

A photograph of an offshore wind farm at sunset. The sky is a warm, golden-orange color with soft clouds. Several wind turbines are visible, their silhouettes dark against the bright sky. In the foreground, dark, choppy waves are breaking, with white foam and spray catching the low light. The overall mood is serene and powerful.

Salamander Offshore Wind Farm

Offshore EIA Report

**Volume ER.A.3, Chapter 17: Marine Archaeology and
Cultural Heritage**



Powered by Ørsted and
Simply Blue Group

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Glossary

Term	Definition
Anthropogenic	Of or relating to human activity.
Applicant	Salamander Wind Project Company Ltd., a joint venture between Ørsted, Simply Blue Group and Subsea7.
Cliniform	A sloping depositional surface.
Cultural Significance	Relates to the ways in which a heritage asset is valued by both specialists and the wider public. It may derive from factors including the asset's fabric, setting, context and associations.
Cumulative effects	The combined effect of the Salamander Project with the effects from a number of different projects, on the same single receptor/resource.
Cumulative impact	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Salamander Project.
Designated asset	Comprising listed buildings, conservation areas, scheduled monuments, historic marine protection areas, World Heritage Sites, Inventory gardens and designed landscapes and Inventory battlefields. The value of these assets has therefore been established through the designation process.
Design Envelope	A description of the range of possible elements that make up the Salamander Project design options under consideration, as set out in detail in the project description. This envelope is used to define Salamander Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known.
Desk-Based Assessment	A written report collating available datasets to produce a list of (known) heritage assets within a defined Study Area, an overview of an area's historic character and archaeological potential of a development site to contain additional (unknown) heritage assets. The assessment should list all known assets that may be impacted during the lifetime of the Development and where possible attempt to define the Sensitivity of identified heritage assets.
Offshore Development Area	The total area comprising the Offshore Array Area and the Offshore Export Cable Corridor.
Onshore Development Area	The total area comprising the Landfall, Onshore Export Cable Corridor, and Onshore Substation, EBI and associated infrastructure.

Direct physical impact	The impact upon features of cultural heritage interest, where sites or potential sites / buried archaeology are in danger of being physically disturbed or destroyed. Direct physical impacts are likely to occur during the construction of the Development. These are considered permanent and irreversible.
Early Medieval Period	400-900AD
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which the potential significant effects of certain projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Environmental Impact Assessment (Scotland) Regulations (2017), including the publication of an Environmental Impact Assessment Report (EIAR).
Environmental Impact Assessment Report (EIAR)	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations.
Fluviomarine (sediment/deposit)	Material laid down by joint sea and river processes.
Glacial (period)	An interval of time characterised by colder temperatures and glacier advances.
Glaciomarine (sediment/deposit)	Material laid down by joint glacier and sea processes.
Hominin	Human species: current, ancestral and very closely related.
Indirect physical impact	These occur where the fabric is lost or preserved as a result of the proposal even though the asset lies at a remove from the proposal. Examples include damage to walls as a result of vibration from piling operations or blasting, the degradation of waterlogged deposits as a result of dewatering and changes in currents resulting in increased/decreased erosion. Such impacts may result at any stage of development and are likely to be permanent.
Inter-array Cables	Offshore cables which link the wind turbines to each other and to the Offshore Export Cable(s).
Interglacial (period)	An interval of time between glacial periods, characterised by warmer temperatures and glacier retreat.
Interstadial (period)	A minor period of glacier retreat during a glacial period; less pronounced than an interglacial period.

INTOG Leasing Round	The Innovation and Targeted Oil and Gas (INTOG) leasing round where developers apply for the rights to build offshore wind farms specifically for the purpose of providing low carbon electricity to power oil and gas installations and help to decarbonise the sector.
Landfall	The generic term applied to the entire landfall corridor between Mean Low Water Spring (MLWS) tide and the Transition Joint Bay (TJB) inclusive of all construction works, including the offshore and onshore Export Cable Corridor, and landfall compound, where the offshore cables come ashore north of Peterhead.
Lithozone	An interval of geological strata defined on the basis of its characteristic lithostratigraphy.
Modern Period	1900AD - present
Non-designated asset	These are features, buildings or places that provide physical evidence of past human activity identified as being of sufficient value to this and future generations to merit consideration in the planning system. These may occur in isolation or form historic landscapes in combination with other heritage assets, which may in themselves be considered to form heritage assets in their own right.
Offshore Array	The visible offshore infrastructure, specifically the wind turbine generators and associated foundations that are visible above the waterline.
Offshore Array Area	The offshore area within which the wind turbine generators, foundations, mooring lines and anchors, and inter-array cables and associated infrastructure will be located.
Offshore Development	The entire Offshore Development, including all offshore components of the Salamander Project (Wind Turbine Generators (WTG), Inter-array Cables and Offshore Export Cable(s), floating substructures, mooring lines and anchors, and all other associated offshore infrastructure) required across all Project phases from development to decommissioning, for which the Applicant is seeking consent.
Offshore Export Cable(s)	The export cable(s) that will bring electricity from the Offshore Array Area to the Landfall. The cable(s) will include fibre optic cable(s).
Offshore Export Cable Corridor	The area that will contain the Offshore Export Cable(s) between the boundary of the Offshore Array Area and Mean High Water Springs (MHWS).
Onshore Development Area	The entire Onshore Development, including Construction Compounds at the Landfall, temporary working areas, Onshore Export Cables, Transition Joint Bay, Joint Bays, Onshore Substation and Energy Balancing Infrastructure, Construction Compounds, any associated landscaping (if required) and access (and all other associated infrastructure) across all Project phases from development to decommissioning, for which the Applicant is seeking consent.

Palaeoenvironmental	Of or relating to a past (usually prehistoric) environment.
Palaeolandscape	A past (usually prehistoric) landscape.
Pleistocene	The earlier and longer epoch of the Quaternary Period of earth’s history.
Post-Medieval Period	1500-1900AD
Proglacial	Situated just beyond the edge of an ice sheet or glacier.
Quaternary	The most recent period of Earth’s history; comprises the earlier Pleistocene and later Holocene epochs.
Receptor (Offshore)	Any physical, biological or anthropogenic element of the environment that may be affected or impacted by the Salamander Project. Receptors can include natural features such as the seabed and wildlife habitats as well as man-made features like fishing vessels and cultural heritage sites.
Salamander Project	The proposed Salamander Offshore Wind Farm. The term covers all elements of both the offshore and onshore aspects of the project.
Scoping	An early part of the EIA process by which the key potential significant impacts of the Salamander Project are identified, and methodologies identified for how these should be assessed. This process gives the relevant authorities and key consultees opportunity to comment and define the scope and level of detail to be provided as part of the EIAR – which can also then be tailored through the consultation process.
Scour	Local erosion of sediments caused by local flow acceleration around an obstacle and associated turbulence enhancement.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the seabed infrastructure as a result of the flow of water.
Sediment transport	The movement of a mass of sedimentary material by the forces of currents and waves. The sediment in motion can comprise fine material (silts and clay), sands and gravels. Potential sediment transport is the full amount of sediment that could be expected to move under a given combination of waves and currents, i.e. not supply limited.
Setting	The way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced. The setting of a historic asset can incorporate a range of factors, such as: <ul style="list-style-type: none"> ● current landscape or townscape context ● views to, from and across or beyond the historic asset or place ● key vistas (for instance, a ‘frame’ of trees,

	<ul style="list-style-type: none"> • buildings or natural features that give the historic asset or place a context, whether intentional or not) • the prominence of the historic asset or place in views throughout the surrounding area, bearing in mind that sites need not be visually prominent to have a setting • aesthetic qualities • character of the surrounding landscape • general and specific views including foregrounds and backdrops • views from within an asset outwards over key elements in the surrounding landscape, such as the view from the principal room of a house, or from a roof terrace • relationships with other features, both built and natural • non-visual factors such as historical, artistic, literary, place name, or scenic associations, intellectual relationships (e.g. to a theory, plan or design), or sensory factors • a 'sense of place': the overall experience of an asset which may combine some of the above factors
Setting impacts	Including changes to the settings of cultural heritage assets, which may affect cultural significance. These are largely visual impacts and are likely to occur as a consequence of the scale of the Development. They are especially likely to occur on cultural heritage assets located on high ground where their historical significance lies in the wider landscape setting including long-distance views to, and from, the asset. These are considered Direct Impacts by HES.
Setting Study Area	The distance within which setting impacts are considered. This consists of an initial 45 km Study Area from the Offshore Array. The Setting Study Area is not considered a hard barrier. Due consideration was given to heritage assets beyond the respective Setting Study Areas that fall within the ZTV and where that asset may undergo a change in setting as a result of the Proposed Development.
Stadial (period)	A minor period of colder conditions and glacial advance.
Suspended sediment concentration	Mass of sediment in suspension per unit volume of water.
Value	Reflects the relative importance of the asset as an element of the historic environment and is most commonly categorised as International, National, Regional and Local with corresponding values ranging from very High to Low.

Acronyms

Term	Definition
AAP	Area of Archaeological Potential
AC	Aberdeenshire Council
AD	Anno Domini
AEZ	Archaeological Exclusion Zone
ALDP	The Aberdeenshire Local Development Plan
BC	Before Christ
BGS	British Geological Survey
BP	(years) Before Present
CA	Conservation Area
CEA	Cumulative Effects Assessment
CifA	Chartered Institute for Archaeologists
DBA	Desk Based Assessment
DE	Drag Embedment
EBI	Energy Balancing Infrastructure
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GIS	Geographic Information System
HA	Hectare
HER	Historic Environment Record

Term	Definition
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Area
JV	Joint Venture
km	Kilometre
LB	Listed Building
m	Metre
MBES	Multibeam Bathymetry / Multibeam Echo Sounder
MCIfA	Member of Chartered Institute for Archaeologists
MHWS	Mean High Water Spring
MIS	Marine Isotope Stage
MLWS	Mean Low Water Spring
MW	Mega Watt
NPF4	National Planning Framework 4
nT	Nano Tesla
OAA	Offshore Array Area
O&M	Operation and Maintenance
OD	Ordnance Datum
OnSS	Onshore Substation
OS	Ordnance Survey
PAD	Protocol for Archaeological Discoveries
PLGR	Pre-lay Grapnel Run
RLB	Red Line Boundary
RSL	Relative Sea Level

Term	Definition
SBES	Single Beam Echo Sounder
SBP	Sub-Bottom Profiler
ScARF	Scottish Archaeological Research Framework
SLA	Special Landscape Area
SLVIA	Seascape, Landscape and Visual Impact Assessment
SM	Scheduled Monument
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
SWPC	Salamander Wind Project Company Limited (formerly called SBES)
TAEZ	Temporary Archaeological Exclusion Zone
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WGS84	World Geodetic System 1984
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
WWII	World War II/Second World War
ZOI	Zones of Influence
ZTV	Zone of Theoretical Visibility

17 Marine Archaeology and Cultural Heritage

17.1 Introduction

- 17.1.1.1 The Applicant, Salamander Wind Project Company Limited (SWPC) (formerly Simply Blue Energy (Scotland) Limited (SBES)), a joint venture (JV) partnership between Ørsted, Simply Blue Group and Subsea7, is proposing the development of the Salamander Offshore Wind Farm (hereafter 'Salamander Project'). The Salamander Project will consist of the installation of a floating offshore wind farm (up to 100 megawatts (MW) capacity), approximately 35 kilometres (km) east of Peterhead. It will consist of both offshore and onshore infrastructure, including an offshore generating station (wind farm), export cables to landfall and connection to the electricity transmission network (see **Volume ER.A.2, Chapter 4 Project Description** for full details on the Salamander Project Design).
- 17.1.1.2 This chapter of the Environmental Impact Assessment Report (EIAR) presents the results of the EIA of potential effects of the Salamander Project on Marine Archaeology and Cultural Heritage. Specifically, this chapter considers the potential impact of the Salamander Project seaward of Mean High Water Springs (MHWS) during the construction, operation and maintenance (O&M) and decommissioning phases of the Offshore Development.
- 17.1.1.3 The chapter provides an overview of the existing environment for the proposed Offshore Development Area, followed by an assessment of significance of effect on Marine Archaeology and Cultural Heritage receptors, as well as an assessment of potential cumulative effects with other relevant projects and effects arising from interactions on receptors across topics.
- 17.1.1.4 This chapter also includes a summary of the review of significance of effect of the offshore infrastructure on the onshore archaeology and cultural heritage receptors, as part of a setting assessment for the offshore aspect the Salamander Project. Further assessment of the potential cumulative effects with the onshore infrastructure from the Salamander Project, as well as with other relevant projects. Potential impacts arising from the Onshore Development will be assessed in a separate Onshore EAIR.
- 17.1.1.5 This chapter should be read alongside and in consideration of the following:
- **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report;**
 - **Volume ER.A.6, Plan P.4: Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD);**
 - **Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore);** and
 - **Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).**
- 17.1.1.6 This chapter has been authored by MSDS Marine and Environmental Resources Management (ERM) Ltd. Ocean Infinity (2022a) have supplied the site-specific geophysical survey data and Wood (2023) have provided the ground model. Further competency details of the authors of this chapter are outlined in **Volume ER.A.4, Annex 1.1: Details of the Project Team.**

17.2 Purpose

- 17.2.1.1 The primary purpose of this EIAR is to support the application for the Salamander Project, satisfying the requirements of Section 36 of the Electricity Act 1989 and associated Marine Licences, as required under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act (2009). This EIAR chapter describes the potential environmental impacts from the Offshore Development Area on the Marine Archaeology and

Cultural Heritage receptors, as well as the potential impacts from the Offshore Array Area to onshore cultural archaeology and cultural heritage receptors and assesses the significance of their effect.

17.2.1.2 The EIAR has been finalised following the completion of the pre-application consultation (described in **Volume ER.A.2, Chapter 5: Stakeholder Consultation**) and the Salamander EIA Scoping Report (SBES Ltd, 2023), (and takes account of the relevant advice set out within the Scoping Opinion from Marine Directorate Licensing Operations Team (MD-LOT)) (MD-LOT, 2023) relevant to the Offshore Development. Comments relating to the Energy Balancing Infrastructure (EBI) will be addressed within the Onshore EIAR. The Offshore EIAR will accompany the application to MD-LOT for Section 36 Consent, as required under the Electricity Act 1989, and Marine Licences under the Marine (Scotland) Act 2010.

17.2.1.3 This EIAR chapter:

- Outlines the existing environmental baseline determined from assessment of publicly available data, project-specific survey data and stakeholder consultation;
- Presents the potential environmental impacts and resulting effects arising from the Salamander Project on Marine Archaeology and Cultural Heritage ;
- Presents the potential environmental impacts and resulting effects arising from the Salamander Project on settings impacts to onshore archaeology and cultural heritage receptors;
- Identifies mitigation measures designed to prevent, reduce, or offset adverse effects and enhance beneficial effects on the environment; and
- Identifies any uncertainties or limitations in the methods used and conclusions drawn from the compiled environmental information.

17.3 Planning and Policy Context

17.3.1.1 The preparation of the Marine Archaeology and Cultural Heritage chapter has been informed by the following policy, legislation and guidance, outlined in **Table 17-1**.

Table 17-1 Relevant policy, legislation and guidance relevant to the Marine Archaeology and Cultural Heritage assessment

Relevant policy, legislation, and guidance

Policy

National and Regional Policy Requirements from the UK Marine Policy Statement (2011)

Scotland's Fourth National Planning Framework (NPF4)

Planning Advice Note 2/2011: Planning and Archaeology

Scottish Planning Policy (2014)

Our Place in Time – The Historic Environment Strategy for Scotland (2014 – currently under review)

Scotland's National Marine Plan (2015)

Historic Environment Policy for Scotland (2019)

Relevant policy, legislation, and guidance

Historic Environment Scotland Circular 12 (2019)

The Aberdeenshire Local Development Plan (ALDP), adopted January 2023

Legislation

The World Heritage Convention (1972)

Ancient Monuments and Archaeological Areas Act (1979)

United Nations Convention on the Law of the Sea (1982)

Protection of Military Remains Act (1986)

Merchant Shipping Act (1995)

International Council of Monuments and Sites Charter on the Protection and Management of Underwater Cultural Heritage (1996) (the Sofia Charter)

Planning (Listed buildings and Conservation Areas) (Scotland) Act (1997)

European Convention on the Protection of Archaeological Heritage (Revised) (1992) (the Valletta Convention) – ratified in the UK in 2000

UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001)

Environmental Assessment (Scotland) Act (2005)

European Landscape Convention (2000) – adopted in the UK in March 2007

Marine and Coastal Access Act (2009)

Marine (Scotland) Act (2010)

Historic Environmental Scotland Act (2014)

Guidance

Identifying and Protecting Palaeolithic Remains (English Heritage, 1998)

Military Aircraft Crash Sites (English Heritage, 2002)

Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2006)

Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)

Aircraft Crash Sites at Sea (Wessex Archaeology, 2008)

Relevant policy, legislation, and guidance

Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011)

Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (2011)

Marine Geophysics Data Acquisition, Processing and Interpretation, Guidance Notes (English Heritage, 2013)

Protocol for Archaeological Discoveries (PAD) (The Crown Estate, 2014)

Scottish Government Planning Advice Notes, in particular *2/2011: Planning and Archaeology; Planning Advice Note; 1/2013: Environmental Impact Assessment (amended 2017); and Planning Circular 1/2017: Environmental Impact Assessment Regulations* (Scottish Government 2017)

Designation Policy and Selection Guidance (HES, 2019)

Standard and guidance for historic environment desk-based assessment (CifA, 2020)

Archaeological Written Schemes of Investigating: Offshore Renewables Projects (The Crown Estate, 2021)

Historic Environment Scotland's *Managing Change in the Historic Environment* series

Historic Environment Circulars

Key Agencies Group National and Major Developments: An Agency Joint Statement on Pre-application Engagement

Planning Advice Note 2/2011: Planning and Archaeology

Planning Advice Note 71/2004: Conservation area management:

Aberdeenshire Council Archaeology Service Strategy (2020-23);

HES: Managing Change in the Historic Environment Series and HES: Managing Change in the Historic Environment – Setting

HES: Our Place in Time Series – 'A Guide to Climate Change Impacts on Scotlands Historic Environment

NatureScot (formally known as Scottish Natural Heritage (SNH)) and Historic Environment Scotland (HES) EIA Handbook (2018)

NatureScot (formally known as Scottish Natural Heritage (SNH 2017)) guidance on visual representation and impacts from windfarms

CifA Standards and Guidance for Desk-Based Assessments

17.3.1.2 Further details on the requirements for EIA are presented in **Volume ER.A.2, Chapter 2: Legislative Context and Regulatory Requirements.**

17.4 Engagement and Consultation

- 17.4.1.1 Consultation is a key part of the application process. It has played an important part in ensuring that the baseline characterisation and impact assessment is appropriate to the scale of development as well as meeting the requirements of the regulators and their advisors.
- 17.4.1.2 An overview of the consultation process is outlined in **Volume ER.A.2, Chapter 5: Stakeholder Consultation**. Consultation regarding Marine Archaeology and Cultural Heritage has been conducted through submission of the Salamander EIA Scoping Report (SBES Ltd, 2023) to MD-LOT who requested feedback on this from Historic Environment Scotland (HES). In relation to the settings assessment, additional consultation regarding onshore archaeology and cultural heritage receptors has been conducted through a single virtual workshop (via Microsoft Teams) with key stakeholders prior to the production of the Salamander EIA Scoping Report (SBES Ltd, 2023), email consultation prior to scoping, the Scoping Response and subsequently through several rounds of consultation via email during preparation and production of this Chapter.
- 17.4.1.3 The issues raised during scoping consultation specific to Marine Archaeology and Cultural Heritage are outlined in **Table 17-2**, including consideration of where the issues have been addressed within the EIAR.

Table 17-2 Consultation responses specific to Marine Archaeology and Cultural Heritage

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
Pre-scoping			
Aberdeenshire Council (AC)	22 January 2022 Pre-Scoping Report Scoping Workshop	<p>Scoping Workshop attended by Marine Directorate and the Planning Archaeologist to AC. Representatives from HES did not attend but provided a written response to the Scoping Report.</p> <p>In relation to the onshore aspects the Planning Archaeologist to AC was broadly content with methodology for undertaking the EIA and agreed to scope in:</p> <ul style="list-style-type: none"> - Direct/Indirect (physical) impacts to onshore heritage assets throughout the construction and operational phase of the Onshore Development; - Setting Impacts to onshore receptors during the Operational Phase of the Development; and - Cumulative Impacts to onshore receptors during the Operational Phase of the Development. <p>The following Study Areas were provisionally agreed:</p> <ul style="list-style-type: none"> - A 1 km Study Area to inform direct/indirect (physical) impacts to onshore heritage assets; and - A 3 km Study Area to inform Setting Impacts to onshore receptors. This Study Area would be guided by the ZTV of the Onshore Development. <p>In addition, the Planning Archaeologist to AC noted that the Onshore ECC had the</p>	<p>The methodology and Study Areas were subsequently set out in the Salamander EIA Scoping Report (SBES Ltd, 2023) issued to Key Stakeholders.</p> <p>Physical Impacts to heritage assets are assessed within this Chapter.</p> <p>Setting and Cumulative Impacts to the Aberdeenshire Coast Special Landscape Area are assessed within this Chapter and Volume ER.A.3, Chapter 16: Seascape, Landscape and Visual Impact Assessment.</p> <p>An agreement over the Offshore Array Setting Area was agreed during EIA consultation (See below).</p> <p>Further details are provided in Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
		<p>potential to create direct (physical) impacts to the known WWII defences located along the length of the landfall beach.</p> <p>In addition, the Planning Archaeologist to AC noted Aberdeenshire Coast Special Landscape Area will have special consideration.</p> <p>In relation to the Offshore Aspects of the Proposed Development AC were broadly content with methodology for undertaking the EIA and agreed to scope in:</p> <ul style="list-style-type: none"> - Setting Impacts to onshore receptors during the Operational Phase of the Development; and - Cumulative Impacts to onshore receptors during the Operational Phase of the Development <p>The following Study Areas were provisionally agreed:</p> <ul style="list-style-type: none"> - A 40 km Study Area to inform Setting Impacts to onshore heritage assets. This Study Area would be guided by the ZTV of the Onshore Development. 	

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
Scoping			
Historic Environment Scotland (HES)	21 June 2023; Scoping Response	<p>We note that the Environmental Impact Assessment for this project is adopting a design envelope approach, and exact details of the location and configuration of turbines and associated development, floating foundation type, mooring system, inter-array cable layout, exact turbine hub height, cable type and cable route are currently unknown. The scoping report stated that to avoid excessive conservatism, the parameters considered throughout are not necessarily a combination of the maximum design parameters for each. We are content that this is an appropriate approach to the assessment for this project.</p> <p>In terms of marine archaeology, we note that there has been a substantive review of historic environment baseline data from appropriate sources and are content that this is sufficient to underpin the forthcoming assessment. We consider the proposed methodologies relating to gathering of geophysical and hydrological data, and to the assessment of potential direct impacts, to be appropriate. We welcome the proposal to ensure that appropriate mitigation, which can include the recommendation for implementation of Archaeological Exclusion Zones (AEZ), is embedded into the scheme as secured by consent conditions via a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD).</p>	<p>Sections 17.7.1: Existing Baseline and 17.8.3: Embedded Mitigation.</p> <p>The baseline environment section of this chapter is drawn from Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report, which drew on numerous sources to assemble a thorough understanding and informed potential for archaeological remains within the Offshore Development Area. A full list of sources consulted can be found within the technical report.</p> <p>Recommended embedded mitigation has been based on the results of Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report, to best mitigate any potential impacts to identified and potential archaeological remains, in accordance with appropriate policy and legislation. The application is also supported by a WSI (which includes details of AEZs) and a PAD (Volume ER.A.6, Plan P.4: Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD))</p>
		<p>We note that impact on setting is described as an indirect impact in the EIA scoping report. For the purposes of EIAs, indirect impact applies to indirect physical impact only, and setting impact should be considered separately. Setting impacts are generally direct and result from the proposal causing change within the setting of the heritage asset that affects its cultural significance or the way in which it is</p>	<p>Acknowledged.</p> <p>No maritime designated heritage assets have been identified which may experience setting impacts. Impacts to onshore assets from the offshore infrastructure are discussed within this chapter,</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
HES (continued)		<p>understood, appreciated and experienced. We would refer the applicant to the discussion of direct, indirect and setting impacts in the cultural heritage appendix of the EIA Handbook (page 182).</p>	<p>and Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>
		<p>Direct impacts: there is no designated heritage asset within the Offshore Development Area. However, we welcome the applicant’s proposal to assess the potential direct impacts on marine archaeology, including both temporary and long-term effects.</p>	<p>Acknowledged.</p> <p>Assessment of potential direct and indirect impacts on marine archaeology including both temporary and long-term impacts is presented in Sections 17.11 (Impact Assessment), 17.13 (Cumulative Effect Assessment) and 17.16 (Inter-related Effects).</p>
		<p>Indirect impacts: we note the applicant has proposed to scope out impacts on known historic environment assets out with the Offshore Development Area. We do not support this as potential indirect physical impacts on known assets out with the Offshore Development Area should be considered.</p>	<p>Indirect impacts on the historic environment are presenting within Sections 17.11: Impact Assessment, 17.13: Cumulative Effect Assessment and 17.16: Inter-related Effects.</p> <p>Taking into account this comment, the Salamander Project has referred to Marine Physical Processes to determine an impact area. This impact area has been used to guide an appropriate Study Area to ensure that all appropriate indirect (physical) impacts to the marine historic environment are identified. This is discussed further in Section 17.5.</p> <p>Drawing on the results of the baseline environment, an impact assessment has been undertaken to identify and quantify the potential indirect (physical) impacts to each receptor. Potential indirect (physical) impacts relating to cumulative and inter-related</p>
HES (continued)			

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
HES (continued)			effects have also been discussed.
		<p>Setting impacts: we welcome the applicant’s proposal to assess the setting impacts on marine archaeology and key onshore assets, including both temporary and long-term effects. The applicant has indicated the assessment on setting impacts will cover 40km within the boundary of the Offshore Array Area and within the Zone of Theoretical Visibility (ZTV). This 40km radius will extend c. 5km inland from the coast. However, this may not be sufficient. We recommend use of a bare earth ZTV analysis to identify assets which may be impacted in the first instance, including but not limited to scheduled monuments, category A listed buildings and inventory gardens and designed landscapes.</p>	<p>Acknowledged.</p> <p>No maritime designated heritage assets have been identified which may experience setting impacts. Impacts to onshore assets from the offshore infrastructure are discussed within this chapter, and Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>
		<p>In regards the specific designated assets on which their setting impacts should be assessed, we note that a number of scheduled monuments have been identified for assessment of setting impacts generated from the Onshore Development, that being St Fergus’s Church (SM5622), Castle Hill, motte south-west of Hallmoss Farm (SM3259), Inverugie Castle (SM98), Ravenscraig Castle (SM2496), Rattray Line, pill box 80m E of Annachie Bridge (SM11315), Rattray Line, pill box 960m NNW of Annachie Bridge (SM11314) and Rattray Line, pill box 1550m SSE of Home Farm (SM11320). We would recommend them, together with Mount Pleasant, enclosure (SM3999), to be assessed also against the potential setting impacts generated from the Offshore Development Area. It is possible that once a ZTV has been prepared, additional assets in our remit may need to be assessed.</p>	<p>Acknowledged.</p> <p>Further details are provided in Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
HES (continued)		<p>When considering impact on setting, we recommend the use of wireframe visualisations. Where initial assessment identifies potential significant impacts on an asset, photomontages should be prepared to help analyse and illustrate these impacts. We would be happy to discuss this in more detail with the applications as the EIA proceeds.</p>	<p>Wireframe visualisations have been used to inform the assessment, see Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore). Photomontages were flagged for use where appropriate for significant impacts, however limited impacts, and no significant impacts, have been identified within assessment.</p>
		<p>Cumulative and Transboundary Impacts: We also note the potential for cumulative impacts on the setting of terrestrial heritage assets caused by the development of this project in combination with other existing and proposed offshore wind farms in the area. In this case, we would also recommend that cumulative impacts are carefully considered. We welcome the stated intention to consider cumulative effects on setting from other relevant projects as defined in chapter 6.4 of the EIA scoping report, as part of the assessment process</p>	<p>A review of the cumulative effects are provided in Section 17.13.</p>
		<p>Having considered the location of this project, we are also content with the scoping out of transboundary impacts upon the marine historic environment due to construction, operation and maintenance, and decommissioning of the Salamander Project.</p>	<p>Sections 17.13: Cumulative Effect Assessment and 17.15: Transboundary Effects.</p> <p>Cumulative effects are examined and discussed within this Chapter (Section 17.13: Cumulative Effect Assessment).</p> <p>The scoping out of transboundary effects is supported by the results of Volume ER.A.4, Annex 17.3: Marine Archaeology and</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
			Cultural Heritage Technical Report.
		<p>Further information: Guidance about national policy can be found in our ‘Managing Change in the Historic Environment’ series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes. Technical advice is available on our Technical Conservation website at https://conservation.historic-scotland.gov.uk/. We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is [name redacted] and they can be contacted by phone on or by email on [name redacted]@hes.scot.</p>	This is noted.
		<p>HES provided a formal Scoping Response in May 2023 on the settings. HES stated that:</p> <ul style="list-style-type: none"> - They were broadly content with the methodology; - That a Setting Study of 40 km may not be sufficient and may need to be extended to capture all receptors which may undergo a change in setting as a result of the Offshore Array; - A setting Study Area should make use of a bare earth ZTV to identify a list of assets that may be subject to a change in setting; and <p>Further consultation over assets to be included within any setting assessment would be required along with supporting visualisations.</p>	<p>The Offshore Array Setting Area was agreed during EIA consultation (See below). This extended the Setting Study Area to 45 km. However, additional assets beyond 45 km, which fell within the bare earth ZTV, were considered where they could potentially undergo a change in setting.</p> <p>The assessment of Setting Impacts made use of both a bare earth and screened ZTV, in conjunction with a setting site visit, to refine the assets included for assessment.</p> <p>Summary provided within this chapter, full details found within Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
MD-LOT	21 June 2023; Scoping Opinion	<p>With regard to the Study Area and setting impacts the Scottish Ministers refer to the HES representation and highlight the concerns raised therein with regard to the area proposed. The Scottish Ministers advise that the Developer must consider the recommendations provided by HES in its representation regarding the use of a bare earth zone of theoretical visibility (“ZTV”) analysis to identify assets which may be impacted by the Proposed Development</p> <p>In addition, the Scottish Ministers advise that the Applicant must consider the additional designated assets highlighted within the HES representation and the use of wireframe visualisations.</p>	<p>Acknowledged.</p> <p>Summarised within this chapter and in full within Consultation letter referenced and confirmed approach used within the assessment; full details within Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>
		<p>In Table 9-17 of the Scoping Report, the Applicant summarises the potential impacts to 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 disagree with the scoping out of impacts on known assets that lie out with the Proposed Development and advise that this must be considered further within the EIA Report. This is a view supported by the HES representation.</p>	<p>Sections 17.11: Impact Assessment, 17.13: Cumulative Effect Assessment and 17.16: Inter-related Effects.</p> <p>Taking this comment into account, the Salamander Project has referred to Marine Physical Processes to determine an impact area. This impact area has been used to guide an appropriate Study Area to ensure that all appropriate indirect (physical) impacts to the marine historic environment are identified. This is discussed further in Section 17.5.</p>
		<p>The Scottish Ministers draw the Applicant’s attention to the HES representation regarding impacts on setting. The Scottish Ministers advise that the Applicant must consider the guidance provided by HES in its representation on the discussion of direct, indirect and setting impacts to take forward within the EIA Report.</p>	<p>This is noted.</p> <p>For further details please see Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
MD-LOT (continued)		The Scottish ministers are content with the embedded mitigations proposed in Table 9-16 of the Scoping Report. The Scottish Ministers direct the Applicant to the HES representation which underlines the requirement for a Written Scheme of Investigation with a Protocol for Archaeological Discoveries to be prepared which must be fully implemented by the Applicant.	This is noted. Please see Section 17.12: Mitigation and Monitoring for further details.
		With regard to cumulative and transboundary impacts the Scottish Ministers note the representation of HES relating to other relevant developments to be considered within the cumulative assessment. The Scottish Ministers are content with the scoping out of transboundary impacts during all phases of the Proposed Development.	Acknowledged.
Further Consultation			
Aberdeenshire Council	05 April 2023 EIA Consultation in relation to Onshore Aspects	ERM issued a consultation letter to the Planning Archaeologist to AC in advance of receiving the council’s Scoping Response. The letter set out the proposed methodology to be used in the EIA with relation to the Onshore Aspects. The consultation letter set out the methodology and Study Areas proposed for assessing direct/indirect (physical) impacts as well as Setting Impacts. A list of designated and non-designated assets was compiled for the 1 km Study Area and 3 km Setting Study Area. The Planning Archaeologist to AC replied on the 06 April 2023, stating that: - They proposed methodology was acceptable; - No non-designated assets/ or designated assets for which the council held	Further consultation in regard to the assessment of Conservation Areas was undertaken with the AC (see below) and methodology agreed. Visualisations have been provided within this EIA Report and Consultation letter referenced and confirmed approach used within the assessment (Volume ER.A.4, Annex 17.2: Setting assessment (Offshore)). A walkover was undertaken to try and locate designated Drumline Fishing Village (NK15SW0004). The results of the walkover survey are detailed in the historic baseline.
Aberdeenshire			

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
Council (continued)		<p>responsibility were missing from the list provided;</p> <ul style="list-style-type: none"> - The Conservation Areas around Peterhead were considered low risk in relation to Setting Impacts but an approach to assessing the Conservation Areas requires agreement; - The proximity of St Fergus old parish church and churchyard (LB16536) to the Onshore Development Area and the need for visualisations to support the EIA; and - There was a degree of uncertainty around the location of the non-designated Drumline Fishing Village (NK15SW0004) in relation to the Onshore Development. The walkover survey undertaken as part of the DBA would need to try and identify this asset on the ground. 	
Aberdeenshire Council	09 March 2023 EIA Consultation in relation to Offshore Aspects	<p>ERM issued a consultation letter to the Planning Archaeologist to AC providing an updated methodology based on Scoping Report feedback from HES. This included a revised 45 km Setting Study, with assets beyond 45 km included where the setting of these assets could potentially be impacted by the Offshore Array. ERM also provided;</p> <ul style="list-style-type: none"> - A bare earth and screened ZTV for the Offshore Array; - A sieving exercise and list of assets warranting inclusion within Technical Appendix 5: Setting assessment for offshore aspects; - A list of receptors and associated visualisations to support the EIA. <p>The Planning Archaeologist to AC replied on the 30 August 2023 stating that they were content with the list of assets to be taken forward to assessment and the</p>	Consultation letter referenced and confirmed approach used within the assessment (Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore)), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore)).

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
		proposed visualisations. A request was also made to consult with the Built Heritage Planner at AC with regards to Conservation Areas included for assessment and associated Listed Buildings.	
HES	09 March 2023 EIA Consultation in relation to Offshore Aspects	ERM issued a consultation letter to HES providing an updated methodology based on their Scoping Report feedback. This included a revised 45 km Setting Study, with assets beyond 45 km included where the setting of these assets could potentially be impacted by the Offshore Array. ERM also provided; - A bare earth and screened ZTV for the Offshore Array; - A sieving exercise and list of assets warranting inclusion within Technical Appendix 5: Setting assessment for offshore aspects; - A list of receptors and associated visualisations to support the EIA.	Consultation letter referenced and confirmed approach used within the assessment Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore) , and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore) .
Aberdeenshire Council	17 August 2023 EIA Consultation in relation to Onshore Aspects	ERM issued a consultation letter to the Planning Archaeologist to AC stating a clear approach to assessing the Conservation Areas and associated Listed Buildings of Peterhead Roanheads and Peterhead Buchanhaven, excluding any assessment of Peterhead Central. ERM also provided; - A bare earth and screened ZTV for the Onshore Development; - A sieving exercise and list of assets warranting inclusion within Technical Appendix 3: Setting assessment for onshore aspects; - A list of receptors and associated visualisations to support the EIA.	Letter actioned as part of this EIAR. Consultation also sought with the AC Conservation Officer over the methodology and approach to Conservation Areas agreed with the AC Planning Archaeologist (see below). Consultation letter referenced and confirmed approach used within the assessment Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore) , and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore) .

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
		<p>The Planning Archaeologist to AC replied on the 30 August 2023 stating that they were content with the list of assets to be taken forward to assessment and the proposed visualisations.</p>	
HES	<p>07 August 2023 Technical note</p>	<p>ERM issued a technical note detailing the proposed strategy for addressing the nearshore coverage, alongside additional project commitments to collect survey data.</p> <p>A response was received on 4 September 2023. The consultee agreed with the proposed approach, adding the following further points:</p> <ul style="list-style-type: none"> - Clarification should be made that all geophysical data shall be assessed by an appropriately qualified archaeologist; - HES should be consulted after assessment of the geophysical data; - HES should be consulted on the Updated Written Scheme of Investigation; and - No works on relevant parts of the development should be undertaken prior to HES acceptance of the products of the above points 	<p>This is noted. See Paragraph 17.6.1.2 referencing the coverage, with recommendations included as part of the embedded mitigation (Section 17.8.3).</p>
Aberdeenshire Council	<p>04 September 2023 and 26 September</p>	<p>ERM issued an email to the Built Heritage Planner to AC requesting feedback on the Conservation Areas and Listed Buildings chosen for inclusion within Technical Appendix 5: Setting assessment for offshore aspects.</p> <p>A response has not yet been issued</p>	<p>In lieu of a response this EAIR has proceeded with the methodology agreed with the AC Planning Archaeologist</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
	2023 EIA Consultation in relation to Offshore Aspects		
HES	28 November 2023 Revised submission strategy	The Applicant communicated to the Consultees (Planning Archaeologist to AC and HES) the intention to submit Offshore and Onshore Archaeological and Cultural Heritage EIAR chapters under separate planning applications with the offshore aspects being submitted to the Marine Directorate - Licensing Operations Team (MD-LOT) and the onshore aspects being submitted to Aberdeenshire Council and the Energy Consents Unit (ECU).	<p>Section 17.7.2 comprises a summary of the settings baseline and assessment of the impacts undertaken for onshore receptors from the offshore infrastructure; full details within Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment (Offshore).</p>
Aberdeenshire Council Archaeology Service	29 November 2023 Revised submission strategy	<p>This letter confirmed that the forthcoming EIA relating to offshore aspects of the Salamander Project would now include an assessment of Setting Impacts to onshore heritage receptors within the Marine Archaeology and Cultural Heritage. The EIA submission for the Onshore Development would be confined to an assessment of effects to onshore heritage receptors resulting from the Onshore Development only.</p> <p>Also, the Study Area used for the marine archaeology and cultural heritage assessment was confirmed as 2 km buffer from the Development Area.</p> <p>The Planning Archaeologist to AC replied by email on 01 December 2023 and HES on 13 December 2023 confirming that they were content with this approach.</p>	<p>No marine receptors were identified requiring settings assessment.</p>

Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
NatureScot	21 June 2023; comments on EIA Scoping Report	<p>Wet Storage</p> <p>Section 4.6.2 (Floating Substructures) refers to the potential for wet storage of the substructures prior to their installation within the array area, either at the initial assembly site, the wind turbine integration site or a separate dedicated storage location. Section 4.7.1 (Floating Assembly) also indicates that once operational the substructures and WTGs will form an integrated assembly piece – the replacement of any major component parts of which is expected to be achieved by towing the assembly to port. Wet storage could represent a significant impact. Consideration of the potential impacts on all receptors needs to be addressed with the EIAR and HRA. We would welcome further discussion on this as and when further details are confirmed, noting the intention to seek a separate Marine Licence application for any requirements for wet storage out with the array area.</p>	<p>Wet storage of the floating substructures (and integrated WTGs) prior to tow-out to the Offshore Array Area is considered to be outside the scope of this EIA and the Marine Licence applications for the Offshore Development. This is due to the fact that at this stage of the Salamander Project it is not known which port(s) will be used for wet storage and therefore it is challenging to undertake a meaningful assessment of impacts related to wet storage. The intent is that the Salamander Project will utilise the services of a port(s) that offer wet storage sites, which will have appropriate consents (obtained by the port authority) for wet storage of floating substructures, fabrication and assembly with the WTGs. To enable the availability of this option for the Salamander Project within the required timeframe, an owner of the Salamander Project is an official member of the TS-FLOW UK-North Joint Industry Project (JIP) exploring the challenges of wet storage and identifying the opportunities and potentially suitable locations for these activities. This JIP is in collaboration with relevant ports and other floating offshore wind developers.</p> <p>Separate Marine Licences and associated impact assessments for wet storage areas out with the Offshore Development Area will be applied for and undertaken as appropriate.</p>
HES	18 March 2024 Issue of visualisation figures for	<p>On 13 December 2023, HES commented that they had not received details of visibility of design elements, with regard to heritage assets and their settings. Visualisation figures were subsequently provided, and no further comments were made.</p>	<p>The visualisations contributed to the settings baseline and impact assessment (Section 17.7.2). Further details can be found within Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore), and in Volume ER.A.4, Annex 17.2: Setting assessment</p>



Consultee	Date and Forum	Comment	Where it is addressed within this EIAR
	settings		(Offshore).

17.5 Study Area

17.5.1.1 The Marine Archaeology and Cultural Heritage Study Area has been defined on the basis of an understanding of the extent of anticipated potential impacts to relevant receptors (see **Paragraph 17.5.1.4**) and comprises the Offshore Development Area, a 2 km radius measured from the Offshore Development Area and a 200 m radius landward from MHWS. The Study Area is shown in **Figure 17-1**. As well as the Marine Archaeology and Cultural Heritage Study Area, the following terms as part of the Offshore Development Area are also referred to in the Marine Archaeology and Cultural Heritage chapter and shown on **Figure 17-1**:

- Offshore Array Area;
- Offshore Export Cable Corridor; and
- Nearshore Export Cable Corridor (see Paragraph 17.6.1.2, below).

17.5.1.2 The Study Area has been defined to characterise the character and potential of marine archaeological remains.

17.5.1.3 Although the principal, direct physical impacts would arise within the footprint of intrusive activities, **Volume ER.A.3, Chapter 7: Marine Physical Processes** defines several subsequent processes which may indirectly physically impact marine archaeology receptors. The locations of these impacts have been used to guide an appropriate assessment area for this EIAR. This is discussed further below.

17.5.1.4 Increases to suspended sediment concentration (SSC) and seabed deposition will occur because of activities such as drilling for pile anchors, seabed preparation and cable burial. Three impact zones (measured from the site of activity) have been identified by **Volume ER.A.3, Chapter 7: Marine Physical Processes**:

- 0 to 50 m: zone of highest SSC increase and greatest likely thickness of deposition (including all gravel, a large proportion of sand and most or all dredge spoil). Tens to hundreds of thousands of mg/l SSC increase during activity plus up to 30 minutes from cessation. Sands and gravels may deposit in local thicknesses to tens of centimetres to several metres;
- 50 to 500 m: zone of measurable SSC increase and lesser thickness of deposition. Principally sands that are released or resuspended higher in the water column. Hundreds to low thousands of mg/l SSC increase during activity plus up to 30 minutes from cessation. Sands and gravels may deposit in local thicknesses to tens of centimetres; and
- 500 m to the tidal excursion buffer distance: zone of lesser but measurable SSC increase and no measurable thickness of deposition. Mainly fine sediments held in suspension for more than one tidal cycle. Low to intermediate SSC increase (tens to low hundreds of mg/l) during activity, decreasing to ambient values after 24 hours. Fine sediments are unlikely to deposit in measurable thickness.

560000

580000

600000

620000

Salamander

Figure 17-1

Marine Archaeology and Cultural Heritage Study Area

N



Grid North

Legend

- Offshore Development Area
- Nearshore Export Cable Corridor
- Offshore Export Cable Corridor
- Offshore Array Area
- 12 nm limit
- 1° 40' W line (WGS84)
- Study Area

6400000

6400000

6380000

6380000

6360000

6360000



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:250,000

0 7.5 15 Kilometers

0 1.75 3.5 7 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Marine Archaeology and Cultural Heritage Study Area

Doc. No : 17-1

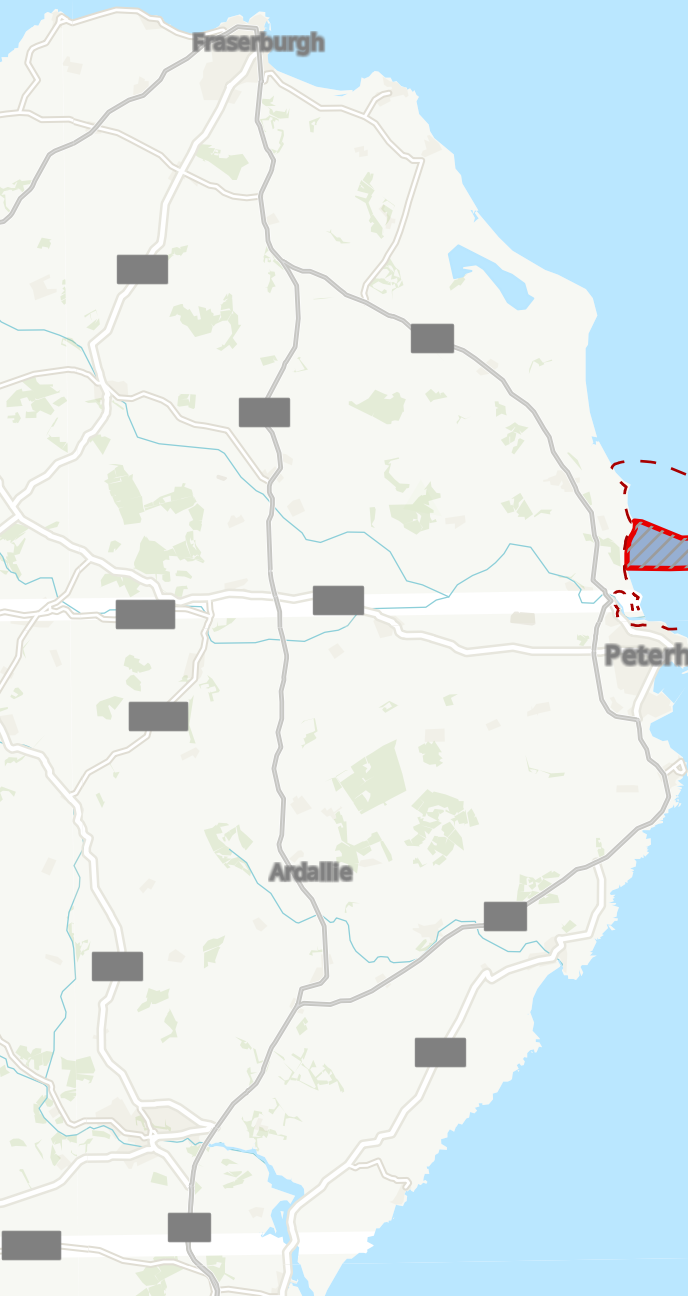
Created by : TB

Checked by : MJ

Approved by : SS



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Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS, Contains OS data
 © Crown Copyright and database right 2023
 Contains data from OS Zoomstack, Esri UK, Esri, TomTom, Garmin,
 Foursquare, METI/NASA, USGS, Esri, USGS; Contains SNH (Scottish

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17.5.1.5 Changes to sediment transport (including scour) have the potential to impact marine archaeology receptors. Anticipated scour extents are summarised below:

- Cable protection: up to a few tens of centimetres in depth and several metres from installed protection;
- Exposed elements of moorings and clump weights close to the seabed: up to a few tens of centimetres in depth and several metres from the obstacle; and
- Exposed elements of anchors: up to a several metres in depth and c. 10 m from the obstacle.

17.5.1.6 Additional processes may also result in changes to sediment transport, including:

- Sweep of moorings and inter-array cables: and
- Wake effects extending from floating substructures and anchors (up to hundreds of metres from obstacle but water depths would minimise disturbance to seabed).

17.5.1.7 While it is feasible that impacts may arise because of marine physical processes post-construction, the higher impact processes are anticipated to occur within a few metres from the source and would be contained within the Offshore Development Area boundary. No significant changes, from direct or indirect physical impacts outside of those assessed for installation, are likely to occur to marine archaeology receptors within the Study Area, and therefore the assessment of impacts within the Offshore Development Area is adequate for the purposes of this chapter (principal O&M and decommissioning impacts are anticipated to fall within installation area of impacts). Further details regarding anticipated impacts and their extents relevant to Marine Archaeology and Cultural Heritage can be found in **Table 17-24** and **Section 17.11**.

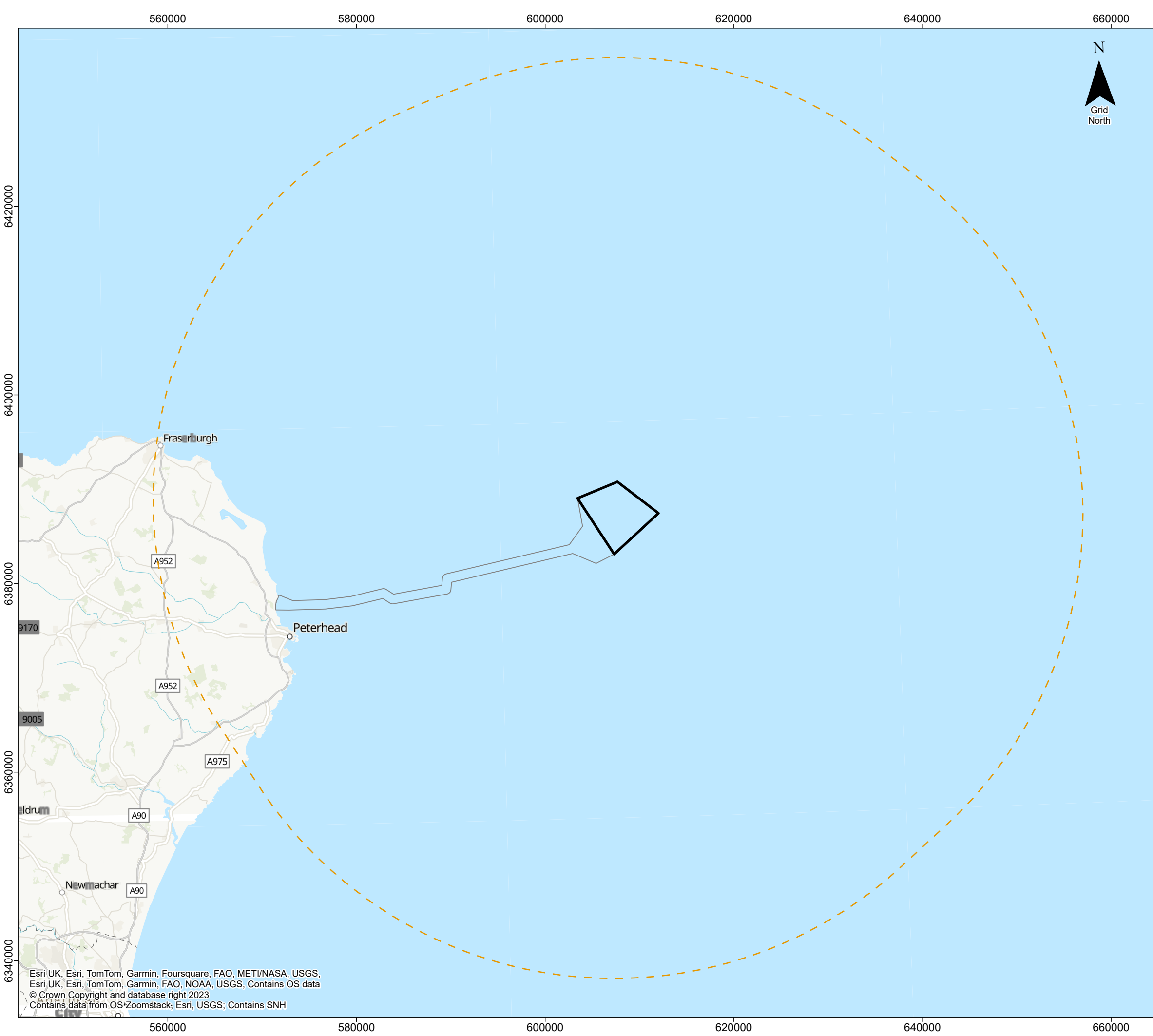
17.5.2 Settings Assessment Study Area

17.5.2.1 In relation to the OAA, the assessment makes use of a 45 km Setting Study Area as a starting point for assessing setting impacts. The initial 45 km Study Area for setting impacts is not an arbitrary cut off point. Due consideration is given to receptors beyond 45 km that fall within the ZTV.

17.5.2.2 An initial 45 km Setting Study Area has been agreed with HES and AC following consultation (see **Table 17-2**) and notification from HES stating that the 40 km Setting Study Area proposed at scoping may not be sufficient to identify all onshore receptors which may be subject to a change in setting as a result of the Offshore Development, notably the Offshore Array. The initial 45 km Setting Study Area has been informed by;

- The location of key coastal settlements and receptors along the coast to the north and south of Peterhead;
- The location of receptors which has a historic relationship to the Offshore Development Area or long distance views taking in the coastline and/or the distant seascape contribute to the setting and the cultural significance of the heritage asset; and
- The NatureScot (2018) guidance on visual representation and impacts from windfarms, as well as Met Office data on typical visibility from onshore receptors to the Offshore Array.




- 17.5.2.3 A full account of the methodology for determining receptors included for assessment can be found within **Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore)**.
- 17.5.2.4 The Settings Study Area for onshore archaeology and cultural heritage receptors in relation to the Offshore Development Area is shown in **Figure 17-2**, below.

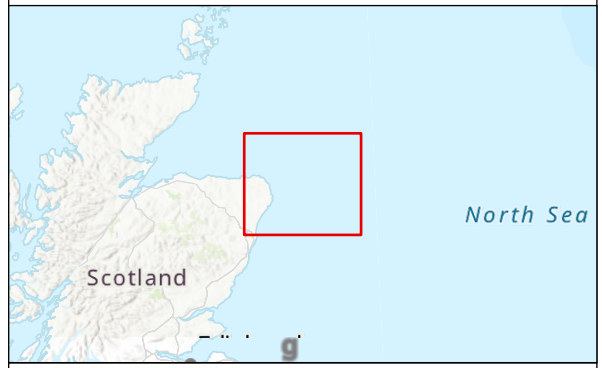


Salamander

Figure 17-2
Study Area for Cultural Heritage
Settings Assessment

Legend

-  Offshore Array Area
-  Offshore Export Cable Corridor
-  Study Area (settings)



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:390,625

0 10 20 Kilometers

0 3 6 12 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Study Area for Cultural Heritage Settings Assessment
Doc. No : 17-2

Created by : TB
Checked by : MJ
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17.6 Methodology to Inform Baseline

17.6.1 Site-Specific Surveys

17.6.1.1 In order to provide site-specific and up to date information on which to base the impact assessment, a series of surveys were conducted, as presented in **Table 17-3**. In addition, setting site visits to receptors with the potential to undergo a change of setting as a result of either the Construction or Operation of the Onshore Development or the Construction or Operation of the Offshore Array, were also undertaken. The results of the setting surveys are detailed in **Volume ER.A.3, Annex 17.1: Setting Sieving Exercise (Offshore)**.

Table 17-3 Surveys completed for Marine Archaeology and Cultural Heritage

Survey	Conducted by	Outcome of Survey
Geophysical survey	Ocean Infinity (2022a)	Geophysical and hydrographic data collected over the Offshore Development Area (and wider area of search) seaward c. 8 km from MHWS.
Intertidal walkover	Ocean Infinity (2022b)	Identification of several WWII assets within the intertidal zone.
Setting site visits to onshore receptors	ERM	The results of the survey informed Technical Appendix 17.1: Setting Sieving Exercise (Offshore) . As a result of the setting site visits the number of heritage assets taken forward to assessment was refined.

17.6.1.2 The Salamander Project has been unable to acquire site-specific data in the nearshore approximately 8 km region (measured from MHWS) of the Offshore ECC (west of the 1°40' line to shore, hereafter referred to as the "Nearshore Export Cable Corridor"). Due to safety restrictions related with deployed creels, it was not possible for surveys to take place in this nearshore region.

17.6.1.3 Geophysical data were collected for the OAA and Offshore ECC (excluding the Nearshore Export Cable Corridor), acquiring Multibeam Echo Sounder (MBES), Side Scan Sonar (SSS), Magnetometer, parametric Sub-bottom Profiler (SBP) and Sparker data (Ocean Infinity 2022a). The data were reviewed by a qualified and experienced marine archaeologist with a background in geophysical data collection, processing, and interpretation.

17.6.1.4 Detailed methods for the review of geophysical and geological data are set out within **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report**.

17.6.1.5 An intertidal walkover survey was also undertaken in August 2022. The survey was undertaken as part of a review of setting assets by the terrestrial archaeological consultants, who were briefed to photograph and position (using GPS) any features of historic interest, such as structures, palaeoenvironmental evidence and wreck remains, within the intertidal part of the Offshore Development Area. The results of this survey for settings are included in **Volume ER.A.4, Annex 17.2: Setting Assessment (Offshore)**, whilst the information to supplement the intertidal assessment are included within **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** and summarised in **Paragraph 17.7.1.7**.

Geophysical Data

17.6.1.6 The site-specific data collected across the Offshore Development Area are of good quality overall and, in the case of SSS and MBES, provided a minimum 100% coverage. SBP data were collected to a pre-

determined line plan, largely providing suitable coverage and penetration for the interpretation of the palaeoenvironment. The Magnetometer data were collected to a pre-determined line plan suitable for the identification of ferrous material with a peak-to-peak amplitude of 5 nT, with the minimum detection size increasing with distance from the track lines.

- 17.6.1.7 Publicly available data (Admiralty survey data, collected in 2009; catalogued as Single Beam Echosounder (SBES) but more illustrative of MBES), were acquired for c. 3.2 to 8 km seaward of MHS (partially covering the Nearshore Export Cable Corridor). However, the 4 m resolution of the data is not suitable for identifying small features of potential archaeological interest and is limited to the identification of large features, such as wrecks.
- 17.6.1.8 Magnetometer data was collected along a pre-determined survey line plan with 85 m spacings. Spacings of such width are too great for the accurate positioning of magnetic anomalies at distances from the survey lines but can indicate areas of archaeological potential or can be correlated with visible seabed features. It is likely that buried ferrous material, particularly smaller objects between the survey lines, may not have been identified.
- 17.6.1.9 The data are considered to be of an appropriate specification, coverage and quality to undertake a robust archaeological assessment to inform the EIA process, noting that additional data collection and interpretation will be required prior to construction (i.e. within the Nearshore Export Cable Corridor).

17.6.2 Data Sources

- 17.6.2.1 The data sources that have been used to inform this Marine Archaeology and Cultural Heritage chapter of the EIAR and onshore data sources relevant to the Settings Assessment are presented within **Table 17-4**.
- 17.6.2.2 This assessment has been based on the existing baseline environment, as summarised in **Section 17.7.1: Existing Baseline** (see **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** for further detail). A wide range of information sources and reference materials were consulted to inform the assessment, including site-specific to regional archaeological records and surveys, existing datasets and published academic studies. Evidence from these sources has been reviewed to produce an understanding of known and potential heritage assets, with the overall aim of determining the nature, extent and significance of the historic environment within the Offshore Development Area.

Table 17-4 Summary of key publicly available datasets for Marine Archaeology and Cultural Heritage

Source	Year	Spatial Coverage	Summary
HES datasets including: Canmore Archaeological Records; Database of World Heritage Sites; Database of Scheduled Monuments; Database of Listed Buildings; Database of Inventoried Garden and Designed Landscapes; and Database of Inventoried Battlefields.	2023	Scotland. Used within: 45 km Setting Study Areas 45 km Setting Study Areas 45 km Setting Study Areas 45 km Setting Study Areas 45 km Setting Study Areas	Geographic Information Systems (GIS) data sets of designated and non-designated assets to inform the DBA and Direct/Indirect (physical) Impacts. GIS data sets of designated assets to inform Setting and Cumulative Impacts.
Conservation Area Appraisals and maps as held by the local planning authority.	2023	Aberdeenshire. Used within: 45 km Setting Study Areas	PDFs of Conservation Areas to inform Setting and Cumulative Impacts.
Special Landscape Areas	2023	Aberdeenshire. Used within: 45 km Setting Study Areas	PDF. An Appendix to the ALDP.
Wrecks designated under the Protection of Military Remains Act (1986)	2023	UK	List of designated wrecks in UK territorial waters, including known/postulated locations and description of remains.
Historic Environment Scotland	2023	Scotland (including territorial waters)	Register of designated and non-designated heritage assets.
United Kingdom Hydrographic Office	2023	UK territorial waters	Register and status of wrecks and obstructions with known locations.
Canmore data from the National Record of the Historic Environment	2023	Scotland (including territorial waters)	Additional data for non-designated heritage assets.
Aberdeenshire Historic Environment Record	2023	Aberdeenshire	Additional data for non-designated heritage assets.
British Geological Survey	2023	Great Britain & territorial waters	Onshore and offshore bedrock and Quaternary geological data, intrusive survey records and lexicon of rock units.

Source	Year	Spatial Coverage	Summary
Ocean Infinity geophysical and hydrographic data	2022	Offshore Development Area (excluding 8 km of nearshore section of Offshore ECC)	Geophysical and hydrographic data.
Wood. <i>Salamander Offshore Windfarm Project: GIS Model and Design Considerations.</i>	2023	Offshore Development Area (excluding 8 km of nearshore section of Offshore ECC)	Ground model, illustrating geological units within the Offshore Development Area, produced using the geophysical data.
Brooks <i>et al.</i> 'The Palaeography of Northwest Europe during the last 20,000 years'.	2011	British Isles	Published study representing prehistoric coastline model.
Clark <i>et al.</i> 'BRITICE Glacial Map, version 2: a map and GIS database of glacial landforms of the last British-Irish Ice Sheet.'	2017	British Isles	Published study illustrating the post-Devensian landscape.
Gibbard & Clark. 'Pleistocene Glaciation Limits in Great Britain.'	2004	British Isles	Published study detailing the extents of Pleistocene glaciations in the British Isles.
Shennan <i>et al.</i> 'Relative sea-level changes and crustal movements in Britain and Ireland since the Last Glacial Maximum.'	2018	British Isles	Published study of sea level index points and correlations with other existing sea level data.
Stoker <i>et al.</i> 'Lateglacial-Holocene shoreface progradation offshore eastern Scotland: a response to climatic and coastal hydrographic change.'	2008	Eastern Scotland	Published study of Devensian/Holocene coastal changes in eastern Scotland.

17.7 Baseline Environment

17.7.1 Existing Baseline

17.7.1.1 This section contains a summary of the archaeological baseline and sensitivity of the assets identified within the Offshore Development Area. It is split into the following sections:

- Summary of known heritage assets;
- Submerged prehistory and palaeolandscapes;
- Coastal and maritime archaeology;
- Intertidal and adjacent sites; and
- Aviation archaeology.

- 17.7.1.2 Full discussion of each area is set out within **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** and key points are summarised here.

Summary of known heritage assets

Designated Heritage Assets

- 17.7.1.3 No marine designated heritage assets (Historic Marine Protected Areas or remains designated under the Protection of Military Remains Act 1986) or other designated heritage assets lie within the Offshore Development Area.
- 17.7.1.4 One Scheduled Monument, two Listed Buildings and one Conservation Area lie within the terrestrial part of the Study Area (i.e. within 200 m landward of MHWS). However, onshore assets are within the Onshore Development Area and beyond the scope of this EIAR. They are, therefore, not examined further here. For further detail on the potential for interaction between effects of the Offshore Development cumulatively with the Onshore Development for the Marine Archaeology and Cultural Heritage receptors, see **Section 17.14**.

Non-Designated Heritage Assets

- 17.7.1.5 A total of 179 non-designated heritage assets have been identified within the Offshore Development Area and Study Area, comprising 15 wrecks, 36 terrestrial records (within 200 m of MHWS) and 128 documented losses. Eleven of these wrecks have corresponding UKHO records, with two recorded dead positions, whilst the remaining four wrecks are derived from Canmore or HER records, with no correlating UKHO record (see **Figure 17-3**).
- 17.7.1.6 Three wrecks (two from UKHO records and one from Canmore/HER records only) and 11 documented losses are recorded within the Offshore ECC. No non-designated heritage assets have been identified within the OAA. The remainder of the non-designated heritage assets lie within the Study Area. Geophysical anomalies of archaeological potential have been identified within both the Offshore ECC and OAA.
- 17.7.1.7 Three terrestrial assets are recorded within the westernmost part of the Offshore ECC, however, these are understood to represent duplicate records of Second World War pillboxes situated slightly west beyond the Offshore ECC, above MHWS (see **Figure 17-4**; TI_018, TI_025 and TI_028).

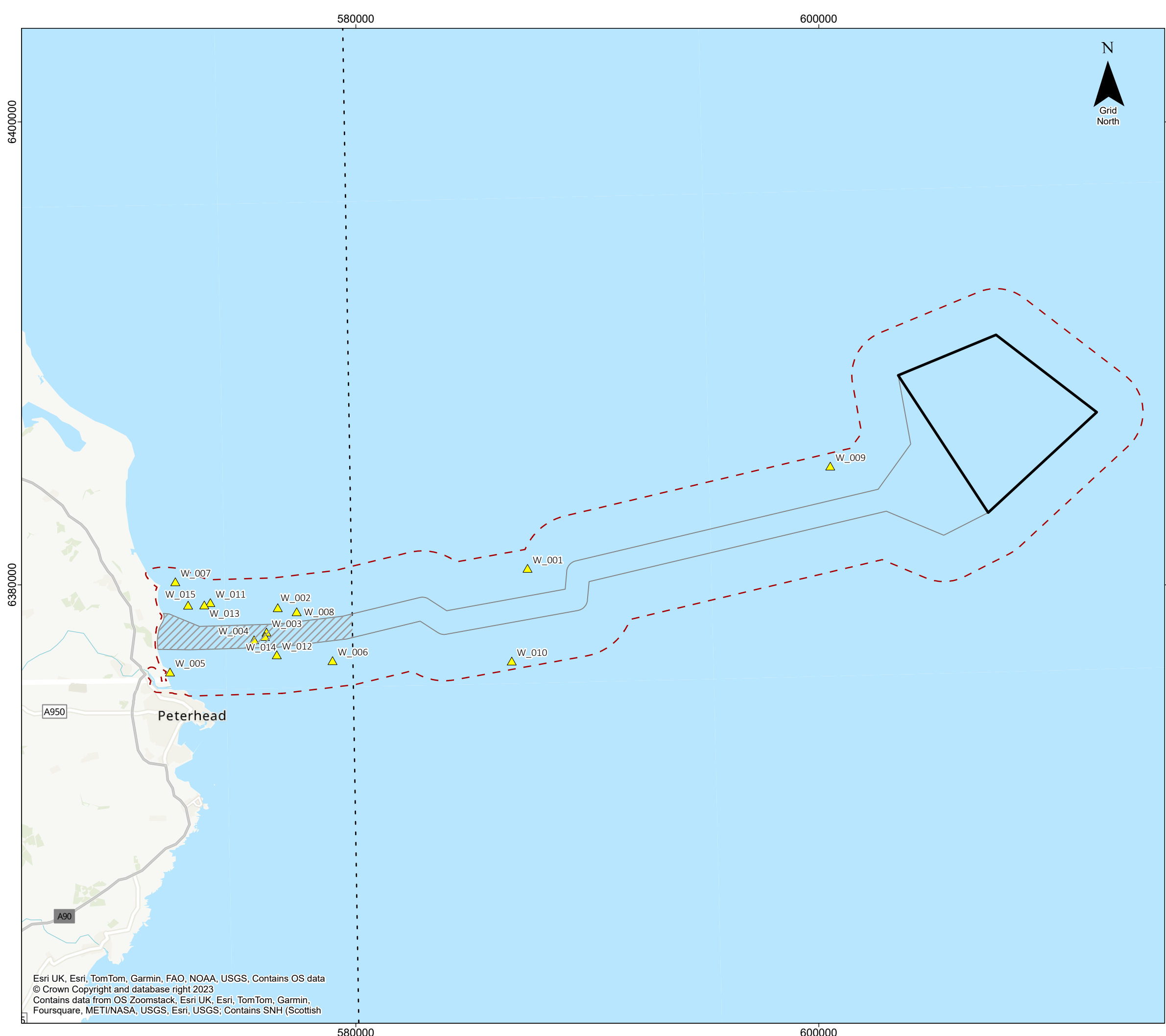
Submerged Prehistory and Palaeolandscapes

- 17.7.1.8 The UK has been affected by several glacial events over the last million years, including the Anglian (480,000 to 430,000 BP), the Wolstonian (350,000 to 132,000 BP) and the Devensian (122,000 to 11,700 BP), as well as intervening marine transgressions, all of which have influenced the archaeological potential of the Offshore Development Area.
- 17.7.1.9 The Offshore Development Area experienced multiple phases of advance and retreat of the British-Irish Ice Sheet and associated marine regression and transgression. The patterns of glaciation were complex and the extents of glaciation in different periods remain a dynamic and evolving field of scholarship. These large-scale events have influenced the geomorphology, geology and archaeological potential of the landscape.

- 17.7.1.10 The dating for the climatic stages discussed within this report include both years before present (BP) and Marine Isotope Stages (MIS), which are alternating cool and warm periods defined by oxygen isotope data derived from deep sea core samples.
- 17.7.1.11 Eight principal Quaternary geological units and horizons were identified within the Offshore Development Area. The deposits are summarised in **Table 17-5** and comprise a sequence of glacial and marine deposits, incisions and channel infills covered by recent seabed sediments.
- 17.7.1.12 The deposits identified within the Offshore Development Area have been tentatively correlated with geological stages, MIS and, where possible, to narrower time windows, although no dating analysis has been undertaken and the units identified are not yet correlated with geotechnical evidence. The attributed formations and lithological characteristics of the units provide some indication of archaeological and palaeoenvironmental potential. Several units exhibit laminations of glaciomarine and marine sediments, which, although indicative of low archaeological potential, could refine our understanding of regional glacial activity and of periods when the landscape may have been habitable.
- 17.7.1.13 There is no known prehistoric archaeology within the Offshore Development Area, though worked flint artefacts have been identified within the terrestrial part of the Study Area, suggesting a comparative potential for evidence in the offshore region. The potential for submerged prehistoric archaeology within the Offshore Development Area is summarised chronologically in **Paragraphs 17.7.1.16 to 17.7.1.34**, below.
- 17.7.1.14 Environmental conditions, as inferred by the composition and depositional environments of identified geological units and sea level data and modelling, are a key consideration for determining archaeological potential. Other regional and national considerations have also informed the potential. Several stages of the Pleistocene have yet to produce any evidence of hominin activity in Britain and, in correlation with climate and environmental conditions, it is widely accepted that hominins were not present during these periods:
- 460,000 to 400,000 BP (representing parts of MIS 12 to 11; Anglian and Hoxnian stages. Hominin remains have been attributed to other parts of these stages, i.e. homo heidelbergensis remains at Swanscombe, Kent, dated to c. 380,000 BP; MIS 11; Hoxnian);
 - 180,000 to 60,000 BP (MIS 8 to 4; Wolstonian, Ipswichian and Early Devensian stages); and
 - 25,000 to 18,000 BP (MIS 2; Late Devensian stage).
- 17.7.1.15 Furthermore, no securely dated evidence of human activity has been recorded within a Scottish context pre-dating c. 12,000 BP (Saville and Ballin, 2009).

Table 17-5 Units and horizons provisionally identified within the Offshore Development Area

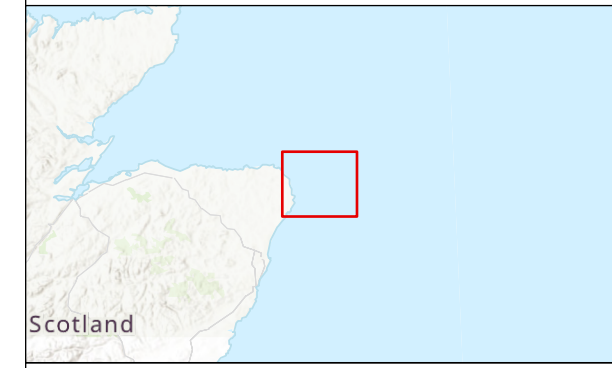
Unit	Horizon	Interpretation	Lithology	Age
10	1	Surface sediments	Sand, with variable gravel inclusions.	Holocene MIS 1
20	2	Witch Ground Formation	Upward transition from pebbly glaciomarine muds to fine sands and silts.	Devensian, Holocene MIS 2 to 1
30	3a	Internal reflector within Forth Formation	Well layered sands.	Holocene MIS 1
	3b	Base of Forth Formation – two defined sub-units: St Andrew’s Bay member (upper) and Largo Bay Member (lower)	St Andrew’s Bay Member: fine to coarse sands. Largo Bay Member: upward transition from boreal marine muds to pebbly glaciomarine muds.	Holocene MIS 1 c. 10,000 to 7,000 years BP Devensian, Holocene MIS 2 to 1 c. 13,500 to 10,000 years BP
40	4a	Internal reflector within Coal Pit Formation	Unrecorded.	Wolstonian, Ipswichian, Devensian
	4b	Base of Coal Pit Formation	Interlaminated marine sands and pebbly glaciomarine muds and sands.	MIS 6 to 3
50	5	Ling Bank Formation	Marine silts with sand and clay interbeds; suggestion of gravelly sediments too, alongside water-lain sediments.	(possibly Anglian) Hoxnian, Wolstonian MIS (12) 11 to 10
60	6	Aberdeen Ground Formation	Chaotic variety of temperate marine muds within sands to glaciomarine muds, sands and gravels.	Cromerian MIS 100 to 13



Salamander

Figure 17-3
Distribution of wreck records

- Legend
- Offshore Array Area
 - Nearshore Export Cable Corridor
 - Offshore Export Cable Corridor
 - 1° 40' W line (WGS84)
 - Study Area
 - Wreck record



Coordinate System: WGS 1984 UTM Zone 30N
Scale @ A3 : 1:160,000

0 4.5 9 Kilometers

0 1.25 2.5 5 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Distribution of wreck records
Doc. No : 17-3
Created by : TB
Checked by : MJ
Approved by : SS



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Contains data from OS Zoomstack, Esri UK, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS, Esri, USGS; Contains SNH (Scottish



Salamander

Figure 17-4
Second World War coastal structures

Legend

Nearshore Export Cable Corridor

Offshore Export Cable Corridor

Study Area

Anti-tank blocks

Confirmed

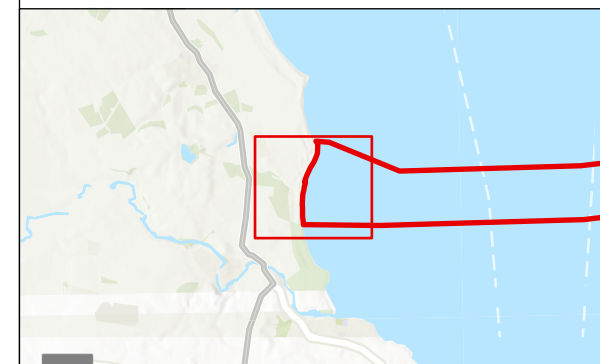
Unconfirmed

Pillbox

Confirmed

Unconfirmed

Duplicate



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:7,037

0 0.2 0.4 Kilometers

0 0.05 0.1 0.2 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Second World War coastal structures

Doc. No : 17-4

Created by : TB

Checked by : MJ

Approved by : SS



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Submerged Prehistory: Lower, Middle and Upper Palaeolithic to Mesolithic (c. 970,000 to 4,000 BC)

- 17.7.1.16 The earliest known hominin evidence within the UK was identified within the Cromer Forest-bed Formation at Happisburgh, Norfolk. This formation has been partly correlated in age with the Aberdeen Ground Formation, identified within part of the Offshore ECC (Unit 60) (Wood, 2023).
- 17.7.1.17 The environment within the Study Area varied considerably during the Lower to Middle Palaeolithic. During the Cromerian stage (970,000 to 480,000 BP; MIS 19 to 13), it is likely that the area was affected by varied, but often glaciomarine or marine, conditions, evidenced by the lithology of the Aberdeen Ground Formation. Parts of the landscape may have been sub-aerially exposed, however, the arctic conditions would have been unfavourable for human habitation and subsequent glacial and marine processes are likely to have significantly reworked any remains present.
- 17.7.1.18 The Anglian glaciation (480,000 to 430,000 BP; MIS 12) followed the Cromerian stage and extended over the wider landscape. The Ling Bank Formation (Unit 50), identified across the OAA and eastern half of the Offshore ECC, is reported by the BGS as having Anglian origins, however, the ground model records Hoxnian origins (Wood, 2023). Other sources attribute a possible Late Cromerian age (Stoker *et al.* 2011). Anglian glaciomarine deposits may therefore be present beneath the sandy and silty marine interbeds characteristic of the warmer climate of the Hoxnian Interglacial. Although such deposits may relate to the Hoxnian, these are difficult to date and have only tentatively been dated to the stage in a small number of sites in Scotland (Merritt *et al.* 2003). The Ling Bank Formation has been identified within the Offshore Development Area filling a series of deep, erosive features cut into the underlying Aberdeen Ground Formation (Wood, 2023). Hominin remains and artefacts have been identified in British Hoxnian deposits, including sites in Suffolk, Essex and Kent. The location of these sites relative to the Offshore Development Area suggest that southern regions may have been more hospitable than the proglacial conditions further north.
- 17.7.1.19 The Wolstonian Complex (350,000 to 132,000 BP; MIS 10 to 6) was broadly glacial in nature, however, it was punctuated by two interstadials: the Purfleet (337,000 to 290,000 BP; MIS 9); and Aveley (243,000 to 150,000 BP; MIS 7). The marine deposits of the Ling Bank Formation and interlaminated marine and glaciomarine deposits of the Coal Pit Formation (Unit 40) (identified across the OAA and eastern half of the Offshore ECC; Wood, 2023) likely correlate in part with the cooler environments of the Late Hoxnian and the onset and duration of the Wolstonian. The formation continued to be laid down during the Early to Middle Devensian (115,000 to 55,000 BP; MIS 5d to 3), signifying a long-lived geological unit spanning a series of vastly different climatic and environmental conditions, including marine, glaciomarine and intertidal.
- 17.7.1.20 Elements of the Coal Pit Formation (MIS 6 to 3) were laid down during the Ipswichian interglacial (135,000 to 115,000 BP; MIS 5e), when the warmer climate was coupled with higher sea levels. Similar to Hoxnian evidence, deposits dating to the Ipswichian are mostly tentatively attributed and only four of these are in a Scottish context (Merritt *et al.* 2003). The Devensian-aged upper strata were deposited during a period when much of northern Europe was dominated by glacial activity and the concurrent marine regression left elements of the Offshore Development Area and wider environs sub-aerially exposed.
- 17.7.1.21 The Late Devensian and Early Holocene witnessed the Last Glacial Maximum (LGM), when the British-Irish Ice Sheet reached as far south as The Wash and the south coast of Wales (Gibbard and Clark, 2004), and subsequent climatic amelioration. The Forth Formation (Unit 30) was laid down during this period and has been identified across the OAA (except for the southeast corner) and central and eastern parts of the Offshore ECC (Wood, 2023). The formation fills a series of north/south aligned channels, correlating with

the incisions first identified as the base of the Ling Bank Formation. The Forth Formation has been subdivided into four members (Stoker *et al.* 2008), two of which have been identified within the Offshore Development Area: the Largo Bay Member and the St Andrew's Bay Member.

- 17.7.1.22 The Largo Bay Member (13,000 to 10,000 BP; MIS 2 to 1) originated in a marine regression phase of the Late Windermere interstadial (14,700 to 12,900 BP; MIS 2; Holloway *et al.* 2002; Peacock, 1999) and Loch Lomond stadial (12,900 to 11,700 BP; MIS 2), continuing to be laid down during the marine transgression of the Early Holocene (11,700 to 10,000 BP; MIS 1; Brooks *et al.* 2011). The member therefore comprises boreal marine muds, expressing an upward transition to pebbly glaciomarine muds, characteristic of these marine and glaciomarine environments.
- 17.7.1.23 The St Andrew's Bay Member is believed to have originated in colder conditions of the Loch Lomond stadial, continuing to be laid down during the Early Holocene (10,000 to 7,000 BP). The BGS records the member as comprising interlaminated silts, sands and muds, with varying pebbly inclusions, whereas the ground model defines it as fine to coarse fluviomarine sands (Wood, 2023). Stoker *et al.* (2008) have divided the St Andrew's Bay Member into four separate lithozones, representing seaward-prograding clinofolds. Lithozone 1 was found to represent a fluvio-delta deposit dated to the Loch Lomond stadial and is thus thought to represent deposition during the lowstand. The seaward edge of the delta may have been around -20 to -30 m OD. These depths are greater than those estimated by other studies, which suggested that the Main Late Glacial Shoreline was around -10 m OD (Brooks *et al.* 2011; Shennan *et al.* 2018). Lithozones 2 and 3 (c. 8,000 to 2,000 BP) are believed to have been laid down during a phase of highstand, where the relative sea level (RSL) may have been up to 5 m OD. Lithozone 4 formed from 2,000 BP onwards, when RSLs closely correlate with that of the present.
- 17.7.1.24 The OAA lies in deeper water (c. 98 m) and is therefore likely to have been submerged during the formative period of the Largo Bay and St Andrew's Bay members, indicating very limited potential for archaeological remains. Much of the Offshore ECC lies within depths of 91 to 30 m (east to west), suggesting that the nearshore section may have been sub-aerial during the formation of the upper Largo Bay Member and St Andrew's Bay Member, if these are found by future surveys within the Nearshore Export Cable Corridor to occur here.
- 17.7.1.25 Adjacent to the Forth Formation and identified beyond the southeast corner of the OAA only (Wood, 2023), the Witch Ground Formation (Unit 20) was laid down during the Devensian and Early Holocene stages (18,000 to 8,400 BP; MIS 2 to 1). The broader composition of glaciomarine muds to temperate marine sands and silts is suggestive of glaciomarine to marine depositional environments, although the elements of the Witch Ground Formation within the Study Area lie c. 39 km offshore and were likely laid down in a wholly marine environment.
- 17.7.1.26 The uppermost stratigraphic unit identified within the Offshore Development Area comprises seabed sediments of fine to coarse grained sands (Unit 10), with varying gravel inclusions generally expressing an increase further offshore.
- 17.7.1.27 The wider landscape was predominantly covered by ice, submerged during marine transgression or summarised by cold, inhospitable proglacial conditions during Lower to Middle Palaeolithic and the potential for archaeological remains is very limited. Remains may have been laid down in sediments deposited during phases of lower RSL and concurrent sub-aerial exposure, however, no phase of the Lower or Middle Palaeolithic correlates with the known period of human occupation of Scotland (i.e. from c. 12,000 BP). Furthermore, any earlier deposits which may have held hominin artefacts or remains may have been impacted by later glacial activity, destroying, reworking or relocating the evidence. Remains may

survive in sheltered areas, such as cave sites, however, much of the coastline present within the Study Area is summarised by an exposed, sandy shore, limiting the potential for *in situ* remains.

- 17.7.1.28 The earliest *in situ* human evidence in Scotland has been approximately attributed to the Upper Palaeolithic, through typology comparison with more securely dated European flint technologies (Saville and Ballin, 2009). Sea level modelling suggests that much of the Offshore Development Area, excluding perhaps only a narrow strip of the nearshore section of the Offshore ECC, was inundated from at least 18,000 BP (Brooks *et al.* 2011), inferring that sub-aerial exposure of much of the Offshore Development Area did not coincide with human occupation of Scotland.
- 17.7.1.29 During the Upper Palaeolithic, the proglacial landscape likely saw the Landfall occupied by a meltwater lake, with an ice dam broadly along the alignment of the boundary between the Landfall and Offshore ECC (Clark *et al.* 2017). Regional studies, alongside sea level data, suggest that Lithozone 1 of the St Andrew's Bay Member (Unit 30), if present within the nearshore part of the Offshore ECC, formed in sub-aerial, proglacial conditions, however, such environments were unfavourable for human occupation. Subsequent lithozones formed in marine environments, suggesting a very low potential for evidence of human activity dating to the Upper Palaeolithic.
- 17.7.1.30 By the onset of the Mesolithic, a final phase of marine transgression was underway, having started in c. 13,000 BP (11,000 BC), and the Offshore Development Area was likely fully submerged by c. 6,000 BP (4,000 BC) (Brooks *et al.* 2011). Although this suggests a possible window during the late Upper Palaeolithic and Mesolithic where the nearshore part of the Offshore ECC was sub-aerially exposed, the upper strata of the Largo Bay Member, Lithozones 2 and 3 of the St Andrew's Bay Member of the Forth Formation (Unit 30), and the Witch Ground Formation (Unit 20) were laid down in marine environments, as evidenced by their lithology. While wholly glacial or marine environments have no potential for *in situ* material, the peripheries of marine environments may have been attractive areas for human activity. Analysis of seismic data from the nearshore part of the cable route may shed further light on this potential.
- 17.7.1.31 Surface sediments of sand and gravel (Unit 10) formed atop the Forth and Witch Ground formations from c. 8,400 BP onwards, also in marine environments.
- 17.7.1.32 It is feasible that Mesolithic groups may have visited, exploited and possibly occupied the Landfall, taking advantage of the lacustrine and intertidal resources. Evidence of maritime activities dating to the Mesolithic is available from national and international contexts, however, such remains are extremely rare. The closest archaeological evidence for Mesolithic activity comes from an assemblage of 34 Late Mesolithic or Early Neolithic flints recovered during investigation at St Fergus, c. 1.4 km northwest from the Landfall (Canmore ID: 365019).
- 17.7.1.33 Considering the marine conditions experienced by the Offshore Development Area during the Mesolithic, there is a very low potential for archaeological remains of this period. Any such remains are likely to have been eroded and translocated from nearby onshore, littoral or fluvial deposits. The nearshore area may hold some potential particularly if Units 30 and 10 are present, though this is dependent on the nature of deposits in this zone.
- 17.7.1.34 There is a variable potential for palaeoenvironmental evidence dating to the Palaeolithic and Mesolithic, which may contribute to our understanding of Pleistocene and Early Holocene environmental conditions, glacial activity and timelines for marine regressions and transgressions. A moderate potential is considered for palaeoenvironmental evidence within the Aberdeen Ground, Ling Bank, Coal Pit and Forth formations and the series of filled channels identified across the Offshore Development Area may offer good preservation environments. A very low potential is considered for the Witch Ground Formation and surface

sediment deposits. Particular value would be attributed to any deposits which may be dated to the Hoxnian or Ipswichian interglacials, as these stages of warmer climatic conditions are poorly represented in the current palaeoenvironmental record.

Summary: Submerged Prehistory and Palaeolandscapes

- 17.7.1.35 Inhospitable environmental conditions summarised by periodic marine transgression and glacial cover, combined with an absence of evidence for human activity suggest a very low overall potential for *in situ* archaeological remains to be present within the geological units of the Offshore Development Area.
- 17.7.1.36 Unit 30 may hold potential for late Upper Palaeolithic to Mesolithic archaeological remains, if the St Andrew's Bay Member is identified within the Nearshore Export Cable Corridor. The current data gap of geophysical survey data for this section prevents accurate determination of the extent of this Member throughout the Offshore Development Area.
- 17.7.1.37 Unit 10, although formed in marine conditions, was laid down from the Early Holocene and terrestrial records suggest possible Mesolithic occupation of the nearby coastline and hinterland. The intertidal zone within the Offshore Development Area may therefore have experienced Mesolithic activity and there is a slightly greater potential for remains to be present.
- 17.7.1.38 Archaeological potential is therefore focused on the nearshore and is dependent on the nature of the deposits identified in this area. The majority of the Offshore Development Area is likely to have been characterised by marine to glacial conditions throughout the human history of Scotland, and therefore has low archaeological potential.
- 17.7.1.39 Units 30, 40 50 and 60 also have a moderate potential for containing remains of palaeoenvironmental interest, particularly within glacial tunnel and channel features. The sensitivity of these remains is considered below.

Sensitivity of Receptor: Submerged Prehistory and Palaeolandscapes

- 17.7.1.40 If present, palaeoenvironmental deposits and archaeological remains could address Palaeolithic and Mesolithic research questions identified within the ScARF and relevant archaeological other frameworks (English Heritage, 2008; Blinkhorn and Milner, 2014).
- 17.7.1.41 Early prehistoric remains could demonstrate intrinsic, contextual and/or associative characteristics and could contribute to ScARF research subjects, including material culture and the timeline of human occupation of Scotland, in addition to other regional and thematic research subjects. Any *in situ* early prehistoric remains could hold up to high value and redeposited remains could hold medium value, though with both the value would be dependent on the nature of the remains. Although a low overall potential has been identified, continued archaeological assessment of future survey data for the nearshore section of the Offshore Development Area will enable understanding of the potential to be refined and updated, as necessary.
- 17.7.1.42 Palaeoenvironmental deposits could address questions relating to the survival of deposits from these periods and could provide evidence which allows landscapes to be better related to the environmental record in the coastal zone, contributing to research strategies laid out by ScARF, including climate changes in Scotland since the Last Glacial Maximum and RSL changes during the last 15,000 years, and the North Sea Prehistory Research and Management Framework (Landward Research and Wessex Archaeology, 2023). There is some disparity in the understanding of marine transgression and regression on the east coast of Scotland during the late Pleistocene and the palaeoenvironmental evidence may contribute to a better

understanding of the timeline of these processes. Any palaeoenvironmental deposits could therefore hold medium value.

- 17.7.1.43 The archaeological resource is finite and would not be able to accommodate or recover from direct (physical) construction impacts within the Offshore Development Area. As such, these assets have been attributed a high sensitivity for any *in situ* sites, while redeposited remains may be of up to medium sensitivity. Likewise, the palaeoenvironmental resource is also finite, and would be of up to medium sensitivity.

Coastal and Maritime Archaeology

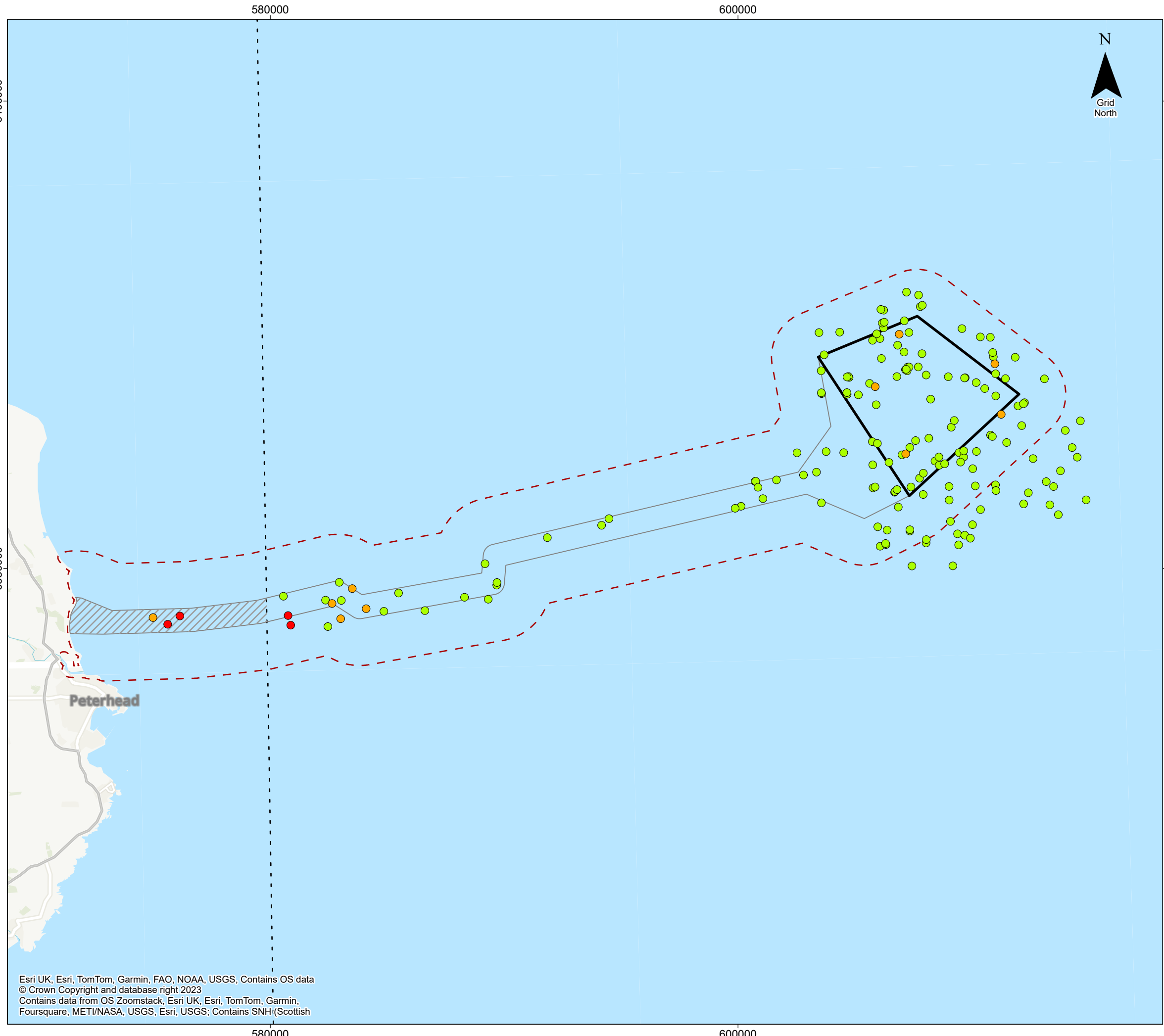
- 17.7.1.44 The potential for maritime archaeological remains to be present from early prehistory to the modern period is discussed in full in **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** and summarised here.
- 17.7.1.45 A total of 15 records relating to wrecks have been identified within the Offshore Development Area from all available sources (**Figure 17-3**). The UKHO records 11 wrecks within the Offshore Development Area and Study Area, of which two (the *Muriel* and the *St Magnus*) were correlated with Admiralty geophysical survey data and lie within the Offshore Development Area. The remaining nine UKHO-recorded wrecks were identified within the Study Area, including two dead positions. In addition, four wreck records are reported by the HER and Canmore databases, with no corresponding UKHO record: one within the Offshore Development Area and three within the Study Area.
- 17.7.1.46 The three wrecks identified through records within the Offshore Development Area all lie within the Nearshore Export Cable Corridor. No records are currently situated within the remainder of the Offshore ECC or the OAA.
- 17.7.1.47 No physical wreck remains were encountered in the intertidal zone during the walkover survey, however, the fine sand forming the upper strata of the beach deposits and dense kelp coverage may feasibly conceal wreck remains.

Geophysical Survey Results

- 17.7.1.48 Geophysical survey data provided further evidence of potential maritime and/or aviation archaeological sites. A total of 172 anomalies of potential anthropogenic origin were identified using the MBES and SSS data. These are categorised by potential in **Table 17-6** and illustrated by **Figure 17-5**. Full details of each anomaly are set out in **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report**. The technical report used the term 'Wider Survey Area' to describe the extent of the geophysical survey beyond the Offshore Development Area. The Wider Survey Area therefore relates to parts of the Study Area (particularly around the OAA) and some areas beyond this, to the full extent of the geophysical survey area.

Table 17-6 Distribution of archaeological anomalies by potential

Potential	Offshore Development Area	Wider Survey Area
Low	76	82
Medium	7	3
High	3	1
<i>Total</i>	<i>86</i>	<i>86</i>



Salamander

Figure 17-5

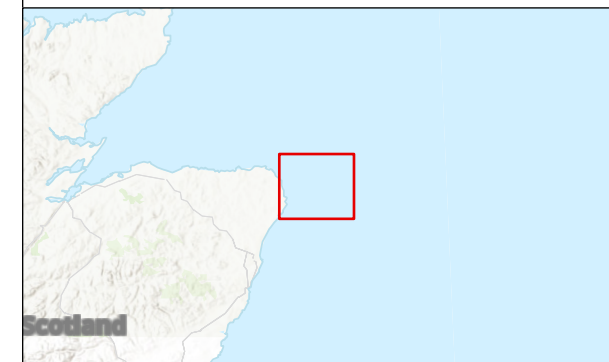
Distribution of archaeological anomalies

Legend

- Offshore Array Area
- Nearshore Export Cable Corridor
- Offshore Export Cable Corridor
- 1° 40' W line (WGS84)
- Study Area

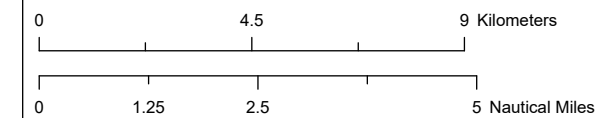
Archaeological anomaly (by potential)

- High
- Medium
- Low



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:160,000



Rev	Description	Date
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Doc. Title : Distribution of archaeological anomalies
 Doc. No : 17-5
 Created by : TB
 Checked by : MJ
 Approved by : SS



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Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS, Contains OS data
 © Crown Copyright and database right 2023
 Contains data from OS Zoomstack, Esri UK, Esri, TomTom, Garmin,
 Foursquare, METI/NASA, USGS, Esri, USGS; Contains SNH (Scottish

Table 17-7 Provisional interpretation of potential archaeological anomalies

Potential	Provisional interpretation	Offshore Development Area	Wider Survey Area
High	Wreck	2	1
	Potential wreck	1	0
<i>Total (high)</i>		<i>3</i>	<i>1</i>
Medium	Debris	3	1
	Potential debris	4	2
<i>Total (medium)</i>		<i>7</i>	<i>3</i>
Low	Debris	1	5
	Potential debris	15	29
	Chain, cable or rope	50	35
	Fishing gear	2	2
	Likely geological	1	4
	Linear feature	7	7
<i>Total (low)</i>		<i>76</i>	<i>82</i>
<i>Total (all)</i>		<i>86</i>	<i>86</i>

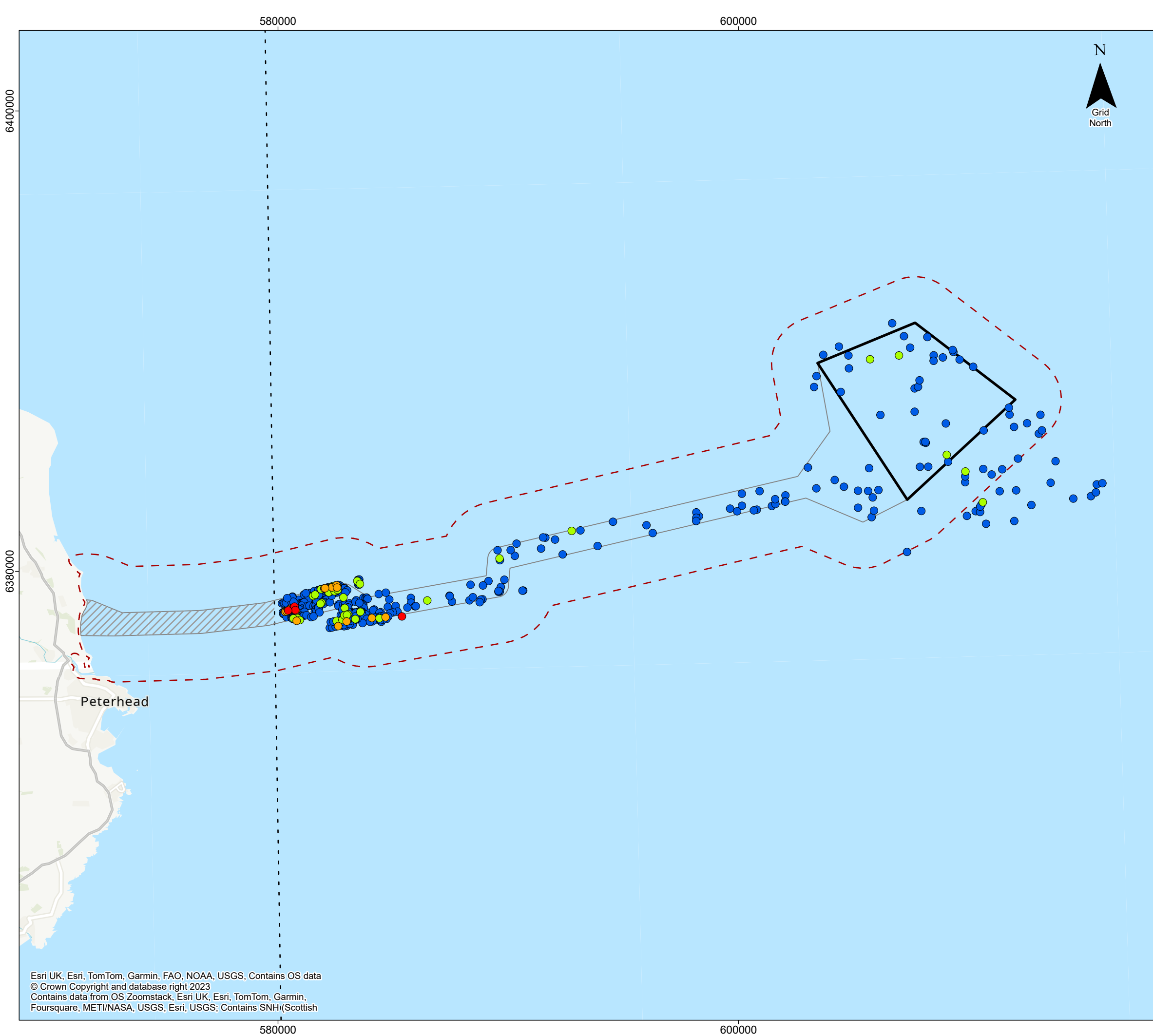
17.7.1.49 Three anomalies of high archaeological potential were identified within the Offshore Development Area and a further one within the Study Area. The two closest to the shore correlate with the wreck records of the *Muriel* and the *St Magnus* (SAL23_170 and UKHO: 2282; and SAL23_171 and UKHO: 2286, respectively). Anomaly SAL23_169 also lies within the Offshore Development Area, although this does not correlate with any other record. The form and distribution of the associated features suggests a wreck or other remains of anthropogenic origin. Anomaly SAL23_168, situated slightly beyond the Offshore Development Area within the Study Area, also does not correlate with any other record. The anomaly’s form is highly suggestive of a wreck.

17.7.1.50 Ten medium potential anomalies were identified: seven within the Offshore Development Area and three within the Study Area. These anomalies have characteristics that indicate a likelihood of representing anthropogenic material that has the potential to be of archaeological interest. A medium potential may also be attributed where a precautionary approach has been taken for anomalies where the identification is not clear.

- 17.7.1.51 A total of 158 low potential anomalies were identified: 76 within the Offshore Development Area and 82 within the Wider Survey Area. Of the latter, 56 were within the Study Area. These anomalies have been provisionally interpreted as a mixture of small features, often boulder-like, or likely to represent modern debris such as infrastructure debris, chain, cable, rope or small items of debris with no features indicating archaeological potential.
- 17.7.1.52 A summary of potential archaeological anomalies alongside provisional interpretations is given by **Table 17-7**. Full details of each anomaly are set out in **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report**.
- 17.7.1.53 In addition, 630 magnetic anomalies were identified within the survey data, of which 501 do not directly correlate with known or visible features. These anomalies ranged in amplitude from 5.0 to 11,663 nT; 385 anomalies within the Offshore Development Area and 116 within the Wider Survey Area. Whilst the vast majority of these are unlikely to be of archaeological interest, some may represent anthropogenic material. All isolated anomalies of 50 nT or less are likely to be of limited archaeological significance, however, a low amplitude may be the result of distance between the anomaly and the sensor. Magnetic anomalies of >100 nT are typically described as large and have the potential to be of archaeological significance.
- 17.7.1.54 The distribution of magnetic anomalies is given by **Table 17-8** and **Figure 17-6**. A full discussion of the results is set out in **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report**.
- 17.7.1.55 With the exception of c. 4 km at the landward extents of the data coverage, the distribution of magnetic anomalies is fairly uniform, primarily consisting of anomalies <50 nT. There is a notable increase in the density of magnetic anomalies towards the landward extent of the survey data within the Offshore ECC, between c. 8.5 to 12.5 km from MHWS. A total of 291 anomalies (of the 385 identified within the Offshore Development Area), ranging between 5.0 nT and 580.0 nT, were identified here, with 38 of these being >50.0 nT (**Figure 17-6**). The significant increase in magnetic anomalies indicates a likely increased presence of ferrous material, however, the distribution does not necessarily indicate an increased potential for archaeological material and, given the presence of outcropping bedrock within the area, the anomalies may relate to geological features.

Table 17-8 Distribution of magnetic anomalies

Intensity (nT)	Offshore Development Area	Wider Study Area
5 to 50	341	101
51 to 100	29	11
101 to 200	11	3
≤201	4	1
<i>Total</i>	<i>385</i>	<i>116</i>



Salamander

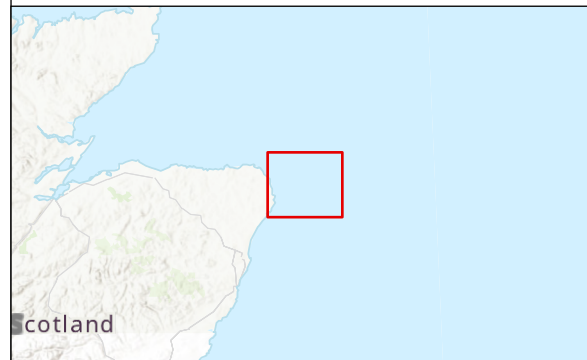
Figure 17-6
Distribution of magnetic anomalies

Legend

- Offshore Array Area
- Nearshore Export Cable Corridor
- Offshore Export Cable Corridor
- 1° 40' W line (WGS84)
- Study Area

Magnetic anomaly (by amplitude (nT))

- 5 - 50
- 50 - 100
- 100 - 200
- 200+



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:160,000

0 4.5 9 Kilometers

0 1.25 2.5 5 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Distribution of magnetic anomalies

Doc. No : 17-6

Created by : TB

Checked by : MJ

Approved by : SS



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Maritime Archaeology

- 17.7.1.56 This section provides a summary of the maritime archaeological character and potential of the Offshore Development Area. The full desk-based assessment is provided by **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report.**

Prehistory (Palaeolithic, Mesolithic, Neolithic, Chalcolithic, Bronze Age and Iron Age – c. 10,000 BC to 400 AD)

- 17.7.1.57 While trade networks and maritime travel are evidenced throughout prehistory by the movement of ideas, goods and people, faunal assemblages indicate that maritime activities, such as fishing, took place in coastal areas during the prehistoric periods from the Mesolithic onwards. Maritime transport was also undertaken, as suggested by the Mesolithic and later occupation of offshore islands, such as the Outer Hebrides. Evidence also indicates that some of these activities were not consistently practiced, as suggested by the sharp decrease in marine-sourced food which marked the onset of the Neolithic period.
- 17.7.1.58 While there is evidence of trade networks, maritime travel and marine exploitation throughout prehistory (albeit at low levels), direct physical evidence in the form of vessels is extremely rare. From a wider context, logboats and paddles are known from the Mesolithic period onward and planked vessels were in use from the 1st millennium BC (the Bronze Age). The known examples of logboats in Scottish contexts demonstrate a long history of use, from the Bronze Age (and potentially earlier) to the medieval period and historical evidence demonstrates their continued use into the 19th century. It has been suggested that skin vessels (coracles and currachs) were used, though no direct evidence has yet been found.
- 17.7.1.59 In Scotland, logboats are mostly encountered in lacustrine sediments and those from Aberdeenshire (and elsewhere in Scotland) are typically associated with lochs and are often found in association with crannogs. Examples from river terraces are also well known, such as those associated with the River Clyde, though the Forth and Tay have also produced numerous examples. Examples from riverine contexts are also represented within the Aberdeenshire landscape, for example at the Glen of Craigston, where a Bronze Age logboat (dating to c. 1,890 to 1,600 cal. BC) was identified, c. 31 km to the west of the Landfall. While lacustrine and riverine deposits have produced most examples of logboats in Scottish contexts, maritime finds are rare.
- 17.7.1.60 The mouth of the River Ugie lies c. 1.6 km to the south of the Landfall. While no prehistoric vessels have been identified in association with the river, prehistoric sites are well attested within the surrounding landscape, demonstrating a focus on the river during several prehistoric periods. Approximately 150 Neolithic flint flakes have been identified on the north bank of the River Ugie, overlooking the mouth of the river, c. 1.5 km south from the Landfall, while to the south of the river mouth, Late Iron Age/Pictish deposits have been identified along with other settlement evidence and several stone cist burials. Further upstream and beyond the Study Area, between c. 1.4 to 2 km west from the Landfall, a series of cropmarks, flint artefacts and pottery sherds illustrate settlement during the Bronze Age and Iron Age. Slightly beyond the Study Area, an assemblage of 34 Late Mesolithic or Early Neolithic flints was recovered during development at St Fergus in 2019, c. 1.4 km north-west from the Landfall. Isolated findspots of polished stone and socketed axeheads, flint arrowheads and other implements illustrate further Neolithic and Bronze Age activity within the wider landscape.
- 17.7.1.61 While no evidence of maritime activity is recorded at these nearby terrestrial prehistoric sites, the location of the remains, in close proximity to the river and coastline, may suggest waterborne activity within the Study Area during the Scottish Neolithic, Bronze Age and Iron Age. The presence of a post-glacial lake within

the Landfall during the Mesolithic period raises the potential for evidence of maritime activity, such as fish traps, logboats and associated artefacts.

- 17.7.1.62 Despite this potential, evidence of prehistoric maritime activity is rare both within the UK and internationally and no evidence of vessels from these periods has been identified within the Offshore Development Area or Study Area. Additionally, the Offshore Development Area lies on a stretch of exposed coast which would likely have been a less favourable location for maritime activity than the more sheltered nearby locations such as the River Ugie and Loch of Strathbeg. The terrestrial archaeological remains dating to prehistory suggest that the River Ugie mouth and valley were the foci of activity during this period, with the Offshore Development Area likely peripheral to this.

Early Medieval to Medieval (400 to 1603 AD)

- 17.7.1.63 Maritime technology continued to evolve during the early medieval period, influenced by invasions, migrations, populations and trade links. The most common maritime activities included fishing, trade and transport and towns expanded or were founded to facilitate these. Aberdeen joined the Hanseatic League, a northern European trading alliance, soon after its founding in 1169 and Peterhead developed as a fishing town in 1593. No early medieval evidence, however, has been recorded within the Offshore Development Area or Study Area and the level or character of occupation of the surrounding landscape during this period is uncertain.
- 17.7.1.64 The Scheduled remains of the parish church of St Fergus are enclosed by the Landfall and relate to a former medieval coastal settlement (Scheduled Monument No: SM5622). No associated evidence of medieval activity has been recorded and the settlement was abandoned prior to 1603 because of the encroaching sea.
- 17.7.1.65 Several other designated and non-designated medieval sites within the surrounding area relate to fortifications and fortified residences, including the old castle of Inverugie (HER ID: NK14NW0007; Canmore ID: 21270), an earthen motte known as 'Castle Hill' (Scheduled Monument No: SM3259) and Ravenscraig Castle (Scheduled Monument No: SM2496). Such sites are situated close to the River Ugie, within its valley or close to the river mouth. The site of the old castle of Inverugie is recorded below MHWS and the correlating Aberdeenshire HER entry mentions an associated former harbour, suggesting contemporary maritime activity which may have extended into the Offshore Development Area.
- 17.7.1.66 The surrounding evidence suggests some importance of the River Ugie and those in possession of the fortifications and controlling the area likely also controlled the landscape including the Landfall. There is some potential for evidence of medieval maritime activity within the Offshore Development Area, associated with local fishing and transport or international trade, however, no such remains have been recorded to date. Medieval maritime remains are generally very rare and any activity undertaken within the Offshore Development Area during this period was likely small scale.
- 17.7.1.67 In consideration of the current lack of evidence for early medieval activity within the vicinity and overall rarity of medieval maritime remains, a low potential for remains of these periods is considered.

Post-Medieval and Modern (1604 to present)

- 17.7.1.68 The recording of maritime history became common practice by the post-medieval period and our knowledge of contemporary and later maritime activity is therefore much more robust than for earlier periods. Documentary evidence of vessels lost during these periods provides evidence of maritime activity in the waters surrounding, and within, the Offshore Development Area.

- 17.7.1.69 The earliest detailed maps illustrating the Offshore Development Area date to the late 18th and early 19th centuries (Ainslie's 1785 chart and Thomson's 1832 map of Aberdeenshire), showing the coastline broadly as at present, with a small watercourse known as Cuttie Burn running through the Landfall. One differing feature of these earlier maps is a deltaic mouth where Cuttie Burn joins the sea, at the centre of the Landfall's eastern boundary. Ordnance Survey maps, from the First Edition (1872) onwards, do not illustrate this feature but do show several tracks leading from small, nearby settlements and farmsteads to the coastal dune system.
- 17.7.1.70 Fifteen wreck sites are recorded by the UKHO within the Offshore Development Area and Study Area. Three are recorded within the Offshore ECC and 12 within the Study Area. No wrecks are recorded by the UKHO within the OAA.
- 17.7.1.71 The two wrecks within the Offshore ECC have been attributed to the *Muriel* and the *St Magnus*. Named wrecks within the Study Area comprise the *Bel Lily* and the *Magician*, whilst other wrecks have been provisionally attributed to the *Egenaes*, the *Ocean Herald II* and the *Cransdale*. All named wrecks were lost during the early 20th century, except for the *Ocean Herald II*.
- 17.7.1.72 A further 128 records relating to positions describing the locations of lost vessels (documented losses) are recorded by Canmore and the HER within the Study Area. Twenty-four of these are duplicate records for the same vessel, bringing the total to 88 vessels recorded as lost during the 18th, 19th and 20th centuries and 16 records of wreck remains washed ashore.
- 17.7.1.73 The vessel types and cargoes recorded illustrate a wide range of maritime activities taking place within the Offshore Development Area, including fishing, passenger and cargo transport, pilotage and leisure.
- 17.7.1.74 The named wrecks, unnamed wrecks and material and potential for further such remains presents a very high likelihood for encountering post-medieval and modern archaeological remains.

Summary: Coastal and Maritime Archaeology

- 17.7.1.75 The identified coastal and maritime archaeological resource within the Offshore Development Area and Study Area can be summarised as:
- Fifteen wreck sites, comprising:
 - Two wrecks with correlating UKHO records and site-specific geophysical survey identification, namely the *Muriel* and the *St Magnus*;
 - Seven wrecks with UKHO records and supporting evidence, but no site-specific geophysical survey identification;
 - Two dead positions recorded by the UKHO;
 - Four HER or Canmore records of wreck with no corresponding UKHO record or supporting evidence;
 - High potential geophysical anomalies, which may represent additional wrecks;
 - Medium potential geophysical anomalies, which may represent maritime archaeological remains;

- Low potential geophysical anomalies, unlikely to be of archaeological significance;
- Magnetic anomalies of uncertain origin; and
- Further potential for wreck sites and isolated maritime remains indicated by documented loss records.

Sensitivity of Receptor: Coastal and Maritime Archaeology

- 17.7.1.76 Wreck sites can be designated as Historic Marine Protected Areas or as Scheduled Monuments (under the Ancient Monuments and Archaeological Areas Act 1979). The value assigned to a particular wreck is case-specific, depending on several factors, including its historical importance, rarity and level of survival. Any wreck sites dating from pre-1815 are likely to be of high archaeological significance, based on the rarity of surviving vessels from this period. Wrecks dating from 1816 to the present day may still be of high archaeological significance, particularly where they specifically contribute to our understanding of technological developments or events, people and places.
- 17.7.1.77 As the identity of the wrecks within the Offshore Development Area and Study Area is not known with certainty, the remains could be of up to high archaeological value. This is also the case for other high potential anomalies, including magnetic anomalies. Additionally, such remains would have no ability to recover from physical impacts and the overall sensitivity of wreck sites is high. This would also be the case for any wreck sites which are currently unknown, relating to any period of history or prehistory.
- 17.7.1.78 Anomalies identified as of medium archaeological potential have been provisionally interpreted as debris. The precautionary approach used during the archaeological assessment means that possible geological features, where there is the potential they may represent anthropogenic debris, have been assessed as of medium archaeological potential. As with high potential anomalies, the remains would have no ability to recover from physical impacts, as such the overall sensitivity of these sites is medium.
- 17.7.1.79 Anomalies identified as of low archaeological potential have been provisionally interpreted as a mixture of small features, often boulderlike, or isolated linear features and modern debris such as rope, chain, fishing gear or seabed anomalies with associated magnetic anomalies. Low potential anomalies have been assessed against all available evidence and are deemed to be unlikely to be of archaeological significance, with low levels of heritage value. The overall sensitivity of these sites is low.
- 17.7.1.80 Further potential for isolated finds also exists, possibly ranging in date from the Mesolithic to modern periods. While the intrinsic value of such remains is dependent upon the physical fabric and its age, rarity and a range of other factors, some contributing factors, such as original context, have been lost. While such finds do hold some significance, this is generally limited. Any such remains would also have no ability to recover from physical impacts and their overall sensitivity is medium.
- 17.7.1.81 Magnetic anomalies have the potential to represent material of anthropogenic origin with archaeological significance. These anomalies are generally buried items and their significance and sensitivity are uncertain.

Intertidal and Adjacent Sites

- 17.7.1.82 The intertidal zone was assessed for its potential to inform the coastal and maritime archaeology of the Offshore Development Area. Although no assets were identified within the Offshore Development Area, several assets were identified slightly above MHWS, all dating to the Second World War and comprising: three concrete pillboxes (**Figure 17-4**; TI_017, TI_024, TI_027; Canmore IDs: 367561, 367562 and 250618) and two formations of concrete anti-tank blocks (TI_024, TI_037; Canmore ID: 367561). The northern and central pillboxes were confirmed during the walkover survey, along with a northerly anti-tank block

formation which did not appear in other records (**Figure 17-4**, TI_037). The southern pillbox and anti-tank block formation (TI_024) were not confirmed, possibly as the survey did not extend to this part of the shore.

- 17.7.1.83 Each of the pillbox records has a corresponding, nearby HER record, which appear to be duplicates with slightly differing recorded locations (**Figure 17-4**; TI_018, TI_025, TI_028). These duplicates, situated within the Offshore Development Area, are not known to represent physical remains at these locations and no other records relate to physical remains within the intertidal element of the Offshore Development Area.
- 17.7.1.84 Other, similar and associated structures may be present within the intertidal zone of the Offshore Development Area, buried by beach deposits.
- 17.7.1.85 No eroded remains or earlier archaeological sites have been recorded within the intertidal zone of the Offshore Development Area or adjacent to this. Given the wider archaeological resource, there is potential for remains to be present within the intertidal zone, such as the remains of the medieval settlement formerly associated with the Church of St Fergus (see **Paragraph 17.7.1.64**).

Summary: Intertidal and Adjacent Sites

- 17.7.1.86 No heritage assets have been identified within the intertidal element of the Offshore Development Area. Three HER records therein are understood to comprise duplicate records of Second World War pillboxes situated slightly above MHWS (outside of the Offshore Development Area).
- 17.7.1.87 The identified adjacent sites are summarised as:
- Three Second World War concrete pillboxes, two of which have been confirmed through visual survey; and
 - Two concrete anti-tank block formations, one of which has been confirmed through visual survey.
- 17.7.1.88 As these lay beyond the scope of this chapter they are not considered susceptible to impacts associated with activities in the Offshore Development Area, these assets will not be considered further. An impact assessment for these sites will be undertaken, as necessary, in the Onshore EIAR.

- 17.7.1.89 There is also the potential for earlier remains buried within beach deposits relating to past human activity.

Sensitivity of Receptor: Intertidal and Adjacent Sites

- 17.7.1.90 Although a potential for other buried remains pre-dating the modern period has been identified, the uncertainty of the nature, character and survival of any such remains prevents the assessment of sensitivity at this stage. As a general consideration, remains may range from individual, isolated, redeposited findspots (of low to medium value) to wrecks and settlement evidence (of possible high value). Therefore, the sensitivity may range from low to high and may only be determined through dynamic and reactive assessment in the event of discovery.
- 17.7.1.91 An impact assessment for adjacent sites, including the Second World War structures, will be undertaken, as necessary, in the Onshore EIAR.

Aviation Remains

- 17.7.1.92 There are no known aviation remains nor documented losses within the Offshore Development Area or Study Area. The wider landscape, however, did hold associations with wartime aviation, particularly during the First World War, presenting a limited overall potential.
- 17.7.1.93 Aircraft casualties rarely result in articulated aircraft remains on the seabed; due to the traumatic nature of an aircraft crashing into the sea, the remains are usually scattered on the seabed (Wessex Archaeology,

2008). Aircraft, particularly military aircraft, are typically small and built of light materials, therefore, crashed remains may travel on the sea surface or laterally through the water column before settling on the seabed. Therefore, it is rare for remains to be identified articulated and *in situ*.

Sensitivity of Receptor: Aviation Remains

17.7.1.94 While no remains are currently known from within the Offshore Development Area, if aviation remains did occur, such remains would automatically fall under the Protection of Military Remains Act 1986 as they represent archaeological remains of high value. The remains would have no ability to recover from physical impacts and, as such, they would have high sensitivity.

17.7.2 Settings Assessment Baseline

17.7.2.1 Within the ALDP, Appendix 13 provides details of ‘Special Landscape Areas’ within the Aberdeenshire Council Planning Authority. The 45 km Setting Study Area identifies heritage receptors located within the within the North East Aberdeenshire Coast SLA. The North East Aberdeenshire Coast SLA recognises ‘*The importance of the coast to the setting of settlements and numerous built heritage assets such as castles, towers and churches...*’. Furthermore, ‘*Settlements and industry have had a major impact on this landscape, most notably the St Fergus Gas Terminal. Elsewhere, traditional fishing villages that have a strong relationship with the coast are nestled into the sheltered landform. There are numerous features of built heritage interest along the coast.*’

17.7.2.2 Within Appendix 13, and relating to heritage, the following aspects and features of the SLA are considered worthy of recognition through SLA designation:

- Overriding horizontal composition, emphasised by low-lying landform and “soft” gradual transition from land to sea;
- Expansive beaches backed by rolling dunes. The views from beaches are typically directed out to sea or along the coast;
- Lighthouses, such as Rattray, form landmark features along the coast as by necessity, they have prominent locations, colours, and a vertical form;
- A popular coast for visitors, with coastal paths, accessible dunes, golf courses and popular beaches;
- Prehistoric sites of national importance, including the Mesolithic landscapes at Sands of Forvie and Blackdog;
- Features of built heritage typically prominent in the open landscape;
- The iconic Slains Castle and its association with Bram Stoker;
- Remains of WWII anti-invasion defences along the beaches, in particular at the mouth of the Ythan River and around Rattray Head;
- Coastal settlement is generally associated with small harbours, such as at Collieston and Cruden Bay; and
- The siting and orientation of buildings can be highly distinctive, as seen at Inverallochy.

17.7.2.3 An initial 45 km Settings Study Area was to be used to compile a list of designated assets which may be subject to an adverse change in setting. The initial 45 km Settings Study Area for Setting Impacts was not to be used as an arbitrary cut off point for assessing setting impacts. Due consideration was given to assets

beyond 45 km that fall within the ZTV. Appendix A provides a summary of the baseline heritage environment within and around the 45 km Setting Study Area.

17.7.2.4 **Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore)** contains a full list of assets within and around the 45 km Setting Study Area. The initial 45 km Study Area used for this assessment takes in a number of coastal settlements along the north-east coast of Scotland, inclusive of (moving north to south):

- Fraserburgh;
- Cairnbulg/Inverallochy;
- St Combs;
- Peterhead;
- Boddam; and
- Port Erroll/Crudan Bay.

17.7.2.5 All of these settlements have associated designated heritage assets for which either the immediate coastline or the wider seascape makes some contribution to their setting and cultural significance.

17.7.2.6 In addition, this stretch of coastline is home to several 18th to 19th century lighthouses and coastal beacons for which the north-east coastline and/or wider seascape makes a significant contribution to their setting and cultural significance. Key Lighthouses and beacons include those at:

- Kinnaird Head Lighthouse (Fraserburgh);
- Cairnbulg Point;
- Rattray Head Lighthouse;
- Peterhead Harbour; and
- Buchan Ness Lighthouse (Boddam)

17.7.2.7 A total of 448 designated assets fall within the 45 km Study Area. These include:

- 37 Scheduled Monuments (17 within 35 km, a further 11 between 35 and 40 km and a further 9 between 40 and 45 km from the Offshore Array);
- 2 Gardens and Designed Landscapes (located within 40 km of the Offshore Array);
- 401 Listed buildings of which 13 are Category A (181 within 35 km, a further 101 between 35 and 40 km and a further 119; and between 40 and 45 km from the Offshore Array);
- 8 Conservation Areas (3 located within 35 km, a further 2 located between 35 and 40 km and a further 3 located between 40 and 45 km from the Offshore Array).

17.7.2.8 Within the bare earth ZTV, these were refined to a total of 371 designated assets remained. A sieving exercise was then undertaken where the following questions were asked:

- Was the asset within the screened ZTV as well as the bare earth ZTV?;
- Did the setting site visit confirm the asset was screened?;
- Was the setting of the asset reliant on a historic relationship to the Offshore Development Area or through long distance views taking in the coastline and/or the distant seascape?; and

- Do views of the asset from sea contribute to setting of the asset?

17.7.2.9 Following this further refinement, a total of 155 were included within the final list of assets taken forward to assessment; full details within **Volume ER.A.4, Annex 17.2: Setting assessment (Offshore)**. These 156 assets are listed within **Table 17-9** below and shown in **Figure 17-7** to **Figure 17-11**; they are summarised as

- 17 Scheduled Monuments;
- Six (6) Conservation Areas; and
- 132 Listed Buildings.

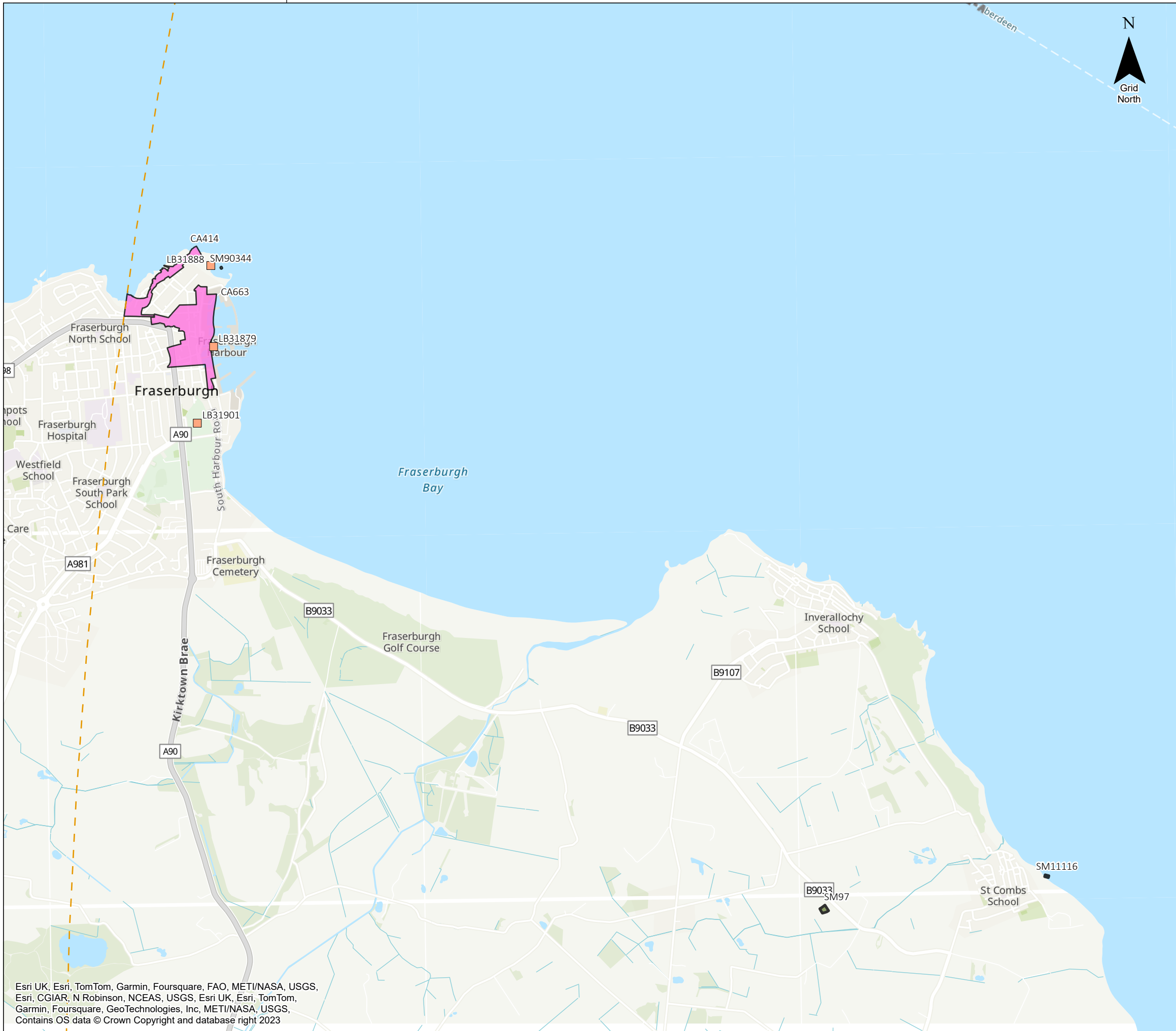
Table 17-9 Summary of grouped heritage assets included for detailed assessment of Setting Impacts (Offshore Aspects)

Asset name (or Group name)	Asset Type	Asset Ref	LB Category	Individual Asset Name	Location from Offshore Array	Value/ Importance
Ratray Line Pill Boxes	Scheduled Monument	SM11315	-	Ratray Line, pill box 80 m E of Annachie Bridge	Within 35 km	High
	Scheduled Monument	SM11314	-	Ratray Line, pill box 960m NNW of Annachie Bridge	Within 35 km	
	Scheduled Monument	SM11320	-	Ratray Line, pill box 1550m SSE of Home Farm	Within 35 km	
	Scheduled Monument	SM11313	-	Ratray Line, pill box 1150m SSE of Home Farm	Within 35 km	
	Scheduled Monument	SM11316	-	Ratray Line, pill box 675m NE of Old Ratray	Within 35 km	
	Scheduled Monument	SM11317	-	Ratray Line, pill box 875m ENE of Old Ratray	Within 35 km	
	Scheduled Monument	SM11318	-	Ratray Line, pill box 460 m WNW of Seatown	Within 35 km	
	Scheduled Monument	SM11319	-	Ratray Line, pill box at Seatown	Within 35 km	
	Scheduled Monument	SM11307	-	Ratray Line, pill box 55 m SE of Ratray Head Shore Station	Within 35 km	
	Scheduled Monument	SM11308	-	Ratray Line, pill box 780 m ENE of Middleton of Ratray	Within 35 km	
	Scheduled Monument	SM11311	-	Ratray Line, pill box 640 m SE of Ratray House	Within 35 km	
St. Fergus Old Parish Church and Churchyard	Scheduled Monument	SM5622	-	St Fergus's Church, old parish church	Within 35 km	High
	Listed Building	LB16536	-	Old Churchyard of St Fergus	Within 35 km	

Asset name (or Group name)	Asset Type	Asset Ref	LB Category	Individual Asset Name	Location from Offshore Array	Value/ Importance
St Combs, St Columba's Church	Scheduled Monument	SM11116	-	St Combs, St Columba's Church	Within 40 km	High
Inverallochy Castle	Scheduled Monument	SM97	-	Inverallochy Castle	Within 40 km	High
Castle Hill, motte SW of Hallmoss Farm	Scheduled Monument	SM3259	-	Castle Hill, motte SW of Hallmoss Farm	Within 40 km	High
Boddam Castle	Scheduled Monument	SM3252	-	Boddam Castle	Within 40 km	High
Wine Tower, Fraserburgh	Scheduled Monument	SM90344	-	Wine Tower, Fraserburgh	Within 40 km	High
Peterhead Conservation Areas and Associated Listed Buildings	Conservation Area	CA425	-	Peterhead Buchanhaven	Within 35 km	Medium
	Conservation Area	CA426	-	Peterhead Roanheads	Within 35 km	
	Conservation Area	CA427	-	Peterhead Central	Within 35 km	High
Boddam	Conservation Area	CA428	-	Boddam	Within 40 km	Medium
Broadsea Fraserburgh & Fraserburgh Town Centre	Conservation Area	CA414	-	Broadsea Fraserburgh	Within 45 km	Medium
	Conservation Area	CA663	-	Fraserburgh Town Centre	Within 45 km	High
Cairnbulg/Inverallochy Village and Listed Buildings	Former Conservation Area with 3 x Listed Buildings	LB16145	B	Inverallochy 26 Shore Street ("Maggie's Hoosie")	Within 40 km	Medium
		LB16144	C	Inverallochy Parish Church		
		LB19779	C	Inverallochy 1 Charles Street		

Asset name (or Group name)	Asset Type	Asset Ref	LB Category	Individual Asset Name	Location from Offshore Array	Value/ Importance
Ratray Head Lighthouse	Listed Building	LB3042	B	Ratray Head Lighthouse	Within 35 km	Medium
Ratray Listed Buildings	Listed Building	LB3038	B	Ratray House	Within 35 km	Medium
	Listed Building	LB3039	B	Walled Garden, Ratray House	Within 35 km	Medium
	Listed Building	LB3040	B	Ratray House Home Farm	Within 35 km	Medium
	Listed Building	LB3041	C	Laundry, Ratray House	Within 35 km	Low
	Listed Building	LB3036	C	Middleton Of Ratray	Within 35 km	Low
Listed Buildings in Peterhead (Peterhead Harbour)	Listed Building	LB39733	B	Peterhead Harbour	Within 35 km	Medium
	Listed Building	LB39734	C	1B-3 Shiprow, Peterhead	Within 35 km	Low
	Listed Building	LB39735	B	Fish Processing Factory, Castle Street, Peterhead	Within 35 km	Medium
	Listed Building	LB39736	C	Fish Processing Factory, Castle Street, Peterhead	Within 35 km	Low
	Listed Building	LB39737	C	Former Sale Rooms, 1, 3 Bridge Street, Peterhead	Within 35 km	Low
	Listed Building	LB39738	C	5, 7, 8 Bridge Street, Peterhead	Within 35 km	Low
Fish-House, Golf Road	Listed Building	LB39847	B	Fish-House, Golf Road	Within 35 km	Medium
The Reform Tower, Meethill, Invernettie	Listed Building	LB16362	B	The Reform Tower, Meethill, Invernettie	Within 35 km	Medium

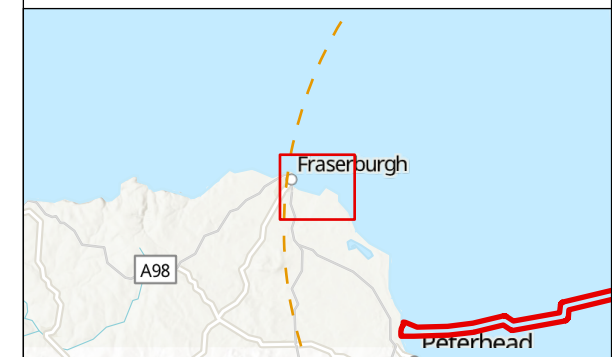
Asset name (or Group name)	Asset Type	Asset Ref	LB Category	Individual Asset Name	Location from Offshore Array	Value/ Importance
Listed Buildings around Peterhead (Sandford Lodge)	Listed Building	LB16364	B	Sandford Lodge	Within 40 km	Medium
	Listed Building	LB16365	C	Walled Garden, Sandford Lodge	Within 40 km	Low
Buchan Ness Lighthouse	Listed Building	LB16367	A	Buchan Ness Lighthouse	Within 40 km	High
Buchanness Cottage, Boddam	Listed Building	LB16366	B	Buchanness Cottage, Boddam	Within 40 km	Medium
Listed Buildings around Cruden Bay	Listed Building	LB3060	B	St James' Chapel, Chapel Hill, Cruden	Within 40 km	Medium
	Listed Building	LB3061	C	The Old Rectory, Cruden	Within 40 km	Low
	Listed Building	LB3062	B	Erroll School House	Within 40 km	Medium
Hay Farm	Listed Building	LB3074	C	Hay Farm	Within 40 km	Low
Kinnaird Head Lighthouse, Fraserburgh	Listed Building	LB31888	A	Kinnaird Head Lighthouse, Fraserburgh	Within 45 km	High
Harbour Works Office, Fraserburgh	Listed Building	LB31879	B	Harbour Works Office, Fraserburgh	Within 45 km	Medium
60, 62, 64, 66, 68, 70 Saltoun Place, Fraserburgh	Listed Building	LB31901	B	60, 62, 64, 66, 68, 70 Saltoun Place, Fraserburgh	Within 45 km	Medium



Salamander

Figure 17-7
Shortlisted designated assets, part 1

- Legend**
- Study Area (settings)
 - Scheduled Monument
 - Listed Building
 - Conservation Area



Coordinate System: WGS 1984 UTM Zone 30N
Scale @ A3 : 1:26,844

0 0.8 1.6 Kilometers

0 0.2 0.4 0.8 Nautical Miles

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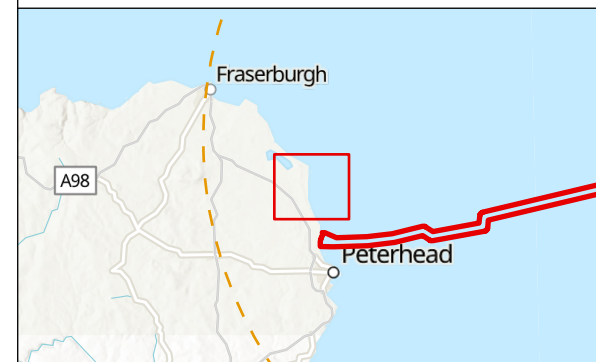
Salamander

Figure 17-8

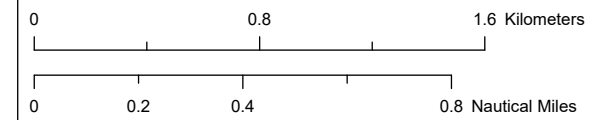
Shortlisted designated assets, part 2

Legend

-  Study Area (settings)
-  Scheduled Monument
-  Listed Building

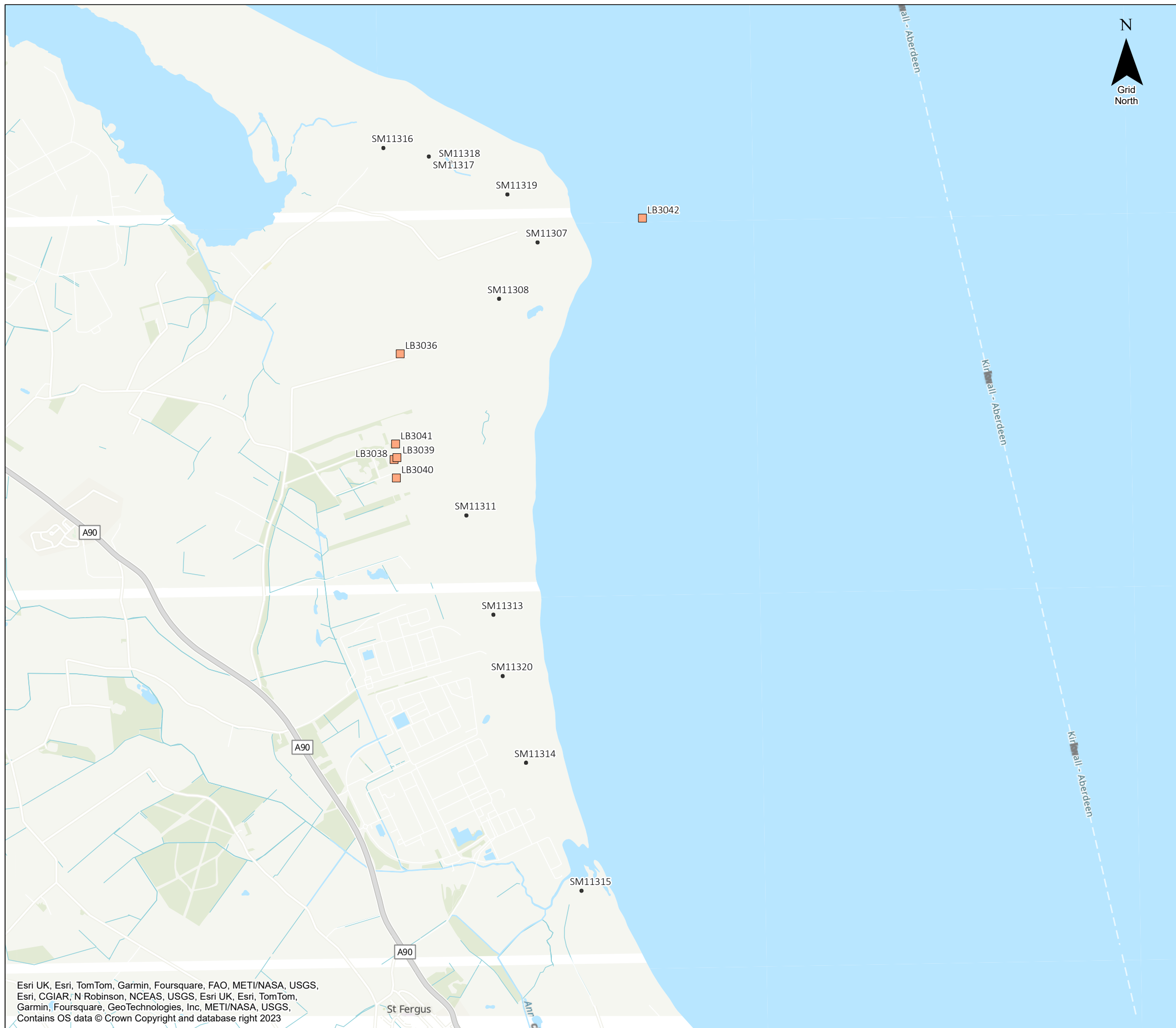


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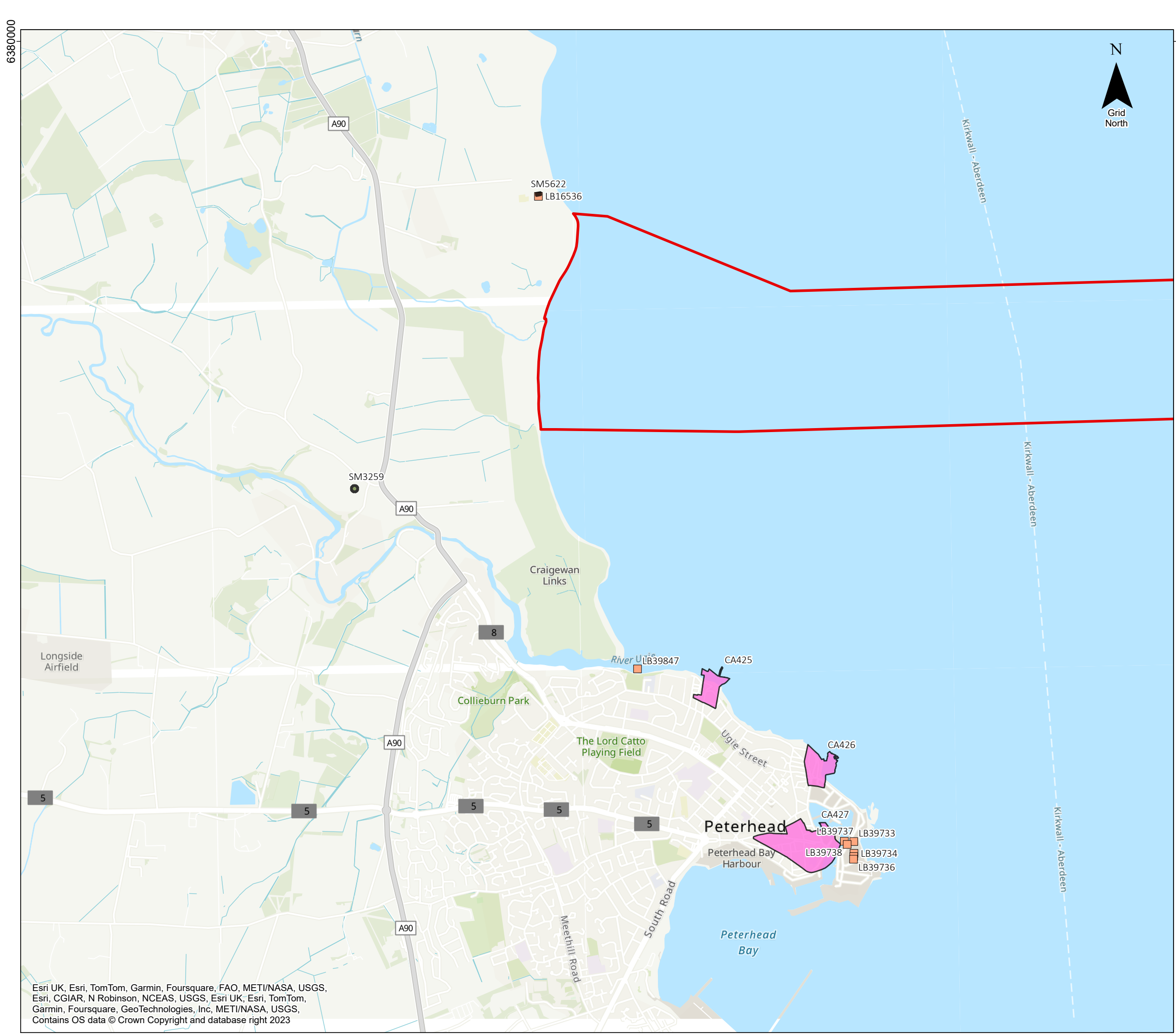


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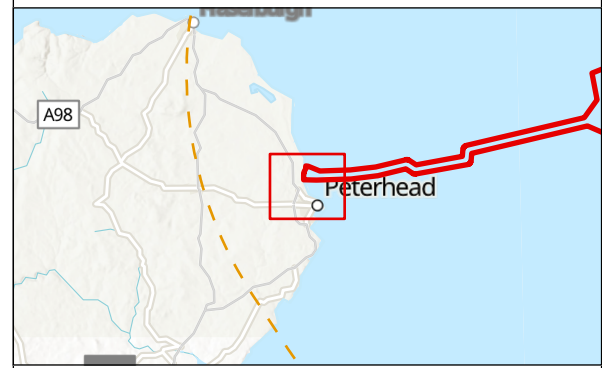


Salamander

Figure 17-9
Shortlisted designated assets, part 3

Legend

- Offshore Development Area
- Study Area (settings)
- Scheduled Monument
- Listed Building
- Conservation Area



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Salamander

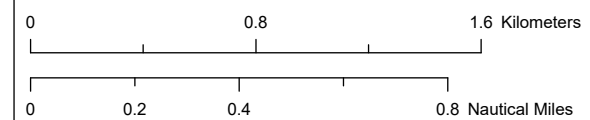
Figure 17-10
Shortlisted designated assets, part 4

Legend

-  Study Area (settings)
-  Scheduled Monument
-  Listed Building
-  Conservation Area



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Scale @ A3 : 1:26,844

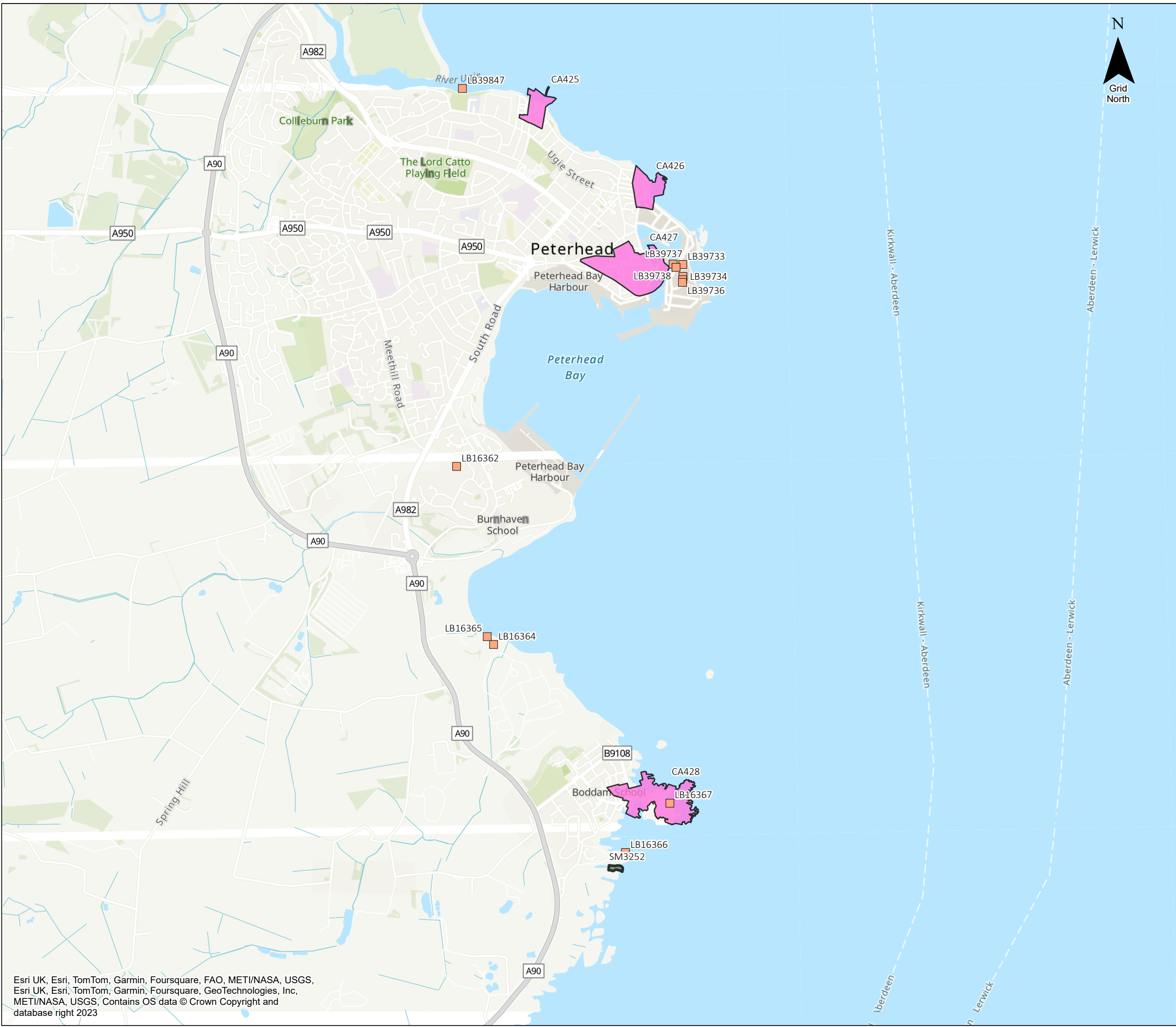


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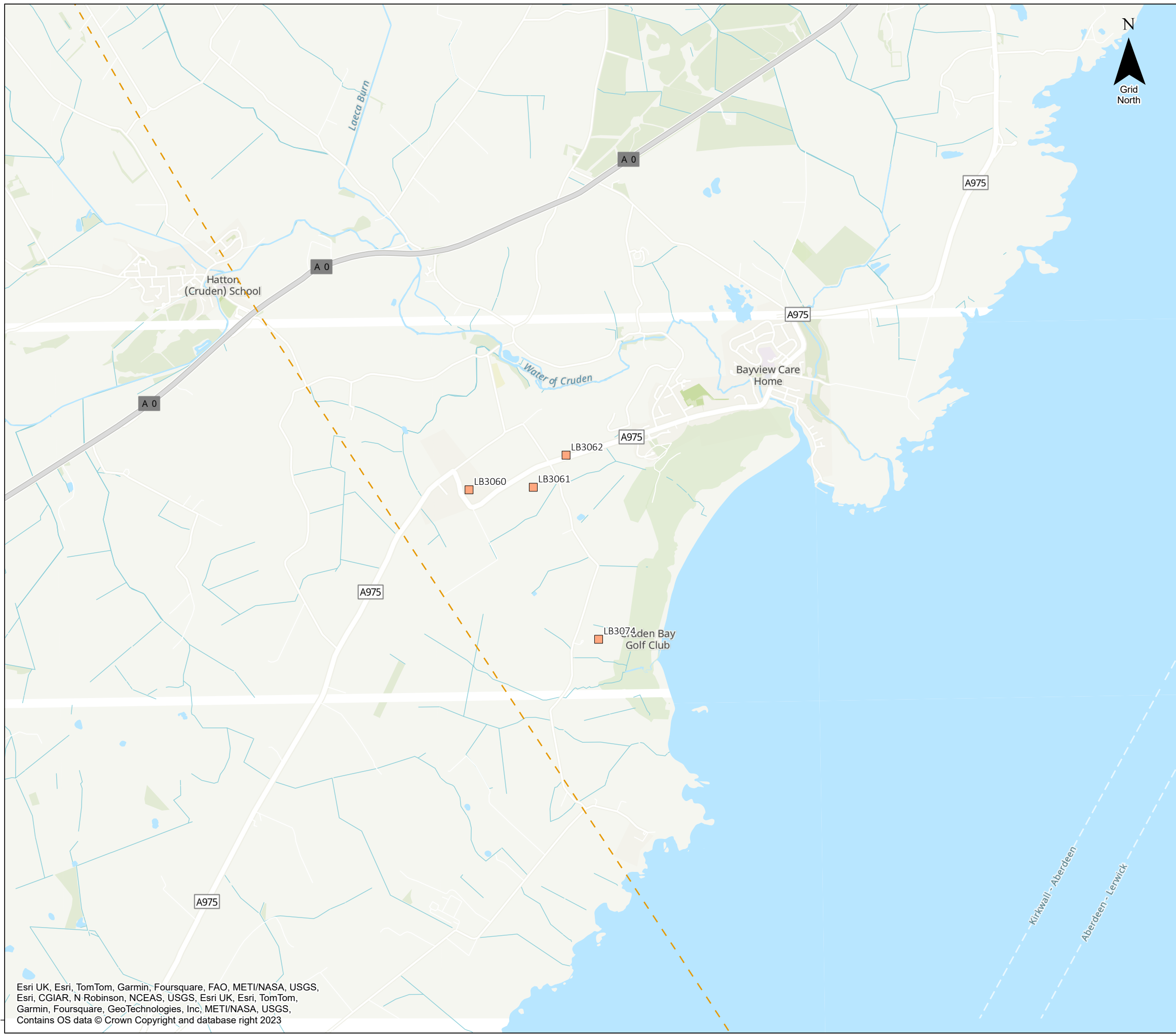


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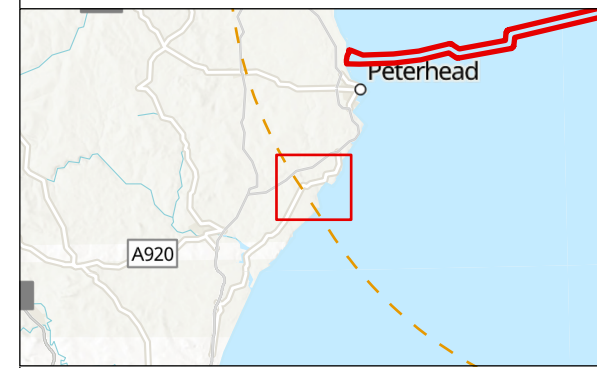
Figure 17-11

Shortlisted designated assets, part 5



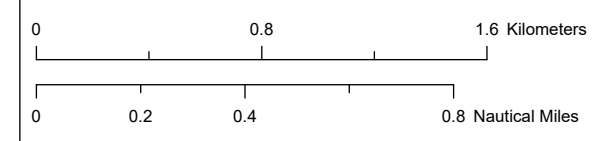
Legend

- Study Area (settings)
- Listed Building



Coordinate System: WGS 1984 UTM Zone 30N

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17.7.3 Future Baseline

Onshore Aspects

- 17.7.3.1 The Onshore EIAR will consider how the identified onshore archaeological baseline would likely change in the future in the event of non-development. The parameters and conclusions of the future baseline are liable to change through input of the climate change projection (**Volume ER.A.3, Chapter 20: Climate Change and Carbon**).
- 17.7.3.2 Based on the climate change projections, there is expected to be increased and accelerating erosion of the coastline around the Onshore ECC. The Second World War coastal features, identified through HER records and confirmed in part through the walkover survey, presently exhibit some degree of alteration. The formation of anti-tank blocks appears haphazard, with an irregular layout and varying degrees of burial within the sand. The two pillboxes examined during the walkover survey undertaken to produce the DBA also exhibited partial burial. Continued burial can be expected to occur, along with subsidence and movement of the features, because of scour and wind erosion. The erosion and movement of these assets is expected to continue into the future.
- 17.7.3.3 As detailed by HES within 'A Guide to Climate Change Impacts on Scotland's Historic Environment' coastal assets and upstanding unroofed structures are particularly vulnerable to anticipated changes to the climate. Listed Buildings and Scheduled Monuments located immediately adjacent to the coastline may also be subject to increased erosion to the associated cliffs as well as the fabric of the buildings themselves. Key designated assets within the 45 km Setting Study Area at greatest risk to climate change impacts include: SM90344 The Wine Tower, SM97 Inverallochy Castle, SM1116 St. Combs St. Columbas Church, SM5622 St. Fergus old parish church, SM5661 St. Peters old parish church, Peterhead, SM3252 Boddam Castle, LB31888 Kinnaird Head Lighthouse, LB3042 Rattray Head Lighthouse, LB16364 Sandford Lodge, LB16367 Buchan Ness Lighthouse and LB52471 Slains Castle.
- 17.7.3.4 In relation to the offshore zone, this chapter assumes that the proposed Green Volt, Muir Mhòr and MarramWind Offshore Wind Farms will proceed with their applications and will be constructed at some future point. The Green Volt Offshore Wind Farm will introduce new turbines to the distant seascape east of heritage assets located between Fraserburgh in the north and Cruden Bay in the south. Green Volt will be located c. 70 km north-east offshore from Peterhead, with Marram Wind and Muir Mhòr turbines located between 75 and 110 km offshore from the Aberdeenshire Coast. The anticipated cumulative impact to the setting of onshore assets located along the Aberdeenshire coast is discussed within the Onshore EIAR.

Offshore Aspects

- 17.7.3.5 This section has considered how the identified marine archaeological baseline would likely change in the future in the event of non-development. The parameters and conclusions of the future baseline are liable to change through input of the climate change projection (**Volume ER.A.3, Chapter 20: Climate Change and Carbon**).
- 17.7.3.6 Submerged early prehistoric and palaeoenvironmental remains and their parent contexts are most likely buried beneath surface sediments of the seabed. Most identified Quaternary geological units hold very limited potential for containing archaeological remains. Units 10 and 30 hold a slightly higher potential, if identified within the nearshore survey data gap. All units beneath Unit 10 have the potential to contain evidence of palaeoenvironmental interest. Natural marine erosion is likely to occur, however, such processes are not likely to result in a significant impact to these underlying deposits of archaeological

interest. Deposition of marine sediments is also likely to occur, improving the protection of buried archaeological and palaeoenvironmental remains.

- 17.7.3.7 Archaeological remains from later prehistory onwards, including wrecks, would be contained within the surface sediments and would be more susceptible to natural erosive processes. Furthermore, human activity, such as trawling and dredging, have the potential to disturb remains. Remains associated with UKHO records are more likely to be avoided by human activity, however, few geophysical and magnetic anomalies correlate with these records. Natural and human processes therefore have the potential to disturb, damage and scatter archaeological remains within the Offshore Development Area. It is also possible that further deposition of marine sediments will create or enhance this protective layer sealing remains.
- 17.7.3.8 A very low potential for aviation remains has been identified within the Offshore Development Area. In the unlikely event that such remains are present, natural processes and human activities have the potential to disturb these. Marine sediment deposition would also likely occur, improving the protection of any remains.
- 17.7.3.9 The Second World War coastal features, identified through HER records and confirmed in part through the walkover survey, presently exhibit some degree of alteration. The formation of anti-tank blocks appears haphazard, with an irregular layout and varying degrees of burial within the sand. The two examined pillboxes also exhibited partial burial. Continued burial can be expected to occur, along with subsidence and movement of the features, because of scour and wind erosion.
- 17.7.3.10 Previous unrecorded archaeological remains within the intertidal zone, if present, would also be subjected to similar natural processes. Where these are buried at present, an increase to the overburden may be seen as a positive change, through the increased protection offered, or negative, where the increased weight may result in compaction impacts.

17.8 Limitations and Assumptions

- 17.8.1.1 The following limitations and assumptions have been identified for Marine Archaeology and Cultural Heritage:
- The Salamander Project has been unable to acquire site-specific data in the nearshore approximately 8 km region of the Offshore ECC (west of the 1°40' line to shore; the "Nearshore Export Cable Corridor"). Due to safety restrictions related with deployed creels, it was not possible for surveys to take place in this nearshore region;
 - Limited hydrographic survey data within the Nearshore Export Cable Corridor (third part multibeam bathymetry data at 4 m resolution between c. 3.2 to 8 km offshore from MHWS), useful only for detecting larger features, such as wrecks;
 - Magnetometer survey spacings (85 m) too great for the detection of buried ferrous objects, particularly smaller objects and objects of archaeological interest may have not been identified;
 - Positional accuracy of UKHO, documented loss and wreck records can vary and may not correlate with seabed remains at that location;
 - Currently available geotechnical data limits the correlation of units with geological formations provided affecting the accuracy of the palaeolandscape assessment and potential; and
 - The settings assessment comprises a desk-based review of information taken from HES datasets and data from the HER, as well as a variety of secondary sources. Whilst this information is assumed to be accurate, it does not constitute a complete record of the historic environment

and does not preclude the potential for hitherto unidentified archaeological remains or deposits to be encountered within the Offshore Development Area. Furthermore, the undertaking of the walkover survey to support this chapter does not preclude the possibility that additional or subsurface archaeological remains survive within the Offshore Development Area.

17.8.1.2 These limitations are noted and embedded mitigation accommodates them. They will primarily be compensated by the Salamander Project’s commitment to the collection and archaeological assessment of additional geophysical data prior to construction and geotechnical data which will be geoarchaeologically reviewed, following the embedded mitigation strategy outlined in **Section 17.8.3: Embedded Mitigation**, below.

17.8.2 Impacts Scoped Out of the Environmental Impact Assessment Review

17.8.2.1 The Marine Archaeology and Cultural Heritage assessment covers all potential impacts presented at scoping, as well as any further potential impacts that have been highlighted as the EIAR has progressed as outlined in **Section 17.7.1: Existing Baseline**.

17.8.2.2 However, following consideration of the baseline environment, the Salamander Project description outlined in **Volume ER.A.2, Chapter 4: Project Description** and in line with the Scoping Opinion, a number of impacts are not considered in detail within this EIAR, as illustrated in **Table 17-10**.

Table 17-10 Impacts scoped out of the Marine Archaeology and Cultural Heritage assessment

Potential Impact	Project Aspect	Project Phase	Justification
Transboundary impacts	OAA and Offshore ECC	Construction, Operation and Decommissioning	Transboundary impacts upon the Marine Archaeology and Cultural Heritage were scoped out at scoping (response dated 15 May 2023; see Section 17.4: Engagement and Consultation). Any cumulative effect for nearby developments were assessed within Section 17.13 .
Setting impacts of Scheduled Monuments, Listed Buildings and other designated archaeological and cultural heritage assets from the Offshore Array	OAA	Construction and Decommissioning	Any impact to setting to heritage assets during the construction or decommissioning phase are expected to be short lived, fully reversable and not significant. Long term setting impacts during the Operation and Maintenance Phase of the Proposed Development are included in the EIA.

17.8.3 Embedded Mitigation

- 17.8.3.1 The embedded mitigation relevant to the Marine Archaeology and Cultural Heritage assessment is presented in **Table 17-11** and **Table 17-12**, and illustrated by **Figure 17-12** to **Figure 17-14**. Specific activities with the potential to cause impacts are detailed within **Table 17-13**.
- 17.8.3.2 No specific embedded mitigation has been identified in relation to the impacts of setting on onshore assets from the Offshore Development infrastructure.

Table 17-11 Embedded mitigation for the Marine Archaeology and Cultural Heritage assessment

Potential Impact and Effect	Mitigation ID	Mitigation	Project Aspect	Project Phase
<i>Primary</i>				
Direct physical impact to known heritage asset (including cable burial)	Co21	Marine Archaeological and Cultural Heritage receptors identified on the seabed within and adjacent to the Offshore Development Area will be subject to mitigation, via an Archaeological Exclusion Zone (AEZ), Temporary AEZ and/or Area of Archaeological Potential. These will be detailed and monitored through the Written Scheme of Investigation (WSI) as part of the tertiary mitigation.	OAA and Offshore ECC	Construction (incl. pre-construction works), Operation and Maintenance, and Decommissioning
Direct physical impact to unknown heritage asset (geoarchaeological)	Co22	<p>Within the WSI, geotechnical cores will be undertaken post-consent and will be preceded by a method statement for curatorial review. These cores will be located to avoid any known seabed and intertidal heritage assets. Core logs will be reviewed to assess presence/ absence of deposits or archaeological interest. Geophysical and hydrographic data will be used to inform the Marine Archaeology and Cultural Heritage EIA. This would be undertaken in line with best practice guidance.</p> <p>Review of new geophysical and geotechnical data will be undertaken as part of the WSI, with appropriate method statements produced.</p> <p>Review of geotechnical core location, acquisition and storage methodology prior to survey, core logs and photos will be completed as a minimum, with potential for a staged approach for any cores of archaeological interest.</p> <p>Core acquisition will also be subject to PAD and a watching brief or training for online review (where appropriate).</p>	OAA and Offshore ECC	Construction (incl. pre-construction works)
<i>Tertiary</i>				

Potential Impact and Effect	Mitigation ID	Mitigation	Project Aspect	Project Phase
Direct and indirect physical impact to unknown heritage asset	Co2	A pre-construction geophysical cable route survey will be undertaken, the results of which will also be used to identify presence of seabed features of interest that may require further consideration prior to construction works.	Offshore ECC	Construction (incl. pre-construction works)
	Co23	The preparation of a Marine Archaeological and Cultural Heritage WSI and PAD to avoid or mitigate accidental impacts and manage discoveries of archaeological interest.	OAA and Offshore ECC	Construction (incl. pre-construction works), Operation and Maintenance, and Decommissioning

Archaeological Exclusion Zones

17.8.3.3 Three high potential surface anomalies and seven medium potential anomalies have been identified within the Offshore Development Area. The anomalies have been identified as likely to be of anthropogenic origin and potentially of archaeological significance. **Table 17-12** summarises the recommended Archaeological Exclusion Zones (AEZs). The anomalies have been recommended AEZs based on the size of the anomaly, the extents of any debris, the potential significance of the anomaly, the potential impact of the Offshore Development and the seabed dynamics within the area. Particularly in the case of shipwrecks, which tend to be greater in length than width, the use of a circle provides unequal protection around the extents. This not only impacts the protection afforded but does not represent proportional mitigation.

Table 17-12 Recommended Archaeological Exclusion Zones and Area of Archaeological Potential (Primary Mitigation)

ID	Archaeological potential	Mitigation and type	Level of mitigation	Size (m – or stated otherwise)	Description	WGS84 Z30N	
						Easting	Easting
SAL23_169	High	AEZ (extent)	Primary	75	Potential wreck	580760.7	6377989.4
SAL23_170	High	AEZ (extent)	Primary	50	Wreck	575612.3	6377615.7
SAL23_171	High	AEZ (extent)	Primary	50	Wreck	576136.8	6377970.4
SAL23_157	Medium	AEZ (extent)	Primary	25	Potential debris	582640.9	6378506.1
SAL23_158	Medium	AEZ (radius)	Primary	35	Potential debris	583506.3	6379142.1
SAL23_159	Medium	AEZ (extent)	Primary	50	Potential debris	584098.5	6378282.4
SAL23_161	Medium	AEZ (radius)	Primary	25	Debris	605864.1	6387780
SAL23_162	Medium	AEZ (radius)	Primary	25	Debris	607168.2	6384905.2

ID	Archaeo-logical potential	Mitigation and type	Level of mitigation	Size (m – or stated otherwise)	Description	WGS84 Z30N	
						Easting	Easting
SAL23_163	Medium	AEZ (radius)	Primary	35	Debris	606889.8	6390024.4
SAL23_172	Medium	AEZ (extent)	Primary	50	Potential debris	574985.2	6377902
N/A	Low to high	AAP	Primary	c. 4.8 x 1 km	Dense area of geophysical and magnetic anomalies of up to high archaeological potential and identified wreck sites.	582341.9 (centroid)	637860.5 (centroid)

Temporary Archaeological Exclusion Zones

- 17.8.3.4 Temporary Archaeological Exclusion Zones (TAEZs) are recommended where an anomaly is not visible in the dataset but is known to exist, where the position cannot be determined with enough accuracy for refined exclusion zones, or where the extents are not fully known. They are often larger than AEZs but are identified as temporary as they are 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.
- 17.8.3.5 No TAEZs are recommended for records originating from the UKHO, the HER, or Canmore within the Offshore Development Area. All record locations have been viewed within the geophysical data, where a feature was visible on the seabed this was assessed for archaeological potential with mitigation recommended as appropriate. Where no feature was visible on the seabed the records were assessed, and in all instances, it was determined unlikely that remains were present, but not visible, on the seabed.
- 17.8.3.6 No TAEZs are recommended for magnetic anomalies that do not have a strong correlation with a seabed feature. However, it should be noted that this is not due to the likely absence of magnetic anomalies that may be of potential archaeological interest, but the vagaries in even approximate positioning and size of the anomalies due to the wide line spacing.

Areas of Archaeological Potential

- 17.8.3.7 No formal mitigation in the form of exclusion zones is recommended for Areas of Archaeological Potential (AAPs), however, they serve to highlight the potential for material of archaeological interest to be identified following the collection of higher resolution, or denser, geophysical survey data. These could originate, for example, from the identification of a high concentration of magnetic anomalies, where the positions cannot be determined and with no correlating seabed feature.
- 17.8.3.8 One AAP is recommended within the Offshore Development Area, covering the area between c. 8.5 km and 12.5 km from shore (**Figure 17-14**). The AAP is recommended to highlight the increased density of magnetic anomalies within this area (**Figure 17-6**) and associated increased potential to identify material of archaeological interest to here. Due to the wide spacing of the magnetometer data, there should be a general awareness across the Offshore Development Area that, following the collection of denser data, it is highly likely that additional anomalies of potential archaeological interest will be identified.

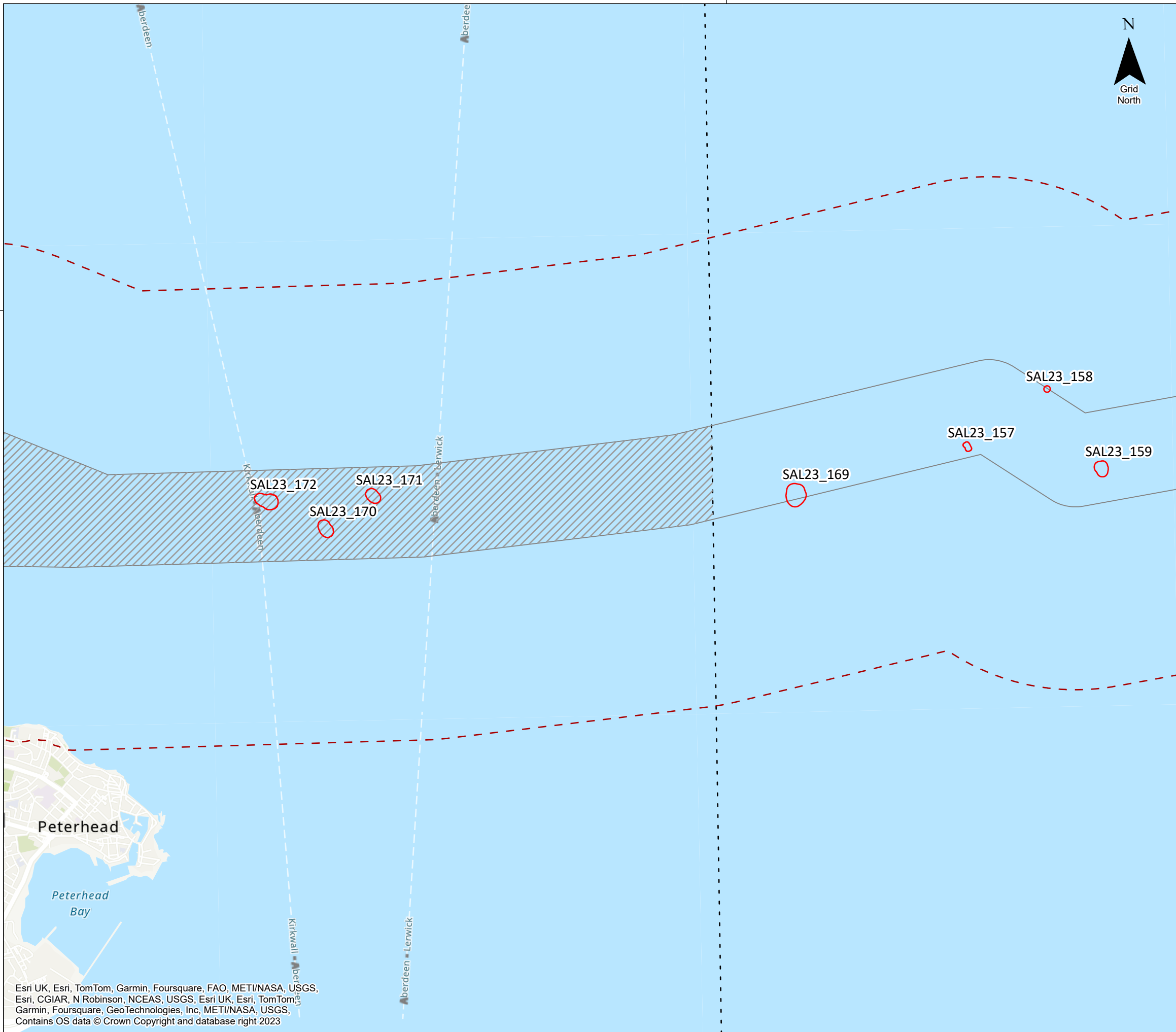
Notes on Exclusion Zones

- 17.8.3.9 Exclusion zones have been recommended based on the available evidence at the time of writing as interpreted by an experienced and qualified maritime archaeologist. They are to be agreed between the

Applicant and the Archaeological Curator(s) (HES). Exclusion zones are implemented to protect known, potentially archaeologically significant, *in situ* material.

- 17.8.3.10 Where an exclusion zone has been implemented, no development work impacting the seabed is to take place within the prescribed area. Should an exclusion zone impact the development program, it is recommended that a program of ground truthing be undertaken to establish the identity of an anomaly in order that the potential archaeological significance can be assessed by a qualified and experienced archaeologist. Following identification and assessment, the exclusion zone can be re-assessed to ensure mitigation is appropriate to the archaeological significance of the anomaly.
- 17.8.3.11 Suitable geophysical and hydrographic data for areas not currently covered by the EIA (see **Paragraph 17.6.1.21**) will be required prior to construction (see **Table 17-11**; Co2). A review and archaeological assessment of any additional data, by an experienced and qualified maritime archaeologist, may lead to alterations to the embedded mitigation, including recommendations to amend current AEZs/TAEZs or for further AEZs, TAEZs and watching brief activities. All are included as primary or tertiary mitigation (see **Table 17-11**), though note no watching briefs are currently deemed to be required. All amendments and updates will be undertaken with consultation from the Archaeological Curator(s) (HES) upon completion, in line with the WSI.

580000



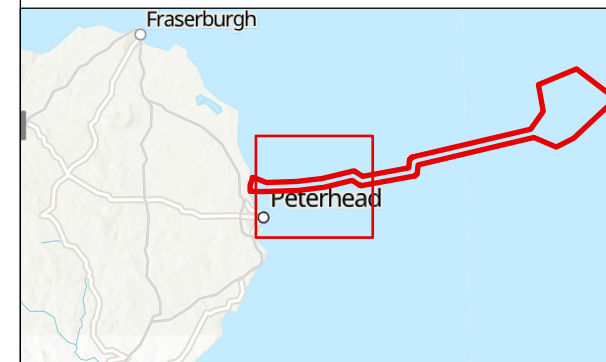
Salamander

Figure 17-12

Archaeological Exclusion Zones in the Nearshore and Offshore Export Cable Corridors

Legend

- Nearshore Export Cable Corridor
- Offshore Export Cable Corridor
- 1° 40' W line (WGS84)
- Study Area
- Archaeological Exclusion Zone



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:41,943

0 1 2 Kilometers

0 0.33 0.65 1.3 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : AEZs in the Nearshore & Offshore ECCs

Doc. No : 17-12

Created by : TB

Checked by : MJ

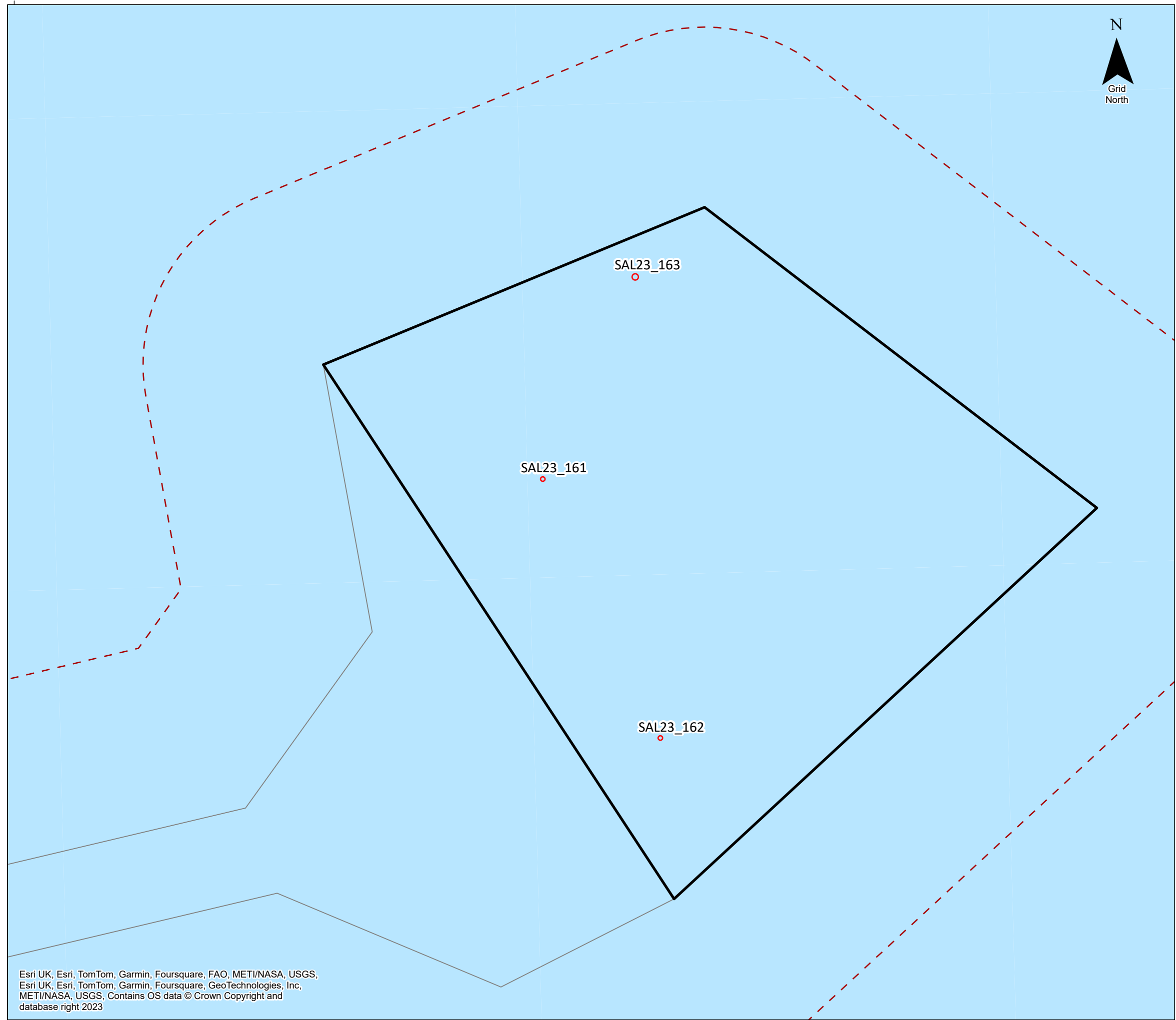
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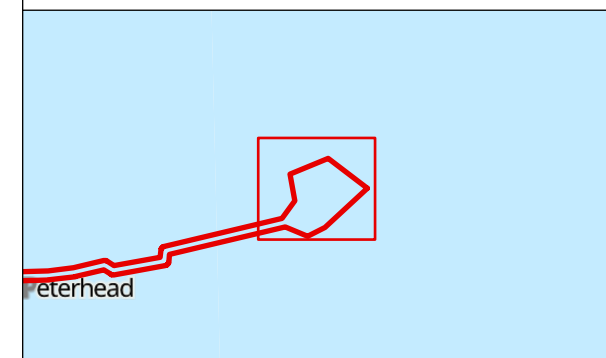
Salamander

Figure 17-13

Archaeological Exclusion Zones in the Offshore Array Area

Legend

-  Offshore Array Area
-  Offshore Export Cable Corridor
-  Study Area
-  Archaeological Exclusion Zone



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:41,943

0 1 2 Kilometers

0 0.33 0.65 1.3 Nautical Miles

Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : AEZs in the Offshore Array Area

Doc. No : 17-13

Created by : TB

Checked by : MJ

Approved by : SS



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


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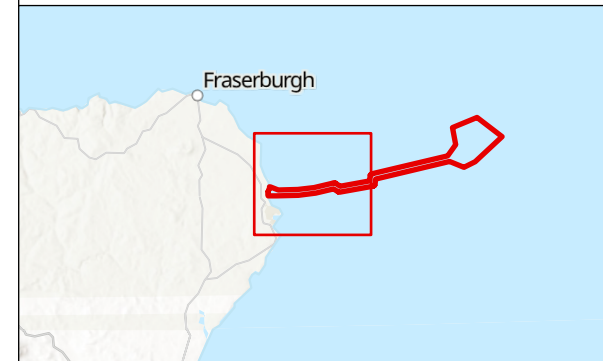
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Salamander

Figure 17-14
Area of Archaeological Potential

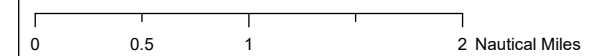
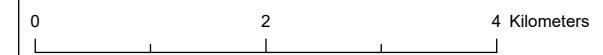
Legend

-  Nearshore Export Cable Corridor
-  Offshore Export Cable Corridor
-  1° 40' W line (WGS84)
-  Study Area
-  Area of Archaeological Potential



Coordinate System: WGS 1984 UTM Zone 30N

Scale @ A3 : 1:65,536



Rev	Description	Date
00	FINAL	16/04/2024
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Doc. Title : Area of Archaeological Potential

Doc. No : 17-14

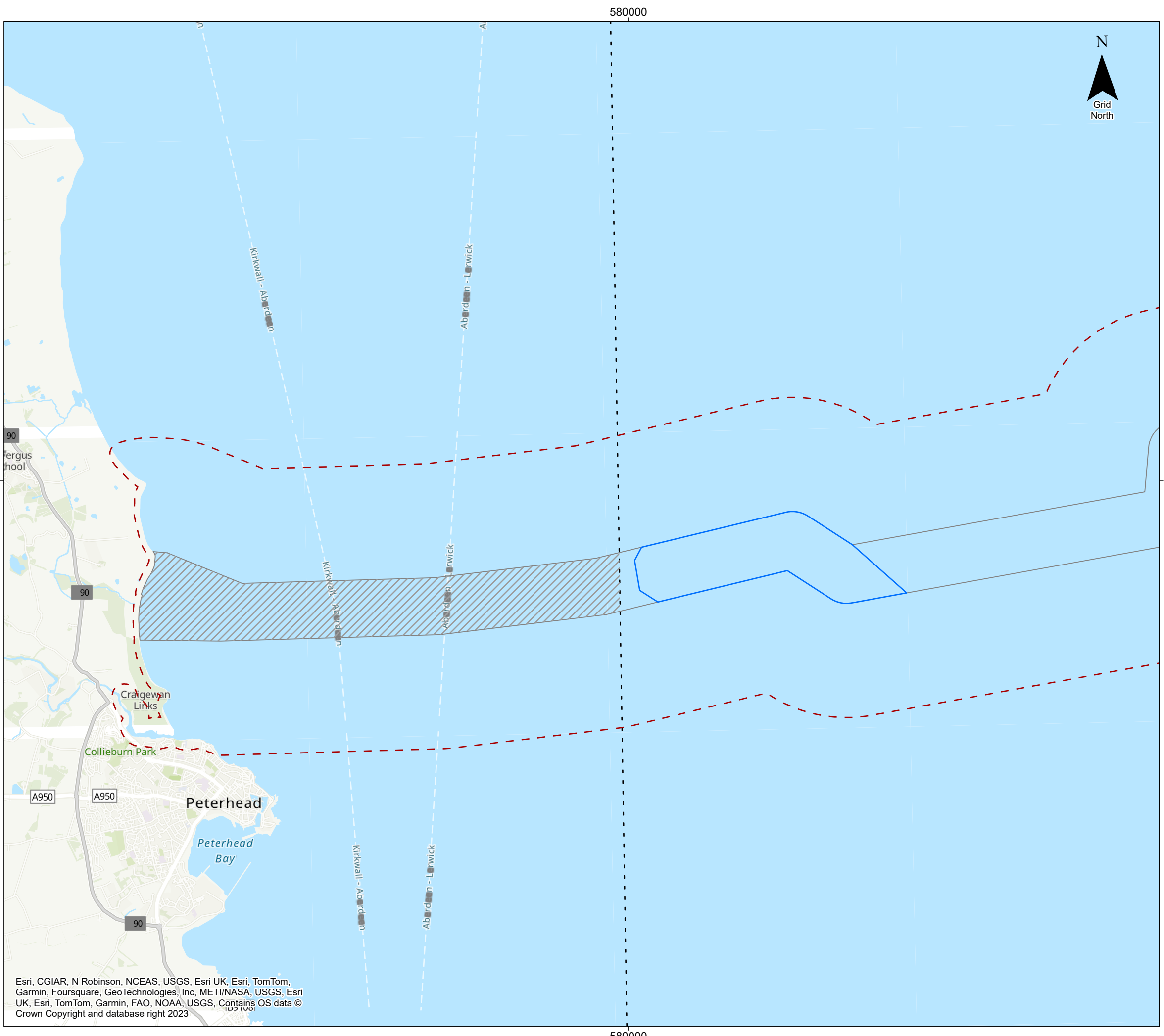
Created by : TB

Checked by : MJ

Approved by : SS



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17.9 Project Design Envelope Parameters

17.9.1.1 Given that the realistic worst-case scenario is based on the design option (or combination of options) that represents the greatest potential for change, as set out in **Volume ER.A.2, Chapter 4: Project Description**, confidence can be held that development of any alternative options within the Project Design Envelope parameters will give rise to no effects greater or worse than those assessed in this impact assessment. The Project Design Envelope parameters relevant to Marine archaeology and Cultural Heritage are outlined in **Table 17-13**.

17.9.1.2 Several activities during construction have the potential to impact historic assets. Operation and decommissioning activities also have the potential to result in impacts. The following section gives an overview of potential interactions between these activities and Marine Archaeology and Cultural Heritage receptors and potential resultant impacts.

Anchoring and Mooring

17.9.1.3 At the OAA, potential impacts are associated with anchoring and mooring for the floating Wind Turbine Generators (WTG) and cable installation. Anchoring will either be by Drag Embedment Anchor (DEA), vertical load anchor, gravity anchor, suction caisson piling, drilled piling or driven piling. All anchoring and mooring installation methods have the potential to impact archaeological remains, however the realistic worst-case scenarios are listed in **Table 17-13**. The mooring lines may include chains and clump weights on the seabed and lines passing through the water column connecting to the floating foundations of the WTG. These lines will move with the tide and will be associated with a 'swept' area, within which any archaeological remains may be impacted by the movement of the lines in a worst-case scenario.

Cable Installation

17.9.1.4 Cable installation for inter-array cables and export cables also has the potential to impact archaeological sites both within the OAA and Offshore ECC. Cable installation would include Pre-Lay Grapple Runs (PLGR), boulder clearance, cable burial techniques and sandwave levelling, in some areas. The cables will be buried where technically possible, though cable protection will be used in areas where sufficient depth of lowering cannot be achieved.

17.9.1.5 Subsea hubs may also be installed within the OAA, allowing the connection of inter-array cables to a single export cable. Subsea hubs would be mounted on a skid which would rest on the seabed, relying on friction to prevent movement. The base of the skid may feature pointed feet to slightly penetrate the seabed and improve stability. Other anchoring methods which may be employed include dead man anchors, suction bucket anchors, small subsea piles or addition of ballast. Scour protection may also be employed around subsea hubs and along cables as they approach the hub.

Spoil Material

17.9.1.6 All spoil material will be redeposited within the area it was extracted from, either at a single location or distributed locally. Spoil material has the potential to impact archaeological remains, though the nature of the impact will be dependent on the deposition scenario and nature of the sediment deposited (see **Volume ER.A.3, Chapter 7: Marine Physical Processes**).

Landfall

17.9.1.7 The precise landfall location will be identified post-application, involving cable installation by trenchless cable installation methods. This would require excavation of exit pits outside of the intertidal zone and

below MLWS (excavated using vessels which would require anchoring or a jack-up barge). Trenchless installation methods have the potential to impact archaeological remains.

Vessel Anchoring

- 17.9.1.8 During construction, O&M and decommissioning, any anchoring of vessels associated with the Salamander Project will have the potential to impact archaeological remains, as does the installation and mooring of ancillary equipment, such as navigational markers or beaching a barge and anchoring.

Post-Construction

- 17.9.1.9 Once constructed, seabed installations also have the potential to cause scouring of seabed sediments. The potential for scour has been assessed by **Volume ER.A.3, Chapter 7: Marine Physical Processes**. Scour protection is to be used where infrastructure cannot be buried, as part of the embedded mitigation associated with the Salamander Project. Embedment anchors will be buried and will not interact with waves or currents and therefore will not lead to scour, however other anchors (drilled or hammered piles, suction caisson or gravity anchors), clump weights, mooring chains or cable protection, and any associated scour protection, may.
- 17.9.1.10 Any scour will be localised (see **Volume ER.A.3, Chapter 7: Marine Physical Processes**). The Nearshore Export Cable Corridor data gap has prevented an assessment of sediment thickness in this area and has not been assessed for scour potential (at the time of writing). As such, the potential impacts of scour upon marine archaeology receptors in this area is not known. The Salamander Project has committed to the collection of data in this area and archaeological (and other relevant) assessment of the new data prior to construction impacts (see **Paragraph 17.8.1.2**).
- 17.9.1.11 In a realistic worst-case scenario, during the O&M phase, repair, replacement and remediation activities have the potential to impact marine archaeological receptors where these activities fall beyond the currently identified footprint of construction impacts. Anchoring of vessels may also impact remains. There is also potential for this as part of decommissioning activities.

Setting Impacts

- 17.9.1.12 Setting Impacts for the OAA assume the construction up to 7 WTGs. A range of WTG models will be considered, and the final model of WTG may be selected post-consent. The worst-case design scenario for the WTGs assumes a blade diameter of 250 m with a maximum blade tip height of 310 m. The closest turbine would be c. 35 km from landfall.
- 17.9.1.13 Please note that the design of the Salamander Project has developed while this Chapter (and the SLVIA Chapter, from which the setting review is associated) has been prepared. The parameters used in the assessment and used in the associated figure and SLVIA montages are larger than those stated within the Project Design Envelope parameters presented here and in **Volume ER.A.2, Chapter 4: Project Description** (and mentioned above). Therefore, effects presented are conservative and the final Salamander Project will not have effects worse than those presented here.

Summary

- 17.9.1.14 In summary, the following activities have the potential to impact archaeological remains:
- Anchoring, including drilling or piling for anchor installation or use of DE anchors;
 - Mooring lines, including chain, clump weights and associated swept area;
 - Cable installation, including inter-array cables (and associated swept area) and export cables;

- Seabed preparation, including sandwave levelling, boulder clearance and PLGR;
- Trenchless methods for landfall in the nearshore and intertidal area, and associated exit pits;
- Mooring/anchoring of vessels and ancillary equipment;
- Scour associated with seabed infrastructure; and
- Cable repair and remediation and decommissioning.

17.9.1.15 **Table 17-13** sets out the potential pathways for change to archaeological remains, in addition to the realistic worst-case scenario for each aspect of the Salamander Project design and receptor(s) of greatest impact in each case. In all cases, the realistic worst-case scenario considers embedded mitigation measures are in place, resulting in no direct physical impacts to identified areas of archaeological interest (e.g. AEZs).

Table 17-13 Project Design Envelope parameters relevant to Marine Archaeology and Cultural Heritage

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
<i>Construction</i>		
Potential direct physical impacts (loss/damage/removal)	<u>Anchor installation: drag embed (DE) (Offshore Array Area)</u> <ul style="list-style-type: none"> • Maximum number of DE anchors: 56. • Maximum dimensions: ≤7 m (L) x 4 m (W). • Depth of penetration: ≤ 20 m. • Anchor height above seabed (after installation): 0 m. • Maximum spoil volume: 0 m³. • Total area of scour protection on seabed: 0 m². • Total area of temporary seabed disturbance: 78,400 m². 	Low potential geophysical anomalies, magnetic anomalies and unidentified maritime/ aviation remains most likely to be impacted, due to large area of seabed disturbance. Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower penetration. Deeper penetration would result in greater impacts to this receptor.
	<u>Anchor installation: vertical load (Offshore Array Area)</u> <ul style="list-style-type: none"> • Maximum number of vertical load anchors: 56. • Maximum dimensions: ≤4 m (L) x 4 m (W). • Depth of penetration: ≤25 m. • Anchor height above seabed (after installation): 0 m. • Maximum spoil volume: 0 m³. • Total area of scour protection on seabed: 0 m². 	Low potential geophysical anomalies, magnetic anomalies and unidentified maritime/ aviation remains most likely to be impacted, due to large area of seabed disturbance. Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower penetration. Deeper penetration would result in greater impacts to this receptor.

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> Total area of temporary seabed disturbance: 22,400 m². 	
	<p><u>Anchor installation: pile (Offshore Array Area)</u></p> <ul style="list-style-type: none"> Maximum number of pile anchors: 56. Maximum dimensions: ≤3 m Ø. Depth of penetration: ≤70 m. Anchor height above seabed (after installation): ≤3 m. Maximum spoil volume: 27,800 m³. Total area of scour protection on seabed: ≤9,500 m². Total area of temporary seabed disturbance: 9,900 m². Total seabed footprint of installed anchors: ≤400 m². 	<p>Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) most likely to be impacted by deeper penetration for piling but extent of effects offset by small footprint (i.e. diameter of pile).</p>
	<p><u>Anchor installation: suction caisson (Offshore Array Area)</u></p> <ul style="list-style-type: none"> Maximum number of suction caisson anchors: 56. Maximum dimensions: ≤7 m Ø. Depth of penetration: ≤35 m. Anchor height above seabed (after installation): ≤3 m. Maximum spoil volume: 36,300 m³. 	<p>Low potential geophysical anomalies, magnetic anomalies and unidentified maritime/ aviation remains most likely to be impacted, due to large area of seabed disturbance.</p> <p>Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower penetration. Deeper penetration would result in greater impacts to this receptor. Extent of impacts would be offset by small footprint of impact (i.e. width of caisson wall).</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> Total area of scour protection on seabed: ≤29,900 m². Total area of temporary seabed disturbance: 32,100 m². Total seabed footprint of installed anchors: ≤2,200 m². 	
	<p><u>Anchor installation: gravity (Offshore Array Area)</u></p> <ul style="list-style-type: none"> Maximum number of gravity anchors: 56. Maximum dimensions: ≤13.5 m. Ø. Depth of penetration: ≤3 m. Anchor height above seabed (after installation): ≤5 m. Maximum spoil volume: 48,600 m³. Total area of scour protection on seabed: ≤117,800 m². Total area of temporary seabed disturbance: ≤125,900 m². Total seabed footprint of installed anchors: ≤8,100 m². 	<p>Low potential geophysical anomalies, magnetic anomalies and unidentified maritime/ aviation remains most likely to be impacted, due to large area of seabed disturbance.</p>
	<p><u>Mooring lines, including chain, clump weights and swept area of catenary</u></p> <p><u>Within Offshore Array Area</u></p> <ul style="list-style-type: none"> Maximum number of lines: 56 (≤8 per WTG). Maximum mooring line length: 1,650 m (per line). 	<p>Catenary sweep has greatest potential to impact seabed remains, i.e. maritime and aviation remains; geophysical/magnetic anomalies.</p> <p>Drag of catenary cables and clump weights where Unit 1 sediments are relatively thin may impact upon deposits</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> • Maximum number of clump weights (per mooring line – catenary or semi-taut): 10. • Mooring clump dimensions: ≤2.5 m (L) x 2.5 m (W) x 2.5 m (H). • Total seabed footprint of mooring clumps: 0 m² (assumed to be within footprint of mooring line swept area). • Mooring line contact length on seabed (per mooring line): ≤1,000 m for catenary lines; ≤800 m for semi-taut lines. • Total swept area on seabed (catenary lines, based on lateral movement): ≤3,920,000 m². • Total swept area on seabed (semi-taut lines, based on lateral movement): ≤3,136,000 m². 	<p>containing redeposited prehistoric remains and/or palaeoenvironmental evidence.</p>
	<p><u>Cable installation including inter-array cables and export cables</u></p> <p><u>Within Offshore Array Area</u></p> <ul style="list-style-type: none"> • Maximum number of static and dynamic array cables: 8. • Cable diameter: ≤220 mm. • Total length of cable trenches: ≤35 km. • Cable burial methods: <ul style="list-style-type: none"> ○ Jetting, vertical injection, trenching/pre-trenching (≤5 m width at seabed) 	<p>Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by cable laying and stabilisation.</p> <p>Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower trench depths. Deeper trench depths may result in impacts to this receptor, particularly where Unit 1 sediments are thin and in the nearshore section if Unit 3 deposits are identified (to be confirmed by future pre-construction geophysical survey and archaeological assessment within current data gap).</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> ○ mass flow excavation, ploughing/pre-ploughing (≤ 7.5 m width at seabed). • Dimensions of cable stabilisation protection: ≤ 7 km (L) x ≤ 10 m (W) x ≤ 1.5 m (H). • Cable stabilisation protection methods: <ul style="list-style-type: none"> ○ rock placement ○ concrete mattress ○ grout/rock bag ○ frond mattress. • Total area of temporary seabed disturbance during installation of inter-array cables and cable stabilisation protection: $\leq 1,400,000$ m². • Maximum number of subsea joints: 16. • Dimensions of subsea joints: ≤ 6 m (L) x 2 m (W) x 2 m (H). • Total area of scour protection on seabed (cable jointing): $\leq 64,000$ m². • Maximum number of dynamic array cable tethers (per dynamic cable end): 4. • Total seabed footprint of tethers: $\leq 22,400$ m². • Dynamic cable contact length on seabed: ≤ 500 m. • Lateral movement of cable: ≤ 100 m (untethered). 	

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> • Total swept area on seabed: up to 3,920,000 m² (based on catenary mooring system). • Maximum number of subsea hubs: 2. • Dimensions per subsea hub: ≤15 m (L) x 15 m (W) x ≤10 m (H). • Maximum number of subsea hub anchor piles: 12. • Dimensions per subsea hub pile anchor: ≤1.5 m (∅) x 30 m (L). • Total seabed disturbance from subsea hubs: ≤7,000 m². • Total volume of scour protection for subsea hubs on seabed: ≤4,200 m³. • Total volume of cable protection material for subsea hubs: ≤4,125 m³. <p><u>Within Offshore Export Cable Corridor</u></p> <ul style="list-style-type: none"> • Maximum number of export cables: 2. • Cable diameter: ≤320 mm. • Total length of cables: ≤85 km. • Cable burial methods: <ul style="list-style-type: none"> ○ Jetting, vertical injection, trenching/pre-trenching (≤5 m width at seabed) ○ mass flow excavation, ploughing/pre-ploughing (≤7.5 m width at seabed). 	

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> • Trench depth: ≤2 m. • Dimensions of cable stabilisation: ≤17 km (L) x ≤10 m (W) x ≤1.5 m (H). • Stabilisation methods: <ul style="list-style-type: none"> ○ rock placement ○ concrete mattress ○ grout/rock bag ○ frond mattress ○ articulated pipe • Total area of temporary seabed disturbance during installation of export cables and cable stabilisation protection: ≤3,400,000 m². • Maximum number of subsea joints: 4. • Dimensions of subsea joint: ≤6 m (L) x 2 m (W) x 2 m (H). • Total area of scour protection on seabed (cable jointing): ≤16,500 m². 	
	<p><u>Seabed preparation requirements</u></p> <p><u>Within full Offshore Development Area</u></p> <ul style="list-style-type: none"> • Boulder clearance (total area of temporary seabed disturbance during installation): 	<p>Low potential geophysical anomalies & magnetic anomalies most likely to be impacted by seabed preparation, due to large areas of impact.</p> <p>Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower preparation activities. Deeper activities (e.g.</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> ○ DE anchors: ≤78,400 m². ○ Plate anchors: ≤22,400 m². ○ Pile anchors: ≤9,900 m². • Boulder clearance, dredging, levelling (total area of temporary seabed disturbance during installation): <ul style="list-style-type: none"> ○ Suction caisson anchors: ≤32,100 m². • Boulder clearance, dredging, levelling, rock placement (total area of temporary seabed disturbance during anchor installation): <ul style="list-style-type: none"> ○ Gravity anchors: ≤125,900 m². • Total spoil volume (sandwave clearance for cable installation): <ul style="list-style-type: none"> ○ Offshore Array Area: 1,624,000 m³. ○ Offshore Export Cable Corridor: 5,576,000 m³. 	<p>PLGR) may result in impacts to this receptor, particularly where Unit 1 sediments are thin and in the nearshore section if Unit 3 deposits are identified (TBC by future pre-construction geophysical survey and archaeological assessment within current data gap).</p>
	<p><u>Landfall</u></p> <p><u>Within Offshore Export Cable Corridor</u></p> <ul style="list-style-type: none"> • Number of cables making landfall: ≤2. • Number of transition joint bays: ≤2. • Transition joint bay dimensions: ≤25 m (L) x 10 m (W) x ≤6 m (D). 	<p>Potential receptors within the Landfall Area of Search include:</p> <ul style="list-style-type: none"> • Intertidal archaeological remains • Maritime/aviation remains • Submerged prehistoric remains.

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> • Installation method: <ul style="list-style-type: none"> ○ Number of trenchless ducts: ≤2. ○ Trenchless installation dimensions (intertidal works) – ducts: ≤2,500 m (L) x ≤1 m Ø x 5 to 40 m (depth of lowering). ○ Number of nearshore exit pits: ≤2. ○ Exit pit dimensions: ≤50 m (L) x 10 m (W) x ≤5 m (D). ○ Total volume of material excavated from exit pits: ≤5,000 m³. 	
	<p><u>Installation vessels seabed disturbance</u></p> <p><u>Within full Offshore Development Area</u></p> <ul style="list-style-type: none"> • Total area of seabed disturbance from vessel anchors (242,400 m²) and from Jack-up events (2,040 m²): <u>244,440 m²</u> 	<p>Low potential geophysical anomalies, magnetic anomalies and unidentified maritime/ aviation remains most likely to be impacted.</p> <p>Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower penetration.</p>
	<p><u>Ancillary equipment</u></p> <p><u>Within full Offshore Development Area</u></p> <ul style="list-style-type: none"> • Total seabed footprint of moorings for navigational aids and/or Metocean equipment: ≤2,000 m². 	<p>Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by ancillary equipment.</p>
<p>Potential indirect physical impacts</p>	<p><u>Scour associated with installations</u></p> <p><u>Within full Offshore Development Area</u></p>	<p>Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by scour around installations, through erosion of seabed sediments and</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
(burial/destabilisation resulting from changes to hydrodynamics/transported sediment/suspended sediment)	Scour protection to be used where infrastructure cannot be buried. All installations and infrastructure in contact with the seabed may lead to scour.	association destabilisation and/or focussing of erosive hydraulic forces.
	Likely maximum dimensions of scour from piles are likely to be in the order of a few metres depth, and up to ten metres in extent.	Deeper scour may impact on submerged prehistoric remains.
	Clump weights and chain may result in localised scour predicted to occur within an area in proportion to the size of the object and likely to be a few tens of centimetres deep and up a few metres from the obstacle (Volume ER.A.3, Chapter 7: Marine Physical Processes).	
	<p><u>Sediment transportation</u></p> <p><u>Within full Offshore Development Area</u></p> <p>Deposition of spoil arising from excavated works and seabed preparation to be undertaken in locality of extraction, i.e. minimal transportation.</p>	Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by sediment transport. Increased overburden may result in negative (compression/disturbance) and/or positive (enhanced protection from other factors) impacts.
	<p><u>Suspended sediment concentration</u></p> <p><u>Within full Offshore Development Area</u></p> <p>Release of quantities of sediment into the water column during excavation/seabed preparation activities. Impact zones identified and described in Paragraph 17.5.1.4.</p>	<p>Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by SSC (specifically by subsequent sediment deposition). Increased overburden may result in negative (compression/disturbance) and/or positive (enhanced protection from other factors) impacts.</p> <p>Wreck remains and high/medium potential anomalies may experience a lesser degree of impact.</p>
<u>Operation and Maintenance</u>		
Setting Impacts resulting from the Offshore Array	<p>Number of Wind Turbine Generators: ≤ 7</p> <p>Rotor Blade Diameter: ≤ 250 m</p>	Onshore archaeology and cultural heritage receptors may be affected by the presence of offshore infrastructure over

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	Total Rotor Swept Area: $\leq 343,612 \text{ m}^2$ Height of Lowest Blade Tip: $\geq 22 \text{ m}$ Height of Highest Blade Tip: $\leq 310\text{m}$ Hub Height: $\leq 172.5 \text{ m}$ Spacing between Turbines: $\geq 1000 \text{ m}$ Distance from MHWS 35 km +	the Salamander Project lifecycle depending on distance and visualisations
Potential direct physical impacts (loss/damage/removal)	<p><u>Subsea cable operation and maintenance impacts</u></p> <p><u>Within full Offshore Development Area</u></p> <ul style="list-style-type: none"> • Subsea cable repair and replacement events: ≤ 14 (≤ 8 within the Offshore Array Area; ≤ 6 within the Offshore Export Cable Corridor). • Subsea cable reburials: $\leq 7.4 \text{ km}$ ($\leq 3.9 \text{ km}$ within the Offshore Array Area; $\leq 3.5 \text{ km}$ within the Offshore Export Cable Corridor). • Total area of seabed impacts from repairs and reburials: $\leq 1,468,000 \text{ m}^2$ ($\leq 774,000 \text{ m}^2$ within the Offshore Array Area; $\leq 694,000 \text{ m}^2$ within the Offshore Export Cable Corridor). • Total area of new cable stabilisation protection: $\leq 36,000\text{m}^2$ ($\leq 12,000 \text{ m}^2$ within the Offshore Array Area; $\leq 24,000 \text{ m}^2$ within the Offshore Export Cable Corridor). 	Impacts at O&M stage only anticipated where these occur beyond impacted areas associated with the construction phase. Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by cable repair/replacement and stabilisation. Submerged prehistoric remains (redeposited remains and palaeoenvironmental evidence) less likely to be impacted by shallower trench depths. Deeper trench depths may result in impacts to this receptor, particularly where Unit 1 sediments are thin and in the nearshore section if Unit 3 deposits are identified

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<ul style="list-style-type: none"> Total seabed impact from vessel anchors during repairs and replacement operations: $\leq 16,800\text{m}^2$ ($\leq 8,000\text{m}^2$ within the Offshore Array Area; $\leq 8,800\text{m}^2$ within the Offshore Export Cable Corridor). 	
Potential indirect physical impacts (burial/destabilisation resulting from changes to hydrodynamics/transported sediment/suspended sediment)	<p><u>Mooring and anchoring O&M impacts (in Offshore Array Area only)</u></p> <ul style="list-style-type: none"> Mooring and anchor replacement events: ≤ 40. Total area of seabed impacts from anchor and mooring replacement: $\leq 90,000\text{m}^2$. Total area of new scour protection: $\leq 84,200\text{m}^2$. 	Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by mooring and anchoring.
<p><u>Decommissioning</u></p>	<p><u>Within full Offshore Development Area</u></p> <p>Removal of all mooring lines and anchors. Where installed, piled anchors will be cut approximately 1 m below the seabed, the section below this left <i>in situ</i> and buried.</p> <p>Dynamic cables will be removed. Buried cables will be re-excavated and removed or left <i>in situ</i>, with ends cut, sealed and re-buried.</p> <p>Scour and cable protection will be left <i>in situ</i>.</p>	<p>Impacts at decommissioning stage are only anticipated where these occur beyond impacted areas associated with the construction and O&M phases.</p> <p>Low potential geophysical anomalies and magnetic anomalies most likely to be impacted by decommissioning activities, assuming impacts are contained within footprints of previous impacts.</p> <p>Activities involving wider impacts (e.g. excavation to remove anchors or buried cables) are likely to impact on</p>

Potential Impact and Effect	Project Design Envelope parameters	Receptor of impact
	<p>Parameters for impacts from vessel anchoring, are unknown at this point in time, but are anticipated to be within that assessed for construction.</p>	<p>submerged prehistoric remains, where this activity fully penetrates Unit 1 deposits.</p> <p>Although not subject to licensing, vessel anchoring has the potential to impact on marine archaeology receptors, namely unidentified wreck and/or aviation remains, magnetic anomalies and low potential geophysical anomalies.</p> <p>At this stage, the worst-case scenario envelope during decommissioning is considered equal to the worst-case scenario during construction, with the exception of vessel movements, where more detailed information is available. Noting this, it is assumed that the worst-case scenario will involve full removal of all infrastructure placed during the construction phase. This assumption is subject to best practice methods and technology appropriate at the time of decommissioning.</p>
<p>Potential indirect physical impacts</p>	<p>Same as for construction activities (see above).</p>	

17.10 Assessment Methodology

17.10.1.1 **Volume ER.A.2, Chapter 6: EIA Methodology** sets out the general approach to the assessment of potential significant effects that may arise from the Salamander Project.

17.10.1.2 Whilst **Volume ER.A.2, Chapter 6: EIA Methodology** provides a general framework for identifying impacts and assessing the significance of their effects, in practice the approaches and criteria applied across different topics vary.

17.10.1.3 The proposed approach to the Marine Archaeology and Cultural Heritage assessment that has been addressed in the EIA is outlined below.

17.10.2 Assessment Methodology and Significance Criteria

17.10.2.1 Following identification of the historic assets within the Offshore Development Area, and those with settings affected by the offshore infrastructure within the Setting Study Area, this chapter identifies the proposed changes and assesses the magnitude of impact of these changes upon the historic environment. The impact assessment makes specific reference to any alterations to the intrinsic, contextual or associative values of the heritage assets. Impacts are considered to include direct physical impacts, indirect physical impacts, settings impacts, inter-relationships between impacts, and cumulative impacts.

17.10.2.2 The approach to impact assessment is summarised here and described further in **Volume ER.A.2, Chapter 6: EIA Methodology**. The approach to assessing Setting Impacts is described further in **Volume ER.A.4, Annex 17.1: Setting Sieving Exercise (Offshore)**.

17.10.2.3 For each effect, the assessment identifies receptors within the Offshore and Onshore Development Area that are sensitive to that effect and implements a systematic approach to understand the impact pathways and the level of impacts on given receptors. The process considers the following:

- Sensitivity;
- Magnitude; and
- Significance of effect.

17.10.2.4 The duration of an effect is also referred to, however, for historic assets direct physical impacts will be permanent and irreversible. Indirect physical impacts such as changes to sedimentation may be reversible or subject to alteration following removal or decommissioning of the development. Any loss of sediment and erosion of heritage assets will not be reversible, but where heritage assets are protected by the accumulation of deeper sediment, this may be considered a reversible change.

Sensitivity

17.10.2.5 The overall receptor sensitivity is determined by considering a combination of value, adaptability, tolerance and recoverability. This is achieved through applying known research and information on the status and sensitivity of the feature under consideration, coupled with professional judgement and experience.

17.10.2.6 The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. Sensitivity is defined by the following factors:

- Tolerance: the susceptibility (ability to be affected or unaffected) of a receptor to an external factor;
- Adaptability: the ability of the receptor to adapt to, or avoid, an external factor;
- Recoverability: the ability of a receptor to return to a state close to that which existed before the

activity or event caused change within a specified period of time; and

- Value: a measure of the receptor’s heritage value.

17.10.2.7 To define the sensitivity of a receptor, the guidelines presented in **Table 17-14** have been adopted in this chapter.

Table 17-14 Sensitivity levels for receptors

Sensitivity	Description
High	Individual receptor has very limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.
Medium	Individual receptor has limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.
Low	Individual receptor has some tolerance to avoid, adapt to, accommodate or recover from the anticipated impact.
Negligible	Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact.

17.10.2.8 Sensitivity criterion is a composite one, combining value with sensitivity. In some instances, the inherent value of a receptor is recognised by means of designation and the ‘value’ element of the composite criterion recognises and gives weight in the assessment to that designation. However, irrespective of the recognised value, all receptors will exhibit a greater or lesser degree of sensitivity to the potential changes brought about by the Offshore Development Area. The assessment of sensitivity is a matter of judgement applied by professional experts, based on the receptors within the relevant Study Area.

Receptor Value

17.10.2.9 The UK Marine Policy Statement (HM Government, 2011) indicates that authorities should take account of the particular nature of the interest in the (heritage) assets and the value they hold for this and future generations.

17.10.2.10 Both designated and non-designated heritage assets can hold heritage value. Value considers whether the receptor is rare, has protected status or has importance at a local, regional, national or international scale. Designated heritage assets, such as Historic Marine Protected Areas (HMPA), have high value. For non-designated assets, significance (value) is best defined as a combination of intrinsic, contextual and associative values (HES, 2019):

- Intrinsic characteristics: relate to the physical form, structure and material of an asset and how these can contribute to our understanding of the past;
- Contextual characteristics: illustrate how an asset relates to its surroundings and our existing knowledge of the past: and
- Associative characteristics: illustrate how an asset relates to past people, events or activities.

17.10.2.11 High value and sensitivity are not necessarily linked within a particular impact. A receptor could be of high value but have a low or negligible sensitivity to an effect. **Table 17-15** provides definitions for the value afforded to a receptor based on importance regarding legislation and guidance.

Table 17-15 Definitions of the value levels for historic assets

Value	Definition
High	<p>Internationally or nationally important. Within a marine or intertidal context, high value heritage receptors include:</p> <ul style="list-style-type: none"> World Heritage Sites and heritage assets of acknowledged international importance, or that can contribute significantly to acknowledged international research objectives; Sites designated under the Marine (Scotland) Act 2010, Ancient Monuments and Archaeological Areas Act or Protection of Military Remains Act; Grade I and Grade II* structures designated under the Listed buildings and Conservation Areas Act; Additionally, in line with the UK Marine Policy Statement, any remains which are not currently designated but have equivalent significance to a designated asset are also considered to be of high value; Onshore, this would include Heritage Assets valued at national level. These may include Scheduled Monuments, Category A Listed Buildings, Registered Battlefields, Gardens and Designed Landscapes, and nationally important archaeological features and conservation areas (as defined in the Council’s HER).
Medium	<p>Within a marine or intertidal context, medium value receptors include:</p> <ul style="list-style-type: none"> Heritage assets that are not designated and that do not meet the criteria for designation (e.g. as a Historic Marine Protected Area or Scheduled Monument) but display intrinsic, contextual or associative value, as identified by HES (2019); Heritage assets, groups of assets or landscapes, that contribute to regional research objectives, particularly those identified in the Scottish Archaeological Research Framework (ScARF); Onshore this also includes Heritage Assets valued at a regional level. These may include Category B and some Category C Listed Buildings as well as regionally important archaeological features and conservation areas.
Low	<p>Within a marine or intertidal context, low value receptors include:</p> <ul style="list-style-type: none"> Heritage assets displaying limited intrinsic, contextual or associative value, as identified by HES (2019); Heritage assets, or groups of assets, that contribute to a limited degree to regional research objectives, particularly those identified in the Scottish Archaeological Research Framework (ScARF); Onshore this would include Heritage Assets valued at a local level. These may include Category C Listed Buildings, some conservation areas and non-designated assets of local value.
Negligible	<p>Heritage assets with very little or no surviving archaeological interest and little or no intrinsic, contextual or associative value, as identified by HES (2019) and heritage assets or groups of assets that cannot appreciably contribute to acknowledged regional research objectives.</p>

Value	Definition
	Onshore this would include badly preserved and/or damaged or very common archaeological features and buildings of little or no value at local or any other scale.
Uncertain	Historic assets for which the importance of the resource has not been ascertained and archaeological resources the importance of which cannot be ascertained.

17.10.2.12 As part of determining the value of the cultural asset and sensitivity of it to change, in accordance with the EIA Handbook, the cultural significance of the heritage asset will be described as will the contribution made by setting.

17.10.2.13 Due to the unique qualities of each heritage asset, the sensitivity of a heritage asset’s setting to change is variable and must be determined on a case-by-case basis for each receptor in lines with setting guidance and the EIA Handbook as per the following methodology:

- Identification of heritage assets that might be affected by the Proposed Development to include a summary of their cultural significance;
- Definition of the setting of the heritage assets and how this contributes to its cultural significance to determine its sensitivity to change; and
- Assessment of the way in which the Proposed Development may change the setting and affect the cultural significance of the heritage asset (magnitude of impact).

Magnitude

17.10.2.14 Magnitude is defined in terms of the level of the impact above background conditions and natural variability, by whatever parameters are measurable relative to the baseline. Magnitude considers may be beneficial or adverse, and short term, long term or permanent. In relation to cultural heritage, impacts are generally adverse and are classified, for both Direct/Indirect (Physical) Impacts and Setting Impacts.

17.10.2.15 Methods set out in **Table 17-16** align with the wider methods used in this EIAR for judging exposure and magnitude of impact, relating specifically to heritage assets. Definitions have been established with reference to key documentation, including the Marine Policy Statement (HM Government, 2011) and Scotland’s National Marine Plan (Marine Scotland (now Marine Directorate), 2015).

Table 17-16 Magnitude of impact

Magnitude	Description	
	Positive change	Negative change
High	Large scale improvement of resource or attribute quality; extensive restoration or enhancement (beneficial). Overwhelming positive changes around the asset that may contribute to the cultural significance of the asset, taking the form of; visual changes to key aspects of the historic landscape.	Substantial loss or harm to the heritage asset/setting and/or integrity of the heritage asset or severe damage to key characteristics, features or elements (adverse), such that the heritage asset is lost or its significance is totally altered. Permanent/irreplaceable change which is certain to occur, or a total or near complete loss of cultural significance.

Magnitude	Description	
	Positive change	Negative change
Medium	Improvement to, or addition of, key characteristics, features or elements of the resource; improvement to attribute quality (beneficial). Visual changes to key aspects of the historic landscape or improved access, resulting in an enhancement of the understanding or appreciation of the asset.	Loss of, or alteration to, key characteristics, features or elements; measurable change in significance, attributes, quality or vulnerability (adverse), such that the heritage asset and its significance is altered. Appreciable change to setting resulting in a loss of understanding, appreciation or experience of the heritage asset. A notable depreciation of cultural significance.
Low	Minor improvement to, or addition of, one or a small number of characteristics, features or elements; very minor improvement to attribute quality (beneficial).	Minor loss of, or small alterations to, one or a small number of characteristics, features or elements; noticeable change in attributes, quality or vulnerability (adverse). Slight change to setting resulting in a minor loss of understanding, appreciation or experience of the heritage asset. A minor depreciation of cultural significance
Negligible	No change or unquantifiable change to the receptor and its significance.	

17.10.2.16 Setting is not simply the visual aspect of the asset in question. It is, rather, the surroundings of an asset that are relevant to the cultural significance of the asset. In general, there will be an appreciable historical relationship between the asset and its setting, either in terms of a physical relationship, or a more distant visual relationship. Some assets’ cultural significance will relate to an aesthetic relationship with their surroundings which may result from design or be fortuitous.

17.10.2.17 In relation to the Offshore Array, an asset must derive part of its cultural significance from either a historic link to the Offshore Development Area, or more generally from coastal views. Given the distance from onshore assets the relationship of an asset to coastal waters, the surrounding seascape and associated shipping lanes will be the chief consideration when assessing impacts to setting and subsequent effects to cultural significance.

17.10.3 Significance of Effect

17.10.3.1 The significance of the effect upon Marine Archaeology and Cultural Heritage is determined by correlating the magnitude of the impact and the sensitivity of the receptor, as presented in **Table 17-17**. Potential impacts are assessed as of negligible, minor, moderate or major significance (see **Table 17-18**).

17.10.3.2 For the purposes of this assessment, any effects with a significance level of major and/or moderate have been deemed significant in EIA terms, while those of minor or negligible level are deemed non-significant, in line with the EIA Handbook Guidance (NatureScot and HES, 2018).

Table 17-17 Impact significance matrix

Significance of effect		Receptor Sensitivity			
		Negligible	Low	Medium	High
Magnitude of impact	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Minor	Minor	Moderate

Significance of effect	Receptor Sensitivity			
	Negligible	Low	Medium	High
Medium	Minor	Minor	Moderate	Major
High	Minor	Moderate	Major	Major

17.10.3.3 **Table 17-18** provides further rationalisation of the implications and definition of each level of effect set out in **Table 17-17**, in relation to historic assets.

Table 17-18 Significance of effect definitions

Value	Definition	
	Beneficial	Adverse
Major	Development will deliver a positive contribution and/or better reveal the value of a heritage asset of recognised international value, such that an application should be treated very favourably.	Substantial harm or total loss of the value of a designated heritage asset (or asset worthy of designation), such that Development should not be consented unless substantial public benefit is delivered by the Development.
Moderate	Development will deliver a positive contribution and/or better reveal the value of a designated heritage asset (or asset worthy of designation), such that an application should be treated favourably.	Less than substantial harm or total loss of the value of a designated heritage asset or an asset of designable quality, such that the harm should be weighed against the public benefit delivered by the Development to determine consent. Harm to a non-designated heritage asset of a greater degree than that perceived of as Minor, which should be considered in determining an application.
Minor	Development will deliver a positive contribution and/or better reveal the value of a non-designated heritage asset.	Less than substantial harm to the value of a designated heritage asset, of a lesser degree than that perceived as Moderate but which should still be weighed against the public benefit delivered by the Development to determine consent. Harm to a non-designated heritage asset that can be adequately compensated through the implementation of a programme of industry standard mitigation measures.
Negligible	No discernible change in receptor.	

17.11 Impact Assessment

17.11.1.1 This Section examines the results of the realistic worst-case impacts at each phase to each receptor discussed in **Section 17.7.1** alongside the embedded mitigation measures detailed in **Section 17.8.3**. Activities with the potential to impact are outlined within **Section 17.9, Table 17-13** and **Volume ER.A.2, Chapter 4: Project Description**.

- 17.11.1.2 An assessment has also been carried out in relation to onshore heritage assets with the potential to be impacted by the Offshore Array. This assessment of effects has been produced to assist Aberdeenshire Council and HES in determining the effect of the Offshore Array to onshore heritage receptors in the context of this particular application.
- 17.11.1.3 Under the construction phase, the following potential impacts have been assessed:
- Impacts to potential submerged prehistoric archaeological sites and palaeoenvironmental remains;
 - Impacts to known and potential wreck sites, aviation remains and geophysical anomalies; and
 - Impacts to known and potential intertidal and adjacent sites.

17.11.2 Construction Impacts to Potential Submerged Prehistoric Archaeological Sites and Palaeoenvironmental Remains

Magnitude and Significance of Effect

- 17.11.2.1 Units 10, 30, 40, 50 and 60 have the potential to contain palaeoenvironmental evidence of medium sensitivity (**Paragraph 17.7.1.39**). Potential submerged prehistoric sites may be of up to high sensitivity (though none are currently known and potential is limited, owing to the rarity of such sites offshore) and medium sensitivity where redeposited.
- 17.11.2.2 Depending on the final design, these remains may be directly (physically) impacted by site preparation and construction activities or indirectly (physically) impacted by changes in hydrodynamic regimes resulting from such activities. A summary of potential impacts within the Offshore ECC and OAA is presented in **Table 17-19**.
- 17.11.2.3 In the realistic worst-case scenario, any impacts to the archaeological resource arising from these activities would be permanent and irreversible, occurring at the time of site preparation, construction and installation.
- 17.11.2.4 The baseline assessment (**Section 17.7.1**) and **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** indicate a very low potential for submerged prehistoric remains of high sensitivity across much of the Offshore Development Area. The exception to this is within the Nearshore Export Cable Corridor, where the current data gap has prevented accurate assessment of archaeological potential. If sites of high sensitivity are identified, appropriate mitigation would be required. The embedded mitigation therefore allows for the identification of sites and implementation of subsequent mitigation, to be agreed with the Applicant and Archaeological Curators (**Table 17-11**).
- 17.11.2.5 If present, redeposited remains may be impacted by construction activities. These impacts may result in the movement or removal of finds that are not *in situ*. The key aspects of significance of these finds relate to the physical properties of the artefacts rather than contextual information. The impacts will not alter these characteristics, however if these finds are not perceived this information could be lost.

Table 17-19 Summary of potential construction phase impacts to submerged prehistoric remains

Offshore Export Cable Corridor	Offshore Array Area
<i>Direct physical impacts</i>	

Offshore Export Cable Corridor

Offshore Array Area

Dredging and PLGR: may impact on submerged prehistoric remains where Unit 1 deposits occur thinly, through disturbance and removal of deposits of archaeological interest.

Cable laying/burial methods: may impact on submerged prehistoric remains where Unit 1 deposits occur thinly, through disturbance and removal of deposits of archaeological interest.

Exit pits and installation route (associated with trenchless installation): may impact on submerged prehistoric remains where Unit 1 deposits occur thinly, through disturbance and removal of deposits of archaeological interest. Landfall works lie in area of nearshore data gap, therefore, accurate submerged prehistoric potential will be reviewed upon completion of future surveys.

DE, plate and gravity anchoring: potential impact on submerged prehistoric remains where impacts extend beneath Unit 1 deposits. Extent determined by excavations for anchors and/or path of DE anchor.

Suction caisson anchoring: impact on submerged prehistoric remains through disturbance of deposits by compression and dispersal during installation. Limited principally to width of caisson wall.

Pile anchoring: impact on submerged prehistoric remains through disturbance of deposits by compression and dispersal during installation. Limited principally to diameter of pile.

Mooring line sweep and clump weight drag: may impact on submerged prehistoric remains where Unit 1 deposits occur thinly, through disturbance of deposits of archaeological interest.

Indirect physical impacts

Scour around installations: may impact upon deposits of archaeological interest where scour penetrates Unit 1 deposits.

- 17.11.2.6 Embedded mitigation provides for a protocol for the reporting of archaeological finds to be implemented for the duration of the Salamander Project (e.g., The Crown Estate, 2014; **Table 17-11**). Protocols provide a system for identifying, recording, reporting and investigating any unexpected discoveries made during the course of the Salamander Project, including prehistoric material. If material is found, there is a range of next-step mitigation options, including creation of temporary or permanent exclusion zones (TAEZs and AEZs) around areas in which archaeological sites or remains may exist. Implementation of the protocol would mitigate impacts upon potential unknown archaeological sites and isolated finds.
- 17.11.2.7 An archaeological assessment of geophysical survey data of the Nearshore Export Cable Corridor will be undertaken, as outlined within **Paragraph 17.8.1.2. Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** identified the potential for *in situ* submerged prehistoric remains within Unit 10 and 30 of the Quaternary sequence of the Offshore Development Area if present within the Nearshore Export Cable Corridor. Continued review of the sub-seabed deposits and interpretation of their depositional environments using any new geophysical data would enhance the understanding of the

archaeological potential of the area. Where possible, this may be supported by geoarchaeological assessment of geotechnical cores, as recommended above (**Section 17.8.3; Table 17-11**).

- 17.11.2.8 Commitment to the embedded mitigation measures would result in a **Negligible** magnitude of change to potential submerged prehistoric archaeological sites (of up to **High** sensitivity), equating to a significance of **Negligible** effect, which is **Not Significant** in EIA terms. The minor effect which remains stems from the initial impacts to the site allowing for its identification and reporting under the protocol.
- 17.11.2.9 Geoarchaeological assessment provides embedded mitigation for potential palaeoenvironmental remains. Impacts would still occur to these potential remains through construction activities, but they would be mitigated through the assessment process. This would result in a **Low** magnitude of change to potential palaeoenvironmental remains of **Medium** sensitivity resulting in a significance of **Minor** effect, which is **Not Significant** in EIA terms. This residual minor effect would also stem from initial identification of impacts allowing for its identification and reporting under the protocol.

17.11.3 Construction Impacts to Known and Potential Wreck Sites, Aviation Remains and Geophysical Anomalies

17.11.3.1 Wreck sites and geophysical anomalies have been identified within the Offshore Development Area, along with a potential for additional, hitherto undetected wreck and aviation remains (see **Paragraphs 17.7.1.75 and 17.7.1.94**). Wrecks and aviation remains can be of up to high sensitivity and direct or indirect physical impacts could lead to permanent and irreversible loss and disturbance of parts of known and potential wrecks, aviation remains and/or geophysical anomalies of potential archaeological significance.

17.11.3.2 A summary of potential impacts within the Offshore ECC and OAA is presented in **Table 17-20**.

Table 17-20 Summary of potential construction phase impacts to wreck and aviation remains and geophysical anomalies

Offshore Export Cable Corridor	Offshore Array Area
<i>Direct physical impacts</i>	
Dredging and PLGR: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Higher potential for impact on receptor due to large area of seabed impacts associated with these activities.	
Anchoring/mooring of construction vessels: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Extent of impact limited by size of anchors.	
Cable laying/burial methods: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Higher potential for impact on receptor due to large area of seabed impacts associated with these activities.	
Exit pits (associated with trenchless installation): may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Landfall works lie in area of nearshore data gap, therefore, accurate wreck/aviation/geophysical anomaly potential will be reviewed upon completion of future surveys.	DE, plate, gravity and suction caisson anchoring: potential direct physical impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Higher potential for impact on receptor due to large area of seabed impacts associated with these activities.
	Suction caisson anchoring: potential direct physical impact on low potential geophysical anomalies, magnetic anomalies and

Offshore Export Cable Corridor	Offshore Array Area
	<p>unidentified maritime/aviation remains. Limited principally to width of caisson wall.</p> <p>Pile anchoring: low likelihood for direct physical impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Limited principally to diameter of pile.</p> <p>Mooring line sweep and clump weight drag: direct physical impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains. Higher potential for impact on receptor due to potentially large area of associated seabed impact.</p>

Indirect physical impacts

Scour around installations: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains, through destabilisation of remains and/or focussing of hydrodynamic processes.

Transportation and deposition of sediment as spoil arising from excavations/clearance: deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.

Increase in SSC: subsequent deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.

- 17.11.3.3 AEZs will be applied to known and potential wreck sites and anomalies of high and medium potential, within which no impacts will take place (**Table 17-11**; **Figure 17-12** and **Figure 17-13**). AEZs will be modified or additional AEZs/TAEZs identified as necessary, following any subsequent archaeological assessments, including but not limited to the nearshore data, which the Salamander Project has committed to collect. The conditions of AEZs will also apply to future surveys, anchoring and any other action that may result in an impact.
- 17.11.3.4 There would be **no impacts** to known and potential wreck sites, following the additional data collection and implementation of the embedded mitigation. Potential effects would therefore be removed and there would be **no change**.
- 17.11.3.5 Buried magnetic anomalies may include a range of assets that may or may not be of archaeological interest and so are of an uncertain level of sensitivity. Although many are likely to be of low or negligible sensitivity, there is potential for some to have a **high sensitivity**. The impacts arising from construction activities, in the realistic worst-case scenario, could lead to the loss and disturbance of these. These impacts would be permanent and irreversible, potentially resulting in a high magnitude of change (worst-case). This would

result in an uncertain significance of effect, due to the uncertainty regarding their origin and form (which inform the assessment of sensitivity).

17.11.3.6 An AAP has been defined around a complex area of magnetic anomalies with an uncertain level of sensitivity, also enclosing a likely wreck site (higher sensitivity) (**Table 17-11, Figure 17-14**). AAPs are primarily reserved for magnetic anomalies where, due to line spacing or data coverage, positions are not accurately known or there is potential for the presence of additional material not covered by the survey extents. Any additional material is likely to be identified following higher resolution or full coverage data assessment prior to construction but, as the nature and position is not precisely known, no formal exclusion zone is recommended at present. An AAP instead recommends awareness of the potential within an area and an expectation of further investigation, should more data become available. As the Salamander Project progresses, in line with the WSI (Co50-53), mitigation via AAP will be revised, with further investigation, in line with the anticipated effects and known impacts (i.e. confirmed preferred cable route). Such mitigation may include implementation of AEZs where appropriate, removing impacts from these areas and resulting in no change. This would reduce to a **Negligible** magnitude, and therefore, there would be a **Negligible** significance of effect, which is **Not Significant** in EIA terms.

17.11.3.7 Low potential anomalies of possible anthropogenic debris of **Low** sensitivity may also be physically impacted during the construction phase. In the realistic worst-case scenario, the impacts arising from construction activities could lead to the loss and disturbance of parts of or whole anomalies. These impacts would be permanent and irreversible, resulting in a **Medium** magnitude of change. While these effects do not require mitigation, the embedded mitigation is also applicable. A protocol for reporting archaeological finds will primarily ensure that significant remains are reported and additional mitigation implemented where necessary, however, it will also allow for reporting of all other material, including low potential contacts (**Table 17-11**). The impact significance would remain **Minor** effect, which is **Not Significant** in EIA terms, arising from any disturbance to the anomaly during the process of identification.

17.11.4 Construction Impacts to Known and Potential Intertidal and Adjacent Sites

17.11.4.1 Several heritage assets have been identified slightly beyond the boundary of the Offshore Development Area above MHWS, within the Onshore Development Area, comprising Second World War defensive structures. These are described in greater detail within **Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report** and will be assessed for impacts within the Onshore EIAR.

17.11.4.2 Modern or earlier remains may be present between MHWS and MLWS of the Offshore ECC, buried beneath the beach deposits, which may be impacted during the construction phase. No such remains have been identified and their sensitivity may range from low to high. In the realistic worst-case scenario (**High** sensitivity), the construction impacts could lead to the permanent and irreversible loss and disturbance of parts of or whole archaeological sites.

17.11.4.3 Embedded mitigation will ensure identification and reporting of these assets by a protocol for reporting finds of archaeological interest, to be maintained for the duration of the Salamander Project (**Table 17-11**).

17.11.4.4 Commitment to the embedded mitigation would result in a **Negligible** magnitude of change upon potential intertidal and adjacent archaeological remains, equating to a **Negligible** effect, which is **Not Significant** in EIA terms.

17.11.4.5 Under the operation and maintenance phase, the following potential impacts have been assessed:

- Impacts to marine archaeological receptors; and
- Impacts on onshore archaeological receptors (setting).

17.11.5 Operation and Maintenance Impacts to Marine Archaeological Receptors

- 17.11.5.1 The greatest impacts to Marine Archaeology and Cultural Heritage will primarily be experienced during the construction phase. Where O&M impacts occur beyond the footprint of previous impacts, receptors may experience additional impacts, including loss of or damage to archaeological remains through direct physical impact and/or indirect physical effects from changes to the hydrodynamics, sediment transport or suspended sediments, resulting in burial or destabilisation.
- 17.11.5.2 Potential impacts are discussed in full within **Section 17.9** and subsequently alongside anticipated O&M activities within **Table 17-21**.

Table 17-21 Summary of potential operation and maintenance phase impacts to marine archaeology receptors

Offshore Export Cable Corridor	Offshore Array Area
<i>Direct physical impacts</i>	
Cable repair/replacement and placement of new cable stabilisation: potential to directly impact (physically) on submerged prehistoric remains, low potential geophysical anomalies, magnetic anomalies and/or unidentified maritime/aviation remains, primarily through excavation alongside cables for repair/replacement.	
Anchoring/mooring of construction vessels: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains.	
	Anchor replacement/mooring line adjustment: potential to directly impact (physically) on submerged prehistoric remains, low potential geophysical anomalies, magnetic anomalies and/or unidentified maritime/aviation remains, primarily through excavation alongside anchors for retrieval/replacement.
<i>Indirect physical impacts</i>	
Scour around installations and cable protection (if differing in placement from previous layout): may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains, through destabilisation of remains and/or focussing of hydrodynamic processes.	
Transportation and deposition of sediment as spoil arising from excavations: deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.	
Increase in SSC: subsequent deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.	

- 17.11.5.3 O&M activities as outlined within **Table 17-21** will be subjected to the embedded mitigation laid out in **Table 17-11** and will have the same resultant significance of effect per receptor as concluded for construction phase activities. A summary of impacts is given within **Section 17.11.8** and **Table 17-24**. The resultant significance of effects is **Negligible or Minor**.

17.11.6 Operation and Maintenance Impacts on Onshore Archaeological Receptors (Setting)

17.11.6.1 Of 371 assets within the bare earth ZTV initially selected for assessment of Setting Impacts, a total of 155 were included within the final list of assets taken forward to assessment. These 155 assets include:

- 17 Scheduled Monuments,
- 6 Conservation Areas; and
- 132 Listed Buildings.

17.11.6.2 **Table 17-22** below provides a full list of assets taken forward for assessment.

17.11.6.3 In order to facilitate a more coherent and concise understanding of impacts to heritage assets and the significance of effects to cultural significance, assets have been grouped and discussed together. Assets have been grouped based on proximity, both spatially and chronologically. In the case of Conservation Areas, their associated Listed Buildings have been grouped with the respective Conservation Area and discussed together. Selected Category A buildings within Conservation Areas have been discussed separately where these assets have views of the Offshore Array and coastal/seascape views are a factor in their setting and contribute to cultural significance.

Table 17-22 List of assets taken forward to assessment and associated group

Asset Name (or group name)	Asset type	Asset ref	Listed Building Category	Individual asset name	Distance
Ratray Line Pill Boxes	Scheduled Monument	SM11315	-	Ratray Line, pill box 80 m E of Annachie Bridge	Within 35 km
	Scheduled Monument	SM11314	-	Ratray Line, pill box 960m NNW of Annachie Bridge	Within 35 km
	Scheduled Monument	SM11320	-	Ratray Line, pill box 1550m SSE of Home Farm	Within 35 km
	Scheduled Monument	SM11313	-	Ratray Line, pill box 1150m SSE of Home Farm	Within 35 km
	Scheduled Monument	SM11316	-	Ratray Line, pill box 675m NE of Old Ratray	Within 35 km
	Scheduled Monument	SM11317	-	Ratray Line, pill box 875m ENE of Old Ratray	Within 35 km
	Scheduled Monument	SM11318	-	Ratray Line, pill box 460 m WNW of Seatown	Within 35 km
	Scheduled Monument	SM11319	-	Ratray Line, pill box at Seatown	Within 35 km

Asset Name (or group name)	Asset type	Asset ref	Listed Building Category	Individual asset name	Distance
	Scheduled Monument	SM11307	-	Ratray Line, pill box 55 m SE of Ratray Head Shore Station	Within 35 km
	Scheduled Monument	SM11308	-	Ratray Line, pill box 780 m ENE of Middleton of Ratray	Within 35 km
	Scheduled Monument	SM11311	-	Ratray Line, pill box 640 m SE of Ratray House	Within 35 km
St. Fergus Old Parish Church and Churchyard	Scheduled Monument	SM5622	-	St Fergus's Church, old parish church	Within 35 km
	Listed Buildings	LB16536	B	Old Churchyard of St. Fergus, excluding Scheduled Monument No 5622 'St Fergus's Church, old parish church', St. Fergus Links, Peterhead	Within 35 km
St Combs, St Columba's Church	Scheduled Monument	SM116	-	St Combs, St Columba's Church	Within 40 km
Inverallochy Castle	Scheduled Monument	SM97	-	Inverallochy Castle	Within 40 km
Castle Hill, motte SW of Hallmoss Farm	Scheduled Monument	SM3259	-	Castle Hill, motte SW of Hallmoss Farm	Within 40 km
Boddam Castle	Scheduled Monument	SM3252	-	Boddam Castle	Within 40 km
Wine Tower, Fraserburgh	Scheduled Monument	SM90344	-	Wine Tower, Fraserburgh	Within 40 km
Peterhead Conservation Areas and Associated Listed Buildings	Conservation Area	CA425	-	Peterhead Buchanhaven	Within 35 km
	Conservation Area	CA426	-	Peterhead Roanheads	Within 35 km
	Conservation Area	CA427	-	Peterhead Central	Within 35 km
Boddam	Conservation Area	CA428	-	Boddam	Within 40 km

Asset Name (or group name)	Asset type	Asset ref	Listed Building Category	Individual asset name	Distance
Broadsea Fraserburgh & Fraserburgh Town Centre	Conservation Area	CA414	-	Broadsea Fraserburgh	Within 45 km
	Conservation Area	CA663	-	Fraserburgh Town Centre	Within 45 km
Cairnbulg/Inverallochy Village and Listed Buildings	Former Conservation Area with 3 x Listed Buildings	LB16145	B	Inverallochy 26 Shore Street ("Maggie's Hoosie") Inverallochy Parish Church Inverallochy 1 Charles Street	Within 40 km
		LB16144	C		
		LB19779	C		
Ratray Head Lighthouse	Listed Building	LB3042	B	Ratray Head Lighthouse	Within 35 km
Ratray Listed Buildings	Listed Building	LB3038	B	Ratray House	Within 35 km
	Listed Building	LB3039	B	Walled Garden, Ratray House	Within 35 km
	Listed Building	LB3040	B	Ratray House Home Farm	Within 35 km
	Listed Building	LB3041	C	Laundry, Ratray House	Within 35 km
	Listed Building	LB3036	C	Middleton Of Ratray	Within 35 km
Listed Buildings in Peterhead (Peterhead Harbour)	Listed Building	LB39733	B	Peterhead Harbour	Within 35 km
	Listed Building	LB39734	C	1B-3 Shiprow, Peterhead	Within 35 km
	Listed Building	LB39735	B	Fish Processing Factory, Castle Street, Peterhead	Within 35 km
	Listed Building	LB39736	C	Fish Processing Factory, Castle Street, Peterhead	Within 35 km
	Listed Building	LB39737	C	Former Sale Rooms, 1, 3 Bridge Street, Peterhead	Within 35 km
Fish-House, Golf Road	Listed Building	LB39847	B	Fish-House, Golf Road	Within 35 km
The Reform Tower, Meethill, Invernettie	Listed Building	LB16362	B	The Reform Tower, Meethill, Invernettie	Within 35 km
Listed Buildings around Peterhead (Sandford Lodge)	Listed Building	LB16364	B	Sandford Lodge	Within 40 km
	Listed Building	LB16365	C	Walled Garden, Sandford Lodge	Within 40 km

Asset Name (or group name)	Asset type	Asset ref	Listed Building Category	Individual asset name	Distance
Buchan Ness Lighthouse	Listed Building	LB16367	A	Buchan Ness Lighthouse	Within 40 km
Buchanness Cottage, Boddam	Listed Building	LB16366	B	Buchanness Cottage, Boddam	Within 40 km
Listed Buildings around Cruden Bay	Listed Building	LB3060	B	St James' Chapel, Chapel Hill, Cruden	Within 40 km
	Listed Building	LB3061	C	The Old Rectory, Cruden	Within 40 km
	Listed Building	LB3062	B	Erroll School House	Within 40 km
Hay Farm	Listed Building	LB3074	C	Hay Farm	Within 40 km
Kinnaird Head Lighthouse, Fraserburgh	Listed Building	LB31888	A	Kinnaird Head Lighthouse, Fraserburgh	Within 45 km
Harbour Works Office, Fraserburgh	Listed Building	LB31879	B	Harbour Works Office, Fraserburgh	Within 45 km
60, 62, 64, 66, 68, 70 Saltoun Place, Fraserburgh	Listed Building	LB31901	B	60, 62, 64, 66, 68, 70 Saltoun Place, Fraserburgh	Within 45 km

17.11.6.4 From the 155 assets (split across 24 groups) with a potential to undergo changes to cultural significance as a result of significant effect to their setting, five assets (two types of assets) were subject a minor (beneficial) effect to cultural significance.

- Lighthouse (3): LB3042 Rattray Head Lighthouse, LB16367 Buchan Ness Lighthouse and LB31888 Kinnaird Head Lighthouse, Fraserburgh would all benefit as a result of increased shipping associated with the Offshore Development (**Low** Positive magnitude), resulting in a **Minor (Beneficial)** effect to cultural significance; and
- Harbour (2): LB39733 Peterhead Harbour and LB31879 Harbour Works Office, Fraserburgh, would also both benefit from increased shipping and trade within the respective harbours of Peterhead and Fraserburgh (**Low** Positive magnitude), resulting in a **Minor (Beneficial)** effect to cultural significance.

17.11.6.5 Of the remaining assets (150), 24 assets (11 Pill Boxes (SM11315, SM11314, SM11320, SM11313, SM11316, SM11317, SM11318, SM11319, SM11307, SM11308 and SM11311), SM5622 St Fergus old parish church and LB16536 churchyard, , SM3259 Castle Hill Motte, SM3252 Boddam Castle, SM90344 Wine Tower, Fraserburgh, CA425 Peterhead Buchanhaven, CA426 Peterhead Roanheads, Cairnbulg/Inverallochy Village and Listed Buildings (LB16145, LB1614 and LB1979), CA428 Boddam, LB39847 Fish-House, Golf Road and LB16366 Buchanness Cottage, Boddam) will be subject to a **Negligible** magnitude of change to setting resulting in a **Negligible** effect with the cultural significance of the asset fundamentally unchanged. The

remaining assets will undergo no impact to setting and therefore no change to cultural significance as a result of the Offshore Array.

- 17.11.6.6 The above effects are **Not Significant** in terms of EIA regulations.
- 17.11.6.7 A full description of the setting assessment for the Offshore Development can be found within **Volume ER.A.4, Annex 17.2: Setting assessment (Offshore)**, with visualisations in **Volume ER.A.5; Annex 16.1: SLVIA Visualisations** and **Volume ER.A.5; Annex 17.1: Cultural Heritage Visualisations**. For ease of use within this chapter only those assets undergoing an effect to cultural significance are discussed below.
- 17.11.6.8 As the final layout and location of the proposed WTGs is still to be determined, the assessments included within this chapter are based on an indicative layout, shown in **Volume ER.A.5, Annex 17.1: Cultural Heritage Visualisations**, that represent the realistic worst-case scenario in respect of visual effects. This realistic worst-case scenario assumes that a higher proportion of the proposed WTGs will be located towards the landward Offshore Array Area boundary and will lie approximately 700 m inside the Offshore Array Area boundary. This realistic worst-case scenario differs from that considered in **Volume ER.A.3, Chapter 14: Shipping and Navigation**, which represents the realistic worst-case scenario in respect of shipping and navigation.

LB3042 Rattray Head Lighthouse (Category B)

- 17.11.6.9 Rattray Head Lighthouse was constructed in 1895AD and consists of a 115-foot-high circular lighthouse made of enameled pre – clay brick sat on top of a granite base. The lighthouse is located in the intertidal area at the mean low water mark at Rattray Head, a point locally named as ‘The Ron’. LB3042 is the only lighthouse positioned north of Peterhead until reaching Cairnbulg Point, Inverallochy. The monument derives its cultural significance from its intrinsic architectural and historic value as well as its communal value. The monument is testament to the ongoing importance of fishing and marine navigation along the north-east coast of Scotland and is a well-preserved example of a late 19th century lighthouse. The asset also serves as a notable local landmark.
- 17.11.6.10 The historic setting of this lighthouse is defined by its relationship to the surrounding coastline between Peterhead and Fraserburgh and to the coastal waters used by ships docking at these harbours. The lighthouse would have once stood as a solitary beacon along the stretch of water between Peterhead and Cairnbulg Point and would have been the most prominent building for several miles along the coast when viewed from coastal waters. Key historic views are towards the monument rather than from it. Its key views are north to south along the beach and associated coast and to the east from the deep sea and shipping lanes. The immediate landscape baseline around the lighthouse takes in the beach and dunes located to the west of the asset. To the south are elements of heavy infrastructure along the coast, inclusive of the St. Fergus Gas Terminal, Peterhead Harbour and Peterhead Power Station. The St. Fergus Gas Terminal, which is located only 3 km south of the lighthouse, erodes key historic views of the lighthouse along this stretch of coastline when viewed from open water and has eroded the historic setting of this asset. Despite the intrusion of heavy infrastructure to the south, the current setting of Rattray Head Lighthouse makes a positive contribution to its cultural significance, chiefly through the retention of the asset’s relationship to the immediate coastline and shipping lanes to the east. The asset is still prominent in views from the sea to the coastline north of Peterhead.
- 17.11.6.11 The Offshore Array would introduce new infrastructure into the very distant seascape to the east of the lighthouse. The Proposed Development would also attract increased shipping to the waters east of the lighthouse. The increased shipping required to construct, maintain and decommission the Offshore Array would enhance the relationship of the asset to the nearby shipping lanes, boats and crews. This would

create a **minor (beneficial)** impact to the setting of this monument. During its operational lifetime the Offshore Array would be visible in the distant seascape on clear days. The turbines would lay beyond the immediate approaches to the harbours of Peterhead and Fraserburgh and the associated coastline. The introduction of WTGs 35 km distant would not erode the relationship of this asset with shipping using the coastal waters between Peterhead and Fraserburgh, which is a key component of the assets setting. The introduction of the Offshore Array into the landscape baseline of heavy infrastructure dotted along the coast to the south of the asset would not substantially erode the relationship to the local community and the lighthouse when walking along the beach, swimming or pleasure boating in the immediate waters offshore. There would be no (adverse) impact to setting. Overall, it is considered that the introduction of the Offshore Array would result in a **Low (Beneficial)** impact on setting.

- 17.11.6.12 The introduction of the Offshore Array into the existing landscape baseline would create a slight (beneficial) impact to the setting of this medium value heritage asset. As a result, there is a **Minor (Beneficial)** effect to cultural significance. This is **Not Significant** in terms of EIA regulations.

LB16367 Buchan Ness Lighthouse (Category A)

- 17.11.6.13 Buchan Ness Lighthouse is a 118-foot tall, tapered circular tower built of granite and painted red and white. The Lighthouse and associated structures (cottages, stores and gardens) sit on rocky outcrop connected to the mainland and the village of Boddam via a bridge. The Lighthouse was built between 1824 and 1827AD. LB16367 is located south of Peterhead forming a line of Lighthouses from Fraserburgh, Rattray Head and Aberdeen. The monument derives its cultural significance from its intrinsic architectural and historic value as well as its communal value. The monument is testament to the ongoing importance of fishing and marine navigation along the north-east coast of Scotland and is a well-preserved example of an early 19th century lighthouse. The asset also serves as a notable local landmark.
- 17.11.6.14 The historic setting of this lighthouse is defined by its relationship to the surrounding coastline between Peterhead and Aberdeen and to the coastal waters used by ships docking at these harbours. The lighthouse would have once stood as a solitary beacon along the stretch of water between Peterhead and Aberdeen to the south and would have been the most prominent building for several miles along the coast when viewed from coastal waters. Key historic views are towards the monument rather than from it. Key views are north to south along the coast between Peterhead and Aberdeen and the east, from shipping lanes. The immediate landscape baseline around the lighthouse takes in the village of Boddam, and the town of Peterhead located to the north. The coastline is made up of rocky cliffs and coves. To the north are elements of heavy infrastructure along the coast, inclusive of Peterhead Harbour and Peterhead Power Station. Out to sea, the Hywind Scotland Offshore Wind Farm (hereafter Highwind Scotland) is visible in the distant seascape. This heavy infrastructure does not, however, interrupt key views or erode the historic setting of this monument. The current setting of Buchan Ness Lighthouse makes a positive contribution to its cultural significance, chiefly through the retention of the asset's relationship to the immediate coastline and shipping lanes to the east. The asset is still prominent in views from the sea to the coastline north and south of Boddam on the approach to Peterhead.
- 17.11.6.15 The Offshore Array would introduce new infrastructure into the very distant seascape to the east of the lighthouse. The Proposed Development would also attract increased shipping to the waters east of the lighthouse. The increased shipping required to construct, maintain and decommission the Offshore Array would enhance the relationship of the asset to the nearby shipping lanes, boats and crews. This would create a minor (beneficial) impact on the setting of this monument. During its operational lifetime the Offshore Array would be visible in the distant seascape on clear days. The turbines would lay beyond the immediate approaches to the harbours of Peterhead and Fraserburgh and the associated coastline. The

introduction of turbines 40 km distant would not erode the relationship of this asset with shipping using the coastal waters between Peterhead and Aberdeen, which is a key component of the asset's setting. The introduction of the Offshore Array into a landscape baseline of heavy infrastructure dotted along the coast to the north of the asset would not create adverse setting impacts. Indeed, there would be no (adverse) impact to setting. Overall, it is considered that the introduction of the Offshore Array would result in a **Low (Beneficial)** impact on setting.

- 17.11.6.16 The introduction of the Offshore Array into the existing landscape baseline would create a slight (beneficial) impact to the setting of this medium value heritage asset. As a result, there is a **Minor (Beneficial)** effect on cultural significance. This is **Not Significant** in terms of EIA regulations.

LB31888 Kinnaird Head Lighthouse (Category A)

- 17.11.6.17 Kinnaird Head is a late 18th century lighthouse built within and above the fabric of the historic Kinnaird Tower House, dated to the late 16th century. The tower house is harled with a corbelled parapet with round bartizans at the corners and square bartizans at the centre of the elevations. The lighthouse is a granite ashlar tower, painted white, with a projecting lantern. The listing for the asset takes in the tower/lighthouse, associated ancillary buildings and foghorn. The building is now used as a museum, being part of the Museum of Scottish Lighthouses, whose visitor center is located just to the north of the asset. Kinnaird Head Lighthouse is located to the north of the historic core of Fraserburgh and the harbour. It is located on high ground on a patch of rough grass beside the coastal path extending north from Fraserburgh harbour. Kinnaird Head is one of a sequence of lighthouses extending along the north-east coast of Scotland. To the south of Fraserburgh are the lighthouses of Rattray Head, and Buchan Ness along with the harbour beacons located at Inverallochy, Peterhead and Aberdeen. The monument derives its cultural significance from its intrinsic architectural and historic value as well as its communal value. The monument is testament to the ongoing importance of fishing and marine navigation along the north-east coast of Scotland and is a well-preserved example of an early 18th century lighthouse. The asset also serves as a notable local landmark and has associated communal and social value. The historic setting of this lighthouse is defined by its relationship to the surrounding coastline between Fraserburgh and Peterhead and to the coastal waters used by ships docking at these harbours. The lighthouse would have once stood a solitary beacon along the stretch of water between Fraserburgh and Rattray Head and would have been the most prominent building for several miles along the coast when viewed from coastal waters. Key historic views are towards the monument rather than from it. Key views are north to south along the coast between Fraserburgh and Peterhead and the east, from shipping lanes. The lighthouse would also have been an important marker for ships travelling east to west along the Moray Firth and towards Inverness. The immediate landscape baseline around the lighthouse takes in the planned settlement of Fraserburgh, its harbour and the historic villages of Broadsea, located to the west and Inverallochy, located to the southeast. The coastline is made up of rocky cliffs and coves. To the south are elements of heavy infrastructure associated with Fraserburgh harbour, with large shipping and warehouses. Elements of onshore energy infrastructure in the form of wind turbines are located further south around the village of Inverallochy (Hallmoss Farm and Gowanfold Farm). Out to sea, Hywind Scotland is visible in the distant seascape from on top of the lighthouse. This infrastructure does not, however, interrupt key views or erode the historic setting of this monument. The current setting of Buchan Ness Lighthouse makes a positive contribution to its cultural significance, chiefly through the retention of the asset's relationship to the immediate coastline and shipping lanes to the east.

The asset is still prominent in views from the sea to the coastline north, south and west of Fraserburgh on the approach to Fraserburgh harbour and when navigating along the east coast.

- 17.11.6.18 The Offshore Array would introduce new infrastructure into the very distant seascape to the east of the lighthouse. The Proposed Development would also attract increased shipping to the waters east of the lighthouse. The increased shipping required to construct, maintain and decommission the Offshore Array would enhance the relationship of the asset to the nearby shipping lanes, boats and crews. This would create a minor (beneficial) impact on the setting of this monument. During its operational lifetime the Offshore Array would be visible in the distant seascape on clear days. The turbines would lay beyond the immediate approaches to the harbours of Peterhead and Fraserburgh and the associated coastline. The introduction of turbines 45 km distant would not erode the relationship of this asset with shipping using the coastal waters between Peterhead and Fraserburgh, which is a key component of the assets setting. The introduction of the Offshore Array into a landscape baseline of energy infrastructure dotted along the coast to the south of the asset, and offshore in the case of Hywind Scotland, would not create adverse setting impacts. Indeed, there would be no (adverse) impact to setting. Overall, it is considered that the introduction of the Offshore Array would result in a **Low (Beneficial)** impact on setting.
- 17.11.6.19 The introduction of the Offshore Array into the existing landscape baseline would create a **Minor (Beneficial)** impact to the setting of this high value heritage asset. As a result, there is a **Negligible (Beneficial)** effect to cultural significance. This is **Not Significant** in terms of EIA regulations.

LB39733 Peterhead Harbour

- 17.11.6.20 Peterhead Harbour (LB39733) is made up of Port Henry, North Harbour and South Harbour. Port Henry represents the original late 16th and 17th century harbour of Peterhead, constructed at the behest of George 5th Earl Marischal, as part of the Peterhead planned settlement. The north and south harbours were 19th century additions with subsequent phases of alteration and improvement into the 20th century. The asset derives its cultural significance from its intrinsic architectural and historical value, helping to inform the development of Peterhead throughout the 17th to 20th centuries, with the harbour itself being central to the original planned settlement of Peterhead and core to its growing prosperity and wealth throughout the 18th and 19th centuries. The harbour and associated buildings also derive importance from their communal value, with the harbour being central to the identity of Peterhead and its population as an important fishing and trading centre along the northeast coast of Scotland.
- 17.11.6.21 The historic setting of the harbour (LB39733) is derived from its relationship to the historic core of Peterhead (Peterhead Central Conservation Area), its fishing and boat fleet and the immediate coastal waters around the harbour. This historic setting has been retained. Key historic views from the harbour and associated buildings are internal to the harbour and the streets fronting the harbour. Views outward are largely restricted to the outer harbour wall and focus on the immediate coastal waters around the harbour, with lines of sight to incoming and departing ships of most importance. These historic views have largely been retained although the scale of warehouses and shipping based around and using the harbour is now of such a size and volume that some historic views internal and across the harbour are now obscured and some external views seawards are also obscured. The immediate landscape baseline around the harbour is one of commercial and residential development, associated with Peterhead, and heavy infrastructure associated with the harbour. Heavy infrastructure is recorded to the south in the form of Peterhead Power Station. The Operational Hywind Scotland is located c. 25 km to the east and is visible in the distant seascape from the harbour walls. The urban and coastal setting of the asset makes a positive contribution to its

cultural significance, helping to inform the relationship and key importance of the harbour with the town of Peterhead itself and the key role in fishing and coastal trade to the settlement.

- 17.11.6.22 The Offshore Array would introduce new infrastructure into the very distant seascape to the east of the asset. This distant seascape already contains turbines associated with Hywind Scotland. Clear views of the Offshore Array would only be possible however from the outer harbour walls, with views from within the harbour largely obscured by infrastructure, buildings and shipping.
- 17.11.6.23 Whilst partial views of the Offshore Array may be visible in the distant seascape on clear days, the introduction of turbines 35 km distant would not erode the setting of these assets and the key relationship to the town of Peterhead or the immediate coastal waters around the town. Introduction of the Offshore Array into the landscape baseline of urban development, heavy infrastructure associated with the harbour and heavy energy infrastructure in the form of Peterhead Power Station and Hywind Scotland would not create any adverse setting impact.
- 17.11.6.24 The Offshore Development would attract increased shipping to the waters east of the harbour throughout the operational lifetime of the Offshore Development, increase the need and use of the harbour for shipping and storage of materials. This increased reliance on Peterhead harbour would enhance the harbour's relationship with its boat fleet and the immediate coastal waters around the harbour resulting in a **Low (Beneficial)** impact on LB39733.
- 17.11.6.25 The introduction of the Offshore Array into the existing landscape baseline would introduce a **Minor (Beneficial)** change to the setting of the medium value LB39733. As a result, there is a **Minor (Beneficial)** effect on cultural significance. This is **Not Significant** in terms of EIA regulations.

LB31879 Harbour Works Office, Fraserburgh

- 17.11.6.26 LB31879 is a stone built two-storey villa dated to 1791 AD. The buildings have been used as the main residence and office for the harbour master at Middle Jetty. The building is located beside Shore Street, overlooking the north and south harbour and outer harbour walls. The building is recorded on the First Edition 6" OS Map with a hotel positioned to the south (hotel now demolished) and the lifeboat station to the north (still present). The building derives its cultural significance from its intrinsic architectural and historic value. The building is testament to the ongoing importance of fishing and marine navigation along the north-east coast of Scotland and is a well-preserved example of a late 17th century residential and commercial property.
- 17.11.6.27 The historic setting of this asset is defined by its relationship to the harbour and Fraserburgh and the immediate coastal waters around the harbour used for shipping. Key historic views are north to south along the length of the harbour and east to the outer harbour wall and harbour entrance. The immediate landscape baseline around the asset takes in the planned historic core of Fraserburgh its harbour, shipping and warehouses. Views beyond the harbour are obscured at ground level but views out and beyond the harbour wall will be visible from the upper storeys of the building. 20th century improvements around the harbour have increased the size of shipping and warehouses along the harbour. This infrastructure does not, however, interrupt key views or erode the historic setting of LB31879. The current setting of the Harbour Works Office makes a positive contribution to its cultural significance, chiefly through the retention of the asset's relationship to Fraserburgh harbour and the immediate coastal waters.
- 17.11.6.28 The Offshore Array would introduce new infrastructure into the very distant seascape to the south-east Fraserburgh Harbour. The Offshore Array would lay well beyond the immediate approaches to the harbours of Fraserburgh and the associated coastline. The introduction of turbines 45 km distant would not erode the relationship of this asset with shipping using the coastal waters around Fraserburgh or the harbour,

which is a key component of the assets setting. The Offshore Development would attract increased shipping to the waters east of the harbour during operation and increase the need and use of the harbour for shipping and storage of materials. This increased reliance on Fraserburgh harbour would enhance Harbour Works Office relationship to its boat fleet and the immediate coastal waters around the harbour resulting in a **Slight (Beneficial)** impact.

17.11.6.29 The introduction of the Offshore Array into the existing landscape baseline would create a **Slight (Beneficial)** impact to the setting of this low value heritage asset. As a result, there is a **Minor (Beneficial)** effect on cultural significance. This is **Not Significant** in terms of EIA regulations.

17.11.7 Decommissioning Impacts

17.11.7.1 Impacts to marine archaeological receptors will primarily be incurred during the construction phase, however, there is potential for additional impacts to be incurred during the decommissioning phase. Decommissioning activities are listed within **Table 17-13** and summarised within **Table 17-23**. Further parameters remain to be confirmed, such as the number and area of vessel anchors during this phase.

Table 17-23 Summary of potential decommissioning phase impacts to marine archaeology receptors

Offshore Export Cable Corridor	Offshore Array Area
<i>Direct physical impacts</i>	
Buried cable removal (if undertaken): potential to directly impact (physically) on submerged prehistoric remains, low potential geophysical anomalies, magnetic anomalies and/or unidentified maritime/aviation remains, primarily through excavation alongside cables for removal.	
Anchoring/mooring of decommissioning vessels: may impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains.	
Removal of landfall trenchless ducts: potential to directly impact (physically) on submerged prehistoric remains, low potential geophysical anomalies, magnetic anomalies and/or unidentified maritime/aviation remains, primarily through excavation alongside such infrastructure for removal.	Removal of anchors and subsea hubs: potential to directly impact (physically) on submerged prehistoric remains, low potential geophysical anomalies, magnetic anomalies and/or unidentified maritime/aviation remains, primarily through excavation alongside anchors for removal (or cutting of piled anchors).
<i>Indirect physical impacts</i>	
Scour around cable protection (left <i>in situ</i>): may physically impact on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains, through destabilisation of remains and/or focussing of hydrodynamic processes.	
Transportation and deposition of sediment as spoil arising from excavations: deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.	
Increase in SSC: subsequent deposition on low potential geophysical anomalies, magnetic anomalies and unidentified maritime/aviation remains may result in negative (compression/disturbance) or positive (enhanced protection from other factors) impacts.	

17.11.7.2 Decommissioning activities will be subjected to the embedded mitigation laid out in **Table 17-11** and will have the same resultant significance of effect per receptor as concluded for construction phase activities. A summary of impacts is given within **Section 17.11.8** and **Table 17-24**. The resultant significance of effects is **Negligible** or **Minor**, which is **Not Significant** in EIA terms.

17.11.8 Summary of Impact Assessment

17.11.8.1 A summary of the impacts and effects identified for Marine Archaeology and Cultural Heritage is outlined in **Table 17-24**. Where the sensitivity of a receptor is known, the residual significance of effect will not exceed minor and is therefore not considered significant in EIA terms.

Table 17-24 Summary of impacts and effects for Marine Archaeology and Cultural Heritage

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
<i>Construction</i>									
Construction activities resulting in sub-seabed impacts, including site preparation, cable burial, foundations and anchoring.	OAA and Offshore ECC	Co21, Co22 and Co23	Submerged palaeo-environmental remains	Medium	Low	Minor	No additional mitigation measures have been identified for this effect above and beyond the embedded mitigation listed in Section 17.8.3 as it was concluded that the effect was Not Significant .	Minor	Not significant
	OAA and Offshore ECC		Potential submerged prehistoric remains – <i>in situ</i>	High	Negligible	Negligible		Negligible	Not significant
	OAA and Offshore ECC		Potential submerged prehistoric remains – redeposited	Medium	Negligible	Minor		Minor	Not significant
	OAA and Offshore ECC		Known wrecks and high potential geophysical anomalies (as identified through	High	No change	No change		No change	Not significant

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
			the additional survey)						
	OAA and Offshore ECC		Medium potential geophysical anomalies	Medium	No change	No change		No change	Not significant
	OAA and Offshore ECC		Low potential geophysical anomalies	Low	Low	Minor		Minor	Not significant
	OAA and Offshore ECC		Potential maritime and aviation remains	High	No change	No change		No change	Not significant
	OAA and Offshore ECC		Potential intertidal sites	Low to high	Negligible	Negligible		Negligible	Not significant
	OAA and Offshore ECC		Buried magnetic anomalies	Negligible to high	Negligible	Negligible		Negligible	Not significant
	OAA and Offshore ECC								Not significant
<i>Operation and Maintenance</i>									
O&M activities which result in impacts beyond extent of	OAA and Offshore ECC	Co21, Co22 and Co23	Wrecks, high and medium potential geophysical anomalies	Medium to high	No change	No change	No additional mitigation measures have been identified for this effect above and beyond the	No change	Not significant

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
construction impacts.	OAA and Offshore ECC		Potential prehistoric remains (<i>in situ</i> or redeposited) and potential palaeo-environmental evidence	Medium to high	Negligible	Negligible	embedded mitigation listed in Section 17.8.3 as it was concluded that the effect was Not Significant .	Negligible	Not significant
	OAA and Offshore ECC		Potential intertidal sites	Low to high	Negligible	Negligible		Negligible	Not significant
	OAA and Offshore ECC		Low potential geophysical anomalies, magnetic anomalies and unidentified maritime or aviation remains	Negligible to high	Negligible	Negligible		Negligible	Not significant
Operation and Maintenance of Offshore Development Area: Setting Impacts	OAA	None	LB3042 Rattray Head Lighthouse, LB16367 Buchan Ness Lighthouse and LB31888 Kinnaird Head Lighthouse, Fraserburgh	Medium	Low	Minor (beneficial)		Minor (beneficial)	Not significant

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
	OAA	None	LB39733 Peterhead Harbour and LB31879 Harbour Works Office, Fraserburgh.	Medium	Low	Minor (beneficial)		Minor (beneficial)	Not significant
		None	SM11315, SM11314, SM11320, SM11313, SM11316, SM11317, SM11318, SM11319, SM11307, SM11308, SM11311, SM5622, SM116, SM97, SM3259, SM3252, SM90344 CA425, CA426, CA427, CA428, CA414, CA663 LB16536, LB16145, LB16144,	Medium to Low	Negligible/None	Negligible/None		Negligible	Not significant

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
			LB19779, LB3042, LB3038, LB3039, LB3040, LB3041, LB3036, LB39733, LB39734, LB39735, LB39736, LB39737, LB39738, LB39847, LB16362, LB16364, LB16365, LB16367, LB16366, LB3060, LB3061, LB3062, LB3074, LB31888, LB31879, LB31901						
<i>Decommissioning</i>									
Decommissioning activities which result in impacts beyond extent of construction or O&M impacts.	OAA and Offshore ECC	Co21, Co22 and Co23	Wrecks, high and medium potential geophysical anomalies	Medium to high	No change	No change	No additional mitigation measures have been identified for this effect above and beyond the embedded mitigation	No change	Not significant
	OAA and Offshore ECC		Potential prehistoric remains (<i>in situ</i> or redeposited) and	Medium to high	Negligible	Negligible	listed in Section 17.8.3 as it was concluded that the	Negligible	Not significant

Salamander Project Activity and Impact	Project Aspect	Embedded Mitigation	Receptor	Sensitivity	Magnitude	Significance of Effect	Additional Mitigation	Residual Significance of Effect	Significance of Effect in EIA Terms
			potential palaeo-environmental evidence				effect was Not Significant.		
	OAA and Offshore ECC		Low potential geophysical anomalies, magnetic anomalies and unidentified maritime or aviation remains	Negligible to high	Negligible	Negligible		Negligible	Not significant
	OAA and Offshore ECC		Potential intertidal sites	Low to high	Negligible	Negligible		Negligible	Not significant

17.12 Mitigation and Monitoring

- 17.12.1.1 Following implementation of embedded mitigation, as outlined in **Section 17.8.3**, effects would not exceed minor levels. As such, no additional mitigation is required.
- 17.12.1.2 Little geotechnical data were available for the Offshore Development Area during the assessment and the geological units identified by the SBP data and interpreted by the ground model have not been confirmed through analysis of physical evidence. As such, the attribution of units to geological formations and members remains tentative. Future geotechnical work as part of the ongoing Salamander Project development, should follow best practice guidance set out in *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (Gribble and Leather, 2011) and *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021). Archaeological review should include examination of core logs to determine the potential for deposits of palaeoenvironmental and archaeological interest and, following a staged process determined by the results of the assessment, may include analysis, reporting and publication. Input into core locations should be sought from a suitably qualified geoarchaeologist to allow cores to be targeted to address specific archaeological questions, including the date of deposits and extent of glaciation at different stages.
- 17.12.1.3 The effect of Setting Impacts, resulting from the Offshore Array to onshore receptors are **Not Significant** in terms of EIA. No mitigation beyond the outlined embedded mitigation is proposed for cultural heritage receptors.

17.13 Cumulative Effect Assessment

- 17.13.1.1 A Cumulative Effects Assessment (CEA) has been made based on existing and proposed developments in the Study Area (**Volume ER.A.4, Annex 6.2: Cumulative Effects Assessment Technical Annex**). Cumulative effects are defined as those effects on a receptor that may arise when the development is considered together with other projects.
- 17.13.1.2 The maximum spatial extent of potential effects on Marine Archaeology and Cultural Heritage offshore assets, as identified within this chapter, is determined by **Volume ER.A.3, Chapter 7: Marine Physical Processes** as a 20 km Zone of Influence (ZOI) measured from the Offshore Development Area boundary. Although the greatest potential and magnitude for impacts lies within the construction footprint (contained within the Offshore Development Area), impacts arising from scour and sediment transport may affect marine archaeology and cultural heritage beyond this.
- 17.13.1.3 For the identification of a potential for additive adverse impacts to visual settings on onshore archaeological designated assets, a blanket approach of 60 km from the OAA for projects with infrastructure above the waterline were identified (in line with the approach to the SLVIA; **Volume ER.A.3, Chapter 16: Seascape Landscape and Visual Amenity**). However, the projects identified within the maximum spatial extent generally also fall within the 20 km extent identified projects.
- 17.13.1.4 Areas beyond these ranges are unlikely to experience any measurable change. As such, only plans or projects with potential to overlap spatially or temporally will be included in the cumulative assessment.
- 17.13.1.5 On this basis, the projects considered within this cumulative assessment from the cumulative long list are provided in **Table 17-25**, with identification of if reviewed for onshore assets (for settings) and/or offshore assets (direct/indirect physical impact).
- 17.13.1.6 New projects submitting consent and scoping applications up to six months before the Salamander Project's application submission would be included in the cumulative assessment (to the end of October 2023).

Further information on this is outlined in **Volume ER.A.4, Annex 6.2: Cumulative Effects Assessment Technical Annex.**

Table 17-25 External projects identified within a radius for effect of the Salamander Project

Development	Type	Project Stage	Reasons for inclusion
Eastern Green Link 2	Interconnector	Consented	There is potential for temporal overlap of construction timelines and the EGL2 project is 26.78 km and 2.86 km from the OAA and Offshore ECC, respectively.
NorthConnect	Interconnector	Consented	The NorthConnect Project overlaps with the OAA and Offshore ECC.
Hywind Scotland Pilot Park	Floating Offshore Wind Farm	Operational	The Hywind project's array is located 11.7 km and 8.1 km from the OAA and Offshore ECC, respectively. The Hywind project's ECC is located 14.3 km and 0.1 km from the OAA and Offshore ECC, respectively.
Green Volt Floating Offshore Wind Farm	Floating Offshore Wind Farm	Consent Application Submitted	The Green Volt project is included as it is scheduled to be operational by 2027. The Green Volt array is 33.6 km and 38.9 km from the OAA and Offshore ECC, respectively. The Green Volt export cable is 0.3 km from the OAA and overlaps the Offshore ECC.
Cenos Floating Offshore Wind Farm Export Cable	Floating Offshore Wind Farm	Scoping Submitted	The Cenos Floating Offshore Wind Farm project is included as it is scheduled to be operational by 2028 and its ECC overlaps with the OAA and Offshore ECC.
Central North Sea Electrification (CNSE) Project	Platform Electrification	Scoping Submitted	The CNSE project is included as it is scheduled to be operational by 2028. The CNSE project's cable route is 18.1 and 4.6 km from the OAA and Offshore ECC, respectively.
MarramWind Export Cable	Floating Offshore Wind Farm	Scoping Submitted	The MarramWind project's array is 47 km and 59 km from the OAA and Offshore ECC, respectively. The MarramWind ECC search area is 1.5 km from the OAA and overlaps with the Offshore ECC.
Muir Mhòr Offshore Wind Farm	Floating Offshore Wind Farm	Scoping Submitted	The Muir Mhòr project is included as the construction period could overlap with Salamander. The Muir Mhòr project's array is 28.4 km and 30.9 km from the OAA and Offshore ECC, respectively. The Muir Mhòr project's ECC is 5.53 km from the OAA and overlaps the Offshore ECC.

Development	Type	Project Stage	Reasons for inclusion
Peterhead (CR070)	Dredge Spoil Disposal	Operational	Disposal ground located within 3.1 km of the Offshore ECC.
North Buchan Ness (CR080)	Dredge Spoil Disposal	Operational	Disposal ground located 1.7 km and 29.9 km from the Offshore ECC and OAA, respectively.

17.13.2 Cumulative effects (direct physical impacts)

- 17.13.2.1 Marine archaeological receptors are most at risk from direct physical impacts, principally those occurring at the construction phase, however, **Section 17.11** has demonstrated that direct physical impacts may also occur during the O&M and decommissioning phases.
- 17.13.2.2 Potential cumulative effects arising from direct physical impacts would mostly be experienced by larger receptors, such as submerged palaeolandscapes and geological deposits with potential for prehistoric and palaeoenvironmental remains. Given the size of these receptors, it is possible for them to experience direct impacts at multiple locations from more than one project.
- 17.13.2.3 Localised concentrations of effect may be experienced where direct physical impacts of two or more projects overlap, for example at cable crossovers. This may provide cumulative impact on more discrete receptors (e.g. wrecks).
- 17.13.2.4 However, any direct physical impacts would be minimised and managed by each project's commitment to industry recognised embedded mitigation for marine archaeological receptors. Embedded mitigation measures are presented in **Table 17-11**. Commitment to such mitigation on a project-by-project basis would result in **Negligible** or **Minor** significance of effects, or no change, to archaeological receptors within each projects' boundaries and within the Offshore Development Area.

17.13.3 Cumulative effects (indirect physical impacts)

- 17.13.3.1 Cumulative indirect physical impacts may occur through sediment deposition where construction or decommissioning timelines of the Salamander Project and cumulative projects overlap. Indirect physical impacts from sediment scour may also occur during the O&M phases.
- 17.13.3.2 Sediment deposition may result in indirect physical impacts to archaeological receptors, as outlined in **Section 17.11**. Whilst the realistic worst-case scenario of identified impacts is understood through the Project Design Envelope approach for the Salamander Project (see **Section 17.9**), any additional suspended sediment from construction of nearby projects, including dredge spoil disposal grounds, would provide a minor beneficial effect, to increase potential burial and therefore protection of any assets.
- 17.13.3.3 Any scour effects from installation of infrastructure, such as one of the offshore wind farms (e.g. Muir Mhòr or MarramWind) and interconnectors or other cable routes (e.g. CNSE) or from vessel anchors, would occur locally. Similar to direct physical impacts, localised concentrations of scour may be experienced within areas of cable crossover.
- 17.13.3.4 Indirect physical impacts would be minimised and managed by each project's commitment to industry recognised embedded mitigation for marine archaeological receptors, resulting in **Negligible** or **Minor** significance of effects, or no change, to marine archaeological receptors.

17.13.4 Cumulative effects (setting impacts)

- 17.13.4.1 Cumulative setting impacts may occur through the potential construction and operation of offshore infrastructure that changes the sea view from a designated asset.
- 17.13.4.2 As discussed within the SLVIA chapter (**Volume ER.A.3, Chapter 16: Seascape, Landscape and Visual Amenity**), given the distance from the coastline of the offshore infrastructure for all the cumulative projects identified (greater than 60 km) there is limited to no potential to generate (adverse) cumulative setting impacts to onshore heritage assets that produce anything beyond negligible effects to cultural significance. MD-LOT were content that no SLVIA was required for these projects due to the distance from shore. However, a review of the cumulative projects was completed for settings, due to the slight variation in

factors taken into account by settings as oppose to SLVIA. The Hywind Scotland Pilot Park is already in place and therefore creates a limited additive effect.

- 17.13.4.3 Setting Impacts to onshore heritage assets generated during the operational lifespan of the Salamander Project are assessed within **Volume ER.A.4, Annex 17.2: Setting assessment (Offshore)**. This assessment identified minor (beneficial) effects to cultural significance for five assets: LB3042 Rattray Head Lighthouse, LB16367 Buchan Ness Lighthouse and LB31888 Kinnaird Head Lighthouse, Fraserburgh and LB39733 Peterhead Harbour and LB31879 Harbour Works Office, Fraserburgh. The setting of these assets is chiefly, or partially derived from their relationship to the coastal waters to the east of Fraserburgh and Peterhead and trade/shipping that uses these waters or make use of the harbours at Peterhead and Fraserburgh. The Salamander Project would increase shipping in the sea lanes east of these assets and the use of Peterhead/Fraserburgh harbours during the entire lifespan of the Salamander Project and as such would be beneficial to their cultural significance. The assessment identified negligible or no effect to cultural significance for all other onshore assets from the presence of the infrastructure, mainly due to the distance offshore of the proposed offshore infrastructure (greater than 60 km for the cumulative projects) and the broken views from the situation of the heritage assets around the already partially industrialised coastline (St Fergus Gas Terminal).
- 17.13.4.4 The other identified offshore wind farms in the CEA, such as the proposed Green Volt Offshore Windfarm, would generate similar beneficial effects and negligible adverse effects to the assets identified above. The combined cumulative effects of the identified projects, such as the Green Volt Offshore Windfarm, with the Offshore Development would not generate effects that are significant in EIA terms.
- 17.13.4.5 The European Offshore Wind Deployment Centre is located 60 km south of the OAA and is beyond the Peterhead headland (southwest of the OAA). Therefore, there is no overlap in visual impact for any of the onshore assets identified and would not generate effects that are significant in EIA terms.

17.14 Assessment of Impacts Cumulatively with the Onshore Development

- 17.14.1.1 The Assessment of Impacts Cumulatively with the Onshore Development considers the effects of the Offshore Development cumulatively with the Onshore Development for the Marine Archaeology and Cultural Heritage receptors, as well as onshore archaeology and cultural heritage receptors in relation to effects on setting from the Offshore Development.
- 17.14.1.2 The Onshore Development components are summarised in **Volume ER.A.2, Chapter 4: Project Description**. These aspects have been considered in relation to the impacts assessed within this chapter.
- 17.14.1.3 The potential for cumulative effects will arise in respect of those Cumulative direct and indirect physical impacts, principally between MHWS and MLWS, where the Offshore Development Area overlaps with the Onshore Development Area. Cumulative direct and indirect physical impacts are most likely to result from construction-related direct physical impacts. Transition Joint Bays will be located above MHWS, beyond the Offshore Development Area, will be assessed in the Onshore EIAR and exit pits will be outside of this intertidal area. Only further survey, such as core sampling would provide overlap. Therefore, there is limited potential overlap within this area for the Salamander Project, as proposed. The worst case design scenario is given within **Table 17-13**.
- 17.14.1.4 Known Marine Archaeology and Cultural Heritage receptors have been identified (summarised in **Section 17.11.8**) and appropriate mitigation recommended will ensure that no direct physical impacts will occur during Salamander Project lifecycle, and indirect physical impacts may be reduced and monitored. Continued use of the mitigation ensures impacts are limited to a **Minor** significance.

- 17.14.1.5 Potential cumulative direct and indirect physical impacts on unknown Marine Archaeology and Cultural Heritage receptors may arise through trenchless cable laying. **Section 17.7.1** has identified a potential for subsurface remains within the intertidal zone, most likely relating to the Second World War defensive structures identified slightly above MHWS. Impacts to any such remains would be mitigated by the adherence to the WSI and PAD. Further detail can be found within **Volume ER.A.6, Plan P.4: Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD)**. Any subsequent impacts would not carry greater than **Minor** significance.
- 17.14.1.6 The potential for cumulative effects on settings may arise in respect of those onshore archaeology and cultural heritage receptors that will be affected by both the Onshore and Offshore Development. These will include the designated assets, St Fergus old parish church and churchyard (SM5622 and LB16536), and Castle Hill Motte (SM3259) upon which visibility of the Onshore Development and Offshore Development will have direct effects.
- 17.14.1.7 The Onshore Development and Offshore Development, namely the OAA, are very different developments in terms of their size, structure and context which in turn affects the extents and magnitude taken into account within each of the individual assessments. The assessment of the OAA presented in **Section 17.11.6** concludes that negligible or no significant effects will occur from the OAA, largely owing to the distance and scale of the WTGs; minor beneficial significance will occur to Rattray Head Lighthouse (LB3042), Buchan Ness Lighthouse (LB16367) and Kinnaird Head Lighthouse (LB31888), for which there is no overlap with the onshore.
- 17.14.1.8 The lack of potential significant effects on the receptors identified within the settings assessments as a result of the OAA and Onshore Development means that any potential for cumulative effects of both developments will be due to the effects of the Onshore Development alone and not the cumulative effects of the Offshore Development and Onshore Development.

17.15 Transboundary Effects

- 17.15.1.1 Transboundary effects are defined as effects that extend into other European Economic Area (EEA) states. These may occur from the Salamander Project alone or cumulatively with other plans or projects.
- 17.15.1.2 No transboundary impacts to offshore archaeological assets have been identified by this assessment. Accordingly, this element has been scoped out via the Scoping Opinion process, in agreement with HES (see **Table 17-2**).

17.16 Inter-Related Effects

- 17.16.1.1 The following assessment considers the potential for inter-related effects to arise across the three project phases (i.e. Project lifetime effects), as well as the interaction of multiple effects on a receptor (i.e. receptor-led effects).
- Project lifetime effects are considered to be effects that occur throughout more than one phase of the Salamander Project (construction, O&M and decommissioning) to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key Project stages (e.g. construction phase, O&M phase and decommissioning phase).
 - Receptor-led effects involve spatially or temporal interaction of effects, to create inter-related effects on a receptor or receptor group. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

- 17.16.1.2 It is important to note that the inter-related effects assessment considers only effects produced by the Salamander Project and not from other projects, which are considered within **Volume ER.A.4, Annex 6.2: Cumulative Effects Assessment Technical Annex**.
- 17.16.1.3 The significance of the individual effects, as determined in **Section 17.11**, is presented herein for each receptor group. A descriptive assessment of the scope for these individual effects to interact to create a different or greater effect has then been undertaken. This assessment incorporates qualitative and, where reasonably possible, quantitative assessments. It should be noted that the following assessment does not assign significance of effect for inter-related effects; rather, any inter-related effects that may be of greater significance than the individual effects acting in isolation on a given receptor are identified and discussed.
- 17.16.1.4 **Table 17-26** summarises the potential over the Salamander Project lifetime of inter-related effects for Marine Archaeology and Cultural Heritage, including Settings. A receptor based inter-related effects assessment is provided below.

Table 17-26 Summary of the potential project lifetime inter-related effects for Marine Archaeology and Cultural Heritage

Impacts	Residual Effects			Inter-related Effects
	Construction 18 months	O&M 35 years	Decommissioning 18 months	
Direct physical impact	Negligible to Minor	Negligible to Minor	Negligible to Minor	Activities associated with each stage across the lifecycle of the Salamander Project may result in additive direct physical impacts, from initial seabed sampling to construction activities, operational repairs and recovery of infrastructure at the end of the Salamander Project (further details in Section 17.16.2, 17.16.3 and 17.16.4).
Indirect physical impact	Negligible	Negligible	Negligible	Indirect physical impacts may also occur across the three Project phases. Where the overall installation footprint from the construction phase changes during the O&M phase, for example, through the installation of new scour protection beyond the existing footprint. Scour may also occur around vessel anchors, which, although temporary and resulting in a localised effect, would accumulate across all Project phases (further details in Section 17.16.2, 17.16.3 and 17.16.4).
Settings impacts	N/A	Negligible to Minor	N/A	Setting impacts are defined as being limited to the Operation and Maintenance Phase and as such there are no Project lifetime effects when considering setting impacts across the three major phases of the Salamander Project (Construction, Operation and Maintenance and Decommissioning) (further details in Section 17.16.5).

Receptor Based Effects

Receptor-led effects may be experienced by marine archaeology and cultural heritage receptors, where direct physical impacts and indirect physical impacts overlap. Mitigation measures are in place to ensure that once a potential receptor is identified (either known through geophysical survey or through an identification during construction, for example), the potential receptor will be reported and protected, as appropriate. Also, indirect physical effects, such as changes in physical processes, may occur. However, these indirect physical effects

have been assessed as part of the impact assessment (**Section 17.11**).

There are no receptor-led effects in settings, since changes are experienced by the same receptor in each case (asset) and in one way (visually) at one point in time. Therefore, effects on views and on perceived character are inter-linked and do not interact to produce a different, or greater, effect on a receptor than when effects are considered in isolation.

17.16.2 Inter-related Effects to Submerged Prehistory and Palaeolandscapes

- 17.16.2.1 As identified in **Section 17.11**, O&M and decommissioning activities have the potential to result in additional impacts to those occurring during the construction phase. Submerged prehistoric remains and palaeolandscapes may experience inter-related effects where activities of these subsequent phases result in direct physical impacts beyond the footprint of construction phase impacts, such as cable repair beyond the current extent. Activities with the potential to result in inter-related effects are summarised within **Table 17-19**.
- 17.16.2.2 Indirect physical impacts may also occur to this receptor across the three Project phases. Where the overall installation footprint from the construction phase changes during the O&M phase, for example, through the installation of new scour protection beyond the existing footprint. Scour may also occur around vessel anchors, which, although temporary and resulting in a localised effect, would accumulate across all Project phases.
- 17.16.2.3 The sum of potential direct and indirect physical impacts across all Project phases may therefore be greater than those occurring during a single phase. However, any such impacts would be mitigated through adherence to the Salamander Project embedded mitigation, which enables the assessment to remain as **Negligible, No Significant** effect.

17.16.3 Inter-Related Effects to Known and Potential Maritime Archaeology

- 17.16.3.1 Known wrecks and sites of identified high or medium archaeological potential have been attributed suitable AEZs through the Salamander Project's embedded mitigation (see **Section 17.8.3**). This mitigation would be maintained throughout all Project phases and no change would occur to receptors.
- 17.16.3.2 Potential sites of archaeological interest will be managed through further embedded mitigation, as necessary.
- 17.16.3.3 Activities with the potential to result in inter-related effects to this receptor are summarised within **Table 17-20**.
- 17.16.3.4 Embedded mitigation conditions would be applied to identified maritime archaeological sites as appropriate, resulting in no change to these.

17.16.4 Inter-Related Effects to Known and Potential Intertidal and Adjacent Sites

- 17.16.4.1 No archaeological sites have been identified within the intertidal zone of the Offshore Development Area. Activities undertaken within the Offshore Development Area will not result in impacts to the identified Second World War structures identified slightly above MHWS (beyond the Offshore Development Area and within the Onshore Development Area).
- 17.16.4.2 **Section 17.7.1** identified a potential for buried archaeological remains within the intertidal zone of the Offshore Development, which may be impacted across the three Project phases, where the footprint of activities of one phase extend beyond that of previous phases.

- 17.16.4.3 Potential sites of archaeological interest will be managed through embedded mitigation, as necessary.
- 17.16.4.4 Embedded mitigation conditions would be applied to identified intertidal archaeological sites as appropriate, therefore, no greater significance of effect through inter-relationships is anticipated.

17.16.5 Setting Impacts

- 17.16.5.1 Setting impacts are defined as being limited to the Operation and Maintenance Phase and, as such, there are no Project lifetime effects when considering setting impacts across the Construction and Decommissioning phases of the Salamander Project.
- 17.16.5.2 As noted in **Table 17-26**, there will be no receptor-led effects in settings, since changes are experienced by the same receptor in each case (asset) and in one way (visually) at one point in time. Therefore, effects on views and on perceived character are inter-linked and do not interact to produce a different, or greater, effect on a receptor than when effects are considered in isolation.

17.17 Conclusion and Summary

- 17.17.1.1 This assessment utilised a wide range of desk-based sources and site-specific geophysical survey data to determine the potential for remains of archaeological interest to be present within the Offshore Development Area. A series of known and potential remains relating to Marine Archaeology and Cultural Heritage were identified, regarding submerged prehistory and palaeolandscapes, maritime and aviation archaeology and intertidal and coastal sites. A review of the onshore designated assets, with a site visit and associated visualisations, enabled an assessment of the setting impacts from the Offshore Development.
- 17.17.1.2 Assessment of geophysical survey data and the Salamander Project ground model demonstrates that a series of Quaternary geological units are present within the Study Area. These deposits are currently undated but have been provisionally correlated with known and dated Pleistocene and Holocene geological formations and an understanding of the archaeological and palaeoenvironmental potential derived from each unit. A low overall potential for submerged early prehistoric remains (late Upper Palaeolithic and Mesolithic) has been identified for Units 10 and 30, although this determination of potential is dependent on the presence of the units within the nearshore section of the Offshore Development Area, where a survey data gap currently exists. A very low potential has been identified for Units 20, 40, 50 and 60. There is moderate potential for palaeoenvironmental remains to be held within Units 30, 40, 50 and 60.
- 17.17.1.3 Maritime archaeological sites and geophysical anomalies (some of which may have anthropogenic origins and archaeological interest) are present within the Offshore Development Area. Desk-based and geophysical sources indicate the remains of two wrecks (the *Muriel* and the *St Magnus*), both identified as high potential geophysical anomalies, within the Offshore ECC. Numerous potential maritime sites were identified within the geophysical survey data within the Offshore Development Area, including one additional high potential anomaly (likely representing a further wreck) and seven medium potential anomalies. Additional wrecks were identified within the Study Area. There are also large numbers of low potential geophysical anomalies and buried magnetic anomalies of uncertain origin, which may represent archaeological remains. From this evidence and nearby terrestrial archaeological records, there is potential for wreck remains from the Mesolithic to the modern periods to be present within the Offshore Development Area. Most maritime archaeological remains likely date to the post-medieval and modern periods, with a very low overall potential for maritime remains from earlier periods.
- 17.17.1.4 No aviation remains are recorded within the Offshore Development Area or Study Area, although the surrounding aviation-related activity from the First World War onwards suggests a slight potential.

Anomalies identified within the Offshore Development Area may therefore relate to aviation remains, however, the overall likelihood of such is very low.

- 17.17.1.5 No designated or non-designated heritage assets have been identified within the intertidal zone of the Offshore Development Area. Three HER records, for Second World War defensive structures, situated here were found to be duplicate records of assets located slightly above MHWS (i.e. beyond the Offshore Development Area). Similar assets and remains from earlier periods may be buried beneath the beach deposits within the Offshore Development Area, however, the overall potential for such is low.
- 17.17.1.6 An assessment of designated onshore assets relating to changes to settings from the Offshore Development infrastructure were identified, including three lighthouses, a harbour and harbour office, church and churchyard and motte.
- 17.17.1.7 Limitations to the assessment have been identified, including:
- Limited geophysical survey data between c. 3.2 to 8.5 km offshore from MHWS (SBES at 4 m resolution) and useful only for detecting larger features, such as wrecks;
 - No geophysical survey data between MHWS and c. 3.2 km offshore;
 - Magnetometer survey spacings (85 m) too great for detection of buried ferrous objects, particularly smaller objects and objects of archaeological interest may have not been identified;
 - Positional accuracy of documented loss and wreck records and HER can vary and may not correlate with remains at that location; and
 - Currently available geotechnical data limits the correlation of units with geological formations provided affecting the accuracy of the palaeolandscape assessment and potential.
- 17.17.1.8 These limitations will primarily be offset by the collection and archaeological assessment of additional geophysical data prior to construction and geotechnical data, which will be geoarchaeologically reviewed, following the embedded mitigation strategy. HES requirements regarding the nearshore data gap will also be adhered to, including future liaison at key stages.
- 17.17.1.9 The Salamander Project will implement a range of appropriate embedded mitigation measures within the Offshore Development Area, comprising 12 AEZs, one AAP, a site-wide PAD and mechanisms through which to implement additional AEZs, establish TAEZs, undertake marine or intertidal watching briefs (the requirement for watching briefs will be confirmed following analysis of the nearshore data) and undertake geoarchaeological assessment of seabed cores. The embedded mitigation will be implemented through **Volume ER.A.6, Plan P.4: Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD)** and amended, as necessary, following review of future survey data. Through implementation of the embedded mitigation, no impact significance will exceed that of **Minor**. The following receptors hold a **Minor** impact significance:
- Submerged palaeoenvironmental remains;
 - Potential submerged early prehistoric remains (redeposited);
 - Low potential geophysical anomalies.
- 17.17.1.10 All other receptors hold a negligible significance of impact (known and potential wrecks/aviation remains, high/medium potential geophysical anomalies). The AAP identifies an area of magnetic anomalies, with

unknown character, and with the embedded mitigations (including further investigation) there is a negligible significance of impact.

- 17.17.1.11 A total of five designated onshore assets relating to settings were identified to benefit from the presence of the Salamander Project due to a potential increase in shipping (lighthouses, harbour and harbour office), with the remaining onshore designated assets having negligible to no setting impact from the Offshore Development infrastructure.

17.18 References

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