GREEN VOLT

Chapter 15

Offshore Archaeology and Cultural Heritage

Offshore EIA Report: Volume 1

Revision history

Revision	Date	Description	Prepared	Checked	Approved
1	26/09/2022	First draft	GSP (Royal HaskoningDHV)	PP (Royal HaskoningDHV)	VC (Flotation Energy)
2	03/10/2022	Second draft	GSP (Royal HaskoningDHV)	CM (Royal HaskoningDHV)	VC (Flotation Energy)
3	08/12/2022	Final for submission	GSP (Royal HaskoningDHV)	CM (Royal HaskoningDHV)	VC (Flotation Energy)

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Acronyms

Acronym	Description
AEZ	Archaeological Exclusion Zones
BGS	British Geological Survey
BP	Before Present
CHIA	Cultural Heritage Impact Assessment
CIA	Cumulative Impact Assessment
CIfA	Chartered Institute for Archaeologists
CPT	Cone Penetration Test
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPS	European Protected Species
GIS	Geographical Information System
HDD	Horizontal Directional Drilling
HEPS	Historic Environment Policy for Scotland
HER	Historic Environment Record
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Areas
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation

Acronym	Description
JNAPC	Joint Nautical Archaeology Policy Committee
km	Kilometre
MAG	Magnetometer
MBES	Multibeam Bathymetry/ Echo Sounder
MHWS	Mean High Water Springs
MS-LOT	Marine Scotland Licencing operations team
nm	Nautical miles
NPF	National Planning Framework
NPP	National Planning Policy
NRHE (CANMORE)	National Record of the Historic Environment
nT	nano Tesla
NtM	Notice to Mariners
ORPAD	Offshore Renewables Protocol for Archaeological Discoveries
OSP	Offshore Substation Platform
PAD	Protocol for Archaeological Discoveries
ROV	Remote Operated Vehicle
RSA	Regional Seascape Assessment
SBES	Single Beam Echo Sounder
SBP	Sub-bottom Profiler
ScARF	Scottish Archaeological Research Framework

Acronym	Description
SPP	Scottish Planning Policy
SSS	Side scan Sonar
TAEZ	Temporary Archaeological Exclusion Zones
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UXO	Unexploded Ordnance
WSI	Written Scheme of Investigation
WWII	World War II

Glossary

Term	Description
Applicant	Green Volt Offshore Windfarm Ltd.
Aviation archaeology	The remains of crashed aircraft and archaeological material associated with historic aviation activities.
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.
Geoarchaeology	The application of earth science principles and techniques to the understanding of the archaeological record. Includes the study of soils and sediments and of natural physical processes that affect archaeological sites such as geomorphology, the formation of sites through geological processes and the effects on buried sites and artefacts.
Glacial/interglacial	A glacial period is a period of time within an ice age that is marked by colder temperatures and glacier advances. Interglacial correspond to periods of warmer climate between glacial periods. There are three main periods of glaciation within the last 1 million years, the Anglian, the Wolstonian and the Devensian which ended about 12,000 years ago. The Holocene period corresponds to the current interglacial.
Green Volt Offshore Windfarm	Offshore windfarm including associated onshore and offshore infrastructure development (Combined On and Offshore Green Volt Projects).
Historic seascape character	The attributes that contribute to the formation of the historic character of the seascape.
Horizontal Directional Drilling	Mechanism for installation of export cable at landfall.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Inter-array cables	Cables which link the wind turbines to each other and the offshore substation platform.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting, and connected to the onshore export cables.
Landfall Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to landfall.
Maritime archaeology	The remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities.
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).

Term	Description
Mesolithic	10000 to 4000 BC The Middle Stone Age, falling between the Palaeolithic and Neolithic and marking the beginning of a move from a hunter gatherer society towards a food producing society.
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 Export Cable Corridor	The proposed offshore area in which the export cables will be laid, from offshore substation to 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 scoping area	An area that encompasses all planned offshore infrastructure, including landfall options at both Weybourne St Fergus South and Bacton NorthConnect Parallel, and allows sufficient room for receptor identification and environmental surveys. This has been refined following further site selection and consultation.
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.
Palaeoenvironmental analysis	The study of sediments and the organic remains of plants and animals to reconstruct the environment of a past geological age.
Palaeogeographic features	Features seen within sub-bottom profiler data (buried) and multibeam bathymetry data (sea floor) interpreted as representing prehistoric physical landscape features such as former river channels (palaeochannels).
Palaeolithic	500000 to 10000 BC The Old Stone Age defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided into Lower, Middle and Upper Palaeolithic.
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.
Seabed features	Features seen on the seafloor in the sidescan sonar or multibeam bathymetry data which are interpreted to represent heritage assets, or potential heritage

Term	Description
	assets. Also includes magnetic anomalies which may represent shallow buried ferrous material of archaeological interest.
Seabed prehistory	Archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower.
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.
Study Area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Windfarm Site	The area within which the wind turbine generators, offshore substation platform and inter-array cables will be present.

CHAPTER 15: OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE

15.1 Introduction

1. This chapter of the **Offshore Environmental Impact Assessment (EIA) Report** describes the potential impacts of the Project (the Project refers to the offshore elements of the Green Volt Offshore Windfarm only, up to Mean High Water Springs (MHWS)) on Offshore Archaeology and Cultural Heritage. The chapter provides an overview of the existing environment for the proposed offshore and intertidal Offshore Development Area (which incorporates the Windfarm Site, the Buzzard Export Cable Corridor and the Landfall Export Cable Corridor) below MHWS, followed by an assessment of the potential impacts and associated mitigation for the construction, operation, and decommissioning phases of the Project.

2. The existing environment, as set out in this EIA (including designated and non-designated heritage assets), a summary of the potential for previously unrecorded heritage assets and finds to be present within the Offshore Development Area. The characterisation of the existing environment has been undertaken with the data and information sources set out in **Section 0**.The known and potential offshore and intertidal archaeological resource is identified with respect to:

   - Seabed prehistory (i.e. archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower);
   - Maritime archaeology (i.e. the remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities);
   - Aviation archaeology (i.e. the remains of crashed aircraft and archaeological material associated with historic aviation activities); and
   - Buried archaeology (including palaeoenvironmental deposits) within the intertidal zone below MHWS.

3. This assessment has been undertaken with specific reference to the relevant national legislation and guidance, of which the primary sources are the National Planning Framework (NPF) 3 and 4, Scotland's National Marine Plan (Marine Scotland, 2015), Environmental Assessment (Scotland) Act 2005 and Scottish Planning Policy 2014. Details of these and the methodology used for the EIA and Cumulative Impact Assessment (CIA) are presented in **Chapter 6: EIA Methodology** and **Section 15.4**.

4. Impacts to offshore archaeology and cultural heritage are assessed with reference to Principles of Cultural Heritage Impact Assessment (CHIA) in the United Kingdom (UK). This is jointly authored by the Institute of Environmental Management and Assessment (IEMA), the Institute of Historic Building Conservation (IHBC) and the Chartered Institute for Archaeologists (CIfA) and was published in July 2021. The relationship between these principles and the overarching approach to EIA is described in **Section 15.4**.

5. The assessment should be read in conjunction with following linked chapters:

   - **Chapter 7: Marine Geology, Oceanography and Physical Processes**.

6. Additional information to support the Offshore Archaeology and Cultural Heritage assessment includes:

- **Appendix 15.1: Archaeological Assessment of Geophysical Data.**

15.2 Legislation, Policy, and Guidance

7. Legislation applicable to archaeology and cultural heritage including national and international policy which recognise the value and significance of cultural heritage are outlined throughout this section. These have been reviewed for their relevance to archaeology and cultural heritage when undertaking the **Offshore EIA Report**.

15.2.1 International Legislation and Policy

8. **Table 15.1** below provides a summary of the key international legislation and policy relevant to the scheme with respect to archaeology and cultural heritage.

Table 15.1: Summary of key international legislation and policy relevant to the Project

Legislation/Policy	Relevance	Reference Location in this EIA
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972	Article 1. For the purposes of this Convention, the following shall be considered as "cultural heritage": […] sites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view Article 4. Each State Party to this Convention recognises that the duty of ensuring the identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation financial, artistic, scientific, and technical, which it may be able to obtain.	The identification of heritage assets is provided in **Section 15.6** along with an assessment of their cultural significance and importance. Potential impacts upon sites and objects of archaeological interest offshore are set out in **Section 15.7**. along with a proposed approach to mitigation.
International Convention for the Law of the Sea, 1982	Article 303. Archaeological and historical objects found at sea: States have the duty to protect objects of an archaeological and historical nature found at sea and shall cooperate for this purpose. In order to control traffic in such objects, the coastal State may, […] presume that their removal from the seabed in the zone referred to in that article without its approval would result in an infringement within its territory or territorial sea of the laws and regulations referred to in that article.	Potential impacts upon sites and objects of archaeological interest offshore are set out in **Section 15.7.** along with a proposed approach to mitigation.
European Convention on the Protection of the Archaeological Heritage, Valletta, 1992	Article 1. The aim of this (revised) Convention is to protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study.	Potential impacts upon sites and objects of archaeological interest offshore are set out in **Section 15.7.** along with a proposed approach to mitigation.
UNESCO Convention on the Protection of the Underwater Cultural Heritage, 2001	Although the UK has not ratified the United Nations Educational, Scientific and Cultural Organization (UNESCO), the principles set out in the Annex have been adopted. Rule 1. of the Annex states: The protection of underwater cultural heritage through in situ preservation shall be considered as the first option. Accordingly, activities directed at underwater cultural heritage shall be authorised in a manner consistent with the protection of that heritage, and subject to that	Potential impacts upon sites and objects of archaeological interest offshore are set out in **Section 15.7**. along with a proposed approach to mitigation.

Legislation/Policy	Relevance	Reference Location in this EIA
	requirement may be authorised for the purpose of making a significant contribution to protection or knowledge or enhancement of underwater cultural heritage.	

15.2.2 National Legislation and Policy

15.2.2.1 Scottish Planning Policy 2014

9. The Scottish Planning Policy (SPP) (Scottish Government, 2014b) states:

> *"Planning authorities should protect archaeological sites and monuments as an important, finite and non-renewable resource and preserve them in situ wherever possible. Where in situ preservation is not possible, planning authorities should, through the use of conditions or a legal obligation, ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development. If archaeological discoveries are made, they should be reported to the planning authority to enable discussion on appropriate measures, such as inspection and recording.*
>
> *There is also a range of non-designated historic assets and areas of historical interest, including historic landscapes, other gardens and designed landscapes, woodlands, and routes such as drove roads which do not have statutory protection. These resources are; however, an important part of Scotland's heritage and planning authorities should protect and preserve significant resources as far as possible, in situ wherever feasible".*

10. Paragraph 110 of the SPP (Scottish Government, 2014b) states that the Scottish Government's policy on the historic environment and guidance on relevant legislation is set out in the Scottish Historic Environment Policy.

15.2.2.2 Historic Environment Policy for Scotland (2019)

11. Scotland's Historic Environment Policy sets out the principles and policies that make up the Historic Environment Policy for Scotland (HEPS) and aiming to deliver the shared vision that:

> *"Scotland's historic environment is understood and valued, cared for, and protected, enjoyed, and enhanced. It is at the heart of a flourishing and sustainable Scotland and will be passed on with pride to benefit future generations."*

12. Although HEPS is non-statutory, HEPS is designed to support and enable good decision making about changes to the historic environment. It should be considered whenever a decision will affect the historic environment and is a material consideration for planning proposals that might affect the historic environment. The policies for managing the historic environment are set out in **Table 15.2** below.

Table 15.2: HEPS Policies for Managing the Historic Environment

Policy Reference	Policy Text
HEP 1	Decisions affecting any part of the historic environment should be informed by an inclusive understanding of its breadth and cultural significance.
HEP 2	Decisions affecting the historic environment should ensure that its understanding and enjoyment as well as its benefits are secured for present and future generations.
HEP 3	Plans, programmes, policies and strategies, and the allocation of resources, should be approached in a way that protects and promotes the historic environment.

Policy Reference	Policy Text
	If detrimental impact on the historic environment is unavoidable, it should be minimised. Steps should be taken to demonstrate that alternatives have been explored, and mitigation measures should be put in place.
HEP 4	Changes to specific assets and their context should be managed in a way that protects the historic environment. Opportunities for enhancement should be identified where appropriate. If detrimental impact on the historic environment is unavoidable, it should be minimised. Steps should be taken to demonstrate that alternatives have been explored, and mitigation measures should be put in place.
HEP 5	Decisions affecting the historic environment should contribute to the sustainable development of communities and places.
HEP 6	Decisions affecting the historic environment should be informed by an inclusive understanding of the potential consequences for people and communities. Decision-making processes should be collaborative, open, transparent, and easy to understand.

15.2.2.3 Scotland's National Marine Plan (2015)

13. Scotland's National Marine Plan (2015) provides a comprehensive overarching framework for all marine activity in Scottish waters. It enables sustainable development and use of marine areas in a way which protects and enhances the marine environment whilst promoting both existing and emerging industries.

14. The Plan contain several policies relating to the Historic Environment. Policy GEN 6 Historic environment States: '*Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance'*.

15. Similarly, Policy GEN 7 Landscape/seascape states: '*Marine planners and decision makers should ensure that development and use of the marine environment take seascape, landscape and visual impacts into account*'.

15.2.2.4 National Planning Framework 3 and 4

16. The NPF provides a statutory framework for Scotland's long-term spatial development. The NPF sets out the Scottish Government's spatial development priorities for the next 20 to 30 years. The SPP sets out policy that will help to deliver the objectives of the NPF.

17. NPF3 recognises the contribution made by cultural heritage to the Scottish economy, cultural identity, and quality of life. It recognises planning has an important role to play in maintaining and enhancing the distinctive and high-quality, irreplaceable historic places which enrich lives, contribute to a sense of identity and are an important resource for tourism and the leisure industry.

18. It recognises the historic environment is a key cultural and economic asset and a source of inspiration that should be integral to creating successful places. As such the planning system should:

- promote the care and protection of the designated and non-designated historic environment (including individual assets, related settings, and the wider cultural landscape) and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning; and
- enable positive change in the historic environment which is informed by a clear understanding of the importance of the heritage assets affected and ensure their future use. Change should be sensitively managed to avoid or minimise adverse impacts on the fabric and setting of the asset, and ensure that its special characteristics are protected, conserved, or enhanced.

19. Additionally, NPF4 (Policy 7) the need to protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places. The policy seeks to achieve the following outcomes:

    - The historic environment is valued, protected, and enhanced, supporting the transition to net zero and ensuring assets are resilient to current and future impacts of climate change; and
    - Recognise the social, environmental and economic value of the historic environment, to our economy and cultural identity.

20. The SPP and NPF3 are supported by the Planning Advice Notes. These provide advice on good practice and other relevant information. Planning Advice Note 2/2011: Planning and archaeology states that:

    "*Developers should consider the possibility of archaeological remains at an early stage in the planning of their development and enter into early discussions with the local authority archaeologist where remains may be present. Developers should be prepared to undertake appropriate excavation and/or recording before and/or during development, and to support consequential analysis, publication and archiving of the results, and this can be required by the planning authority through the use of conditions or a legal agreement*".

15.2.2.5 Historic Environment Scotland Act 2014

21. The primary current legislation relating to the historic environment in Scotland is the Historic Environment Scotland Act 2014 which sets out Historic Environment Scotland's (HES) role and legal status. It includes changes in processes for the designation of monuments and buildings (scheduling and listing) and for consents relating to scheduled monuments, listed buildings and conservation areas. The Act amended the following pieces of legislation:

    - Ancient Monuments and Archaeological Areas Act 1979;
    - Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
    - Environmental Assessment (Scotland) Act 2005; and
    - Marine (Scotland) Act 2010.

22. In addition to listed buildings and scheduled monuments within terrestrial environments, archaeological sites on the forehorse may also be protected as scheduled monuments, such as:

    - crannogs and fish-traps;
    - the remains of castles;
    - industrial and religious sites along the coastal edge;
    - settlements; and
    - coastal defence networks and military defences.

23. Similarly, coastal buildings and structures of special architectural or historic interest may be protected as listed buildings, such as harbours, lighthouses or piers and bridges.

15.2.2.6 Marine (Scotland) Act 2010

24. Marine historic assets of national importance which are situated in Scottish territorial waters (0–12 miles) can be designated as Historic Marine Protected Areas (HMPA) under the Marine (Scotland) Act 2010. In Scotland, HMPAs have replaced Section 1 of the Protection of Wrecks Act 1973, which provides protection for designated shipwrecks in the UK. Section 1 of the Protection of Wrecks Act

1973 provides for wrecks to be designated because of historical, archaeological, or artistic value. Section 2 provides for designation of dangerous sites. Military wrecks and aircraft are further addressed through the Protection of Military Remains Act 1986.

15.2.2.7 Protection of Military Remains Act 1986

25. Under the Act all military aircraft wrecks are automatically designated as Protected Places under the Protection of Military Remains Act 1986. Vessels, which meet the criteria of being sunk or stranded while in military service, may be designated as either a Protected Place or a Controlled Site. Divers can visit a Protected Place on a 'look but don't touch' basis. Divers may not visit a Controlled Site without a license.

15.2.3 Guidance

26. 'Managing Change in the Historic Environment' is a series of guidance notes published by HES about making changes to the historic environment. This assessment has been carried out in accordance with the published guidance, specifically:

- Managing Change in the Historic Environment: Setting (2020)
- Guidance on Conservation Areas (2019)

27. Additionally, the following guidance will also be considered:

- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development (JNAPC and The Crown Estate 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology 2008); and
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b).

15.3 Consultation

28. Consultation is a key feature of the EIA process, and continues throughout the lifecycle of the Project, from the initial stages through to consent and post-consent.

29. To date, consultation with regards to Offshore Archaeology and Cultural Heritage has been undertaken via the **Offshore Scoping Report** (Royal HaskoningDHV, 2021) (**Appendix 1.2**), which was submitted to Marine Scotland Licensing Operations Team (MS-LOT) in November 2021. A 30-day consultation process on the **Offshore Scoping Report** was coordinated by MS-LOT, commencing on 3rd December 2021. MS-LOT submitted their **Scoping Opinion** (**Appendix 1.1**) in April 2022.

30. All consultation regarding to date has been undertaken in line with the general process described in **Chapter 6: EIA Methodology.** Feedback received during this consultation process has been incorporated into the **Offshore EIA Report** wherever possible. A summary of consultation responses is presented in **Table 15.3**.

Table 15.3: Summary of Consultation.

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
Marine Scotland Licensing Operations Team (MS-LOT)	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	**[Ref: 5.17.1] Marine Archaeology and Cultural Heritage:** The Scottish Ministers are broadly content with the Study Area and that baseline data gathered is appropriate for the assessment. However, the Scottish Ministers draw attention to the representation from HES which highlights that the Developer has referenced HES' "Managing Change" guidance note dated 2016 and notes that this guidance was updated in 2020. The Scottish Ministers advise that the Developer must review and implement any necessary changes included in the updated guidance. The Scottish Ministers also highlight the Aberdeenshire Council representation which notes that the Aberdeenshire Historic Environment Record (HER) included with data sources in Table 7.9 of the Scoping Report includes maritime records which should be utilised in conjunction with those extracted from Canmore.	The guidance document has been updated and referred to throughout this chapter. Data sources including Aberdeenshire HER are outlined in **Section 15.5.2.2**
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	**[Ref: 5.17.2] Marine Archaeology and Cultural Heritage:** In Table 7.11 of the Scoping Report the Developer summarises the potential impacts to marine archaeology and cultural heritage during different phases of the Proposed Development. The Scottish Ministers are broadly content with the impacts proposed to be scoped in to and out of the EIA Report. However, the Scottish Ministers advise that cumulative impacts on archaeology should be scoped in to the EIA Report and the HES and NorthConnect representations must be addressed in full by the Developer in this regard.	Cumulative impacts are assessed in **Section 15.4.2,** and will also be assessed in the EIA for the onshore project elements.
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	**[Ref: 5.17.3] Marine Archaeology and Cultural Heritage:** In regards to the embedded mitigations proposed, the Scottish Ministers are content with those proposed in Section 7.4.3.5 of the Scoping Report. In addition the Scottish Ministers direct the Developer to the HES representation which underlines the requirement for a Written Scheme of Investigation with a Protocol for Archaeological Discoveries to be prepared and the NorthConnect representation which recommends that appropriate mitigations are put in place to manage unexpected or incidental archaeological finds. The Scottish Ministers advise that this must be implemented and fully addressed by the Developer.	An Outline Written Scheme of Investigation (WSI) has been produced in support of the **Offshore EIA Report** in **Appendix 15.2.** With respect to the NorthConnect representation, mitigation for the Project is discussed in **Section 15.7.2** and will be refined once the final design and layout is confirmed
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion for Green Volt Offshore Windfarm	**[Ref: 5.17.4] Marine Archaeology and Cultural Heritage:** The Scottish Ministers ask the Developer to note the representation from Aberdeenshire Council that emphasises the potential for aviation remains to be present in the Proposed Development Area. The representation states that this is in the light of its location, which as noted by the Developer in Section 7.4.2 of the Scoping Report, is close to Peterhead which was heavily bombed during World War II. The Scottish Ministers advise the Developer to address the Aberdeenshire Council representation in full.	Further detailed geophysical survey will be undertaken post-consent and pre-construction as outlined in **Section 15.7.2**. It is noted that Unexploded Ordnance (UXO) also has heritage interest/cultural significance. However, in dealing with UXO safety is the primary concern. As such, heritage interest/cultural significance is a secondary concern.
MS-LOT	April 2022, Marine Scotland - Licensing Operations Team: Scoping Opinion	**[Ref: 2.5.8] Description of the Proposed Development:** The EIA Report must also include consideration of the options which will be assessed in relation to UXO clearance, the differences amongst	The detonation of UXO has the potential to negatively affect cultural heritage assets. However,

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
	for Green Volt Offshore Windfarm	them and an assessment of the environmental effects of these options. In this regard, the Scottish Ministers advise that the EIA Report must include a worst case of high order detonation in terms of impact and mitigation, unless there is robust supporting evidence that can be presented to show consistent performance of the preferred low order or deflagration method.	through the implementation of a PAD as outline in **Section 15.7.2** any assets can be investigated, recorded, and relocated where required.
Aberdeenshire Council	24th December 2021 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We agree with the proposed methodology for undertaking the assessment of the historic environment for the offshore part of the development as detailed in this report (i.e. seawards of the MHWS). Within the list of Data Sources in Table 7.9 we would note that the Aberdeenshire Historic Environment Record (HER) also includes maritime records as well which should be considered in conjunction with those extracted from CANMORE.	Data sources including Aberdeenshire HER are outlined in **Section 15.5.2.2**
Aberdeenshire Council	24th December 2021 Representation to MS-LOT during consultation on Offshore Scoping Opinion	Page 165, 5th paragraph notes that the development and Cable Corridor are likely to lay within the former Luftwaffe flight path during the World War II (WWII) bombing raids, and as such that there is potential for aviation remains relating to this activity to be located within this area. It should also therefore be noted that this also the potential for unexploded ordnance to be present as well, a factor to be taken into consideration when assessing the development site.	It is noted that UXO also has heritage interest/cultural significance. However, in dealing with UXO safety is the primary concern. As such, heritage interest/cultural significance is a secondary concern
Aberdeenshire Council	24th December 2021 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We agree with indirect impacts on heritage assets being scoped out of the EIA.	Impacts are discussed in **Section 15.7**
Aberdeenshire Council	24th December 2021 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We agree with the proposed mitigation to be included within the project design (Section 7.4.3.5)	Mitigation is discussed in **Section 15.7.2**
Historic Environment Scotland (HES)	14th February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We welcome the thorough scoping exercise undertaken for the proposed development as set out in Section 7.4 of the Scoping Report and note it has been made with reference to our Managing Change guidance note on Setting (2016). Please note that this Guidance was updated in 2020 and can be accessed here.	Noted this has been updated throughout
HES	14th February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We are content that there has been a substantive review of historic environment baseline data from appropriate sources and that this is sufficient to underpin the forthcoming assessment.	No response required
HES	14th February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We welcome that the Scoping Report proposes to assess both potential direct and indirect impacts on terrestrial and marine archaeology caused by the construction of the wind farm and export Cable Corridor. We consider the proposed methodologies appropriate.	Terrestrial archaeology is not covered by this **Offshore EIA Report**. Terrestrial archaeology will be considered within the **Onshore EIA Report**
HES	14th February 2022 Representation to MS-LOT during	We also welcome the proposal to ensure that appropriate mitigation is embedded into the scheme. As part of this, we would highlight the requirement for	An **Outline WSI (Offshore)** (**Appendix 15.2**) has been produced

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
	consultation on Offshore Scoping Opinion	the preparation of a project specific Written Scheme of Investigation (WSI) with a Protocol for Archaeological Discoveries (PAD).	in support of the **Offshore EIA Report.**
HES	14th February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	The relevant local authority archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.	Noted. Green Volt Offshore Windfarm Ltd (the Applicant) has also engaged with the Aberdeenshire Council and the Archaeology Service.
HES	14th February 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	We note the potential for cumulative impacts on the setting of terrestrial heritage assets within our remit by the development of this wind farm in combination with other existing and proposed off-shore wind farms in the area. In this case, we would also recommend that cumulative impacts are carefully considered as part of your EIA assessment.	Cumulative impacts are assessed in **Section 15.4.2,** and will also be assessed in the EIA for the onshore project elements.
NorthConnect	April 2022 Representation to MS-LOT during consultation on Offshore Scoping Opinion	Sections 7.4.3.1 Potential Impacts During Construction and 7.4.3.4 Potential Cumulative Impacts with regards to Archaeology, put a level of reliance on the NorthConnect mitigation. It is understood the Green Volt cable may be laid within the consented NorthConnect corridor, which is nominally 500m wide, although it has been surveyed this does not preclude the potential for unexpected or incidental finds. Hence, NorthConnect have a protocol for archaeological discoveries in place for cable installation works. However, the actual cable lay footprint will be much narrower than the consented corridor and any unexpected or incidental finds during construction will be limited to the cable lay area. As such it should not be assumed that where the Green Volt cable will be laid will be free from archaeological artifacts, therefore Green Volt will need to have their own appropriate mitigation in place to manage archaeology finds.	Noted. Mitigation for the Project is discussed in **Section 15.7.2** and will be refined once the final design and layout is confirmed

15.4 Impact Assessment Methodology

31. The following sections sets out the impact assessment methodology offshore archaeology and cultural heritage within the Offshore Development Area. The approach to identifying and evaluating potential impacts upon the historic environment (within offshore and intertidal contexts, up to MHWS) arising due to the project, is also set out.

32. This section also sets out how the methodologies for cumulative impact assessments and transboundary impact assessment differ from the main EIA impact assessment methodology.

33. Note that this Chapter defined magnitude in terms of impact and significance in terms of effect, unlike **Chapters 6-14**, and **16 – 20** in this **Offshore EIA Report**.

15.4.1 Impact Assessment Methodology

34. **Chapter 6: EIA Methodology** provides a summary of the general impact assessment methodology applied to the Project. The following sections confirm the methodology used to assess the potential impacts on Offshore Archaeology and Cultural Heritage only.

35. The impact assessment methodology adopted for Offshore Archaeology and Cultural Heritage will define heritage assets, and their settings, likely to be impacted by the Project. It will assess the level of change to their cultural significance.

36. The assessment is not limited to direct impacts, but also assesses possible indirect impacts upon heritage assets which may arise. These can be due to changes to hydrodynamic and sedimentary processes, changes to the setting of heritage assets, whether visually, or in the form of noise and vibration, spatial associations, and a consideration of historic relationships between places which may impact their cultural significance.

37. As set out in Principles of CHIA in the UK (IEMA, IHBC and CIfA, 2021, hereafter 'the Principles'), CHIA is concerned with "understanding the consequences of change to cultural significance". The principles of assessment are:

    A. understanding cultural heritage assets; and

    B. evaluating the consequences of change.

38. Understanding cultural heritage assets distinguishes between:

    - describing the asset (what it is and what is known about it);
    - ascribing cultural significance (a description of what is valued about it); and
    - attributing importance (a scaled measure of the degree to which the cultural significance of that asset should be protected).

39. Evaluating the consequences of change also distinguishes between three separate analytical stages:

    - understanding change (a factual statement of how a proposal would change a cultural heritage asset or its setting, including how it is experienced);
    - assessing impact (a scaled measure of the degree to which any change would impact on cultural significance); and
    - and weighting the effect (the measure that brings together the magnitude of the impact and the cultural heritage asset's importance).

40. The relationship between these principles and the general approach to EIA is described below.

15.4.1.1 Understanding Cultural Heritage Assets

41. A description of the assets, and their cultural significance, relevant to the assessment of Offshore Archaeology and Cultural Heritage is provided in **Section 15.6**. At this initial stage of the project, many of these assets are not yet fully understood. However, as set out in the Principles (IEMA, IHBC and CIfA, 2021), proportionality is key, and applicants must provide a level of detail that is proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their cultural significance. The level of detail provided in **Section 15.6**, therefore, sufficiently characterises these assets so that potential impacts upon their cultural significance can be understood for the purposes of EIA.

42. Further investigation and data gathering will be progressed post-consent, including high resolution surveys, alongside additional mitigation requirements. This is in line with the Principles (IEMA, IHBC and CIfA, 2021) which describe how,

> "*an understanding of the cultural heritage asset is likely to be an iterative process which regularly reappraises the consequential impact on cultural significance as a proposal evolves or as more evidence emerges from research and investigations*".

43. **Section 15.6.** therefore, also highlights where there is a need to acquire additional information, and when this will be progressed, as part of an ongoing iterative design process.

44. HES's *Historic Environment Policy for Scotland* (HES, 2019) defines cultural significance as:

> '*Aesthetic, historic, scientific or social value for past, present or future generations. Cultural significance can be embodied in a place itself, its fabric, setting, use, associations, meanings, records, related places, and related objects*'.

45. As defined in the Principles, cultural significance does not have a scale associated with it and it is therefore not appropriate to refer to 'high' or 'low' cultural significance. This scaling is addressed through the separate consideration of a heritage asset's importance. Cultural significance is not directly related to designation status, nor is it defined in law. However, the reasons for designation may articulate aspects of heritage significance

46. In describing the cultural significance of heritage assets, reference will also be made to the contribution of setting to that cultural significance. The setting of a heritage asset is described as the way the surroundings of a historic asset or place contribute to how it is understood, appreciated, and experienced (HES, 2020). Elements of an asset's setting may make a positive or negative contribution to the cultural significance of an asset, may affect the ability to appreciate that cultural significance or may be neutral.

47. The importance of a heritage asset is a measure of the degree to which we seek to protect and preserve the cultural significance of that asset through, for example, legislation and planning policy. Determining the importance of an asset is a key decision in impact assessment as it will affect judgements regarding the relative weight to be given to protecting different assets during the design of a proposal.

48. Importance is scaled (unlike cultural significance) and requires the assessor to make a judgement regarding the merits of different heritage assets. It is therefore appropriate to refer to 'high' or 'low' importance for example. The statutory designation of heritage assets provides examples of how assets can be assigned a level of importance against explicit criteria. Some designated assets are judged to be of national importance, for example Scheduled Monuments, and World Heritage Sites are, again by definition, sites of international importance.

49. In determining the significance of impacts for the purposes of EIA, this last analytical stage (attributing importance) broadly equates to 'sensitivity' as described in **Section 15.4.1.3** below.

15.4.1.2 Evaluating the Consequences of Change

50. The Principles (IEMA, IHBC and CIfA, 2021) describe change as, "*both the act and the result of making something different from how it was before, whether directly or indirectly, temporarily or permanently, reversibly or irreversibly*". It is also important to note that change may or may not lead to an impact on cultural significance. Before a scaled measure of this change can be determined it is necessary to describe the potential change to a heritage asset or its setting. To this end, a narrative approach describing the nature of potential changes is provided for each impact assessed in **Section 15.6.2**.

51. This is followed by the determination of a scaled measure of the degree to which any change would impact cultural significance, which broadly equates to the 'magnitude of impact' as described in **Section 15.4.1.3** below. This change could have a positive (beneficial) or negative (adverse) outcome. It is not a measure of the reach or extent of the proposal but rather the change to 'what matters' about a heritage asset.

52. The final stage is weighting the effect (the measure that brings together the magnitude of the impact and the cultural heritage asset's importance) (see **Table 15.31**). For the Project this is articulated through the significance of effect matrix presented in **Table 15.6**. Following on from the previous stages of the assessment (which draw out the narrative regarding the importance of a cultural heritage asset, its cultural significance, and how the proposal will impact this cultural significance), this measure is indicative of the weight that should be given to the matter in influencing the design of the proposal or, ultimately, in influencing whether the proposal will be acceptable and permitted.

53. Definitions for this weighted measure of significance of effect (in EIA terms) are provided in **Table 15.7**.

15.4.1.3 Definitions of Sensitivity and Magnitude

54. The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. However, while impacts to a heritage asset's setting or character can be temporary, impacts which result in damage or destruction of the assets themselves, or their relationship with their wider environment and context, are permanent. Once destroyed an asset cannot recover. On this basis, the assessment of the significance of effect of any identified impact is largely a product of the importance of an asset (rather than its sensitivity) and the degree to which any change would impact on cultural significance.

55. For the purposes of this **Offshore EIA Report**, the criteria for determining the heritage importance of any relevant heritage assets are described in **Table 15.4**.

56. The categories and definitions of heritage importance do not necessarily reflect a definitive level of importance of an asset. They are intended to provide a provisional guide to the assessment of perceived heritage importance, which is to be based upon professional judgement incorporating the evidential, archaeological, historical, aesthetic, architectural and communal heritage values of the asset or assets. It is important to note that the importance and cultural significance of an asset can be amended or revised as more information comes to light (i.e., as part of further investigations planned post-consent). Any amendments to the mitigation requirements for the project as a result changes to the importance and cultural significance of an asset would be considered in consultation with the Applicant and HES as required. **Table 15.4** includes heritage assets of uncertain heritage importance i.e., where the importance, existence and / or level of survival of an asset has not been ascertained (or fully understood) from available evidence. Although **Table 15.4** provides a definition for assets of an uncertain heritage importance, where uncertainty occurs, the precautionary approach is to assign the highest likely level of importance. This precautionary approach represents good practice in cultural heritage impact assessment and reduces the potential for impacts to be under-estimated.

Table 15.4: Criteria for Determining Cultural Heritage Importance

Cultural Heritage Importance	Definition
High (perceived International / National Importance)	World Heritage Sites Scheduled Monuments Grade I and II* Listed Buildings or structures Historic Marine Protected Areas Protected wrecks

Cultural Heritage Importance	Definition
	Sites and vessels designated under the Protection of Military Remains Act 1986 (aircraft and vessels). Designated historic landscapes of outstanding interest Conservation Areas containing buildings or structures with high heritage importance, or high concentrations of listed buildings Assets of acknowledged international / national importance Assets that can contribute significantly to acknowledged international / national research objectives
Medium (perceived Regional Importance)	Grade II Listed Buildings or structures Designated special historic landscapes Other types and character of Conservation Areas Assets that contribute to regional research objectives Assets with regional value, educational interest or cultural appreciation
Low (perceived Local importance)	'Locally Listed' buildings or structures Assets that contribute to local research objectives Assets with local value, educational interest or cultural appreciation Assets compromised by poor preservation and / or poor contextual associations
Negligible	Assets with no significant value or archaeological / historical interest
Uncertain/Unknown	The importance / existence / level of survival of the asset has not been ascertained (or fully ascertained / understood) from available evidence

57. Magnitude broadly equates as the degree to which cultural significance is positively or negatively changed by the proposal.

58. Direct impacts, indirect impacts and impacts from a change in setting on the cultural significance of heritage assets are considered relevant. Impacts may be adverse or beneficial. Depending on the nature of the impact and the duration of development, impacts can also be temporary and / or reversible or permanent and / or irreversible.

59. The finite nature of archaeological remains means that physical impacts are almost always permanent and irreversible as the 'fabric' of the asset and, hence, its potential to inform our historical understanding, will be removed. By contrast, impacts resulting from the change in the setting of heritage assets will depend upon the longevity of construction and operation of the Project and the sensitivity with which the landscape/seascape is re-instated after decommissioning / demolition, if applicable.

60. The magnitude of adverse impact with respect to offshore archaeology and cultural heritage directly relates to the extent of harm to, or loss of, key elements of the asset's cultural significance, which may include its setting.

61. The magnitude of beneficial impact with respect to offshore archaeology and cultural heritage directly relates to the level of public benefit associated with an individual impact. Benefits may correspond directly to the project itself where a project will enhance the historic environment (e.g., through measures which will improve the setting of a heritage asset or public access to it).

62. Alternatively, benefits may occur on the basis of data gathering exercises undertaken for the purpose of a project which will enhance public understanding by adding to the archaeological record (e.g., through the accumulation of publicly available information and data). The measure of beneficial impact (high / medium / low) is, therefore, necessarily situational, and specific to a given site, area or subject. One such example of a positive magnitude of impact could be relevant to, for example, new survey data being acquired, which will ultimately be made publicly accessible.

63. The criteria used for assessing the magnitude of impact regarding archaeology and cultural heritage are presented in **Table 15.5**.

Table 15.5: Definition of Magnitude of Impact to Heritage Assets

Magnitude	Definition
High Adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's cultural significance is lost or severely compromised.
Medium Adverse	Elements of the asset's fabric and/or setting which contribute to its cultural significance are affected, but to a more limited extent, resulting in an appreciable but partial loss of the asset's cultural significance.
Low Adverse	Elements of the asset's fabric and/or setting which contribute to its cultural significance are affected, resulting in a slight loss of cultural significance.
Negligible	The asset's fabric and/or setting is changed in ways which do not materially affect its cultural significance.
Low Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved *in situ*; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
Medium Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved *in situ*; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
High Beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved *in situ*; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.

15.4.1.4 Significance of Effect

64. In accordance with the Principles (IEMA, IHBC and CIfA, 2021), for the purposes of this chapter the assessment refers to magnitude of impact and significance of effect. This is a departure from the language used in other chapters which refers to magnitude of effect and impact significance.

65. In basic terms, the potential significance of effect is a function of the sensitivity of the receptor and the magnitude of the impact. As described above, for Offshore Archaeology and Cultural Heritage this equates to the importance of a heritage asset weighed against the magnitude of change to its cultural significance. The determination of significance is guided using a significance of effect matrix, as shown in **Table 15.6**. Definitions of each level of significance are provided in **Table 15.7**.

66. Potential effects identified within the assessment as major or moderate are regarded as significant in terms of the EIA regulations. Potential effects should be described using significance of effect, followed by a statement of whether this is significant in terms of the EIA regulations, e.g., "*minor adverse effect, not significant in EIA terms / moderate adverse effect, significant in EIA terms"*. Appropriate mitigation has been identified, where possible, in consultation with the regulatory authorities and relevant stakeholders. The aim of mitigation measures is to avoid or reduce the overall impact to determine a residual impact upon a given receptor.

Table 15.6: Significance of Effect Matrix

		Adverse Magnitude				Beneficial Magnitude			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Cultural Heritage Importance	**High**	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 15.7: Definition of Significance of Effect.

Effect Significance	Definition
Major	Change in cultural significance, both adverse or beneficial, which are likely to be important considerations at a national or regional level because they contribute to achieving national or regional objectives. Effective/acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Moderate	Change in cultural significance, both adverse or beneficial, which are likely to be important considerations at a local level. Effective / acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Minor	Change in cultural significance, both adverse or beneficial, which may be raised as local issues but are unlikely to be material considerations in the decision-making process. Industry standard mitigation measures may still apply.
Negligible	No material change to cultural significance.
No Change	No impact, therefore, no change to cultural significance.

15.4.2 Cumulative Impact Assessment

67. CIA considers other plans, projects and activities that may impact cumulatively with the Project. As part of this process, the assessment considers which of the residual impacts assessed for The Project on their own have the potential to contribute to a cumulative impact, the data and information available to inform the cumulative assessment and the resulting confidence in any assessment that is undertaken. **Chapter 6: EIA Methodology** provides further details of the general framework and approach to the CIA.

68. For Offshore Archaeology and Cultural Heritage, cumulative impacts may occur where archaeological receptors also have the potential to be impacted by other existing, consented and/or proposed developments or activities. This includes consideration of the extent of influence of changes to marine physical processes (see **Chapter 7: Marine Geology, Oceanography and Physical Processes**) arising from the Project alone and those arising from the Project cumulatively or in combination with other offshore wind farm developments.

69. Cumulative impacts are considered in **Section 15.8**.

15.4.3 Transboundary Impact Assessment

70. The transboundary assessment considers the potential for transboundary effects to occur on Offshore Archaeology and Cultural Heritage receptors as a result of the Project either those that might arise within the Exclusive Economic Zone (EEZ) of European Economic Area (EEA) states or arising on

the interests of EEA states e.g., a non-UK fishing vessel. **Chapter 6: EIA Methodology** provides further details of the general framework and approach to the assessment of transboundary effects.

71. For Offshore Archaeology and Cultural Heritage, transboundary impacts may be relevant heritage where wrecks of non-British, European nationality are subject to impact from development and may therefore fall within the jurisdiction of another country. Transboundary impacts may also occur if the cumulative effects of changes to physical processes have the potential to impact archaeology across extended sea areas. In addition, there is potential for developments, individually and cumulatively, to affect larger-scale archaeological features such as palaeolandscapes and to affect the setting of heritage assets and historic landscapes/seascapes which may also extend across these boundaries. This may also include sensitivities in conjunction with local community groups and interests.

72. Transboundary impacts are considered in **Section 15.9.**

15.5 Scope

15.5.1 Study Area

73. The Study Area for Offshore Archaeology and Cultural Heritage is defined as Offshore Development Area, comprising the Windfarm Site, the Buzzard Export Cable Corridor, the Landfall Export Cable Corridor, the NorthConnect Parallel and St Fergus South Landfalls and the intertidal zone at the landfall up to MHWS (see **Figure 15.1**).

LEGEND

- Windfarm Site
- Offshore Export Cable Corridor

0 20

Kilometres

Data:
Esri, HERE, Garmin
Esri, HERE
Contains OS data © Crown Copyright and database right 2022
Contains data from OS Zoomstack

PROJECT: GREEN VOLT

TITLE: Figure 15.1 Marine Archaeology and Cultural Heritage Study Area

VER	DATE	COMMENTS	DRAWN	CHECKED
001	13/01/2023		GC	CM

ARCGIS REF: PC2483_RHD_EIA_Offshore_Chpt_MarineArchaeology
LAYOUT: PC2483-RHD-EI-OF-D-GS-0040

SCALE:	PAGE SIZE:	COORDINATE SYSTEM:
1:600,000	A4	WGS 1984 UTM Zone 30N

GREEN VOLT

Royal HaskoningDHV
Enhancing Society Together

15.5.2 Data Sources and Information Sources

74. This Offshore Archaeology and Cultural heritage assessment includes all identified receptors within the Offshore Development Area. This will include any receptors in the intertidal zone.

15.5.2.1 Site-Specific Surveys

75. Geophysical survey data were collected across the Windfarm Site (116 km^2) and 75 kilometres (km) of cable route by Gardline in September 2021. Data for c.32 km of cable route from 12 nautical miles (nm) landward was collected by Hydrofix in March 2022 (see **Figure 2** of **Appendix 15.1**). No data were collected from shore to c.8.2 km on the St Fergus South Landfalls cable route, and from shore to 10.4 km on the NorthConnect Parallel Landfall Cable Route, this was due to restrictions from the local fishing community. Data collected for the Windfarm Site comprised:

- Side Scan Sonar (SSS)
- Magnetometer (MAG)
- Single Beam Echo Sounder (SBES)
- Multibeam Bathymetry/Echo Sounder (MBES)

76. Data collected for the Offshore Export Cable Corridor comprised to 12 nm:

- SSS
- MBES
- MAG

77. Data collected landward of 12 nm consisted only of MBES. This was because a European Protected Species (EPS) licence for mammal disturbance could not obtained within the Project timescales. Further data (SSS, MAG, MBES and Sub-Bottom Profiler (SBP) will be obtained to characterise these area post consent and once relevant licences have been obtained. Full details of the technical specifications of the acquired geophysical data can be found in **Section 4** of **Appendix 15.1**

78. MSDS Marine were appointed by Royal HaskoningDHV to undertake the archaeological assessment of geophysical and hydrographic survey data. MSDS Marine are a specialist marine and coastal contractor with offices in Derbyshire (England) and Skye (Scotland) and with extensive experience in this field.

79. Geophysical survey data was provided to MSDS Marine firstly to audit the data for its quality and suitability for archaeological purposes and for archaeological assessment. A summary of deliverables provided to MSDS Marine is provided in **Table 15.8** below.

Table 15.8: Data deliverables to MSDS Marine

Sensor	Deliverables
Sidescan Sonar (SSS)	Navigation corrected, unprocessed high and low frequency lines Georeferenced mosaic at 2 m resolution Seabed features
Multibeam Bathymetry (MBES)	Navigation corrected, unprocessed points Georeferenced mosaic at 2 m resolution Seabed features
Sub-bottom Profiler (SBP)	Navigation corrected, unprocessed lines Navigation corrected, processed lines Horizon grids and unit interpretations
Magnetometer (MAG)	Navigation corrected, unprocessed lines

Sensor	Deliverables
	Magnetic anomalies

80. Overall, the data were deemed suitable for archaeological interpretation. It must be noted that there is always potential for contacts of possible archaeological interest to not be visible in the data, this possibility is increased in areas of poor data quality or variable topography.

81. As part of their assessment, MSDS Marine applied a 500m buffer to the extents of the Windfarm Site and 200m from the Offshore Export Cable Corridor, where possible (where data collection allowed) (see **Figure 2** of **Appendix 15.1**). This was done to provide an assessment of the historic environment and therefore data from a wider area was considered.

15.5.2.2 Other Available Sources

82. In addition to the geophysical survey data, the sources presented in **Table 15.9** have been used to inform the Offshore Archaeology and Cultural Heritage assessment.

Table 15.9: Other Available Data and Information Sources.

Data Set	Spatial coverage	Notes
The United Kingdom Hydrographic Office (UKHO) data for charted wrecks and obstructions	UK	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
Maritime records maintained by CANMORE (National Record of the Historic Environment)	Scotland	Maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index
HES	Scotland	Records of designated heritage assets within Scotland, maintained by HES. Geographical Information System (GIS) data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Aberdeenshire HER	Aberdeenshire	Contains data on all recorded non-designated heritage assets, held by Aberdeenshire Council. The data includes archaeological, maritime records, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.
British Geological Survey (BGS)	UK	Historic borehole logs and the wider geological background for the region.
Regional Seascape Assessments (RSA)	Scotland	Character texts for seascape character of coastal and marine areas around Scotland.
Scottish Archaeological Research Framework (ScARF)	Scotland	The primary resource for Scottish archaeology, one which provides an overview of the subject and a set of relevant research questions to guide assessment.
Existing archaeological studies and published sources	North Sea	Background information on the archaeology of the North Sea, including the results of nearby offshore windfarm projects including NorthConnect Interconnector and the Ettrick and Blackbird oil and gas works.

15.5.3 Assumptions and Limitations

83. The records held by the UKHO, HES, CANMORE, Aberdeenshire HER, and the other sources used in this assessment are not a record of all surviving cultural heritage assets. Rather, they are a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these datasets is not complete and does not preclude the

subsequent discovery of further elements of the historic environment that are, at present, unknown. This particularly relates to buried archaeological features.

84. Additionally, as stated in **Section 15.5.2.1** above, only MBES data were collected for the Landfall Export Cable Corridor landward of 12 nm, while no data were collected for St Fergus South Export Cable Corridor or the NorthConnect Parallel Export Cable Corridor. This (SSS, MAG, MBES and SBP data) will be collected post consent and when all relevant licences have been obtained.

15.6 Existing Environment

15.6.1 Seabed Prehistory

85. There are no prehistoric sites or finds known from the Study Area but the potential for previously undiscovered prehistoric remains is summarised below.

86. At various times in the past the North Sea has been exposed as dry land including the Offshore Development Area which was dry land until sometime after c.16,000 BC (World Ocean Review, 2017). This is due to sea level falls driven by climate change. Buried sediments related to this may contain, not only direct archaeological evidence of the human occupation of the area, but also palaeo-environmental data. This can be used to develop an understanding of the wider natural environment within which early humans lived.

87. A range of Palaeolithic stone artefacts as well as Pleistocene faunal remains have been recovered in the North Sea. However, these have largely been found further south, from the Brown Ridge area and Dogger Bank, with the Scottish assemblage limited to two worked flints. One of these was obtained from a vibrocore (number 60+01/46) acquired as part of a BGS programme on the UK shelf, some 150 km northeast off Lerwick, near Viking bank further north of the Windfarm Site (ScARF, 2012). The other was recovered from a core taken from a depression of muddy sand off Halibut Bank (Flemming 2002).

88. A wide range of fossils have been identified in the Scottish North Sea (ScARF, 2012) including:

- reindeer
- bison
- musk-ox
- woolly mammoth
- red deer
- woolly rhino

89. In recent years, the archaeological assessment of marine geophysical and geotechnical data acquired for constructed and planned projects in the North Sea has led to a much greater understanding of the potential for prehistoric, maritime and aviation archaeology. For example, assessment undertaken for Moray East Offshore Windfarm demonstrated the presence of palaeo-landscape features and sub-seabed deposits of palaeo-environmental interest. Similarly, assessment undertaken for the Hywind, and Beatrice Offshore windfarms identified a lack of such features, helping to define where such features are less likely to be present.

90. There are no known seabed prehistory sites within the Offshore Development Area.

91. The potential for prehistoric sites to be present within Offshore Development Area, either exposed on or buried within the seabed, is primarily associated with surviving terrestrial features and deposits

corresponding to times when sea levels were lower. As such, prehistoric hominin populations may have inhabited what is now the seabed. Archaeological material may also be present within secondary contexts, as isolated finds within deposits comprising material from terrestrial phases that may have been reworked by marine or glacial processes, for example.

92. The shallow geology of the Offshore Development Area has been established from SBP data interpreted by MSDS Marine and other available studies which contribute to the understanding of the palaeolandscape and prehistoric archaeological potential within the area. This comprises a series of Pleistocene and Holocene sediments deposited in a range of environments, from terrestrial to marine. This potential is discussed in detail of **Appendix 15.1** and is summarised below. Account has also been taken of previous geoarchaeological assessments undertaken within the Offshore Development Area and in its vicinity. Previous assessments are summarised in **Table 15.10** below.

Table 15.10: Summary of Previous Assessments

Date	Site	Survey Details	Reference
2006	Ettrick	Environmental and geophysical data collection and included grab sampling, seabed photography and the collection of vibrocores, in addition to SSS, MBES and SBP data.	Fugro. (2006). Rig Site Survey UKCS 20/2a and 20/3a Ettrick Drill Sites Report No.: 68 - 8713.2 Volume II: Environmental Baseline Survey
2007	Blackbird	Survey to identify obstructions, geology, geohazards and environmental conditions, including collection of camera footage, grab sampling and coring. Geophysical survey data were also collected including SBP, echo sounder, MBES, SSS, 2D High Resolution Seismic data.	Gardline. (2007). Nexen Petroleum U.K. Ltd Site Survey UKCS 20/2a (Blackbird) January 2007 Survey Report
2008	Ettrick to Blackbird	Geophysical and environmental survey including SSS, MBES, pinger SBP, magnetometer data.	Fugro (2008). Pipeline Route Survey UKCS Block 20/2a Ettrick to Blackbird
2009	Blackbird	Rig site survey involving the collection of single beam and MBES, SSS, pinger and boomer (SBP) data, high resolution seismic, environmental camera, and grab data.	Gardline. (2009). Nexen Petroleum UK Ltd UKCS Block 20/2a Blackbird Site Survey
2010	Blackbird	Debris clearance accompanied by geophysical survey including single and MBES, SSS and pinger SBP.	Fugro. (2010). Debris Clearance Survey UKCS Block 20/2a Proposed Locations at Blackbird
2011	Blackbird	Including collection of single beam echo sounder, MBES, pinger SBP, SSS, magnetometer 2DHR multichannel seismic data, seabed sampling.	Fugro. (2011). Rig Site Survey UKCS Block 20/02 Proposed Location 20/02 Blackbird
2011	Ettrick	SSS data collection of debris identified within Ettrick site.	Fugro. (2011). Debris Box-In Survey, UKCS 20/02 Ettrick Wi Debris Memo
2013	Ettrick	Surveys associated with revised DCM location and including the collection of 2DHR infill lines and reporting on extensive 2DHR collected in 2005 and 2011, 3D seismic data, and collection of four CPTs.	RPS. (2013). Independent Geohazard Assessment: Ettrick DCM Revised Well Location UKCS, BLOCK 20/2a and 20/3a
2013	Ettrick	Habitat survey involving geophysical survey (SSS, MBES, SBP), grab samples and seabed photography.	Calesurvey. (2013a). Habitat survey involving geophysical survey (SSS, MBES, SBP), grab samples and seabed photography
2013	Ettrick	Environmental survey of proposed well locations including collection of 2DHR data, pinger SBP, single beam echosounder, MBES, SSS and Chirp and magnetometer data.	Calesurvey. (2013b). Ettrick Site Survey UKCS Blocks 20/2a and 20/3a Results Report

93. The geology within the Offshore Development Area has been divided by MSDS Marine into nine phases as summarised in **Table 15.11**.

Table 15.11: Shallow Stratigraphy of the Offshore Development Area Identified by MSDS Marine

Unit Name	Unit Age	Environment	Sediment Type	Archaeological Potential
Modern seabed sediments	Holocene	Marine	Veneer of fine silty sand with occasional shell fragment	Limited
Forth Formation (partially laterally equivalent to the Witch Ground Formation)	Late Devensian to early Holocene (MIS 2-1)	Glaciomarine, marine, estuarine, intertidal?	Sands resting on marine to glaciomarine muds	Archaeological and paleoenvironmental potential within some members
Witch Ground Formation	Late Devensian to early Holocene (MIS 2-1)?	Glaciomarine to marine	Very soft to soft silty clay with interbedded very loose silty sand silty sand toward the base (confirmed by vibrocores and cone penetration test (CPTs)). Highly irregular and erosive base.	Very limited
Wee Bankie Formation (laterally contemporary with the Swatchway Formation)	Late Devensian (MIS 3-2)	Sub glacial	Diamicton with some interbeds of sand, pebbly sand, and silty clay.	Limited/ no potential for *in situ* remains
Swatchway Formation	Late Devensian (MIS 3-2)	Glaciomarine to sub glacial?	Soft to firm silty clay and silty sand with occasional gravel, cobbles, and boulders	Very limited
Coal Pit Formation	Late to Middle Pleistocene (MIS 6-3)	Glaciomarine, marine, intertidal	Firm to stiff clay with dense layers of sand and occasional gravel, cobbles, and boulders	Limited
Fisher Formation	Middle Pleistocene Wolstonian Complex (MIS 10 – 6)	Glaciomarine to sub glacial	Firm to very stiff sandy clay, with sand layers.	Very limited
Ling Bank Formation	Middle Pleistocene	Glaciomarine to marine	Stiff to very stiff clay, silt and sand with gravel, cobbles, and boulders	Very limited
Aberdeen Ground Formation/ Near Base Quaternary	Middle to Early Pleistocene	Deltaic, marine, glacial, and terrestrial	Very stiff to very hard clay with occasional sandy and silty layers	Limited

94. These sedimentary units have been identified within the seismic data based on their seismic character and likely depositional environment, and tentatively correlated with known geological formations in the area based on the available data (Gardline, 2022). The base of each sedimentary unit has been mapped to feed into the ground model, and grids have been exported from the ground model for this assessment.

95. The stratigraphy set out in **Table 15.11** is a combination of all the interpreted shallow geological units from across the Offshore Development Area. The entire stratigraphy was not identified in any one single area of the Offshore Development Area, and the exact number of units present will differ depending on location. A full description of the stratigraphy is provided in **Section 9.5** of **Appendix 15.1**, with a summary of each unit provided below.

96. Relative sea level in the post-glacial period is not currently understood in detail, with different models and data presenting differing scenarios. Sea level over the late Pleistocene and Holocene (and over the last 2000 years) has been identified as an area of future research (Smith *et al*. 2019).

97. In general, the eastern coast of Scotland is agreed to be an area which saw variations in relative sea level, with episodes of regression and transgression occurring during the Late glacial and Holocene

periods (Stoker et al. 2008). Current models suggest that relative sea level within the area of the Offshore Development Area may have been lower than current levels at around 10,000 Before Present (BP) following the regression associated with the Loch Lomond Stadial. However, sea levels began to rise either toward the end of this period or during the early Holocene (Stoker et al. 2008).

98. Deposits within the site, particularly the Forth Formation, may have the potential to contribute to understanding of relative sea levels during these periods. Though uncertainties in relative sea level exist, based on current evidence, it is likely that much of the Offshore Development Area was inundated for much of the Holocene, though areas of the nearshore Cable Corridors may have been exposed during the Loch Lomond Stadial and Early Holocene.

99. During periods of sea level change areas of the cable corridors may have been exposed as intertidal and terrestrial areas, and the current intertidal zone may have been characterised as such potentially from the mid Holocene. Remains from Mesolithic sites indicate a strong focus on marine resources during this period, and evidence such as extensive shell middens suggest that exploitation of intertidal and nearshore areas formed a key part of life during the Mesolithic (Cramp *et al*. 2014 and Mellars 1987).

100. The intertidal and nearshore areas of the Offshore Development Area may have formed an attractive environment for exploitation during this period and remains relating to exploitation may have been laid down. Therefore, there is potential for archaeological remains to occur within these areas situated within the Forth Formation deposits dating to the Mesolithic. However, erosion and reworking of the deposits associated with any potential remains may also have occurred over the Holocene period, suggesting a greater potential for redeposited remains (Kuchar *et al*. 2012).

101. MSDS Marine have also interpreted several palaeogeographic features from the SBP data. While the seabed in the Windfarm Site is largely flat, with gentle undulations, pockmarks are recorded throughout the Windfarm Site (formed resulting from methane venting from deeper marine sediments) however, these are not of archaeological interest. Similarly, several irregular depressions thought to be associated with glacial boulders have been identified. Buried iceberg plough marks have also been observed within the bathymetry data, again likely associated with glaciation (Gardline 2021). The bathymetry and these features can be seen in **Figure 14** of **Appendix 15.1**. No other features associated with palaeolandscapes have been identified within the Cable Corridors or the Offshore Development Area.

102. Other seabed features noted within the array site are of modern origin and include scarring associated with former drilling, pipe laying and anchoring. These seabed scars were mapped by Gardline and are also presented in **Figure 4** and **Figure 5** in **Appendix 15.1**.

15.6.1.1 Cultural Significance of Identified Assets

103. There are no known seabed prehistory sites within the Offshore Development Area for which cultural significance can be described.

104. As such, the cultural significance of any palaeolandscapes, lies primarily in their archaeological interest or research value, particularly when considered alongside survey data and interpretations produced for other seabed development projects in the North Sea. This is discussed further in terms of CIA and transboundary impacts in **Sections 15.8** and **15.9** below

105. The setting of a heritage asset is described as the surroundings in which a heritage asset is experienced (Historic Environment Scotland, 2020). Elements of a setting may make a positive or negative contribution to the cultural significance of an asset, may affect the ability to appreciate that cultural significance or may be neutral. HES's guidance on setting notes how the setting of buried

heritage assets may not be readily appreciated by a casual observer but retain a presence in the landscape.

106. For offshore assets, for the most part, submerged archaeological sites are not '*readily appreciated by a casual observer*'. With respect to former prehistoric landscapes in the North Sea, these are largely experienced conceptually in terms of interpreted data and research. As such, the setting of these assets (in terms of the surroundings in which they are experienced) does not form a key part of their cultural significance. However, changes within the physical setting will occur (i.e., the introduction of the Project into the seascape) and the capacity of these palaeolandscapes to accommodate this change is discussed alongside historic seascape character in **Section 15.6.3.1**.

15.6.1.2 Importance of Identified Assets

107. The rarity of *in situ* prehistoric sites in offshore contexts means that should such sites be encountered with the project areas these will be of national, or possibly international interest. Such sites would have significant potential to contribute to acknowledged international and national research objectives. Given the particularly high importance of these *in situ* sites, the features and deposits which have the potential to contain *in situ* prehistoric archaeological material (i.e., interpreted palaeolandsurfaces and palaeolandscape features) should also be considered of high importance. Similarly, should palaeoenvironmental evidence be discovered in the context of an *in situ* prehistoric site this would also be of high importance.

108. Although palaeoenvironmental material encountered beyond the context of an *in situ* prehistoric site still has evidential value for understanding changes in the climate and environment with offshore contexts, isolated discovers should be considered of low importance for the purposes of assessment.

109. Isolated finds of prehistoric archaeological material within secondary contexts also have evidential value for understanding patterns of population and exploitation of landscapes. These may comprise material from terrestrial phases that may have been reworked by marine or glacial processes. However, as these finds are derived, and out of context, they are regarded as being of medium rather than high importance.

110. The heritage importance of the potential heritage assets outlined above are presented in **Table 15.12**.

Table 15.12: Heritage Importance (Seabed Prehistory)

Asset Type	Definition	Importance
Potential *in situ* prehistoric sites	Primary context features and associated artefacts and their physical setting (if/where present)	High
	Known submerged prehistoric sites and landscape features with the demonstrable potential to include artefactual material	
Potential submerged landscape features	Other known submerged palaeolandscape features and deposits likely to date to periods of prehistoric archaeological interest with the potential to contain *in situ* material	High
Potential derived Prehistoric finds	Isolated discoveries of prehistoric archaeological material discovered within secondary contexts	Medium
Potential palaeoenvironmental evidence	Isolated examples of palaeoenvironmental material	Low
	Palaeoenvironmental material associated with specific palaeolandscape features or archaeological material	High

15.6.2 Maritime and Aviation Archaeology

111. Within the Offshore Development Area there are no Historic MPAs. There are no designated areas, protected under Part 5 of the Marine (Scotland) Act 2010, which protect '*marine historic assets*' of national importance which survive in Scottish territorial waters.

112. Marine historic assets are defined in law and include a wide variety of man-made structures, including wrecked vessels and aviation crash sites. It can also include more scattered remains such as groups of artefacts on the seabed or submerged prehistoric landscapes (Historic Environment Scotland, 2019).

113. Similarly, there are no assets protected under the Protection of Military Remains Act 1986.

15.6.2.1 Seabed Features

114. SSS, MBES, and magnetometer data interpreted by MSDS Marine has demonstrated the presence of several seabed features which have been identified at varying levels of archaeological potential. Seabed features are discriminated by MSDS Marine in accordance with the definitions set out in **Table 15.13** below.

Table 15.13: MSDS Marine criteria for discriminating the relevance of identified seabed features with their

Potential	Criteria
Low	An anomaly potentially of anthropogenic origin but that is unlikely to be of archaeological (cultural) significance – Examples may include discarded modern debris such as rope, cable, chain, or fishing gear; small, isolated anomalies with no wider context; or small boulder-like features with associated magnetometer readings.
Medium	An anomaly believed to be of anthropogenic origin but that would require further investigation to establish its archaeological (cultural) significance – Examples may include larger unidentifiable debris or clusters of debris, unidentifiable structures, or significant magnetic anomalies.
High	An anomaly almost certainly of anthropogenic origin and with a high potential of being of archaeological (cultural) significance – high potential anomalies tend to be the remains of wrecks, the suspected remains of wrecks, or known structures of archaeological significance.

115. In total 32 anomalies of potential archaeological interest were identified by MSDS Marine. These are distributed across their Study Area as shown in **Table 15.14** and **Figures 8** and **9** of **Appendix 15.1**.

Table 15.14: Distribution of archaeological anomalies by potential

Potential	Windfarm Site	Windfarm Site 500m buffer	Landfall Export Cable Corridor	Buzzard Export Cable Corridor	Total
Low	22	7	1	1	31
Medium	0	0	0	0	0
High	1	0	0	0	1
Total	23	7	1	1	32

116. 31 anomalies have been interpreted by MSDS Marine as low archaeological potential within their Study Area. 22 of these anomalies lie within the Windfarm Site, while seven lie within the 500m buffer of the Windfarm Site. The two remaining anomalies are located along the cable corridors (one within the Buzzard Export Cable Corridor and the other in the Landfall Export Cable Corridor). These anomalies are set out in **Table 15.15**.

Table 15.15: Low potential anomaly categories as defined by MSDS Marine

Anomaly Category	Count	Anomaly ID
Chain, cable, or rope	2	GV22_0006 and GV22_0023
Likely geological	1	GV22_0004

Anomaly Category	Count	Anomaly ID
Possible mine sinker	8	GV22_0025 - GV22_0032
Potential debris	11	GV22_0002, GV22_0003, GV22_0009, GV22_0010, GV22_0011, GV22_0014, GV22_0015, GV22_0017, GV22_0019, and GV22_0022
Unidentified debris	9	GV22_0005, GV22_0012, GV22_0016, GV22_0018, GV22_0020, GV22_0021, GV22_0013, and GV22_0007
Total	31	

117. As identified in **Table 15.15** eight of the anomalies were identified as possible World War Two (WWII) mine sinker weights. These were identified in the southwest corner of the Windfarm Site and its 500 m buffer. Seven of these were arranged along a line extending c.1.8 km and orientated approximately north-north-west, south-south-east. They were interpreted as mine sinkers by Gardline based on similar evidence from other survey undertaken in the area (Gardline Ltd, 2021). The potential sinker weights have limited archaeological interest as objects, rather their interest is that they could represent the location of a historic mine field. As their archaeological interest as objects is limited, they have been categorised as low potential.

118. The remaining anomalies were reviewed by MSDS Marine and have been interpreted as low archaeological potential. These likely comprise a mixture of small features, often boulder like, or likely to represent modern debris such as chain, cable, or rope or linear features. The distribution of low potential anomalies is presented in **Figure 9** of **Appendix 15.1**.

119. No anomalies of medium potential were identified by MSDS Marine in accordance with the criteria set in **Table 15.13**. However, one anomaly has been identified as being of high archaeological potential (**GV22_0008**) seen as a wreck in the geophysical data, located within the northwestern area of the Windfarm Site and visible in both the SSS and MBES data. It is also associated with a magnetic anomaly of 125 nano Tesla (nT).

120. There is no UKHO record of a wreck at the location of anomaly **GV22_0008**, although the *Ernst Friesecke*, a German cargo vessel built in 1955, is recorded as having been lost in the vicinity of this position in 1972. It seems probable that the vessel located at **GV22_0008** represents the remains of the *Ernst Friesecke*. Should this be confirmed, the wreck may be of limited archaeological interest as a modern vessel of recent construction.

15.6.2.2 Magnetic Anomalies

121. Within MSDS Marine's Study Area, 115 magnetic anomalies were identified, however, only six of these are not associated with existing infrastructure relating to the Ettrick and Blackbird oil fields (**Figures 4** and **5** of **Appendix 15.1**), or with corresponding SSS or MBES anomalies of archaeological potential. All six of these anomalies are located within the Windfarm Site, the distribution of which are presented in **Figure 14** of **Appendix 15.1**. All these anomalies had a Mag. reading of >50nT so are considered be of limited potential to be of archaeological (cultural) significance. They likely represent isolated items of metallic debris.

15.6.2.3 Historic Environment Records

122. In addition to the geophysical anomalies identified by MSDS Marine, there are additional records charted by the UKHO, CANMORE, and Aberdeenshire HER within the Landfall Export Cable Corridor, the NorthConnect Parallel and St Fergus South Landfalls Cable Corridor and Windfarm Site which have not been seen in the acquired geophysical data. These are presented in **Figure 15.2** to **Figure 15.3,** and in **Table 15.16** below.

Table 15.16: Distribution of heritage records across the Project areas/

Data Set	Windfarm Site	Cable Corridor Landfall Export	St Fergus South Export Cable Corridor	NorthConnect Parallel Export Cable Corridor
UKHO	2	0	0	3
CANMORE	2	3	4	11
Aberdeenshire HER	0	2	14	18

123. These additional records largely relate to 19th and 20th century documented losses, with largest concentrations towards shore. These records do not necessarily relate to the physical remains of vessels at the recorded locations, but document records of lost vessels which have the potential to be present, currently undiscovered, within the Offshore Development Area or in the wider region.

124. For the purposes of this assessment, only assets within the Offshore Development Area are assessed. While MSDS Marine included HER within the 500 m buffer of the Windfarm Site and 200m of the Offshore Export Cable Corridor, for the purposes of characterisation, only those within the area of potential impact (i.e., within the Offshore Development Area) are taken forward for assessment.

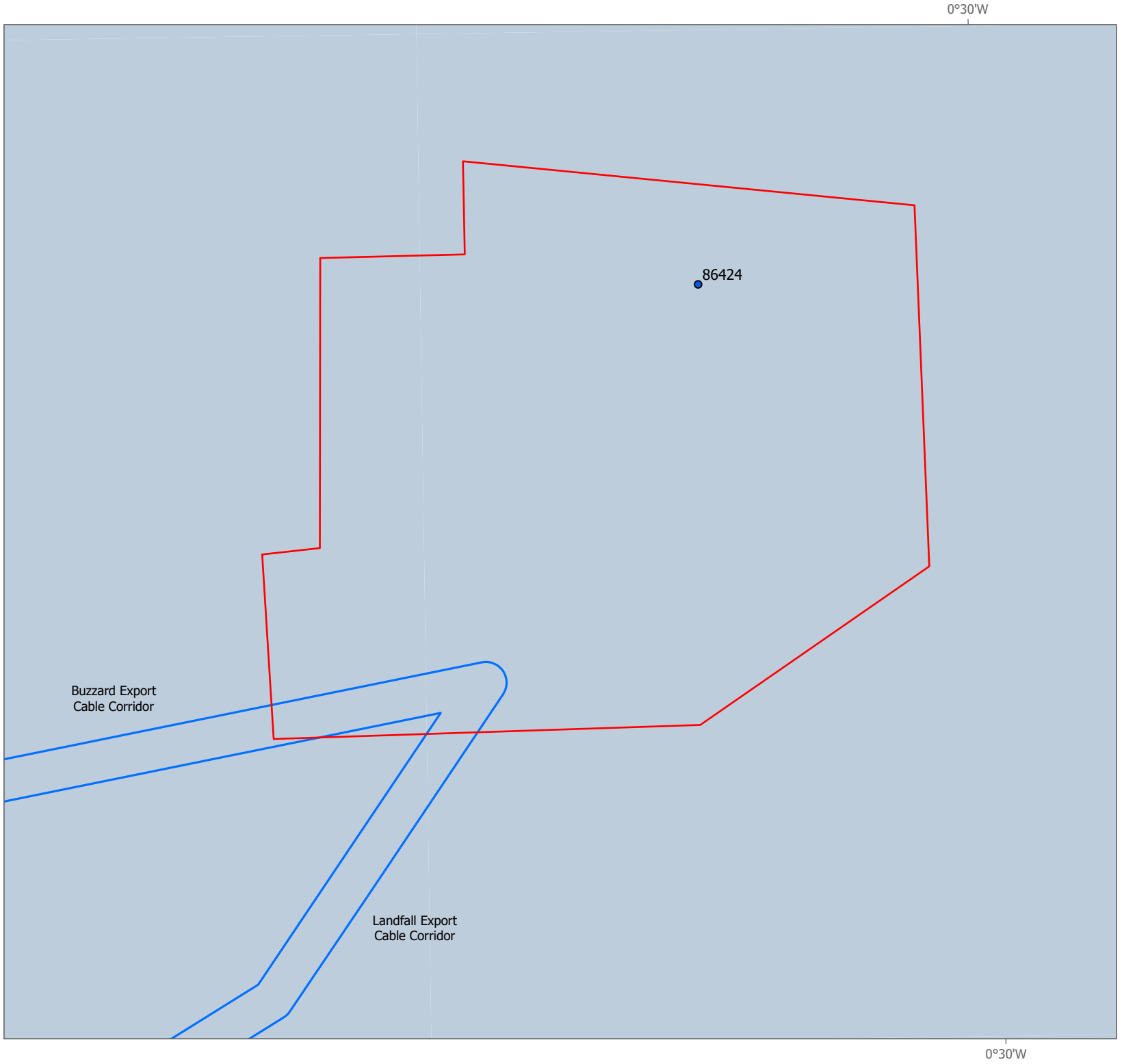
UKHO Records

125. In terms of the UKHO records **2402** is related to the *Ernst Friesecke*, while the remaining four are summarised in **Table 15.17** below. The locations of the records in presented in **Figure 15.2** and **Figure 15.4**.

Table 15.17: Summary of UKHO records

UKHO ID	Name	Status	Description	Location
79296	N/A	Dead	National HO/authority Notice to Mariners (NtM)	NorthConnect Parallel Export Cable Corridor
86424	N/A	Dead	National HO/authority NtM	Windfarm Site
2267	*Zitella*	Live	The steamship *Zitella*, under Captain Wilfred Martinson, carrying a cargo of iron ore from Narvik, Norway, to Middlesbrough was stranded on Kinnaird Rock in dense fog on the 6th February 1940, in Boddam Bay. The crew of 33 were all saved.	NorthConnect Parallel Export Cable Corridor
2266	*Cairnavon*	Live	The steel steamship *Cairnavon* (formerly named as *Baarn*), carrying a cargo of general goods (including coal, coke, and rags) from Leith to Montreal, ran aground 0.5 miles South of Buchan Ness in dense fog on the 1st November 1925.	NorthConnect Parallel Export Cable Corridor

126. Geophysical data were not obtained for the areas of Cable Corridor where **79296**, **2266** and **2267** are located, however, **79296** lies within the Windfarm Site, where data was obtained. No anomalies related to this were identified by MSDS Marine.



LEGEND

- Windfarm Site
- Offshore Export Cable Corridor
- UKHO Records in Windfarm Site

0 4

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 15.2 UKHO records in the Windfarm Site

VER	DATE	COMMENTS	DRAWN	CHECKED
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GREEN VOLT

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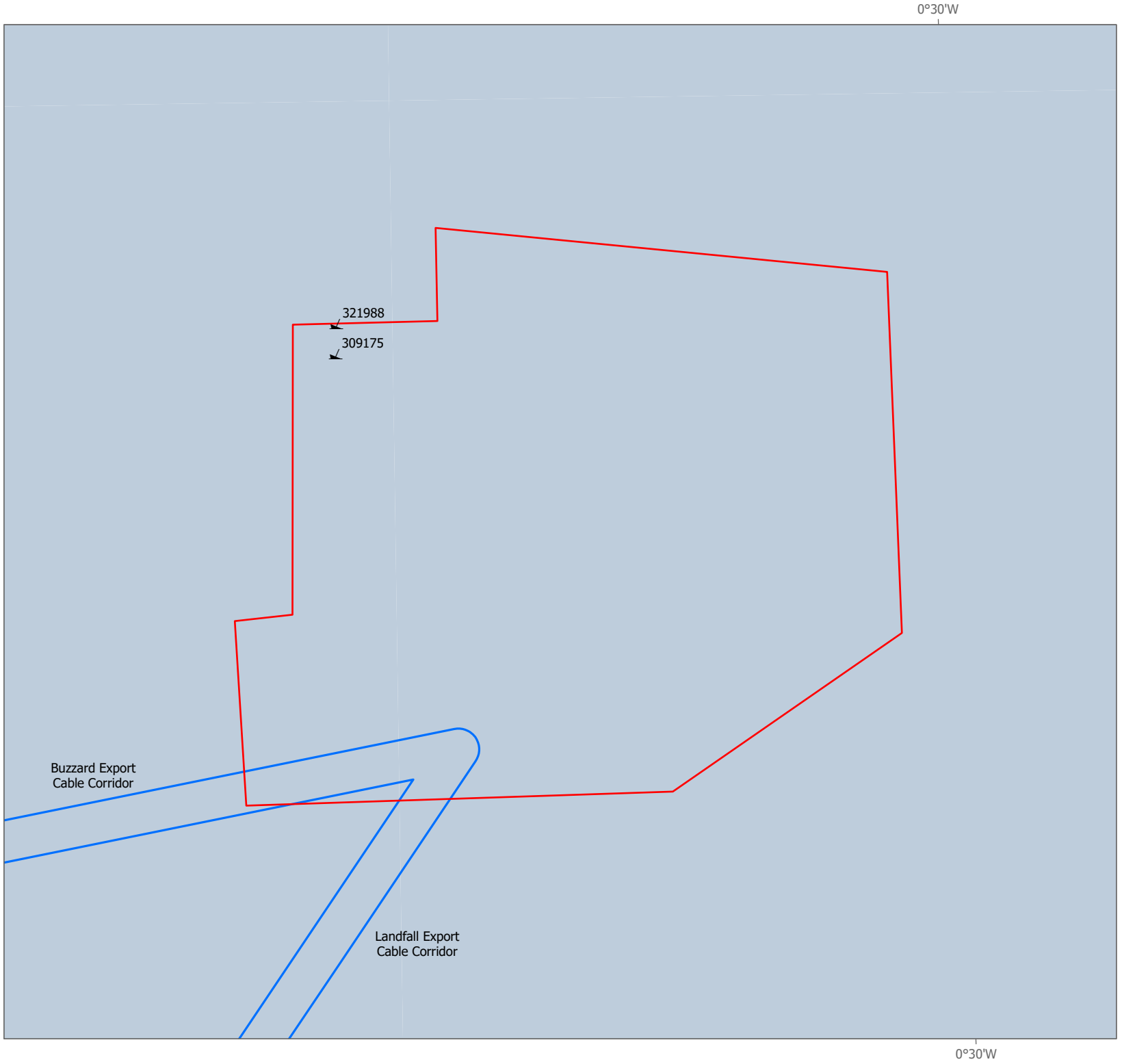

LEGEND

- Windfarm Site
- Offshore Export Cable Corridor
- Wreck

0 4

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 15.3 CANMORE records within the Windfarm Site

VER	DATE	COMMENTS	DRAWN	CHECKED
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GREEN VOLT

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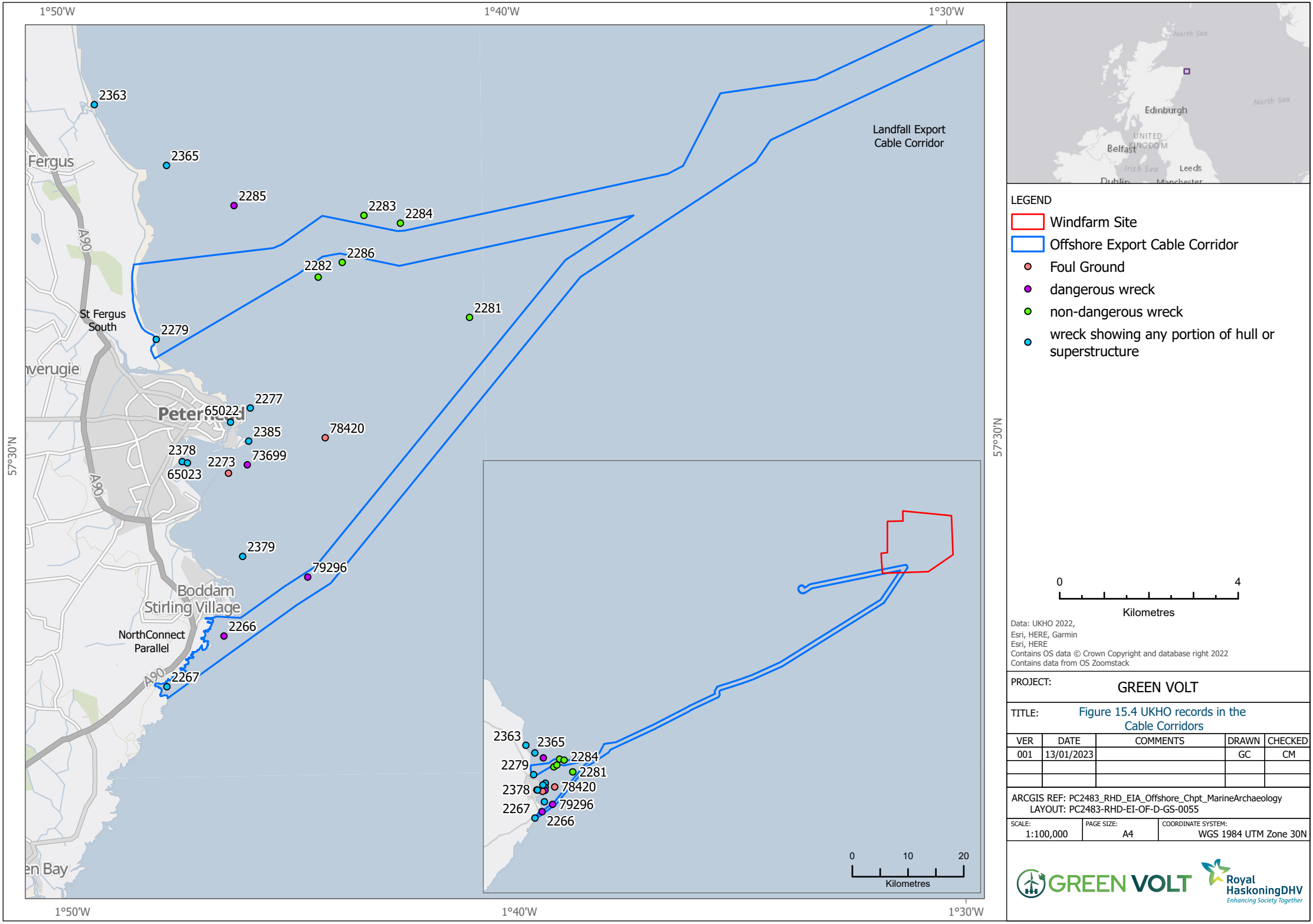

LEGEND

- Windfarm Site
- Offshore Export Cable Corridor
- Foul Ground
- dangerous wreck
- non-dangerous wreck
- wreck showing any portion of hull or superstructure

0 4

Kilometres

Data: UKHO 2022,
Esri, HERE, Garmin
Esri, HERE
Contains OS data © Crown Copyright and database right 2022
Contains data from OS Zoomstack

PROJECT: GREEN VOLT

TITLE: Figure 15.4 UKHO records in the Cable Corridors

VER	DATE	COMMENTS	DRAWN	CHECKED
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GREEN VOLT

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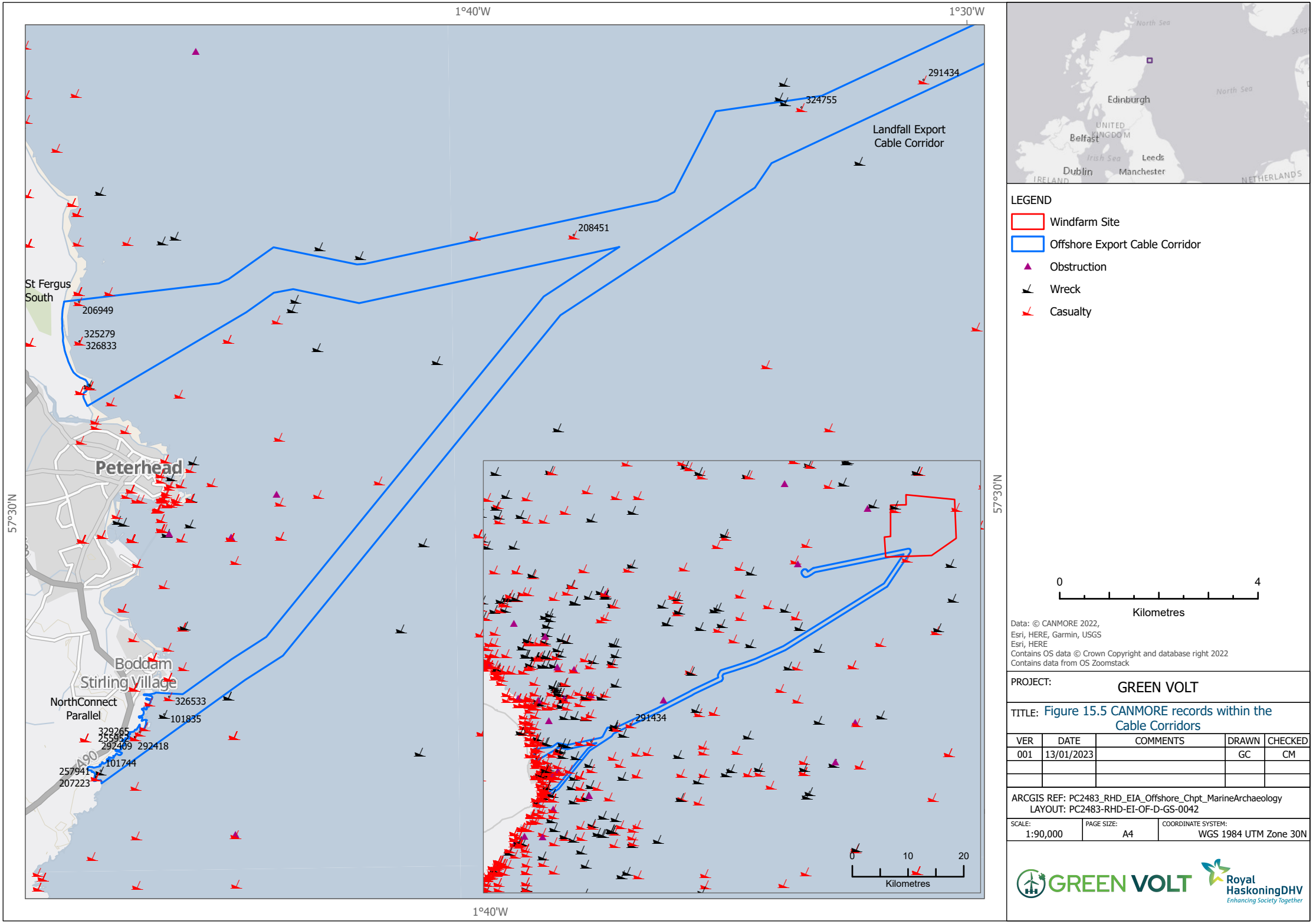

PROJECT: GREEN VOLT

TITLE: Figure 15.5 CANMORE records within the Cable Corridors

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SCALE:	PAGE SIZE:	COORDINATE SYSTEM:
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GREEN VOLT

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CANMORE Records

127. Within the Offshore Development Area there are 20 CANMORE records, two of these are located within the Windfarm Site, 11 within the NorthConnect Parallel Export Cable Corridor, four within the St Fergus South Export Cable Corridor and the remaining three are located within the Landfall Export Cable Corridor. The location of these records is presented on **Figure 15.3** and **Figure 15.5** while a summary of these records is presented in **Table 15.18** below.

Table 15.18: Summary of CANMORE records

CANMORE ID	Type	Name	Description	Location
321988	Maritime Craft	*Ernst Friesecke*	German cargo vessel built in 1955 which sunk on the 4th March 1972 carrying a cargo of 680 tons of coal	Windfarm Site
309175	Maritime Craft	*Ernst Friesecke: North Sea*	German cargo vessel built in 1955 which sunk on the 4th March 1972 carrying a cargo of 680 tons of coal	Windfarm Site
202106	Maritime Craft	Unknown: North Sea	Craft	Landfall Export Cable Corridor
291434	Maritime Craft	Unknown: North Sea	Barge (20th Century) (Possible)	Landfall Export Cable Corridor
324755	Maritime Craft	Unknown	Craft (Possible)	Landfall Export Cable Corridor
101744	Maritime Craft	*Zitella*: Long Haven Bay, Buchan Ness, North Sea	Craft (20th Century), Steamship (20th Century)	NorthConnect Parallel Export Cable Corridor
101835	Maritime Craft	*Cairnavon*: Buchan Ness, North Sea	Motor Ship (20th Century), Steamship (20th Century)	NorthConnect Parallel Export Cable Corridor
207483	Maritime Craft	Aberdeenshire: Dundonnie, North Sea	Steam Trawler (20th Century)	NorthConnect Parallel Export Cable Corridor
207223	Maritime Craft	*Fiery Cross*: Long Haven, Buchan Ness, North Sea	Ketch (20th Century)	NorthConnect Parallel Export Cable Corridor
257960	Maritime Craft	*Behrend*: Long Haven, Buchan Ness, North Sea	Barque (19th Century)	NorthConnect Parallel Export Cable Corridor
257941	Maritime Craft	*Augusta*: Long Haven, Buchan Ness, North Sea	Schooner (19th Century)	NorthConnect Parallel Export Cable Corridor
255952	Maritime Craft	*Hallo*: Boddam, North Sea	Brig (19th Century)	NorthConnect Parallel Export Cable Corridor
292409	Maritime Craft	*Lovely Mary*: Boddam, North Sea	Sloop (19th Century)	NorthConnect Parallel Export Cable Corridor
292418	Maritime Craft	*Britannia*: North Sea	Sloop (19th Century)	NorthConnect Parallel Export Cable Corridor
329265	Maritime Craft	Unknown 1823	Fishing Vessel	NorthConnect Parallel Export Cable Corridor
326533	Maritime Craft	Unknown 1860	Craft (Possible)	NorthConnect Parallel Export Cable Corridor
206949	Maritime Craft	*Nile*: Rattray Head, North Sea	Ketch (19th Century)	St Fergus South Export Cable Corridor
208451	Maritime Craft	*St Fergus*: North Sea	Steamship (20th Century)	St Fergus South Export Cable Corridor
325279	Maritime Craft	Unknown 1946	Drifter	St Fergus South Export Cable Corridor
326833	Maritime Craft	*Bridport*	Sloop	St Fergus South Export Cable Corridor

128. Of the 20 CANMORE records, only three are in areas where geophysical data was collected. These are:

- **321988** - *Ernst Friesecke* (discussed above in **Section 15.6.2.1**);
- **309175** - *Ernst Friesecke*: North Sea (discussed above in **Section 15.6.2.1**); and
- **291434** - Unknown: North Sea (Barge (20th Century) (Possible)).

129. Of these three records, no physical remains were identified at their recorded locations by MSDS Marine through the assessment of geophysical data, with **321988** and **309175** (both relating to the loss of the *Ernst Friesecke*) with **GV22_0008** having been shown to the likely location of this wreck.

130. The remaining 17 records all lie outside the geophysical survey area. As such, it is not possible to determine the likelihood of physical wreck remains to be present at the recorded locations. However, in general these locations represent arbitrary locations of loss, rather than confirmed wrecks. For example, in the case of **208451** *St Fergus* the record lies within the St Fergus South Export Cable Corridor. However, a UKHO record **2295** is located c.8 km north of this, where physical remains have been identified, is thought to be the *St Fergus.*

131. While these records are likely to represent arbitrary point of loss, given their high concentration in the nearshore areas of both Cable Corridors provides an indication of the likely potential for previously unrecorded vessels to be present.

Aberdeenshire HER

132. Within the Offshore Development Area there are 34 Aberdeenshire HER records. These are presented in **Figure 15.6** and summarised in **Table 15.19** below:

Table 15.19: Summary of Aberdeenshire HER records

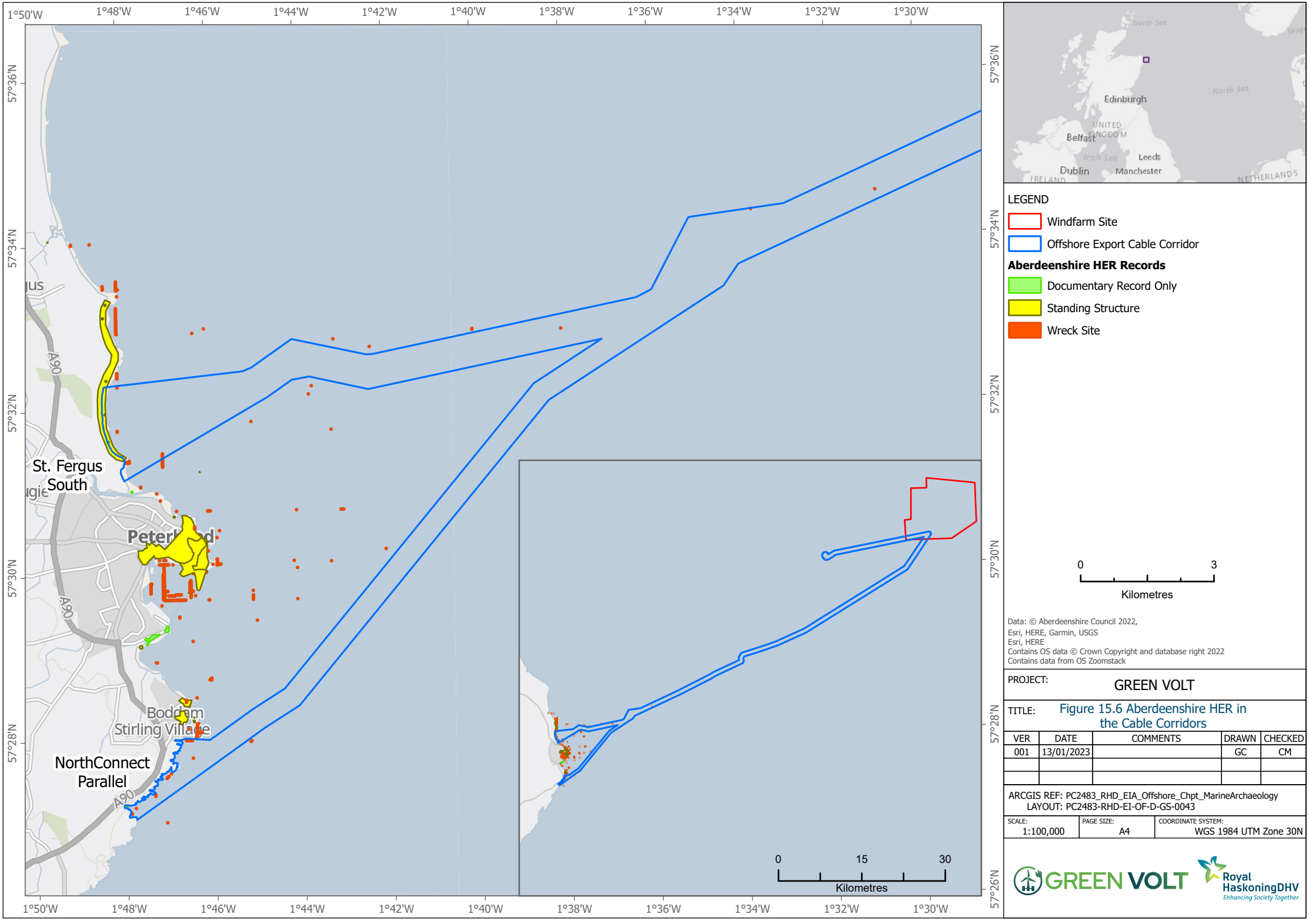
HER ID	Summary	Type	Location
NK14SW0148	Supposed site of wreck.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0296	Part of the stern of a 'foreign schooner' was washed ashore North of Peterhead on the 15th March 1833.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0044	During WWII a boat carrying iron ore was run aground here deliberately after a bomb attack in order to save the cargo.	Documentary record only	NorthConnect Parallel Export Cable Corridor
NK14SW0120	The barque *Behrend*, with a crew of 11 under Captain Kohler, carrying a cargo of timber from Memel for Belfast, was wrecked at Waterhaven, South of Buchan Ness, on the 22nd October 1875. All hands were lost.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0372	A Pilot Boat was wrecked near Peterhead on the 30th April 1854. No further information.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0145	The Motor Fishing Vessel *Girl Gracie* (BCK 139), under Captain Reid, was stranded at Boddam on the 10th August 1945 and was expected to become a wreck.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK25SW0003	The steel steamship *St Fergus* was in collision with the *Fidra* on the 31st December 1940 and sank off Rattray Head.	Wreck site	Landfall Export Cable Corridor
NK14SW0164	The steamship *Zitella*, under Captain Wilfred Martinson, carrying a cargo of iron ore from Narvik, Norway, to Middlesbrough was stranded on Kinnaird Rock in dense fog on the 6th February 1940, in Boddam Bay. The crew of 33 were all saved.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK25SE0003	Wreckage has been reported at this location. No further information.	Wreck site	Landfall Export Cable Corridor
NK14NW0297	A drifter, on tow, was abandoned and stranded 1.5 miles North of Peterhead on the 31st January 1946.	Wreck site	St Fergus South Export Cable Corridor

HER ID	Summary	Type	Location
NK14SW0167	A vessel, supposed the *Hope*, of Aberdeen, and a very large foreign ship, supposed a Dutch or Danish East-Indiaman, were lost near Peterhead in 1803, and all the crew of the latter perished.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0159	The brig *Hallo*, under Captain Larsen, travelling from Grangemouth to Drammen, was wrecked on Dizard Rocks, 1 mile South of Boddam. The crew were lost.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0109	The ketch *Fiery Cross*, under Captain Burrows, carrying a cargo of empty barrels, was stranded at Long Haven, near Buchan Ness, on the 15th February 1900.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0129	The sloop *Fisher*, under Captain Wood, carrying a cargo of wheat and flour from Dunbar to Aberdeen, was wrecked at Buchan Ness in December 1825. The crew and part of the cargo saved.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0160	The sloop *Brittania* struck rocks and sank one mile South of Boddam on the 15th December 1809.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0186	The steel steam trawler *Suzette* (A 346) (formerly named as *Edward Grey*) was stranded one mile North of Peterhead, on Girdle Reef, on the 11th July 1941.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0116	The schooner *Highlander*, under Captain Reid, carrying a cargo of coal from Sunderland to Portgordon, whilst riding in Peterhead Bay during a snowstorm, drove from her anchors on to the rocks near Buchan Ness Lighthouse on the 24th March 1850 and was wreck.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0378	The ketch *Nile*, with a crew of 4 men under Captain A. Hansen, carrying a cargo of potatoes from Invergordon to West Hartlepool, was stranded about 4 miles S of Rattray Head on the 25th January 1890.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0165	The steel steamship *Cairnavon* (formerly named as *Baarn*), carrying a cargo of general goods (including coal, coke and rags) from Leith to Montreal, ran aground 0.5 miles South of Buchan Ness in dense fog on the 1st November 1925.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0113	The steel steam trawler *Aberdeenshire* (A234), in ballast, with a crew of 9 under Captain J. Wells, ran aground between Craigscaw and Dundonnie, approximately 0.5 miles S of Buchan Ness, on the 21st October 1910. The crew were saved.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0331	Wreckage and barrels of tar were washed ashore at Peterhead on the 10th January 1848.	Wreck site	St Fergus South Export Cable Corridor
NK14NW0355	A Danish-built vessel was reportedly wrecked near Peterhead in March 1786.	Wreck site	St Fergus South Export Cable Corridor
NK14NW0373	The *John* was wrecked near Peterhead on the 5th November 1834.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0150	Wreckage, including part of a hull, was washed ashore at Boddam on the 10th December 1860.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0158	The sloop *Lovely Mary*, under Captain Mirk, in ballast, was stranded to the South of Castlehaven, Boddam on the 24th May 1820.	Wreck site	St Fergus South Export Cable Corridor
NK14NW0181	The iron steamship *Trieste* (formerly named as *Daisy Morris*), carrying a cargo of coal, was stranded on Girdle Shoal, 0.75-mile N of Peterhead, on the 16th July 1918.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0382	A brig, in ballast, was stranded between Boddam and Cruden Bay on the 9th January 1803. No further information.	Wreck site	St Fergus South Export Cable Corridor
NK14NW0356	A quantity of wreckage was reportedly washed ashore near Peterhead in January 1786.	Wreck site	St Fergus South Export Cable Corridor

HER ID	Summary	Type	Location
NK14SW0136	On the 25th March 1867, a headboard, marked *Margaret West*, a board, and part of a galley door were picked up near Buchan Ness. No further information.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14NW0374	A fishing vessel was stranded near Peterhead on the 3rd July 1941. No further information.	Wreck site	St Fergus South Export Cable Corridor
NK14NW0172	The steel steamship *Princess Mary*, under Captain Kerr, carrying a general cargo, was stranded 0.5 mile North of Peterhead on the 30th May 1908.	Wreck site	St Fergus South Export Cable Corridor
NK14SW0099	The schooner *Marquis of Huntly* (or *Huntley*), travelling from Aberdeen to Peterhead, was driven ashore on the rocks near Boddam on the 29th November 1817 and became waterlogged. The crew were saved.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK14SW0119	The schooner *Augusta*, with a crew of 3 under Captain and Owner R. Wahl, Stettin, carrying a cargo of timber battens from Christiania to Thurso, was wrecked at Long Haven, near Buchan Ness, on the 19th October 1875. One of the crew was lost.	Wreck site	NorthConnect Parallel Export Cable Corridor
NK25SE0004	A barge was seen adrift off Buchan Ness, bearing SW, Rattray Head bearing NW x W on the 11th December 1919. Presumed to have sunk in this area. No further information.	Wreck site	Windfarm to Landfall Export Cable Corridor before it splits to St Fergus South and NorthConnect Parallel Export Cable Corridor options

133. Of the 34 HER records within the Offshore Development Area, only one of these was only covered by the geophysical survey. This is **NK25SE0004** an unnamed barge which corresponds to CANMORE record **291434**. No anomalies relating to a vessel were observed at the recorded location by MSDS Marine in the geophysical data.

134. In terms of the remaining 33 HER records within the Offshore Development Area, these are largely duplicates of the CANMORE records. As such, they are largely considered to be arbitrary points of loss, rather than the recorded location of physical wreck remains. However, given their concentration these records of loss provide an indication of the likely potential for previously unrecorded vessels to be present. along the Cable Corridors (see **Table 15.19**), particularly in the nearshore area.



PROJECT: GREEN VOLT

TITLE: Figure 15.6 Aberdeenshire HER in the Cable Corridors

VER	DATE	COMMENTS	DRAWN	CHECKED
001	13/01/2023		GC	CM

ARCGIS REF: PC2483_RHD_EIA_Offshore_Chpt_MarineArchaeology
LAYOUT: PC2483-RHD-EI-OF-D-GS-0043

SCALE:	PAGE SIZE:	COORDINATE SYSTEM:
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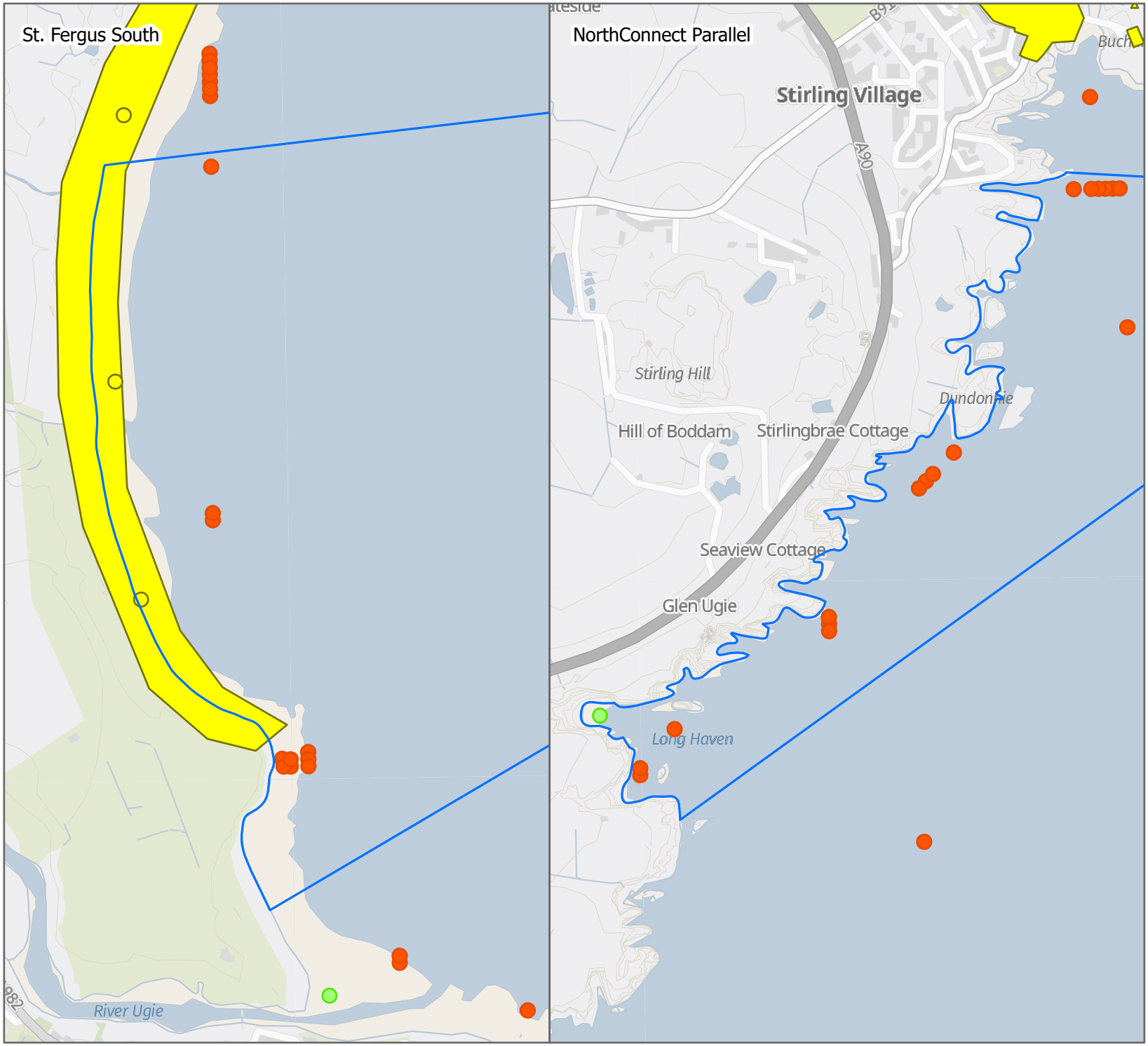

LEGEND

Offshore Export Cable Corridor

Aberdeenshire HER Records

Documentary Record Only

Standing Structure

Wreck Site

0 250 500

Metres

PROJECT: GREEN VOLT

TITLE: Figure 15.7 Aberdeenshire HER within the intertidal zone

VER	DATE	COMMENTS	DRAWN	CHECKED
001	13/01/2023		GC	CM

ARCGIS REF: PC2483_RHD_EIA_Offshore_Chpt_MarineArchaeology
LAYOUT: PC2483-RHD-EI-OF-D-GS-0052

SCALE:	PAGE SIZE:	COORDINATE SYSTEM:
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GREEN VOLT

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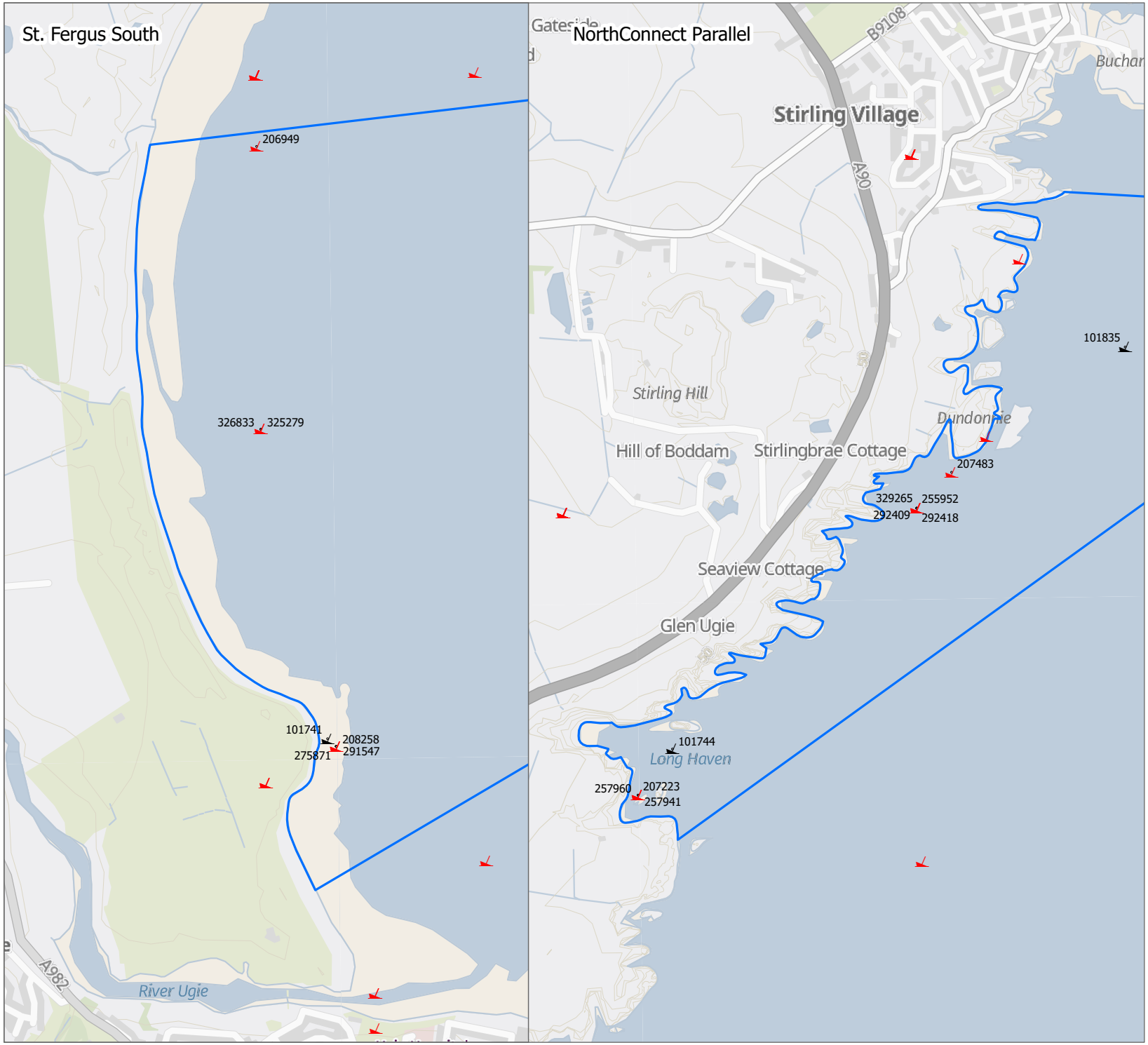
Enhancing Society Together



LEGEND

- Offshore Export Cable Corridor
- Obstruction
- Wreck
- Casualty

0 250 500
Metres

PROJECT: GREEN VOLT

TITLE: Figure 15.8 CANMORE records within the intertidal zone

VER	DATE	COMMENTS	DRAWN	CHECKED
001	13/01/2023		GC	CM

ARCGIS REF: PC2483_RHD_EIA_Offshore_Chpt_MarineArchaeology
LAYOUT: PC2483-RHD-EI-OF-D-GS-0053

SCALE:	PAGE SIZE:	COORDINATE SYSTEM:
1:15,000	A4	WGS 1984 UTM Zone 30N

GREEN VOLT
Royal HaskoningDHV
Enhancing Society Together

15.6.2.4 NorthConnect Surveys

135. As part of the NorthConnect HVDC Link assessment of geophysical data, two wrecks were identified within the NorthConnect HVDC Link route. These were a motor vessel lost in 1925 and a fishing vessel lost in 1917. Both wrecks were surrounded by a debris field of varying size and complexity. Within the NorthConnect Offshore Survey Corridor, four further wrecks were identified. Two of these were identified as debris, while another identified as a fishing vessel. The fourth was thought to have been the remains of an aircraft. Due to the character of the wreckage, it was recommended that unless further information becomes available, the site should be treated as if it were protected under the terms of the Protection of Military Remains Act 1986 (NorthConnect, 2018).

15.6.2.5 Aviation Remains

136. No aviation remains have been identified within the Offshore Development Area, however, if any aircraft remains were identified these would be protected under the Protection of Military Remains Act 1986.

137. During WWII Peterhead was the second most bombed location in Britain, being bombed 28 times. This was because Peterhead was the first built-up area the Luftwaffe reach during bombing runs from Norway (Taylor, 2010). Similarly, Aberdeen was bombed 24 times and Clydebank also saw several attacks. The Offshore Development Area is likely to have lain within the Luftwaffe flight path during these raids, so there is potential for aviation remains relating to these bombing runs located within the Offshore Development Area.

138. No such remains were identified by MSDS Marine; however, geophysical data were not obtained for the entire Offshore Development Area. Similarly, such remains would be expected nearer to shore, where geophysical data were not obtained.

15.6.2.6 Cultural Significance of Identified Assets

139. The cultural significance of unidentified wrecks and debris, archaeological anomalies and potential wrecks, aircraft, and isolated finds (which are yet to be discovered) is currently unknown. The archaeological interest (or otherwise) of these features will be further examined post-consent (e.g., investigation of individual anomalies (ground truthing) through Remote Operated Vehicle (ROV) and/or diver survey).

140. Once the character, nature and extent of selected features are more fully understood, their cultural significance can be described to inform any requirements for further work on a case-by-case basis.

141. The cultural significance of shipwrecks lies largely in their historic and archaeological interest, in terms of their historical associations with people or events and with their research value.

142. Only one wrecked vessel was identified through the assessment of geophysical data by MSDS Marine, this being the *Ernst Friesecke* (**GV22_0008**). This German cargo vessel was built in 1955 which sunk on the 4th March 1972 carrying a cargo of 680 tons of coal bound for Buckie from Gdansk (Aberdeen Press and Journal, 1972). The vessel appears well intact and exhibits characteristics which are relatively well represented in the known wreck resource around the UK. Given its relatively modern age and being a vessel that sank outside of war this wreck is considered to represent a typical example of a wrecked vessel from this period, therefore the archaeological interest and cultural significance of this wreck is limited.

143. In terms of the mine sinkers (**GV22_0025 - GV22_0032**) as objects, their heritage significance is considered to be limited. They have some cultural significance as they signify the location of a historic mine field.

144. In terms of the UKHO, CANMORE, and Aberdeenshire HER records these largely represent 19th and 20th century vessels, some of which were sunk during conflict. As the majority of these lay within areas where geophysical data were not obtained, their presence and cultural significance cannot be determined. As such, their survival (if present where recorded) cultural significance and interest would need to be established post-consent through the acquisition of additional geophysical data, and where appropriate via ground truthing Remotely Operated Vehicle (ROV) survey.

145. Regarding setting, as for seabed prehistory above, for the most part, submerged archaeological sites are not '*readily appreciated by a casual observer'*. Although some wreck sites have a setting which can be experienced and appreciated within their seascape (by divers or visitors on boats trips for example) none of the wrecks identified within the Offshore Development Area fall into this category, due to distance from shore and depth of the site, for example. Setting (in terms of the surroundings in which they are experienced), does not, therefore, form a key part of their cultural significance.

15.6.2.7 Importance of Identified Assets

146. The importance of unidentified wrecks and debris, and potential wrecks, aircraft, and isolated finds (which are yet to be discovered) is currently unknown and these are, therefore, assessed as being of **high importance** as a precautionary measure. However, for potential sites each individual discovery will be considered independently and any requirements for further data gathering, or analysis will be considered on a case-by-case basis proportionate to the importance of the discovery.

147. The *Ernst Friesecke* (**GV22_0008**) is not considered to represent an example of a wreck which could be considered of national importance. Similarly, it is not considered to be of regional interest as it represents the remains of a modern cargo vessel. While it is well preserved, given its age its importance is assessed as being **negligible**.

148. In terms of the unidentified wrecks recorded by UKHO, CANMORE and HER, their importance will be ascertained post-consent through the acquisition of additional geophysical data, and where appropriate ground truthing through ROV survey. However, their importance would in general follow the definitions set out in **Table 15.20**.

149. Isolated finds of maritime or aviation origin within secondary contexts will have evidential value for patterns of activities offshore and are assessed as being of medium importance. A summary of heritage importance is presented in **Table 15.20** below.

Table 15.20: Heritage Importance (Maritime and Aviation Archaeology)

Asset Type	Definition	Importance
Known maritime heritage assets	Named wrecks and associated debris (*Ernst Friesecke (*GV22_0008)	Negligible
	Debris identified as possible wreck sites or associated debris	High
	Un-named wrecks and associated debris fields / debris	
	Seabed disturbance associated with large magnetic anomaly	
	Previously recorded wrecks not seen in geophysical data	
Additional anomalies	Anomalies identified by geophysical assessment that could be of anthropogenic origin	High
Potential wrecks	Wrecks within the Study Area that are yet to be discovered	High

Asset Type	Definition	Importance
Potential derived maritime finds	Isolated artefacts lost from a boat or ship or moved from a wreck site	Medium
Potential aircraft	Aircraft within the Study Area that are yet to be discovered	High
Potential derived aviation finds	Isolated artefacts lost from an aircraft or moved from a crash site	Medium

15.6.3 Intertidal Archaeology

150. Within the intertidal zone there are no designated heritage assets, however, there are a several non-designated heritage assets recorded by CANMORE and the Aberdeenshire HER. There are seven Aberdeenshire HER records and four CANMORE records within the intertidal zone, all are located within the footprint of the St Fergus South Export Cable Corridor Landfall (**Figure 15.7** and **Figure 15.8**).

151. Both sets of records largely comprise the reported locations of 19th and 20th century wrecked vessels and WWII defensive structures. The Aberdeenshire HER records comprise:

- A previously recorded line of WWII anti-tank blocks (NK14NW0084);
- Two WWII type 24 Pillboxes (NK14NW0080 and NK14NW0079):
- The reported locations of three 20th century steamships (NK14NW0112, NK14NW0303 and NK14NW0185); and
- A 19th century brig (NK14NW0264).

152. The four reported wreck locations are summarised in **Table 15.21**.

Table 15.21: Reported wreck locations

HER ID	CANMORE ID	Name	Description
NK14NW0112	101741	Magician	The steel steamship Magician, carrying a general cargo from Trinidad to London was wrecked on Craigewan, 2 miles north of Peterhead, on the 14th April 1944.
NK14NW0303	101741	Deeside	The steel steam trawler Deeside (A 397), in ballast, was stranded at Craigewan Rock on the 21st January 1917.
NK14NW0185	101741	Renaissance	The steel trawler Renaissance (formerly named as JOHN H IRVINE), carrying a cargo of fish, was stranded on Craigewan Rock, about 0.5-mile northeast of the mouth of the River Ugie, on the 25th March 1928.
NK14NW0264	275871	N/A	A brig was wrecked on Craigewan Rock, near Peterhead, in January 1849.

153. There are no recorded remains associated with the reported wreck locations and the Aberdeenshire HER records their conditions as unknown. As such, these records represent the reported location of a wrecking event rather than known physical wreck remains. However, these vessels could still be present either as wrecks or fragmentary remains. As no geophysical data were acquired for the intertidal zone their presence or their lack of cannot be established.

154. Based on the above, there is a potential for further unrecorded defensive military remains and unrecorded wreck remains within the intertidal zone. With the use of horizontal directional drilling (HDD) for the cable instillation beneath the intertidal zone, such remains are unlikely to be encountered during construction.

15.6.3.1 Cultural Significance of Identified Assets

155. Within the intertidal zone there are no records dating from the prehistoric periods to the post-medieval period.

156. The majority of Aberdeenshire HER records within the intertidal zone represent the recorded locations of various 19th - 20th wreck sites which wrecked on Craigewan Rock. There are no known remains associated with these, however these could survive either as wrecks or as fragmentary remains. Therefore, their cultural significance is currently unknown. The archaeological interest (or otherwise) of any remains which come to light during the project will be described to inform any requirements for further work on a case-by-case basis.

157. In terms of the WWII remains both the anti-tank blocks and pillboxes survive as upstanding remains, however, the pillboxes have become partially buried within the beach deposits. These structures are encountered within their original, intended coastal setting, a contextual setting which was fundamental to their use in the defence of Britain during WWII. As such, their setting contributes to their cultural significance, however, this is limited as the two pillboxes have become buried.

15.6.3.2 Importance of Identified Assets

158. Should *in situ* prehistoric sites be encountered within the intertidal zone these will be of national, or possibly international interest, however, no such remains have been encountered here. Given the particularly high importance of these *in situ* sites, any palaeoenvironmental evidence discovered in the context of an *in situ* prehistoric site would also be of **high importance**.

159. Although palaeoenvironmental material encountered beyond the context of an *in situ* prehistoric site still has evidential value for understanding changes in the climate and environment within offshore contexts, isolated discoveries should be considered of **low importance** for the purposes of assessment.

160. Isolated finds of prehistoric archaeological material within secondary contexts, also have evidential value for understanding patterns of population and exploitation of former landscapes. However, as these finds are derived, and out of context, they are regarded as being of **medium importance**.

161. The fragmentary and buried remains of WWII coastal defences and isolated finds relating to WWII activities are also assessed as being of **medium importance**.

162. The heritage importance of the potential heritage assets outlined above are presented in **Table 15.22**.

Table 15.22: Heritage Importance (Intertidal Archaeology)

Asset Type	Definition	Importance
Potential *in situ* prehistoric sites	Primary context features and associated artefacts and their physical setting (if/where present)	High
Potential palaeoenvironmental evidence	Isolated examples of palaeoenvironmental material	Low
	Palaeoenvironmental material associated with prehistoric settlements or archaeological evidence for prehistoric activities	High
Intertidal heritage assets	WWII coastal defences (fragmentary and buried remains on beach)	Medium
Potential derived intertidal finds	Isolated artefacts and findspots dating to all periods which are located within the intertidal zone	Medium

163. Should wreck remains be present within the intertidal zone their importance would be the same as that presented in **Table 15.20**.

15.6.4 Climate Change and Natural Trends

164. The existing environment for offshore archaeology and cultural heritage as set out above has been shaped by a combination of factors. The most prevalent of these being changes in global sea levels and associated climatic and environmental conditions. These have affected the burial and preservation of prehistoric archaeology, and latterly that of maritime and aviation archaeology.

165. Historic Environment Scotland (2020) recognise that '*Scotland's climate has always been dynamic, and many historic sites retain evidence of shifting environmental conditions*'.

166. Aberdeenshire Council Archaeology (2020) also recognises that the '*historic environment is also dynamic and constantly changing through natural processes, development, land management and climate change. The archaeological resource is finite, and as such must be carefully managed in a sustainable way'*.

167. Scottish tidal records show that over the past 20 years, relative sea-levels around Scotland have been increasing on average by 3 mm/yr. This is faster than the 20th-century average for the British Isles, which is 1.4 mm/yr. Since the 1970s in Scotland there has been a 39% increase in the amount of soft coast experiencing erosion, and a 22% decrease in the amount of soft coast accreting. The erosion rate on Scotland's soft coastlines (19% of the total) has nearly doubled to 1 m/yr (Hansom *et al*, 2017).

168. The NorthConnect Parallel Export Cable Corridor option makes landfall along the granite-dominated coast just south of Peterhead. The shoreline is indented by bays, such as (from south to north) Heathery Haven, Long Haven, South Castle Haven, or Thief's Loup. The cliffs and predominantly bedrock dominated shore (with surface gravel deposits in some bays) are resistant to erosion.

169. The St. Fergus South Export Cable Corridor option makes landfall along the sandy beach and dune-dominated coast north of Peterhead. There are occasional rock outcrops at Craigewan and Black Stones (at Kirkton Head). The Dynamic Coast website projects some erosion of the dunes between Peterhead and Rattray Head to the year 2100 under a 'High' greenhouse gas emissions scenario for climate change. Within the St. Fergus South Export Cable Corridor this could be up to around 50 m in places, increasing to up to 100 m north of the St. Fergus South Export Cable Corridor along the frontage between St. Fergus and Rattray Head.

170. Fitton *et al*. (2017) note that the dunes and beaches around St. Fergus have experienced a change from accretion (which was strongly evident from 1900 to1971) to erosion, with in places, more than 20m erosion occurring since the 1970s.

171. Historic and archaeological heritage is identified as a specific area of vulnerability and impact within the strategy with damage to, or loss of heritage assets, recognised as a direct result of continued erosion. Conversely, it is also recognised that erosion may facilitate the discovery of previously hidden archaeological sites and finds.

172. Cycles of burial and exposure resulting from marine physical processes, including storm events which can result in the stripping of shallow sediment from the seabed and beach, have an ongoing effect upon the preservation of archaeological material. As described in **Section 15.6.3** there are several records of military infrastructure known from this coastal stretch, which appear to have been buried within the beach deposits. In some ways this offers them extra levels of protection, however, this does detract from their setting as it is difficult to appreciate them while buried.

173. In contrast exposed heritage assets are at greater risk from erosion and degradation resulting from the effects of physical processes than those which remain buried and are consequently provided with greater protection from continued sediment cover. These cycles of burial and exposure are

anticipated to continue although the effect upon individual heritage assets is difficult to predict as this will depend upon site-specific conditions and will vary depending upon the nature of any exposed archaeology.

15.7 Potential Impacts

174. **Table 15.23** presents the impacts that were proposed to be scoped out in the **Offshore Scoping Report (Appendix 1.2)** and the impacts that the **Scoping Opinion (Appendix 1.1)** require to be scoped in for the **Offshore EIA Report**.

Table 15.23 Potential impacts scoped in or out of the EIA for Offshore Archaeology and Cultural Heritage

Potential Impact	Construction		Operation and Maintenance		Decommissioning	
	Scoping Report	Scoping Opinion	Scoping Report	Scoping Opinion	Scoping Report	Scoping Opinion
Direct impacts to heritage assets.	✓	✓	✓	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes.*	x	x	x	x	x	x
Change to the setting of heritage assets, which could affect their heritage significance	✓	✓	✓	✓	✓	✓
Change to character which could affect perceptions of the HSC	✓	✓	✓	✓	✓	✓
Cumulative Impacts	x	✓	x	✓	x	✓

**While it was not proposed that indirect impacts were scoped in, this potential impact has been included for completeness.*

175. **Table 15.24** presents a summary of the potential impacts assessed.

Table 15.24 Potential impact pathways on offshore archaeology and cultural heritage receptors

Green Volt Project Phase	Potential Impact Pathways	Receptor
Construction	Direct impact to known heritage assets	Wrecks and anomalies of archaeological interest (GV22_0008 Ernst Friesecke) Historic wrecks for which remains have yet to be identified Additional anomalies of possible archaeological interest Intertidal Assets (WWII defensive structures)
	Direct impact to potential heritage assets	In-situ prehistoric, maritime or aviation sites Intertidal assets Isolated finds
	Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets

Green Volt Project Phase	Potential Impact Pathways	Receptor
	Impacts to the setting of heritage assets	Known and potential heritage assets
Operation and Maintenance	Direct impact to known heritage assets	Known heritage assets
	Direct impact to potential heritage assets	In-situ prehistoric, maritime or aviation sites Isolated finds
	Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets
	Impacts to the setting of heritage assets	Known and potential heritage assets WWII defensive structures
Decommissioning	Direct impact to known heritage assets	Known heritage assets
	Direct impact to potential heritage assets	In-situ prehistoric, maritime or aviation sites Isolated finds
	Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets
	Impacts to the setting of heritage assets	Known and potential heritage assets WWII defensive structures

15.7.1 Types of Impact

176. Potential impacts to heritage assets within the Offshore Development Area include both direct and indirect impacts.

177. Direct impacts to heritage assets, either present on the seafloor or buried within seabed deposits, may result in damage to, or destruction of, archaeological material or the relationships between that material and the wider environment (stratigraphic context or setting). These relationships are crucial to developing a full understanding of an asset. Such impacts may occur if heritage assets are present within the footprint of elements of the Project (i.e. turbine anchors or cables) or within the footprint of activities such as seabed clearance, anchoring or the placement of jack up barges. Of note would be scouring of the seabed caused by the turbine anchor mooring lines.

178. The Project also has the potential to change the hydrodynamic and sedimentary process regimes directly and indirectly, both locally and regionally. Changes in coastal processes can lead to redistribution of erosion and accretion patterns, while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features.

179. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave/tidal action for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.

180. Indirect impacts to setting may occur if a development affects the surroundings in which a heritage asset is experienced. Similarly, impacts to the historic seascape character may occur with the introduction of new elements causing a change in that character which may affect present perceptions of that seascape across an area.

15.7.2 Embedded Mitigation

181. A range of different information sources has been considered as part of embedding mitigation into the design of the Project including engineering requirements, ongoing discussions with stakeholders and regulators, commercial considerations, and environmental best practice.

182. In order to prevent significant effect, the following mitigation has been recommended by MSDS Marine and embedded in the Project design. These largely comprise the application of Archaeological Exclusion Zones (AEZ), TAEZs or through micrositing of the design. Mitigation measures embedded into the project design are summarised in **Table 15.25**:

Table 15.25: Summary of embedded mitigation

Strategy	Description
Archaeological Exclusion Zones (AEZs)	For archaeologically significant anomalies that are clearly identifiable in the survey data and where the extents are largely known, AEZs have been recommended. AEZs will remain for the life of the project or until ground truthing or higher resolution data determines a reduction in potential, cultural significance, or extents.
Temporary Archaeological Exclusion Zones (TAEZs)	Where an anomaly is not visible in the survey data but likely to exist on the seabed at a known position or where the extents of an anomaly are not fully identifiable, Temporary Archaeological Exclusion Zones (TAEZs) will be recommended. TAEZs have been identified as highly likely to be altered following higher resolution or full coverage data assessment, however, they will remain in place until alterations have been formally agreed.
Areas of Archaeological Potential (AAP)	Areas of Archaeological Potential (AAP) are primarily reserved for magnetic anomalies where, due to line spacing, positions are not accurately known. AAPs demonstrate that there is potentially an anomaly of archaeological significance around the given position. The anomaly is likely to be identified following higher resolution or full coverage data assessment but as the nature and position is not precisely known, no formal exclusion zone is recommended but instead a general awareness of the position is considered appropriate at this phase.

183. Mitigation strategies are based on the criteria set out in **Table 15.13**.

184. In terms of the seabed prehistory, following the collection of engineering led geotechnical cores post-consent, these will undergo a staged program of geoarchaeological assessment and analysis. In brief the process is as follows;

- Stage 1: Geoarchaeological review of core logs;
- Stage 2: Geoarchaeological recording;
- Stage 3: Geoarchaeological assessment;
- Stage 4: Geoarchaeological analysis; and
- Stage 5: Final reporting.

185. In addition to the above, further mitigation measures will include:

- Watching briefs[1] where seabed material is brought to the surface, for example during pre-lay grapnel runs;
- Watching briefs for any intrusive works carried out in the HDD exit zone (during long HDD); and
- The archaeological assessment of any further geophysical and geotechnical data.

186. As stated above, the primary means of preventing impacts to known heritage assets is avoidance. It is also noted that proposed AEZs may be reduced, enlarged, or removed in agreement with HES if further relevant information becomes available. However, unless modified by agreement, it is important that AEZs are retained throughout the project lifetime. Additionally, monitoring of AEZs may be required by the regulator and curator to ensure adherence both during construction and in the future operation and decommissioning of the wind farm.

[1] *A watching brief is a formal programme of archaeological monitoring that involves attendance by a suitably qualified and experienced archaeologist during groundworks or other site activities/interventions associated with the scheme in the terrestrial or inter-tidal zone, and/ or marine activities such as during offshore obstruction clearance (where considered appropriate).*

187. If anomalies cannot be avoided then additional work may be required to further investigate the nature and extent of anomalies, to establish the archaeological interest and to record them prior to removal. The methodology for such works will be set out post-consent in an **Outline WSI (Offshore)** (**Appendix 15.2**) and agreed with HES prior to works commencing. Any WSI will be undertaken in accordance the *Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects* (The Crown Estate, 2010) and *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021).

188. HES will also be consulted on the scope of all further post-consent geophysical and geotechnical surveys undertaken for the project. This will ensure that the data generated are sufficiently robust to enable professional archaeological interpretation and analysis.

189. To account for unexpected discoveries of archaeological material during construction, operation and decommissioning, a formal protocol will be established. It is recommended that if any objects of possible archaeological interest are encountered, that they should be reported through a Protocol for Archaeological Discoveries (PAD). This will largely follow the principles set out in the *Protocol for Archaeological Discoveries: Offshore Renewables Projects* (The Crown Estate, 2014) (ORPAD) and will establish whether the objects are of archaeological interest and recommend appropriate mitigation measures where necessary.

15.7.3 Worst Case Scenario

190. The worst case scenario for archaeology below MHWS is based upon the general assumption that the greatest potential footprint for the Project represents the greatest potential for direct impacts (e.g. damage / destruction) to surviving archaeological material. This equates to:

- The greatest potential area of direct contact with the sea floor/landfall zone;
- The maximum number of locations at which direct contact may occur (e.g. maximum number of moorings, mooring chains, cables, jack up feet or anchors);
- Scour protection;
- Instillation of offshore cabling;
- installation of ancillary infrastructure; and
- The greatest volume of disturbed seabed sediments and intertidal deposits.

191. The worst case scenario for indirect impacts equates to those aspects of the Project which result in the greatest potential for increased scour and sediment stripping across an area as a result of changes to physical processes. Conversely, those aspects of the development which result in the greatest increase in sediment deposition also represent the greatest potential effect in terms of the beneficial impact of increased protection for archaeology.

192. The worst case scenario for the disturbance of setting and character equates to the maximum intrusive effect (e.g. number and type of new infrastructure elements, height of infrastructure) for the longest duration.

193. Offshore infrastructure for the Project includes:

- wind turbines;
- the offshore substation platform;
- array cables;
- scour protection;

- turbine moorings;
- inter-array cables; and
- offshore export cables (see **Table 15.26**).

194. The worst case assumptions relevant to the assessment of archaeology below MHWS are set out in **Table 15.26**. The parameters for the worst case scenarios are based upon the project description included in **Chapter 5: Project Description** and take account of the embedded mitigation described in **Section 15.7.2** above. As the embedded mitigation includes the avoidance of known heritage assets (through AEZs or through micro-siting) where possible, impacts arising from the Project layout would only become relevant if known heritage assets could not be avoided.

195. The worst case layout will be that which corresponds to the most number of known heritage assets which cannot be avoided. As this is location specific, this cannot be known until after the layout is defined. For this reason, the worst case for the Project (i.e., the maximum overall potential disturbance of the seabed from individual parameters across the project) is considered in **Table 15.26.** These are based on the project parameters described in **Chapter 5: Description of the Development**, which provides further details regarding specific activities and their durations**.**

Table 15.26: Worst Case Assumptions.

Impact	Parameter	Notes
Construction		
Impact C1: Direct (physical) impact to known heritage assets	N/A	Direct impacts to known heritage assets will not occur due to the application of embedded mitigation (see **Section 15.7.2**).
Impact C2: Direct impact to potential heritage assets	**Area of sediment disturbed = 4.55 km²** • Total substructure moorings = 0.06825 km² (based on worst case for catenary system) • Total area of disturbance from ploughing/jetting inter-array cables = 1.34 km² • Total area of rock protection for crossings of inter-array cables = 0.0189 km² • Total area of disturbance for OSP foundations = 0.00724 km² (based on worst case for suction bucket foundation including scour protection) • Total area of disturbance from ploughing/jetting of export cables = 3.00 km² • Total area of rock protection for non-buried export cables = 0.800 km² • Total area of rock protection for crossings export cables = 0.0330 km² **Volume of sediment to be disturbed = = 6,545 km³** • Total length of cable = 300 km • Maximum depth of burial = 1.5 m • Maximum width of disturbance = 10 m (jetting/ploughing) • Total maximum volume of sediment disturbed = 4,500,000 m³ • Max pre-sweep volume = 35,000 m³ Total maximum volume of sediment disturbed = 4,535,000 m³ • Total length of cable = 134 km	The worst case scenario represents the maximum area of disturbed seabed sediments with the potential for archaeological material to be present either on the seafloor or buried within seabed deposits.

Impact	Parameter	Notes
	• Maximum depth of burial = 1.5 m • Maximum width of seabed disturbance = 10 m (jetting/ploughing) • Total maximum volume of sediment disturbed = 2,010,000 m^3 HDD Exit Point = max 1,300 m from shore	
Impact C3: Indirect impact to heritage assets from changes to physical processes	The worst case scenarios for marine physical processes are set out in Chapter 7: Marine Geology, Oceanography and Physical Processes (Table 7-2). The following impacts are relevant to the worst case for offshore archaeology and cultural heritage: Impact C2: Increase in suspended sediment concentration and deposition; and Impact C3: Disturbance of seabed sediments during cable installation.	
Impact C4: Impacts to the setting of heritage assets	Maximum temporal footprint: Duration of offshore construction: 2 years Construction vessels: Max at any one time: • 4 supply vessels; • 3 tugs / anchor handling vessels; • 1 windfarm service vessel; • 1 support vessel; • 1 dynamic position heavy lift vessel; • 1 inter-array cable installation vessel; • 1 export cable installation vessel; • 1 pre trenching vessel; • 1 cable survey vessel; • 1 commissioning vessel; and • 1 crew transfer vessel.	The worst case scenario represents the maximum intrusive effect of construction activities for the longest duration.
Operation		
Impact O1: Direct (physical) impact to known heritage assets	N/A	Direct impacts to known heritage assets are not anticipated to occur due to the retention of AEZs throughout the project lifespan and restriction of activities to red line boundary. Any currently unknown heritage assets which are identified during pre-construction surveys would be subject to avoidance, if required.
Impact O2: Direct impact to potential heritage assets	Operational disturbance footprints Catenary drag footprint = 1.134 m^2 per WTG at low water when mooring line radius is at a maximum	The worst case scenario represents the maximum area of disturbed seabed sediments with the potential for archaeological material to be present either on the seafloor or buried within seabed deposits. With the application of the mitigation (see Section 15.7.2), and the retention of AEZs throughout the project lifespan, it is anticipated that all direct impacts to known heritage assets will be avoided. Similarly, any currently unknown heritage assets which are identified during pre-construction surveys would be subject to avoidance, if required.

Impact	Parameter	Notes
Impact O3: Indirect impact to heritage assets from changes to physical processes	The worst case scenarios for marine physical processes are set out in Chapter 7: Marine Geology, Oceanography and Physical Processes (Table 7-2). The following impacts are relevant to the worst case for offshore archaeology and cultural heritage: Impact O1: Rock deposit or concrete mattress footprint on seabed; Impact O2: Effect of rock deposits or concrete mattresses on the wave, tidal and sediment regimes; Impact O3: Disturbance of seabed sediments due to catenary action of mooring lines in the Windfarm Site; and Impact O4: Disturbance of seabed sediments due to scour around the foundations of the mooring anchors in the Windfarm Site.	
Impact O4: Impacts to the setting of heritage assets	Presence of wind farm infrastructure: Up to 35 wind turbines One OSP in the Windfarm Site.	The worst case scenario represents the maximum intrusive effect of installed infrastructure and operation and maintenance activities for the longest duration.
Decommissioning		
Same as for construction	Decommissioning arrangements will be detailed in a Decommissioning Programme, which will be drawn up and agreed with Scottish Ministers prior to construction. This plan will also ensure lighting and marking mitigations remain functioning throughout the life of the Project and include where an obstruction is left in place. Decommissioning areas will be assumed as those defined by the construction phase.	

15.7.4 Potential Impacts During Construction

15.7.4.1 Impact C1: Direct (physical) impact to known heritage assets

196. As described in **Section 15.6.2** above, there are 32 seabed features of potential archaeological interest or possible interest have been identified by MSDS Marine ranging between low and high potential within the Offshore Development Area. Of these, only one, **GV22_0008** (the *Ernst Friesecke*) was identified as being of high archaeological potential, with the remaining 31 being low.

197. With the application of embedded mitigation measures, **No Change** to the cultural heritage significance of the WWII remains and **GV22_0008** (the *Ernst Friesecke*) is anticipated.

198. Embedded mitigation measures are set out in the **Outline WSI (Offshore)** (**Appendix 15.2**) and presented in **Section 15.7.2.** It is anticipated that all direct impacts to known heritage resulting from the Project will be avoided.

199. Subject to approval by HES, it is recommended that AEZs are implemented around anomalies assessed by MSDS Marine as being of high archaeological potential. The location of the high potential anomaly **GV22_0008** (the *Ernst Friesecke*) is illustrated on **Figure 10** of **Appendix 15.1.** It is recommended a 50m AEZ is implemented around this which is presented in **Table 15.27** below.

Table 15.27: Recommended AEZ Within the Offshore Development Area.

ID	Classification	Potential	ETRS89 Z30N		AEZ (m)
			X	Y	
GV22_0008	Wreck	High	636672.5	6419826.0	50m

200. Within the intertidal zone (see **15.6.3**) there are three Aberdeenshire HER upstanding features. These are WWII anti-tank blocks (NK14NW0084), two WWII type 24 Pillboxes (NK14NW0080 and NK14NW0079). It is anticipated that all such intertidal remains would be avoided using HDD to install the cable ducts, passing below the beach deposits. As such, **No Change** to the significance of intertidal remains is anticipated to occur.

15.7.4.2 Impact C2: Direct impact to potential heritage assets

201. Direct (physical) impacts encompass direct effects from the physical siting of the Project. Direct impacts to heritage assets, either present on the seafloor or buried within seabed deposits, may result in damage to, or destruction of, archaeological material. It may also result in the deterioration or destruction of the relationships between that material and the wider environment (stratigraphic context or setting).

202. These relationships are crucial to developing a full understanding of an asset. Such impacts may occur if heritage assets are present within the footprint of infrastructure elements of the Project (i.e., mooring anchors and cables) or within the footprint of activities such as seabed clearance, anchoring or the placement of jack up barges.

203. It is not possible to avoid heritage assets that have not yet been discovered (potential heritage assets). Therefore, unavoidable direct impacts may occur if archaeological material is present within the footprint of the project associated with the following activities:

- Seabed preparation (including UXO and boulder clearance, where required);
- Installation of wind turbine moorings and foundations for other offshore infrastructure;
- Installation of ancillary infrastructure;
- Installation of offshore cabling;
- Seabed contact by legs of jack-up vessels and / or anchors; and
- Cable installation at the landfall.

204. For this assessment, potential heritage assets are regarded as comprising the following asset types:

- Potential *in situ* prehistoric sites, submerged landscape features, derived/isolated Prehistoric finds and palaeoenvironmental evidence;
- Potential wrecks and derived/isolated maritime finds;
- Potential aircraft and derived/isolated aviation finds; and
- Potential intertidal finds.

205. There are no known seabed prehistoric sites within the Offshore Development Area, however, the Forth Formation was identified as being a geological unit with some archaeological potential. Areas of the nearshore Cable Corridors may have been exposed during the Loch Lomond Stadial and Early Holocene, with these areas and the intertidal zone potentially being attractive areas for exploitation. it is anticipated that all such intertidal remains can be avoided using HDD to install the cable ducts, passing below the beach deposits. As such, there will be no direct pathway for impact to intertidal assets.

206. Additionally, the depth of sedimentary sequences of archaeological interest at the landfall will be further clarified through the geoarchaeological assessment of engineering led geotechnical data to be acquired in 2023 which inform the design of HDD and nearshore cable installation.

207. Similarly, there are 34 Aberdeenshire HER records in the Offshore Development Area, 20 CANMORE records and five UKHO records. These provide an indication of the likely potential for previously unrecorded vessels to be present, however, do not necessarily indicate known remains.

208. Additionally, the reported losses of three 20th century steamships (NK14NW0112, NK14NW0303 and NK14NW0185) and a 19th century brig (NK14NW0264) are recorded within the intertidal zone. In

addition to these there are several known WWII defence structures. As such, similar remains could be present within the intertidal zone.

209. As set out in **Table 15.12**, **Table 15.20** and **Table 15.22**, *in situ* prehistoric, maritime and aviation sites are assessed as being of potentially high cultural heritage significance (importance), as are potential submerged landscape features and potential palaeoenvironmental evidence (where associated with palaeolandscape features or archaeological material).

210. With the use of HDD to install the cable ducts, passing below the beach deposits it is anticipated that all such intertidal remains can be avoided. As such, there will be no direct pathway for impact to intertidal assets. As such, **No Change** to the significance of intertidal remains is anticipated to occur.

211. In terms of the remaining potential heritage assets, impacts to these would be reduced through the application of mitigation measures. Further archaeological assessment of high-resolution geophysical data and geoarchaeological assessment of geotechnical data will be undertaken post-consent. This will reduce, as far as possible, the potential for unintended impacts during construction.

212. The examination of potential prehistoric deposits through the assessment of preconstruction geotechnical and geophysical data will further contribute to the body of scientific data available for the study of seabed prehistory in the North Sea.

213. There will be archaeological input into any future sampling programmes and all available pre-construction geotechnical data (e.g., samples / geotechnical logs acquired as part of engineering-led ground investigation works) will be subject to geoarchaeological assessment during the post-consent stages of the Project. If *in situ* prehistoric sites are identified as a result of such work, then mitigation measures to record and/or protect such sites will be agreed in consultation with HES.

214. Similarly, the archaeological assessment of high-resolution geophysical data to be acquired post-consent, together with ground-truthing of identified anomalies of potential archaeological (cultural) significance, will help to confirm and clarify further the potential for maritime and aviation heritage assets. Planned pre-construction surveys will result in full coverage of the areas within which construction will take place (corresponding to the final wind farm layout and cable route) with SSS, MBES and magnetometer data.

215. If features of archaeological interest are identified during these further investigations post-consent, they will be subject to the same mitigation as described for known heritage assets described **Section 15.7.4.1** above.

216. Although measures will be taken to reduce, as far as possible, the potential for impact to previously undiscovered heritage assets it is still possible that unexpected discoveries may be encountered during construction. However, possible measures to further reduce the cultural significance of potential impacts include ensuring that prompt archaeological advice is received in the event of a discovery and through recording and conserving any objects that have been disturbed.

217. Any unexpected discoveries, of isolated finds or multiple chance finds from a specific location that might be indicative of a wider debris field representing previously unknown *in situ* archaeological material, this will be reported through a formal protocol for archaeological discoveries. This will be based upon the established *Protocol for Archaeological Discoveries: Offshore Renewables Project*s (The Crown Estate, 2014) (ORPAD). This will establish whether the recovered objects are of archaeological interest and allow for the application of appropriate mitigation measures where necessary. For any new discoveries, any further mitigation which may be required will be considered on a case-by-case basis, proportionate to the cultural significance of the discovery.

218. The approach to the implementation of these mitigation measures is set out in the **Outline WSI (Offshore)** (**Appendix 15.2**). The **Outline WSI (Offshore)** has been prepared in accordance with industry standards and guidance including *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021).

219. With the application of these mitigation measures, residual effects are anticipated to be no higher than **minor adverse significance**.

15.7.4.3 Impact C3: Indirect impact to heritage assets from changes to physical processes

220. The Project has the potential to interact with both local and regional hydrodynamic and sedimentary processes which in turn may result in impacts of an in-direct (physical) nature occurring upon heritage assets.

221. Changes in coastal processes can lead to re-distribution of erosion and accretion patterns while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features.

222. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave / tidal action for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.

223. The potential indirect impact to heritage assets from changes to physical processes is assessed with reference to **Section 7.7.3** (Potential Impact during Construction) of **Chapter 7: Marine Geology, Oceanography and Physical Processes**.

224. Marine physical processes impacts which correspond to increased bed-level, and, therefore, increased potential for the protection of heritage assets which are currently exposed through additional sediment cover (sediment deposited from plume) are:

- Impact C2: Increase in suspended sediment concentration and deposition; and
- Impact C3: Disturbance of seabed sediments during cable installation.

225. Impacts for the marine physical processes impacts from **Chapter 7: Marine Geology, Oceanography and Physical Processes** which correspond to increased bed-level, and, therefore, increased potential for the protection of currently exposed heritage assets through additional sediment cover (sediment deposited from plume) are both assessed as **negligible**.

226. Based upon the assessment of marine physical process, the indirect far-field effect upon the burial of heritage assets will be **negligible** and will not result in a measurable change to the preservation of heritage assets.

227. Similarly, although short term changes will occur near-field, the low magnitude (as a worst case) combined with the temporary nature of such changes, which will be largely confined to the vicinity of the offshore infrastructure. As such they are not anticipated to result in a measurable change to the burial of heritage assets should they be present.

228. The indirect effect of changes to marine physical process upon offshore heritage assets, therefore, changes to the cultural significance of offshore heritage assets are assessed as resulting in **No Change**.

15.7.4.4 Impact C4: Changes to the setting of Heritage Assets

229. As part of the assessment undertaken in relation to onshore heritage assets, it was concluded that any changes in setting due to construction activities will be temporary and of sufficiently short duration that they would not give rise to material harm. The same conclusions are considered as applicable to marine and intertidal heritage assets. As such, indirect impacts upon the setting of such assets during the construction phase have therefore also been excluded from further consideration (**No Change**).

15.7.5 Potential Impacts During Operation

15.7.5.1 Impact O1: Direct (physical) impact to known heritage assets

230. As all known heritage assets will be avoided through the retention of AEZs throughout the project lifespan, there is no pathway for impact during routine or unscheduled maintenance activities. As such, there would be **No Change** to their significance.

15.7.5.2 Impact O2: Direct impact to potential heritage assets

231. Direct impacts to potential heritage assets are unlikely to occur as a result of intrusive maintenance as any impacts would already have occurred during installation of the wind farm infrastructure during the construction phase and would already have been subject to appropriate and proportionate additional mitigation measures, as and where necessary. There will be no impact at the landfall during the operation phase as there will be no groundworks within or disturbance of intertidal deposits.

232. There is, however, potential for impacts to occur if archaeological material is present within the footprint of jack-ups or vessel anchors deployed during planned or unscheduled maintenance activities, if these are in areas which were not previously subject to disturbance. In practice, the nature and extent of individual impacts cannot be fully understood until after the impact has occurred.

233. As set out in **Table 15.12**, **Table 15.20** and **Table 15.22**, *in situ* prehistoric, maritime and aviation sites are assessed as being of potentially high heritage significance (importance), as are potential submerged landscape features and potential palaeoenvironmental evidence (where associated with palaeolandscape features or archaeological material).

234. With the application of mitigation measures impacts to potential heritage assets will be reduced. The archaeological assessment of post-construction monitoring data will further reduce the potential for unintended impacts during operation. If further features of archaeological interest are identified these will be subject to the same mitigation as described for known heritage assets described in **Section 15.7.4.1** above with the primary approach being avoidance.

235. In the event of an unexpected discovery, the ongoing implementation of a formal protocol for archaeological discoveries, throughout the operation phase, will allow for such discoveries to be efficiently reported, for advice to be provided and for any further mitigation to be considered on a case-by-case basis, proportionate to the cultural significance of the discovery.

236. The approach to the implementation of these mitigation measures is set out in the **Outline WSI (Offshore)** (**Appendix 15.2**). The **Outline WSI (Offshore)** has been prepared in accordance with industry standards and guidance including *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021).

237. With the application of these mitigation measures, residual effects are anticipated to be no higher than **minor adverse significance**.

15.7.5.3 Impact O3: Indirect impact to heritage assets from changes to physical processes

238. The Project has the potential to interact with both local and regional hydrodynamic and sedimentary processes which in turn may result in impacts of an in-direct (physical) nature occurring upon heritage assets.

239. Changes in coastal processes can lead to re-distribution of erosion and accretion patterns while changes in tidal currents, for example, may affect the stability of nearby morphological and archaeological features.

240. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to marine processes, due to increased wave / tidal action for example, as these will deteriorate faster than those protected by sediment cover. Conversely, if increased sedimentation results in an exposed site becoming buried this may be considered a beneficial impact.

241. Potential indirect impacts to heritage assets from changes to physical processes is assessed with reference to **Section 7.7.4** (Potential Impact during Operation) of **Chapter 7: Marine Geology, Oceanography and Physical Processes**.

242. Marine physical processes impacts which correspond to changes could result in scour and sediment stripping across the Offshore Development Area. This could lead to the exposure and increased degradation of heritage assets which are currently buried and protected from marine processes. Such impacts are as follows:

- Impact O1: Rock deposit or concrete mattress footprint on seabed;
- Impact O2: Effect of rock deposits or concrete mattresses on the wave, tidal and sediment regimes;
- Impact O3: Disturbance of seabed sediments due to catenary action of mooring lines in the Windfarm Site; and
- Impact O4: Disturbance of seabed sediments due to scour around the foundations of the mooring anchors in the Windfarm Site.

243. For Impact O1 the magnitude of impact for marine physical processes at landfall is concluded to be **no effect**. This is concluded to be **negligible** from the HDD exit point to the 12 nm point. This is considered insufficient to result in a measurable increase in the exposure and degradation of heritage assets and there will be **no impact**.

244. For Impact O2 the magnitude of impact for marine physical processes at landfall is concluded to be **no effect**. Between the exit point of the HDD and the 12 nm limit there would be a **negligible** magnitude of impact for the NorthConnect Parallel Export Cable Corridor and a possibly a **low** magnitude along the St Fergus South Export Cable Corridor. This is considered insufficient to result in a measurable increase in the exposure and degradation of heritage assets. As such, the significance of effect is assessed as **No Change**.

245. For Impact O3 in the vicinity of the WTGs will be swept by the catenary action of the mooring lines for each WTG. The effect will be localised and **low** in magnitude, and although it will persist throughout the operation and maintenance phase it is deemed to be negligible. This is considered insufficient to result in a measurable increase in the exposure and degradation of heritage assets. As such there will be **No Change** to the cultural significance of heritage assets

246. For Impact O4 seabed scour is likely to be minimal in the deeper waters of the Windfarm Site. Based upon these considerations, this effect is deemed to be **negligible** throughout the operation and

maintenance phase. This is considered insufficient to result in a measurable increase in the exposure and degradation of heritage assets. As such, there will be **No Change** to the cultural significance of heritage assets**.**

15.7.5.4 Impact O4: Changes to the setting of Heritage Assets

247. During the operational life of the Project, the presence of the wind turbines and offshore platforms will introduce a clear change to the setting of offshore assets. However, as assessed in **Sections 94** and **15.6.2.6**, the setting of marine heritage assets is not considered to form a key part of their cultural significance, which lies primarily in their historical and research value.

248. Furthermore, the baseline setting is already influenced by passing vessels in this area associated with industry and fishing. Therefore, the potential magnitude of impact is reduced from the presence of vessels, personnel and infrastructure associated with maintenance activities. The significance of effect would, therefore, be **negligible adverse** as the setting will change in a way which does not materially affect its cultural significance.

249. Regarding the setting of WWII defensive structures located within the intertidal zone, their setting will not be impacted. This is because the array site will be located over 80 km offshore, so will not be visible at that range. As such, there will be not **No Change** to their setting nor cultural significance

15.7.6 Potential Impacts During Decommissioning

250. No decision has been made regarding the final decommissioning policy for the Project as it is recognised that industry best practice, rules and legislation change over time. Decommissioning works would most likely involve the accessible installed components. Offshore, this is likely to include removal of all the wind turbine components, including the anchors and mooring cables above seabed level but excluding scour protection.

251. Offshore cables may be left *in situ* or removed depending on available information and technology at the time of decommissioning. The inter-array cables will be cut at each end towards the foundation substructures. Scour and cable protection would likely be left *in situ*, other than in any Marine Conservation Zones (MCZs) where external cable protection may be removed.

15.7.6.1 Impact D1: Direct (physical) impact to known heritage assets

252. As all known heritage assets will be avoided through the retention of AEZs throughout the project lifespan, there is no pathway for impact during routine or unscheduled maintenance activities. As such, there would be **No Change** to their significance.

15.7.6.2 Impact D2: Direct impact to potential heritage assets

253. Direct impacts to potential heritage assets are unlikely to occur due to decommissioning as any impacts would already have occurred during the construction phase and would already have been subject to appropriate and proportionate mitigation measures where necessary.

254. There is potential for impacts to occur if archaeological material is present within the footprint of jack-ups or vessel anchors deployed during decommissioning activities if these are in areas which have not disturbed. In practice, the nature and extent of individual impacts cannot be fully understood until after the impact has occurred.

255. As set out in **Table 15.12**, **Table 15.20** and **Table 15.22**, *in situ* prehistoric, maritime and aviation sites are assessed as being of potentially high heritage significance (importance), as are potential

submerged landscape features and potential palaeoenvironmental evidence (where associated with palaeolandscape features or archaeological material).

256. As a worst case, there is potential for direct impacts of **major adverse** magnitude upon potential *in situ* heritage assets and **minor adverse** magnitude upon potential isolated finds that are in areas which have not disturbed during construction. It is anticipated that through the implementation of a formal PAD, and additional mitigation measures if required, residual impacts will be no higher than **minor adverse significanc**e.

257. In areas where construction activities have been undertaken, there will be **No Change**, as all impact will have been mitigated against at the pre-construction/construction stages.

15.7.6.3 Impact D3: Indirect impact to heritage assets from changes to physical processes

258. Potential indirect impact to heritage assets from changes to physical processes is assessed with reference to **Section 7.7.5** (Potential Impact during Decommissioning) **of Chapter 7: Marine Geology, Oceanography and Physical Processes**.

259. During the decommissioning phase, there is potential for wind turbine substructure and cable removal activities to cause changes in suspended sediment concentrations and/or seabed or shoreline levels because of sediment disturbance effects. The types of effect will be comparable to those identified for the construction phase. As such, there will be **No Change** to their cultural significance.

15.7.6.4 Impact D4: Changes to the setting of Heritage Assets

260. Decommissioning may result in a further change to the setting of heritage assets with the removal of the wind turbines and associated infrastructure. The presence of vessels, personnel and infrastructure associated with decommissioning activities will also temporarily affect setting. However, as for construction these impacts are temporary and reversible and the significance of this effect would, therefore, be **negligible adverse** as the setting will change in a way which does not materially affect its cultural significance.

15.8 Cumulative effects

15.8.1 Identification of Potential Cumulative Effects

261. The first step in the cumulative assessment is the identification of which residual impacts assessed for the Project have the potential for a cumulative impact with other plans, projects, and activities (described as ‘impact screening’). This information is set out in **Table 15.28** below, together with a consideration of the confidence in the data that is available to inform a detailed assessment and the associated rationale. Only potential impacts assessed in **Section 15.7** as negligible or above are included in the CIA (i.e., those assessed as ‘no impact’ are not taken forward as there is no potential for them to contribute to a cumulative impact).

262. It was not considered that any cumulative impacts would arise with the decommissioning of OandG facilities as impacts to heritage are likely to have occurred during the construction phases of these projects. Additionally, the majority of the OandG facilities are located over 50 km from the Windfarm Site. Two facilities Goldeye (13 km from the Windfarm Site) and Buchan and Hannay (33 km from the Windfarm Site) are of relevance, however, do not temporally overlap with the construction of the Project. As such, it is considered that cumulative impacts would not arise from the decommissioning of these two facilities.

Table 15.28: Potential Cumulative Impacts

Impact	Potential for cumulative effect	Rationale
C1: Direct (physical) impact to known heritage assets	No	Direct cumulative impacts to known heritage assets are unlikely to occur due to the application of AEZs identified through EIA for constructed and planned projects as part of the consenting process.
C2: Direct (physical) impact to potential heritage assets	Yes	Although the effect of unavoidable impacts will be mitigated by agreed measures as part of the consenting process for each of the constructed and planned projects, the impacts will still have occurred, and permanent damage or destruction will have taken place. The assessment of cumulative impacts, therefore, needs to consider the effect of multiple unavoidable impacts from multiple projects upon the archaeological resource.
C3: Indirect impact to heritage assets from changes to physical processes	No	In relation to marine geology, oceanography, and physical processes, as no cumulative impacts are anticipated during the construction phase (see **Chapter 7: Marine Geology, Oceanography and Physical Processes**), there is no pathway for cumulative impacts to heritage assets.
C4: Impacts to the setting of heritage assets	No	As assessed in **Sections 15.6.1.1** and **15.6.2.6**, the setting of marine heritage assets is not considered to form a key part of their cultural significance, which lies primarily in their historical and research value.
O1: Direct (physical) impact to known heritage assets	No	Direct cumulative impacts to known heritage assets are unlikely to occur due to the continued avoidance and retention of AEZs throughout the life of constructed and planned projects.
O2: Direct (physical) impact to potential heritage assets	Yes	There is potential for multiple unavoidable impacts associated with operations and maintenance activities (e.g. cable repairs and vessel anchors/jack up legs) during the operation phases of multiple projects
O3: Indirect impact to heritage assets from changes to physical processes	No	In relation to marine geology, oceanography, and physical processes, as no cumulative impacts are anticipated during the construction phase (see **Chapter 7: Marine Geology, Oceanography and Physical Processes**), there is no pathway for cumulative impacts to heritage assets.
O4: Impacts to the setting of heritage assets	No	As assessed in **Sections 15.6.1.1** and **15.6.2.6**, the setting of marine heritage assets is not considered to form a key part of their cultural significance, which lies primarily in their historical and research value.
D1: Direct (physical) impact to known heritage assets	No	Direct cumulative impacts to known heritage assets are unlikely to occur due to the continued avoidance and retention of AEZs throughout the life of constructed and planned projects.
D2: Direct (physical) impact to potential heritage assets	Yes	There is potential for multiple unavoidable impacts associated with operations and maintenance activities (e.g. cable repairs and vessel anchors/jack up legs) during the operation phases of multiple projects
D3: Indirect impact to heritage assets from changes to physical processes	No	In relation to marine geology, oceanography, and physical processes, as no cumulative impacts are anticipated during the construction phase (see **Chapter 7: Marine Geology, Oceanography and Physical Processes**), there is no pathway for cumulative impacts to heritage assets.
D4: Impacts to the setting of heritage assets	No	As assessed in **Sections 15.6.1.1** and **15.6.2.6**, the setting of marine heritage assets is not considered to form a key part of their cultural significance, which lies primarily in their historical and research value.

15.8.2 Other Plans, Projects, and Activities

263. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative impacts for inclusion in the CIA (described as 'project screening'). This information is set out in **Table 15.29** below, together with a consideration of the relevant details of each, including status (e.g., under construction), planned construction period, closest distance to the Project, status of available data and rationale for including or excluding from the assessment.

264. The project screening has been informed by the development of a CIA Project List which forms an exhaustive list of plans, projects, and activities in a very large Study Area incorporating all planned and operational projects in the vicinity of the Project (**Appendix 20.1)**. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects, and activities to be screened in or out.

Table 15.29: Summary of Projects Considered for the CIA in Relation to Offshore Archaeology and Cultural Heritage (Project Screening)

Project	Status	Construction Period	Distance from Project (km)	Data Confidence	Included in the CIA (Y/N)	Rationale
Salamander Floating Wind Farm	Pre-Application	Construction 2026 (earliest)	Approx. 36 km south-west of the Offshore Development Area	Low	No	Information on export cable is unavailable and therefore cumulative interactions with export cables should be assessed in the Salamander Floating Windfarm EIA.
Acorn Carbon Capture and Storage Site	Pre-Application	Operational by mid 2020s	Approx. 2 km north of the St. Fergus South Landfall Option	High	No	No pathway for cumulative impacts to heritage assets to occur
NorthConnect HVDC Link	Under development - Consent has been received for the project in UK waters but is awaiting consent within Norwegian waters.	2021-2024	0	High	Yes	Both projects have footprints which overlap with that of the Project resulting in potential cumulative direct (physical) impact to potential heritage assets.
Eastern Green Link 2	Under development - A Report on Proposed Content of the Assessment to Support a Marine Licence Application was submitted to MS-LOT in July 2021 for the project. Ground investigation works onshore near Peterhead began in February 2022. Installation activities for the project are due to commence in 2025, with cable installation to take place in 2026/27.	2025-2029	0	High	Yes	

Project	Status	Construction Period	Distance from Project (km)	Data Confidence	Included in the CIA (Y/N)	Rationale
Sea Wall Repair and Extension - Alexandra Parade, Peterhead Harbour	Licenced	Construction yet to be commenced	Approx. 2.4 km south of the landfall of the St. Fergus South Export Cable Corridor option within the Study Area (12 nm limit)	High	No	No pathway for cumulative impacts to heritage assets to occur

265. **Table 15.29** concludes that in relation to Offshore Archaeology and Cultural Heritage, cumulative direct (physical) impacts to known heritage assets can be avoided (**No Change**). There are numerous constructed/consented and planned offshore wind farms, a maintenance licences and an oil and gas development within 100 km (for example) of the Project. Of these, only two will overlap with Green Volt, these are the NorthConnect HVDC Link and Eastern Green Link 2.

266. The NorthConnect HVDC Link will be installed through the southeast section of the Offshore Development Area. Similarly, Eastern Green Link 2 will be installed within the St. Fergus South Landfall Export Cable Corridor. Regardless, all projects should be subject to the same primary mitigation for known heritage assets (i.e., avoidance and preservation *in situ*) and there is no pathway for cumulative direct (physical) impacts. Similarly, all projects should be subject to the same mitigation where known heritage assets cannot be avoided (i.e., investigation and recording, preservation by record) which if undertaken would reduce anticipated impacts to acceptable levels in EIA terms (i.e. no greater than **minor adverse significance**).

267. As it is not possible to avoid heritage assets that have not yet been discovered (potential heritage assets), significant cumulative (unavoidable) direct (physical) impacts may occur if archaeology is present across multiple plans, projects, and activities. The potential cumulative effects upon the cultural significance of these heritage assets is described below.

15.8.3 Assessment of Cumulative Effects

268. Assessments undertaken for EIA as part of the consents process for offshore plans, projects and activities have revealed a large body of data indicating the likely potential for previously undiscovered prehistoric, maritime and aviation archaeology within the Northern North Sea. This includes palaeolandscape features mapped through interpretations of SBP and MBES data and geoarchaeological assessment of geotechnical data. These help to better understand the potential for terrestrial landscapes and inhabitable environments where prehistoric populations may have settled at times of lower sea level.

269. Similarly, studies have also shown that historic maritime and aviation networks can be mapped, such as the East Coast War Channels (Firth 2014). Whilst the group value of individual wrecks, or crash sites, for example, also collectively form part of the variously perceived historic seascape characters (e.g., wartime conflict, fishing areas, transport, leisure industry etc) of the North Sea

270. As stated for the assessment of impacts from the Project in **Section 15.7** above, it is not possible to avoid heritage assets that have not yet been discovered (potential heritage assets). Therefore, unavoidable direct impacts may occur if archaeological material is present within the footprint of any plans, projects, and activities. These activities and these impacts have the potential to be of high magnitude without the application of appropriate mitigation. With the application of appropriate mitigation to reduce or offset direct (physical) impacts, these will be reduced to no greater than a **minor adverse** significance of effect at a project level.

271. If multiple unavoidable impacts occur during the construction, operation or decommissioning of multiple projects, then cumulative impacts may be considered of greater significance of effect. For example, it is possible that unique aspects of former landscapes, or of the *in situ* maritime and aviation archaeological resource, may be lost as a result. In addition, if a site is damaged or destroyed, comparable sites elsewhere may increase in importance resulting from greater rarity and any future direct impacts will be of greater significance of effect.

272. Despite the significant data that is being produced through the consenting process, the extent of these networks and seascapes/landscapes from various periods remain largely unmapped. These may

either be confined within a project area or may extend beyond the bounds of a project (or beyond UK waters see **Section 15.9** below). Within Scottish waters, little research, or the mapping of submerged palaeolandscapes has been undertaken. As such, the potential magnitude of such changes and impacts remains poorly understood.

273. It is acknowledged that strategic analysis in relation to the cumulative impact of multiple constructed and planned projects would facilitate greater understanding of the cumulative effect of development within the Northern North Sea. Whilst this is considered beyond the scope of an individual project, the contribution of publicly available data from the Project has the potential to contribute to the ongoing industry wide build-up of data which would form the basis for such a study.

274. Research agendas and academic research focussing on the marine historic environment of the North Sea have gained considerable momentum in recent decades. Data has been acquired from development-led investigations and is increasingly considered to represent a significant opportunity to enhance our understanding of the archaeology and cultural heritage resource in offshore contexts. Examples include (but are not limited to):

- Scottish Archaeological Research Framework (ScARF);
- Europe's Lost Frontiers (Research led by Professor Vince Gaffney, University of Bradford); and
- The scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains (Research led by N. C. Flemming).

275. This research falls in line with various policy frameworks which have been developed to ensure the sustainable development of the North Sea, considering the non-renewable nature of the marine historic environment. Through the delivery of further investigation and mitigation post-application/post-consent, with account of current research agendas, policy frameworks and academic or industry led research initiatives, the Project has the potential to contribute to this overall cumulative beneficial impact.

276. In addition to scientific research objectives, the Project has the potential to contribute significantly to wider public interest. Marine heritage assets, in particular shipwreck sites, are often connected to significant past events and retain and reflect stories of the crew, vessel construction, trade, immigration, emigration, and conflict, for example. As such, discoveries within the offshore sites have the potential to be of significant interest to the public, creating opportunities for outreach and education, particularly with local audiences.

277. Should the Project be granted consent, approaches to realising public benefit, the creation of joined-up objectives for post-consent investigation and mitigation, including links with academic and industry wide research initiatives, will be established post-consent in consultation with key stakeholders (i.e., HES).

278. A commitment to the delivery of this beneficial effect, including the completion of studies to professional archaeological standards and to making the results of such work publicly available, is set out in the **Outline WSI (Offshore)** (**Appendix 15.2**) prepared and submitted as part of the application.

15.9 Transboundary Impacts

279. Transboundary impacts to heritage assets will not occur due to the localised nature of disturbance which do not cross territorial borders. Similarly, as concluded in **Chapter 7: Marine Geology, Oceanography and Physical Processes**, given that there will be no impact to the hydrodynamic

and sedimentary regime resulting from transboundary impacts to heritage assets are unlikely to occur as a result of changes to marine physical processes.

280. The North Sea is not the property of any nation, although distinctions are made between territorial waters (the administrative and political division which form part of a particular nation's territory up to 12 nautical miles) and EEZs. These represent sea zones prescribed by the United Nations (UN) Convention on the Law of the Sea over which a state has special rights regarding the exploration and use of marine sources. While the Project is within the UK's EEZ, any data acquired and archaeologically assessed as part of the Project has the potential to feed into wider research objectives initiated by neighbouring EEZs in the North Sea (most notably, the Danish and Norwegian EEZs).

281. In terms of palaeolandscapes, the area between Scotland and continental Europe is relatively unknown, with potential for new information to arise. Regarding maritime and aviation archaeology, the North Sea has played host to numerous conflicts, migration and trade routes and wrecks and aircraft from multiple nations are known to be present on the seafloor. Therefore, the cumulative impacts discussed above, are not restricted to the UK's EEZ and transboundary effects must also be considered.

282. As for cumulative impacts above, should the Project be granted consent, the approach to delivering any transboundary objectives will be established in consultation with key stakeholders post-consent. This will allow for the potentially beneficial effects to be realised by those engaged in marine archaeological research (and the offshore wind farm industry) for both commercial and non-commercial purposes.

15.10 Inter-relationships

283. There are potential inter-relationships between the offshore archaeology and cultural heritage topic and several other topics that have been considered within this EIA report. **Table 15.30** provides a summary of the principal inter-relationships and signposts to where those issues have been addressed

Table 15.30: Offshore Archaeology and Cultural Heritage Inter Relationships

Topic and description	Related Chapter	Where addressed in this Chapter
Construction		
Indirect impact to heritage assets from changes to physical processes	**Chapter 7: Marine Geology, Oceanography and Physical Processes**	**Section 15.7.4.3**
Indirect (non-physical) impacts upon the setting of heritage assets (designated and non-designated)	**Onshore Archaeology and Cultural Heritage**	**Separate onshore EIA report**
Operation		
Indirect impact to heritage assets from changes to physical processes	**Chapter 7: Marine Geology, Oceanography and Physical Processes**	**Section 15.7.5.3**
Indirect (non-physical) impacts upon the setting of heritage assets (designated and non-designated)	**Onshore Archaeology and Cultural Heritage**	**Separate onshore EIA report**
Decommissioning		
Same as construction		

284. Inter-relationships between offshore archaeology and marine physical processes (**Chapter 7: Marine Geology, Oceanography and Physical Processes**) have been discussed as part of the impact assessment above.

285. This has demonstrated that no significant impacts are expected for any single archaeological receptor resulting from the construction, operation or decommissioning of the Project. As such, there is no potential for the accumulation of residual impacts on a single archaeological receptor.

286. Potential impacts upon the setting of onshore heritage assets from offshore infrastructure are addressed in the separate onshore EIA report.

15.11 Summary

287. This chapter has provided a characterisation of the existing environment for Offshore Archaeology and Cultural Heritage based on both existing public data and site-specific survey data, which has established that there will be at worst **minor adverse** residual impacts on heritage assets during the construction, operation, and decommissioning phases of the Project

288. There are no known seabed prehistory sites within the Study Area. MSDS Marine have identified gentle undulations and pockmarks (formed resulting from methane venting from deeper marine sediments) within the Windfarm Site (see **Appendix 15.1**). Similarly, several irregular depressions thought to be associated with glacial boulders have been identified (SBP and MBES).

289. A sequence of nine geological phases was also interpreted from the SBP and MBES and other available studies. The interpreted sedimentary units are largely of limited/very limited archaeological potential although there is some potential for *in situ* archaeological remains focused on nearshore areas. This potential is dependent on the survival of the Forth Formation and specifically the early Holocene, shallow marine or estuarine St. Andrews Bay Member within these nearshore areas and geotechnical investigations may help to investigate this potential further.

290. MSDS Marine identified 31 seabed features of low archaeological potential and a single high potential anomaly (**GV22_0008**) which is considered to be the wreck of the *Ernst Friesecke.* Eight of the low potential anomalies were identified as possible mine sinker weights, with the remaining ones likely representing isolated items of debris.

291. In addition to the known wreck and identified anomalies described above, there is also potential for the presence of further maritime and aviation archaeological material to be present, which has not been seen in the geophysical data. This may comprise isolated finds of material, or wrecks or aircraft crash sites, potentially buried and concealed within or beneath marine seabed sediments. Within the Offshore Development Area, 20 CANMORE Records, 34 Aberdeenshire HER records and eight UKHO records were identified, the majority of which were located beyond the geophysical survey coverage. This is due to the majority being concentrated nearshore, where geophysical data were not obtained.

292. Within the intertidal zone a total of four CANMORE and seven Aberdeenshire HER records were identified. These comprise the reported locations of 19th-20th century vessels and the upstanding remains of WWII defensive structures. As such there is a potential for similar remains relating to these to be present. However, with the use of HDD, impacts to potential intertidal archaeological material will be avoided. The depth of sedimentary sequences of archaeological interest at the landfall will be further clarified through the geoarchaeological assessment of geotechnical data to be acquired in 2023, and post-consent, and will inform the design of HDD and nearshore cable installation so that HDD will pass beneath deposits of potential archaeological interest.

293. With the application of mitigation measures, it is anticipated that all direct impacts to known heritage assets as a result of the Project will be avoided. The approach to the implementation of these mitigation measures is set out in the **Outline WSI (Offshore)** (**Appendix 15.2**) submitted alongside the application. This has been prepared in accordance with industry standards and guidance including *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021).

294. Subject to approval from HES, a 50m AEZ will be implemented around the high potential anomaly **GV22_0008** to be retained for the lifetime of Project. AEZs are not recommended at this time for features of low archaeological potential, magnetic anomalies or AAPs. The positions of these features will be avoided by means of micro-siting during detailed project design, where possible.

295. The archaeological assessment of pre-construction survey data, including high resolution geophysical data undertaken for the purposes of UXO identification, will further clarify the nature and extent of these anomalies and the scheme design will be modified to avoid heritage assets where possible. If features cannot be avoided, then additional work may be required to establish the archaeological interest of the feature (e.g., investigation of individual anomalies (ground truthing) through ROV and/or diver survey) and to record features prior to removal, as appropriate.

296. It is not possible to avoid heritage assets that have not yet been discovered (potential heritage assets). To minimise this potential impact, further archaeological assessment of high-resolution geophysical data and geoarchaeological assessment of geotechnical data will be undertaken post-application/ post-consent. This will reduce, as far as possible, the potential for unintended impacts during construction. In the event of an unexpected discovery, this will be reported using a formal protocol for archaeological discoveries which will establish whether the recovered objects are of archaeological interest and recommend appropriate mitigation measures where necessary. Through the protocol, any possible *in situ* heritage assets encountered on the seabed will be immediately provided with a temporary exclusion zone to prevent further impacts from taking place until advice had been received. Following confirmation of the presence of archaeological material, additional mitigation measures to record or conserve the site will be agreed in consultation with HES.

297. Potentially beneficial effects have also been identified in relation to both cumulative and transboundary impacts, through the contribution of data to academic and scientific objectives, and public outreach and engagement. The approach to delivering these objectives will be established post-consent in consultation with key stakeholders, including HES, and set out in the **Outline WSI (Offshore)** (**Appendix 15.2**).

Table 15.31: Summary of Potential Impacts on Offshore Archaeology and Cultural Heritage

Potential impact	Receptor	Cultural Heritage Importance	Magnitude of Impact	Significance of Effect	Mitigation Measures Proposed	Residual Effect	Cumulative Residual Effect
Construction							
Impact C1: Direct impact to known heritage assets	Wrecks and anomalies of archaeological interest (GV22_0008 *Ernst Friesecke*)	No impact due to application of AEZs					
	Historic wrecks for which remains have yet to be identified	No impact due to application of AEZs					
	Additional anomalies of possible archaeological interest	No impact due to avoidance of these locations through micro-siting					
	Intertidal Assets (WWII defensive structures)	No impact due to avoidance of these locations using HDD					
Impact C2: Direct impact to potential heritage assets	*In-situ* prehistoric, maritime or aviation sites	High	High	Minor adverse – not significant	Further assessment and investigation and additional mitigation to avoid, reduce or offset impacts.	Minor adverse – not significant	Potential beneficial effect (described but currently not quantifiable, to be realised post-consent through provision of publicly accessible data)
	Intertidal assets	No impact					
	Isolated finds	Medium	Low	Minor adverse – not significant	Protocol for archaeological discoveries.	Minor adverse – not significant	
Impact C3: Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets	No impact					
Impact C4: Impacts to the setting of heritage assets	Known and potential heritage assets	No impact					

Potential impact	Receptor	Cultural Heritage Importance	Magnitude of Impact	Significance of Effect	Mitigation Measures Proposed	Residual Effect	Cumulative Residual Effect
Operation							
Impact O1: Direct impact to known heritage assets	Known heritage assets	No impact due to application AEZs					
Impact O2: Direct impact to potential heritage assets	*In-situ* prehistoric, maritime or aviation sites	High	High	Minor adverse – not significant	Further assessment of geophysical and geotechnical data post-consent.	Minor adverse – not significant	Potential beneficial effect (described but currently not quantifiable, to be realised post-consent through provision of publicly accessible data)
	Isolated finds	Medium	Low	Minor adverse – not significant	Protocol for archaeological discoveries.	Minor adverse – not significant	
Impact O3: Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets	No impact as **Chapter 7: Marine Geology, Oceanography and Physical Processes** concluded impacts would be low as a worst case. As such there will be no impact to the cultural significance of heritage assets.					
Impact O4: Impacts to the setting of heritage assets	Known and potential heritage assets	Medium to High	Low	Minor negligible – not significant	N/A	Minor negligible – not significant	Minor negligible – not significant
	WWII defensive structures	No impact as the turbines will not be visible from shore. Similarly, construction activities within the intertidal zone will be temporary and will therefore not result in a long lasting change.					
Decommissioning							
Impact D1: Direct impact to known heritage assets	Known heritage assets	No impact due to application AEZs					
Impact D2: Direct impact to potential heritage assets	*In-situ* prehistoric, maritime or aviation sites	High	High	Minor adverse – not significant	Further assessment of geophysical and geotechnical data post-consent.	Minor adverse – not significant	Potential beneficial effect (described but currently not quantifiable, to be realised post-consent through

Potential impact	Receptor	Cultural Heritage Importance	Magnitude of Impact	Significance of Effect	Mitigation Measures Proposed	Residual Effect	Cumulative Residual Effect
	Isolated finds	Medium	Low	Minor adverse – not significant	Protocol for archaeological discoveries.	Minor adverse – not significant	provision of publicly accessible data)
Impact D3: Indirect impact to heritage assets from changes to physical processes	Known and potential heritage assets	No impact as the types of effect will be comparable to those identified for the construction phase.					
Impact D4: Impacts to the setting of heritage assets	Known and potential heritage assets	No impact					

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