of cables, and vessels. Underwater noise can lead to both physical injury and disturbance.

103. Underwater noise modelling was carried out to determine the distance from the Offshore Development Area at which different marine mammal species could potentially be injured or disturbed by the different noise sources. These results were used to inform the assessment of effects of underwater noise on the nine key species of marine mammal present in the Study Area. The results from the underwater noise modelling and assessments concluded that, with appropriate and

adequate mitigation for geophysical surveys, UXO clearance and for piling the risk of physical injury for all species is not significant.

104. Disturbance, including any barrier effects, during construction, O&M is assessed as not significant for all noise sources and all marine mammal species assessed. Any potential disturbance would be temporary and localised. Therefore, there would be no significant disturbance of marine mammal populations, including bottlenose dolphin from the Moray Firth SAC (see the **Green Volt Offshore Windfarm Offshore Report to Inform Appropriate Assessment**) and minke whale associated with the Southern Trench MPA.

105. There is the perceived risk for entanglement in the mooring systems for floating offshore wind turbines. The mooring lines and cables have a large diameter and are sufficiently heavy which prevents them from looping and entangling marine mammals. Marine debris, such as fishing gear, may become snagged on mooring lines and cables, which could potentially lead to entanglement of marine mammals. To reduce this risk, monitoring will be conducted following a similar approach used at Kincardine Offshore Windfarm, which has not recorded any entanglement events to date.

106. The potential effect for increased collision risk with vessels during construction, O&M is assessed as not significant. All vessel operators will use good practice to reduce any risk of collisions with marine mammals, this includes following the Scottish Marine Wildlife Watching Code.

107. Other potential effects on marine mammals occurring during construction, O&M, including EMF, changes of prey resources and barrier effects from physical presence of the Project are assessed as not significant.

108. During decommissioning, the potential impacts are anticipated to be similar or less than the worst-case for the construction phase as no piling or UXO clearance will be required. All effects during decommissioning are also assessed as not significant.

109. The cumulative impact from underwater noise is assessed for piling and other construction activities at other offshore wind farms, plus geophysical surveys, oil and gas installation projects, seismic surveys, subsea pipeline installation and UXO clearance. The overall cumulative effect significance for disturbance to marine mammals from underwater noise including the Project, is not significant for all marine mammals, except for grey seal for which there is a potentially significant disturbance effect. However, the scenario used for the cumulative assessment is likely to be over-precautionary and a worst-case estimate of the marine mammals that could be at risk of disturbance. The contribution of the Project to cumulative underwater noise is small and the effect significance for disturbance from cumulative noise is the same with and without the Project. The potential cumulative effects for barrier effects due to underwater noise or physical presence, increased collision risk with vessels, entanglement and any changes in prey resources are assessed as not significant.

110. All of the effects on marine mammals, taking into account proposed mitigation measures, for the Project alone and in-combination with other projects and activities, are assessed as not significant. There are no significant transboundary effects. Effects upon the minke whale population of Southern Trench MPA are not significant.

111. EPS licence applications will be made for all activities that have the potential for injury or disturbance on EPS (cetaceans).

3.6 Offshore and Intertidal Ornithology

112. The EIA of offshore ornithology seeks to identify the offshore and intertidal ornithology receptors which may experience a changes as a result of the Project. To inform this assessment, site-specific aerial digital video surveys have been conducted for the Project over 24 months, the details of which are presented in **Appendix 12.1: Offshore and intertidal ornithology baseline technical report**.

113. Potential impacts on a number of SPAs were considered as part of the **HRA**, the results of which are presented in the **RIAA**.

114. To determine intertidal ornithology associated with HDD landfall onshore/offshore interface for the export cable, surveys of breeding seabirds utilising the cliffs and vantage point surveys of birds utilising waters up to 500 m from shore at the NorthConnect Parallel Landfall site have been conducted for the Project.

115. The St Fergus South Export Cable Corridor Option is located away from all known breeding locations and as HDD is proposed for the method of installation no impact is considered for the intertidal zone and subsequent impacts on winter breeding birds.

116. A total of 21 species were recorded across the site-specific baseline surveys, with guillemot, fulmar, kittiwake and gannet the most frequently encountered species. These four species accounted for 93.2% of all birds recorded.

117. The temporal scope of the assessment of offshore ornithology is the entire lifetime of the Project, which therefore covers the construction, O&M, and decommissioning phases.

118. The potential impacts on offshore ornithology receptors include:

- Displacement and disturbance;
- Indirect effects via changes in prey or habitat availability;
- Entanglement with mooring lines;
- Collision;
- Barrier effects;
- Impacts of aviation and navigation lighting;
- Cumulative impacts; and
- Transboundary impacts.

119. The construction, O&M and decommissioning phases of the Project may cause a range of effects on offshore ornithological receptors. The magnitude of these effects has been assessed individually using expert judgement, drawing from a wide science base that includes project-specific surveys and previously acquired knowledge of the bird ecology of the North Sea.

120. Disturbance and subsequent potential displacement of offshore ornithology receptors at the Windfarm Site and Offshore Export Cable Corridors during the construction phase is primarily centred around where construction vessels and anchoring and cable connection activities are planned to occur (Windfarm Site) and the physical presence of the installation vessels (Offshore Export Cable Corridors). The activities may displace individuals that would normally occur within and around the area of sea where the Project is proposed to be developed. This potentially reduces the area available to those seabirds to forage, loaf and/ or moult.

121. Disturbance and subsequent potential displacement, including any barrier effects, of offshore ornithology receptors at the Windfarm Site and Offshore Export Cable Corridors during the O&M phase primarily considers the physical presence of the WTGs and associated Project vessels. The assessment assesses the impacts on both breeding and non-breeding seasons.

122. The indirect effects via changes in prey or habitat availability during all phases of the Project largely concerns benthic disturbance and the increase in suspended sediments from Project activities (eg cable burial, movement of moorings on the seabed, removal of moorings etc). These mechanisms could potentially result in reduced prey availability in areas adjacent to active construction sites to

seabird foraging areas. Any form of indirect effect (including reductions in prey and habitat availability) may cause reduced survival or reproductive fitness of the species deemed at risk.

123. Diving birds have the potential to become entangled in the mooring lines during the operation of the wind farm. There is also a risk to birds through collision with WTGs. Both impacts have the risk of resulting in injury or fatality to affected birds.

124. Collision risk modelling (CRM) has been carried out for the Project, with detailed methods and results presented in **Appendix 12.3: Offshore ornithology collision risk**, to provide information for seabird species of interest identified as potentially at risk and of interest for impact assessment.

125. There is the potential that aviation and navigation lighting on WTGs could affect the behaviour of birds moving through the Project at night.

126. All of the effects on offshore ornithology receptors, taking into account proposed mitigation measures, for the Project alone and in-combination with other projects and activities, are assessed as not significant. There are no significant transboundary effects. Effects upon the populations of birds within potentially affected SPAs are assessed as not significant.

3.7 Commercial Fisheries

127. A number of different types of fisheries are active in the Offshore Development Area. In the Windfarm Site and surrounding areas, a Nephrops fishery is active in a small area of the south-eastern boundary of the Windfarm Site, and a herring and demersal whitefish fishery is active in areas around the Windfarm Site. In the Offshore Export Cable Corridor and surrounding areas, a lobster and crab creel fishery is concentrated in inshore areas within 6 nm, while the scallop dredge fishery is active between 6 and 12 nm. Squid fishing is also undertaken in these areas at low levels and inshore mackerel fishery undertaken by jigs/handlines in the nearshore area. Fishing activity takes place only at low levels in the Windfarm Site.

128. There is potential for commercial fishermen to be affected by the Project in a number of ways, including:

- Reduction in access to, or exclusion from established fishing grounds;
- Displacement leading to fishing gear conflict and increased fishing pressure on adjacent grounds;
- Physical presence of offshore wind farm infrastructure leading to fishing gear snagging;
- Displacement or disruption of commercially important fish and shellfish resources;
- Project activities (associated with construction, O&M or decommissioning activities) leading to additional steaming to alternative fishing grounds; and
- Increased vessel traffic within fishing grounds leading to interference with fishing activity.

129. During construction, there may be temporary reduced access to fishing grounds or temporary exclusion from discrete areas. This could be in response to installation activities and the physical presence of constructed infrastructure. The reduction in access may also lead to the displacement of the fisheries into other areas.

130. Potential effects on all fisheries due to construction and installation activities were assessed as being not significant. Fishing activity in the Windfarm Site is low and construction activities will be short term and localised to areas where Safety Zones are implemented around construction vessels or infrastructure in both the Windfarm Site and along the Offshore Export Cable Corridor. For creel fisheries only, gear clearance may be required in certain areas, however, measures will be implemented to manage any potential impacts of construction activities on all commercial fisheries.

131. Once operational, the worst-case scenario assumes that fishing vessels operating mobile gear (demersal fisheries such as Nephrops, squid and whitefish; pelagic herring fishery) will be excluded from fishing activity in the Windfarm Site but that fishing may continue at the fisher's discretion along the Offshore Export Cable Corridor. In the context of the range of available Nephrops grounds compared to the size of the Windfarm Site and the lower importance of other demersal fisheries, significance of effect is considered to be not significant for these fisheries. For the creel fishery and scallop dredge fisheries, any fishing restrictions will be limited to exclusions associated with maintenance works on the inshore sections of the Offshore Export Cable Corridor and therefore have negligible impact. The scallop dredge fishery will also be excluded from any areas where external cable protection is used, however, this constitutes only a minimal proportion of the total areas that are available to scallop dredgers.

132. All fisheries active in the vicinity of the Offshore Development Area have the potential to be impacted by gear snagging. However, a number of mitigation measures will be implemented to reduce potential impacts. Post-installation assessments will be undertaken to identify any areas where remedial protection is required, and results will be shared with the fishing industry.

133. Potential impacts of decommissioning are considered to have largely the same effect as reversal of the construction process and are therefore not significant. In the event that some cable infrastructure is left in situ to avoid disturbing the seabed unnecessarily, impacts for the operational phase will apply for the offshore export cables only.

134. No significant cumulative effects were identified for commercial fisheries receptors as a result of reduction in access to, or exclusion from established fishing grounds during the construction phase of the Salamander Floating Wind Farm, Moray West Wind Farm, NorthConnect Interconnector and Eastern Green Link 2 transmission link projects. This is a result of restrictions being temporary and localised in nature and considering the operational ranges of the relevant fisheries. During operation, negligible impact only was identified for the demersal whitefish and pelagic herring trawling fisheries.

3.8 Shipping and Navigation

135. The assessment of potential impacts from the Project on shipping and navigation users is based on a 10 nm buffer around the Windfarm Site and is informed by the Navigational Risk Assessment (NRA). It is noted that the NRA also includes detailed assessment of vessel traffic within a 2 nm buffer of the Offshore Export Cable Corridor.

136. The most prominent navigational features in the Study Area are associated with oil and gas. The Ettrick and Blackbird oil and gas field is situated within the Windfarm Site, noting that production ceased in June 2016. Fields in the Study Area currently in production include Buzzard, which is approximately 14 km to the southwest of the Windfarm Site, and Golden Eagle approximately 11 km to the northwest. The nearest operational offshore wind farm is Hywind Scotland Pilot Park, located 52 km to the southwest of the Windfarm Site. There are 11 wrecks or obstructions located within the Study Area, noting none of these are located within the Windfarm Site itself.

137. The site-specific survey took place over two periods; summer (August, 2021) and winter (January, 2022). The main vessel types recorded within the Study Area were oil and gas, fishing, and cargo vessels. The main commercial routes in the vicinity of the Offshore Development Area were associated with oil and gas platforms and cargo. Fishing vessels were less prevalent during the winter period. In addition, consultation input indicated that recreational transits were likely to occur in the area from vessels sailing between the UK and Scandinavian ports.

138. Impacts assessed for the construction phase include vessel displacement, vessel to vessel collision risk, vessel to structure allision risk, reduced access to local ports and reduction in emergency response capability. It is considered likely that commercial vessels will deviate to avoid the Windfarm Site during construction noting that there will be no restrictions on entry other than through any active

Safety Zones. None of the deviations would require large changes in routeing patterns, and due to the number of vessels affected it is perceived to be unlikely that there will be an increase in vessel encounters or collision risk. Port access is unlikely to be reduced as the Offshore Export Cable Corridor is located in excess of 2 km from the port entrance. The increase in frequency of occurrence in relation to emergency response capability is extremely unlikely. Therefore, all impacts are assessed as broadly acceptable, with the exception of vessel to structure allision risk. While the frequency of occurrence is extremely unlikely, the severity of consequence is very serious, and therefore risks are assessed to be tolerable with the incorporation of mitigation measures.

139. The risk for the above impacts is the same for the O&M phase. For the O&M phase, additional impacts of reduction of under keel clearance, anchor snagging and loss of station are also assessed. Risks are considered to be broadly acceptable with the incorporation of mitigation measures.

140. Decommissioning impacts are assessed as for construction. There is potential for cumulative impacts associated with vessel displacement, vessel to vessel collision risk, vessel to structure allision risk and reduction of emergency response capability from the MarramWind and Acorn Carbon Capture Storage projects. Potential cumulative impacts were assessed as broadly acceptable for all impacts except vessel to structure allision, which is tolerable with mitigation.

3.9 Aviation and Radar

141. The site lies 80 km off the Aberdeenshire coast, approximately 112 km northeast of Aberdeen Airport. It lies underneath uncontrolled airspace, remote from any danger areas or restricted areas. It does lie underneath military flight refuelling area 4, operating between 7,000 ft and 24,000 ft. It is also directly underneath two of the offshore helicopter main routes (HMRs), which radiate out from Aberdeen to service the oil and gas platforms.

142. The key receptors are military and civil radar and airspace used by helicopters servicing the oil and gas platforms:

- A single military air defence radar (RAF Buchan) located approximately 4 km south of Peterhead;
- Two civil en-route radars (Allanshill and Perwinnes Hill) located approximately 9 km southwest of Fraserburgh and 6 km north of Aberdeen respectively;
- Aberdeen Airport; and
- HMRs from Aberdeen.

143. The WTGs are the only source of potential impact for this topic. Wind turbines interfere with aviation radar because of the movement of the blades. Radars are complex pieces of equipment, designed and set-up with the specific aim of seeing aircraft but not displaying land, static objects or weather systems. For this reason, when a turbine's blades are not rotating, it does not generate radar impacts that are of concern. In addition, turbines could be a collision hazard for aircraft.

144. With the implementation of a number of mitigation measures to reduce or eliminate potential impacts to radars, the effect of the Project will be not significant. No cumulative impacts are expected from the closest other wind farm development (Hywind Scotland Pilot Park) due to its small size (five turbines) and distance (55 km to the southwest of the Project).

3.10 Marine Archaeology and Cultural Heritage

145. A characterisation of the existing environment for offshore archaeology and cultural heritage has been undertaken based on both existing and site-specific geophysical survey data. This has considered the potential for seabed prehistory sites, paleogeographic features and seabed features of archaeological interest, such as wrecks of either maritime or aviation origin.

146. There are no known seabed prehistory sites within the Study Area, however, once additional data has been acquired pre-construction, the archaeological assessment and interpretation of this will help to determine the presence or absence of any paleogeographic features, such as former river channels. These are of interest from an archaeological perspective because they may be associated with surviving terrestrial features and deposits corresponding to times when sea levels were lower, and the Offshore Development Area may have been inhabited. This will be further investigated through geotechnical surveys, such as the collection of sediment samples or 'cores', prior to the start of construction.

147. Seabed features are categorised according to their level of archaeological potential, from low to high. Features described as high archaeological potential include all those of anthropogenic origin or archaeological interest, of which one has been identified within the Windfarm Site, a wreck identified as the *Ernst Friesecke*, a German cargo vessel built in 1955. The approach to mitigation is to avoid these features via Archaeological Exclusion Zones and micro-siting of infrastructure to ensure that direct impacts will not occur. This will include further investigations prior to the start of construction, such as high-resolution geophysical survey and seabed imagery.

148. In order to account for unexpected archaeological finds such as wrecks or aircraft crash sites potentially concealed beneath the seabed and not seen by the geophysical surveys, a formal protocol for archaeological discoveries will be agreed with regulators and implemented during construction. The approach to the implementation of mitigation measures will be agreed in consultation with Historic Environment Scotland in accordance with industry standards and guidance. An Outline Written Scheme of Investigation is provided in **Appendix 15.2**, setting out the methodology for all proposed mitigation.

149. With the application of recommended measures, significant effects to offshore archaeology and cultural heritage from the Project (including cumulative and transboundary impacts) will not occur. There is the potential for beneficial impacts through the contribution of data to academic and scientific objectives, and public outreach and engagement, both within the UK and wider European networks.

3.11 Infrastructure and Other Users

150. The infrastructure and other users assessment considered the potential impacts of the Project on other activities within the North Sea / Outer Moray Firth. These include: other offshore wind farm developments; Carbon Capture and Storage; oil and gas infrastructure; future exploration of other licenced oil and gas blocks in the North Sea; and marine disposal activities at Peterhead. There are eight electrical cable crossings and 11 gas pipeline crossings required during the installation of export and inter-array cables. There are no military Practice and Exercise Areas of relevance to the assessment.

151. The Project is being developed to support decarbonisation of the oil and gas industry by electrification of oil and gas platforms. The physical presence of the Project will not inhibit further oil and gas exploration as, prior to decommissioning of the Ettrick and Blackbird fields, these have been deemed uneconomic and unviable. The Windfarm Site is located wholly within a provisional INTOG Lease Area, identified by Marine Scotland as suitable for potential offshore wind development for the oil and gas industry. Whilst Outer Moray Firth platforms will have the potential to use the Project's electricity, a key target for the project is the electrification of the Buzzard oil and gas platform complex. Buzzard is a large, relatively new facility with high power demand, and the closest oil and gas infrastructure to the Windfarm Site.

152. The Project has sought to avoid existing marine infrastructure and minimise crossings where required, and the Project's infrastructure can be actively microsited to avoid obstacles on the seabed as necessary. The final offsets from historic oil and gas asset locations applied will be determined by collaboration with the oil and gas operator via a structured risk assessment approach. Industry standard safety zones will be applied for by the Project to ensure safe and effective construction,

O&M of the wind farm and marine users will be updated via appropriate communications, and a series of management plans will be developed to protect other marine users in line with best practice. Crossing agreements will be made with owners and operators of existing infrastructure and oil and gas licence blocks which are crossed by the offshore export cable routes where required. All cables will be installed and maintained in line with standard industry guidance and good practice. Measures will also be taken to minimise the risks of a turbine breaking free of mooring, including third party verification of moorings, alarms and tracking systems.

153. The main source of a potential impact on other human activities is where construction activities or operations of the Project restricts access to, or interferes with, the ongoing operation of the existing activities. Access restrictions are likely to be greatest during construction activities for oil and gas and other offshore wind farms, however this will be short term and temporary. Overall, with the implementation of the embedded mitigation, effects to infrastructure and other marine users are anticipated to be no more than minor adverse in significance.

154. The potential cumulative impacts of the Project on infrastructure and other users have been assessed to be non-significant or able to be fully mitigated through consultation with the relevant parties for construction, O&M and decommissioning phases. All other parties that interact with the same receptor will also need to demonstrate no impact (i.e., through avoidance) or agree mitigation with the operators. Therefore, no project will have a direct impact on another user, and by extension it is considered that there will be no pathways for cumulative impact.

3.12 Climate Change

155. A Greenhouse Gas (GHG) assessment was undertaken to predict the contribution of the offshore aspects of the Project to national and regional GHG emissions in Scotland and the UK, and its 'net effect' compared to the Project not going ahead and the equivalent power being generated using fossil fuels.

156. To assist with the determination of the significance of the Project's contribution to GHG emissions, consideration was given to the GHG intensity of the Project (the amount of energy generated over the Project lifetime in relation to its total GHG emissions), the GHG savings resulting from the Project (the net reduction in GHGs) and the GHG 'payback' period (the time it would take for electricity generated by fossil fuels to be displaced, including the use of energy generated by the Project to fully electrify Buzzard).

157. The total emissions of GHGs generated by the Project during construction, O&M, and decommissioning (by proxy) were quantified. The GHG intensity of the project was determined to be 15.3 gCO_2/kWh, which is in the mid-range of values derived from other offshore wind farm life cycle studies. Over the Project's lifetime, the GHG savings would be -38,649,717 tonnes CO_2 equivalent in comparison to the same amount of energy being produced by natural gas. Assuming that energy generated by natural gas would be displaced by the renewable energy from the Project, the GHG 'payback' period of the Project would be 1.44 years from the Project becoming fully operational.

158. The Project's GHG emissions would contribute 0.01% of the UK's 6th Carbon Budget (2033-2037), which was not considered to be significant in the context of the Project's net benefit after 1.44 years of operation. The overall significance of the effect on GHG emissions and climate change was considered to be beneficial, as the Project will result in a reduction in atmospheric GHG concentrations compared to the without-project baseline and will contribute to Scotland's goal of achieving net zero emissions by 2045, and the UK by 2050.

3.13 Socioeconomics, Tourism and Recreation

Socioeconomics

159. The socioeconomic assessment considers the potential for the Project to generate direct, indirect and induced employment (at local, regional, national scales) and to promote investment and supply chains in the local, regional, and national levels. As the **Offshore EIA Report** considers the offshore components of the Project, so does the socioeconomics assessment consider the potential impacts of the offshore component.

160. The strategy for procurement adopted by the Applicant aims to maximise local content, where possible. Supply chain events in Scotland will be held to enable local businesses to engage with the Project, and a supply chain contact form is available on the Project website to enable local suppliers to contact the Project. Construction work is likely to be undertaken at a port or harbour in a region of Scotland that has the appropriate facilities, capacity and staff resources. Installation will draw on existing oil and gas industry expertise in the Aberdeenshire region. It is therefore expected that opportunities for the creation of employment and supply chain engagement will be realised as a positive impact of the Project.

161. Full-time equivalent employment directly generated by the project is expected to be 113 per annum at the local level, and 703 at the regional level over the three-year construction period, resulting in a significant beneficial effect at the local level. At total of 13 full time equivalent (FTE) jobs per annum generated in the local area during the operation phase, whilst beneficial is not assessed as significant.

162. There will be no significant effect of increase in demand for local private services/goods, or interference with planned infrastructure improvements in the local area. Construction activities will occur predominantly in a region of Scotland with existing port capacity, facilities and staff resource to service the project, meaning there will be no impact on local accommodation availability. Floating turbine structures will be towed to site and anchored using tug/anchor handling vessels with their pre-existing crews. During O&M, a service operation vessel will be used for any required works, and workers will live aboard the vessel for periods of up to two-weeks, once again meaning that no significant effect on accommodation or services will occur.

163. Significant cumulative beneficial effect may occur, if the construction periods of Salamander Floating Windfarm and Acorn Carbon Capture and Storage Site overlap with the Project and coordination between these projects allows for the maximal employment resource and supply chain engagement to be achieved across the region (rather than stretching a limited supply of workers and suppliers across all projects). The Applicant aims to engage with these projects in due course to promote this outcome.

Recreation and tourism

164. There are a number of coastal recreational users within the Study Area, including surfing, yachting, scuba diving, sea angling, cliff climbing, golfing, stand-up paddleboarding, swimming, windsurfing, kayaking, and snorkelling. The nature of these activities means that the vast majority are constrained to within the coastal 12 nm zone.

165. There is no pathway for effects from the Windfarm Site located 80 km from shore to these inshore recreational activities.

166. The greatest scope for effects therefore comes from cable-laying and landfall activities in the inshore area during construction. Effects caused by cable laying have been assessed as not significant, due to the limited area affected and their temporary duration. Regardless of the final landfall location chosen, landfall activities will not have a significant effect as horizontal directional drilling will be used to bring cables ashore, thereby minimising impacts to coastal users.

167. Given the highly localised and temporary effects of the cable route and landfalls on coastal tourism and recreational users, the potential for additional cumulative effect from other projects is limited and not significant.

4 Southern Trench MPA

168. Scotland designates Nature Conservation Marine Protected Areas (MPAs) within 12 nm under the Marine (Scotland) Act 2010. MPAs are designated to protect biodiversity and heritage, with specific focus on protected features (species, habitats, large scale features or geomorphological features). Where a project may have risk of hindering the achievement of the MPA's conservation objectives, the EIA Report for the project should include the necessary information to inform an MPA assessment. The MPA assessment is undertaken by the Public Authority (Scottish Ministers for marine licenses and s.36 consents) in consultation with NatureScot/JNCC. The **Offshore EIA Report** provides the required information to inform the MPA assessment for the Southern Trench MPA. A detailed impact assessment is provided in **Chapter 9: Benthic Ecology** and **Chapter 11: Marine Mammal Ecology** for screened in protected features.

169. No significant effects were identified for any of the protected features of the Southern Trench MPA, and there is no significant risk of hindering the achievement of the conservation objectives as a result of the Project.

170. The Offshore Export Cable Corridor route is sufficiently distance from the Turbot Bank MPA to not cause any direct or indirect effects on the site that may hinder conservation objectives, and the Turbot Bank MPA is therefore not considered.

5 Combined Onshore and Offshore Green Volt Projects Assessment

171. The **Offshore EIA Report** technical chapters detailed in in this report only cover the offshore infrastructure associated with the Project. A separate **Onshore EIA Report** will provide an assessment of the Project's onshore infrastructure. Where a technical topic is required to be assessed for both offshore and onshore, such as socioeconomics, a separate chapter is provided in the **Onshore EIA Report** for the Project's onshore infrastructure. It is recognised that the onshore EIA assessment will be undertaken later than the submission of the **Offshore EIA Report**. To enable consideration of the on and offshore elements of the Project as a whole, an additional document has been prepared. This additional document is called the **Summary of Offshore and Onshore Environmental Impact Assessments** and provides a summary of the **Offshore EIA Report** and the predicted summary of the onshore EIA. It will be submitted to the Scottish Ministers along with the offshore application documents and will be available on the Green Volt website[2]. If required, it will be updated upon completion of the **Onshore EIA Report**.

[2] *https://greenvoltoffshorewind.com/*

6 Contact Us

172. This document provides a non-technical summary of the **Offshore EIA Report** for the proposed Green Volt Offshore Windfarm. If you wish to see more detailed information, the **Offshore Scoping Report** (**Appendix 1.2** of the **Offshore EIA Report**) and MS-LOT **Scoping Opinion** (**Appendix 1.1** of the **Offshore EIA Report**) for the Green Volt Offshore Windfarm, together with the full **Offshore EIA Report** are available online at the following link:

https://marine.gov.scot/ml/green-volt-floating-offshore-wind-farm

173. Once the application has been submitted to Marine Scotland and acknowledged, public consultation will be undertaken. During this time the EIAR will be publicly available. Visit the project website to view the public exhibition, register your interest in the project and receive updates:

https://greenvoltoffshorewind.com/

References

Royal HaskoningDHV (2021), Green Volt Offshore Windfarm - Offshore Environmental Impact Assessment, Offshore Scoping Report, PC2483-RHD-ZZ-XX-RP-Z-0001.

GREEN VOLT

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