European Offshore Wind Deployment Centre
Environmental Statement

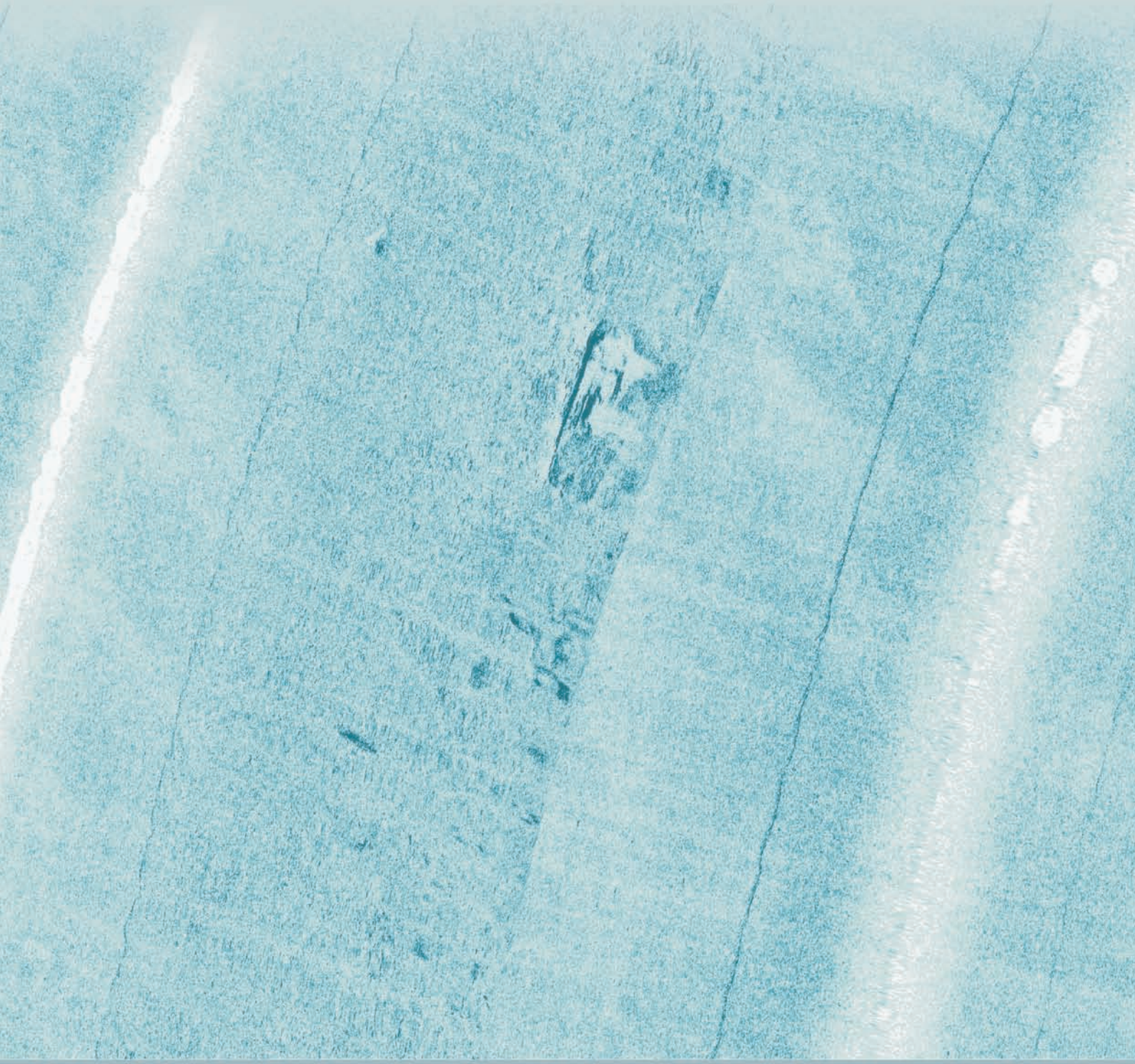
Appendix 18.1: Marine and Maritime Archaeology Baseline Technical Report

A project part-funded by the European Union under the European Economic Plan for Recovery in the field of Energy

Wessex Archaeology

European Offshore Wind Deployment Centre: Baseline

Technical Report



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EUROPEAN OFFSHORE WIND DEPLOYMENT CENTRE: BASELINE

TECHNICAL REPORT

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EUROPEAN OFFSHORE WIND DEPLOYMENT CENTRE: BASELINE

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EUROPEAN OFFSHORE WIND DEPLOYMENT CENTRE: BASELINE

TECHNICAL REPORT

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Data was provided by the United Kingdom Hydrographic Office (UKHO), Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) and Aberdeenshire Sites and Monuments Record (SMR). The geophysical data was provided by EMU Ltd (2007) and Osiris Projects (2010).

Wessex Archaeology is grateful to the staff of all the above organisations for their co-operation during the project.

Dr Andrew Bicket produced this report. David Howell and Patrick Dresch processed and reviewed the geophysical data and further contributed to the report. Kitty Brandon prepared the illustrations. Dr Jonathan Benjamin managed the project for Wessex Archaeology, and quality assurance was conducted by John McCarthy and Dr Paul Baggaley.

Data Licences

Details of archaeological sites within the study area were received from the National Monuments Record Scotland and UKHO. Copyright restrictions apply to this data (http://www.rcahms.gov.uk/crown-copyright.html).

The following acknowledgments and licences apply:

- Jarvis A., H.I. Reuter, A. Nelson, E. Guevara, 2008, Hole-filled seamless SRTM data V4, International Centre for Tropical Agriculture (CIAT), available from http://srtm.csi.cgiar.org.
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Contents

Figures:

Tables:

Covers:

Front: Unidentified wreck WA_7071.
Back: Wessex Archaeology diver returning to dive vessel (© Wessex Archaeology 2008).

1 MARINE & MARITIME ARCHAEOLOGY

1.1 Information for the Non-Technical Summary

1 The proposed European Offshore Wind Deployment Centre (EOWDC) comprises 11 wind turbines and inter-turbine and export electrical cables.

2 A total of two cultural heritage assets characterised as A1 – being '*anthropogenic origin of archaeological interest*' (**WA 7071** and **7072**) have been identified within the survey area, approximately 40m apart. Of these, one is a previously uncharted wreck site (**7071**) and the other is a large piece of debris, possibly relating to a wreck (**7072**) (**Table 1**).

3 Wreck **7071** exhibits a magnetometer contact and therefore may be of partly metal construction, with dimensions similar to that of a small trawler or sailing vessel. Identification is not possible with the available evidence.

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination
7071	Wreck	561077	6342919	**A1**
7072	Debris	561038	6342931	**A1**

Table 1: Summary table of principal features of archaeological interest within assessed geophysical survey area. **N.B. FULL DETAILS CAN BE FOUND IN SECTION A.4.**

4 The shallow geological sequence of much of the survey area represents a prograding shoreline sequence relating to the Forth Formation (**WA 7505**) (**Figure 3**). This type of deposit records changes in sea-level in the area since the Last Glacial Maximum. These deposits are therefore potentially an important palaeogeographical and palaeoenvironmental sequence in relation to local and regional patterns of Mesolithic coastal activity and now-submerged archaeological landscapes. Any cultural heritage assets of early prehistoric origin encountered in an offshore, primary (*in situ*) context would be of national importance.

5 Five small possible cut and fills (**7500**, **7501**, **7502**, **7503** and **7504**) have also been identified in the south-west of the Marine Study Area (MSA). These are shallow, relatively small features and, since it has not been possible to trace them between adjacent geophysical survey lines, they are expected to be isolated depressions and not part of a coherent palaeochannel system. Reworked archaeological material in secondary contexts may be present in the fills of these features.

1.2 Introduction

6 Wessex Archaeology (WA) was commissioned to undertake a technical archaeological assessment for the Environmental Impact Assessment (EIA) of the known and potential marine and maritime cultural heritage assets within the vicinity of the proposed European Offshore Wind Deployment Centre (EOWDC).

1.2.1 Aim & Objectives

1.2.1.1 Project Aim

7 The aim of this report is to provide a baseline of the known and potential cultural heritage assets within a defined Marine Study Area (MSA) (see **paragraph 9**). The MSA contains the maximum proposed development area associated with the installation of 11 turbines and inter-turbine cabling in addition to an indicative export cable corridor. The MSA is outlined on **Figure 1**.

1.2.1.2 Project Objectives

- To outline and discuss the known cultural heritage assets within the MSA based on existing archaeological records, an assessment of marine geophysical data and secondary sources
- To summarise the potential for the presence of unknown archaeological sites that may be impacted by the proposed development with specific reference to human activity associated with palaeo-shoreline change and submerged prehistoric landscapes, maritime installations and wreck sites (civilian and military) of domestic and foreign origin
- To make an assessment of the importance of known and potential cultural heritage assets
- To present the statutory, planning and policy context relating to the historic environment within the MSA (see **Appendix A.1**)

1.2.2 Methodology Consultation

8 During the preparation of this baseline report stakeholders and organisations have been consulted. These are listed below:

- UK Hydrographic Office (101201) – consulted on source data
- RCAHMS (101201) – consulted on source data
- Ministry of Defence, Third Sector Heritage (110128) – consulted on source data

9 In order to provide adequate spatial context for assessing marine and maritime archaeology the MSA was created by placing a 1km buffer around the combined area of the proposed AOWFL Crown Estate lease boundary and the 2010 geophysical survey area as studied by Osiris Projects Ltd (**Figure 1**). This allowed an assessment of maritime cultural heritage assets preserved on the coast (i.e. wrecks run aground on the beach) as well as wrecks and other features on the seabed.

Point	Easting	Northing
1	558678	6346426
2	560802	6345476
3	563484	6346151
4	561740	6340780
5	560394	6340441
6	560813	6342626
7	557769	6341578
8	557275	6339047
9	556445	6339515
Datum: WGS84 **Projection:** UTM z30N		
To obtain MSA, apply 1km buffer to polygon derived from these points		

Table 2: Vertex coordinates of marine study area.

10 The terrestrial components of the proposed scheme are not considered in this report, except where documented wrecks are present on the beach and to provide qualitative context for submerged landscape features.

11 Sub-bottom profiling surveys have also allowed an investigation of Quaternary sedimentary units permitting an assessment of potential for encountering palaeolandscape features of archaeological significance within the context of published sources.

12 The methodology reflects the requirements of Environmental Impact Assessment arising as set out in European Council Directive 85/337/EEC as amended by Directive 97/11/EC. This follows best practice for archaeological reporting as outlined by the Institute for Archaeologists (IfA) in Standards and Guidance for Archaeological Desk-based Assessment (2008).

13 The approach actively assesses models of past sea-level, palaeo-shorelines and submerged prehistoric landscapes alongside the archaeological record to effectively communicate the relationship of the MSA to the extent of inhabitable land throughout the late Pleistocene and Holocene (i.e. last 18,000 years). The broader geological and geomorphological context of the MSA is also summarised to provide sufficient context to allow an assessment of potential for encountering submerged prehistoric landscapes.

14 A variety of documentary sources have been consulted to provide a gazetteer of recorded maritime assets as well as a contextual baseline. This information underpins an assessment of the archaeological and historic importance of maritime resources identified during the geophysical assessment of survey data.

15 This has partly been undertaken within the context of maritime resources compiled and discussed in a previous desk based assessment (DBA) from an area abutting the south of the MSA (Wessex Archaeology 2007) – where appropriate, this report has incorporated and updated elements of the 2007 report, notably maritime history in the Aberdeen Bay area and gazetteers of known losses (**Appendix A.5**).

1.2.3 Data Information and Sources

- Archaeological records for the MSA available in the maritime section of the CANMORE database held by the Royal Commission for Ancient and

Historic Monuments Scotland (RCAHMS) which constitute the National Monuments Record for Scotland (NMRS), also interrogated via a map interface, CANMAP
- Archaeological records for the MSA held locally in the Aberdeenshire, Moray and Angus Sites and Monuments Record (SMR)
- Records of wrecks and obstructions collated by the UK Hydrographic Office (UKHO)
- Records of Protected Places and Controlled Sites provided by the Ministry of Defence
- SeaZone datasets provided by AOWFL including basemapping and wreck information (derived from UKHO records)
- British Geological Survey (BGS) mapping and UKHO charts
- Various secondary sources relating to the palaeo-environment of the area and to the Palaeolithic and Mesolithic archaeology of Northern Europe (see **section 4**)
- Secondary sources relating to wrecks and the maritime environment and the history and archaeology of Aberdeen and its surrounding area (see **section 4**)

16 Geophysical data that has been archaeologically assessed as part of this report is associated with the following reports:

- Emu Ltd (2008) *Geophysical and Seabed Habitat Assessment of the Proposed Aberdeen Offshore Wind Farm for Aberdeen Offshore Wind Farm Ltd.* Report No. 07/J/1/02/1136/0716
- Osiris Projects (2010) *Aberdeen Offshore Windfarm Geophysical Survey. Volume 1: Operations Report. No. C10023*

1.2.3.1 Data Management

17 A Geographical Information System (GIS) using ArcGIS 9.3 has been built to store spatial data for the MSA. Qualitative data without accurate geospatial positions have been compiled in a project archive and used to provide baseline context (e.g. recorded losses).

Feature Numbering System

18 Records of wrecks, casualties and seabed features with sufficient positional data have been mapped in the GIS to determine spatial relationships within the MSA. Duplicate records (i.e. sites and features that appeared in more than one dataset) have been merged where practicable and examined against identified geophysical features and anomalies – reference to original sources are retained in the gazetteer located in section A.2, and highlighted by a Wessex Archaeology identification number (WA_ID) beginning (**WA_2000**).

19 Features identified during the geophysical assessment are numbered with a Wessex Archaeology identification number beginning (WA_6000).

20 Once the documentary records (WA_2000s) and observed geophysical anomalies (WA_6000s) are incorporated into the geophysical assessment the known assets and anomalies on the resulting list have each been given a final unique WA_ID number in a sequence starting at **WA_7000**; reference is retained in the gazetteer to the earlier documented features number system (i.e. WA 2000s – documentary records – and 6000s – geophysical anomalies).

21 A full gazetteer of wrecks, casualties and obstructions within the MSA is presented in Appendices A.2 - A.5.

Data Source Quality

22 The UKHO is considered to be the primary record for wrecks and obstructions on the seabed. Wreck information from the UKHO is incorporated into the SeaZone datasets that were also consulted during this project. The following definitions describe the state of the wreck and obstruction records held by the UKHO (incorporated into the SeaZone datasets), and which have been used to classify some of the sites in the gazetteer:

- ABEY: Previously reported but not detected by survey, leading to doubts about its reported position or existence
- DEAD: Not detected by repeated surveys, therefore considered not to exist
- LIFT: A salvaged wreck
- LIVE: All wrecks and anomalies found by UKHO survey

23 DEAD features may just be buried or obscured during subsequent surveys, and therefore represent potential cultural heritage assets which must be considered. This may apply to ABEY records as well; however, poor positioning of such records may make it difficult to reconcile documentary sources with seabed features.

24 CANMORE/CANMAP provides a mapping interface in which to examine the National Monument Record of Scotland (NMRS). The database assigns the positions of these losses with varying degrees of positional accuracy. Where wreck positions are provided by both the UKHO and CANMORE databases, and positional quality can be accurately assessed, the most accurate positional information has been used. For wrecks discussed in this report, positional information is derived from UKHO records (duplicated in the SeaZone datasets). Wreck records from CANMORE have been integrated into the gazetteer of recorded losses as the positional information was found to be inaccurate (**Appendix A.5**).

25 The Aberdeenshire SMR also provides a map interface allowing the creation of polygons to define the desired search area. The marine and maritime content is relatively scarce, within the MSA some records of beached wrecks are present but with relatively poor positional information. The SMR is also a valuable source for early prehistory, particularly for Mesolithic period sites that provide context for submerged Holocene landscapes, inundated by sea-level rise. These themes are developed in the baseline (see **section 2.3.2.4**, **Table 10**).

26 Many of the records in the CANMORE (RCAHMS) and Aberdeenshire SMR databases and other sources (e.g. literary sources) can be termed ‘recorded losses’. These records refer to maritime casualties for which there are no currently known or confirmed seabed remains. Casualty positions are often based on descriptive definitions or dead reckoning and therefore tend to be much less precise and reliable for older shipwrecks. The records are based on the recording practice of ‘Named Locations’, such as 'off Aberdeen' whereby records are assigned to an arbitrary position not directly related to their point of loss, but within the general area.

27 Casualties that will not have resulted in an archaeological site, such as strandings that were subsequently refloated, have been excluded.

28 A qualitative assessment for the potential for encountering military aircraft crash sites at sea is made in **section 2.5**.

29 Recorded losses 'attached' to the Named Locations that may fall within the MSA have been included in the gazetteer (**Appendix A.5**). However, it should be understood that considerable uncertainty attaches to the actual location of many of the losses records. Therefore the gazetteer is likely to contain records of many losses that have not occurred within the MSA.

1.2.3.2 Mapping and Datums

30 All positions and figures are presented in **UTM zone 30N**, relative to the **WGS 84** datum.

31 Unless otherwise stated, all depths are given in metres and relate either to the Chart Datum (CD) Aberdeen or to the Ordnance Datum (OD), Newlyn. The difference between CD Aberdeen and OD is -2.25m, i.e. CD Aberdeen is 2.25m below OD (Newlyn).

1.2.3.3 Chronology

32 In order to clarify the discussion of submerged landscape potential the chronology of British prehistory currently extending to the last 1 Million years (Ma) is presented in **Figure 2**. Major archaeological industries (characteristic artefacts and technologies of particular periods) and their sea-level context are provided; the fluctuating 'island' palaeogeography of Britain is a critical factor for understanding and assessing the archaeological record.

33 The archaeological dating presented in this report relies on two distinct chronological systems. These are as follows:

- Calendar dates, which are suffixed with BC (Before Christ). Such dates can be considered as part of our present day calendar. Derived from chronological methods that equate directly to calendar years or calibrated radiocarbon dates are either related to our modern calendar as BC (cal.BC) dates, or presented as cal.BP (before present) dates calculated in years before 1950
- BP dates (before 1950) are generally used for geological time and refer to dates derived by means other than radiocarbon dating (which is limited to dating the last 45,000 years

34 Archaeological periods during the Holocene (last 10,000 years BP) are outlined in **Table 3**, based upon the scheme adopted for Scotland by the RCAHMS.

Period	Dates
Mesolithic	8600-4000 BC
Neolithic	4000-2000 BC
Bronze Age	2000-800 BC
Iron Age	800 BC – AD 79
Prehistoric	Pre-AD 79
Roman	AD 79-410
Early Historic	AD 411-700
Early Medieval	AD 700-1100
Medieval	AD 1100-1540
Post-Medieval	AD 1541-1700
Industrial	1700-1899
20th Century	1900-1999

Table 3: Key archaeological periods pertaining to Scotland (RCAHMS).

1.2.3.4 Geophysical Assessment Methodology

35 As part of this technical report WA carried out an archaeological assessment of marine geophysical data previously collected by Emu Ltd. (2007) and Osiris Projects Ltd. (2010) in conjunction with records of historic wreck sites and the archaeological record. This has resulted in an archaeological review of the effects of the proposed development upon sites of archaeological interest within the MSA (Wessex Archaeology 2011b). The objectives were as follows:

- To assess geophysical data in order to identify any material of archaeological interest lying within the limits of the survey area
- To locate, identify and characterise any previously unrecorded archaeological sites, and confirm the presence and condition of any known sites within the survey area
- To identify the presence of any sedimentary deposits of archaeological potential
- To propose future mitigation for material of archaeological interest within the survey area

36 The geophysical data used for this report were assessed for quality and were rated as variable using the following criteria:

Data Quality	Description
Good	Data which are clear and unaffected by weather conditions or sea state. The dataset is suitable for the interpretation of standing and partially buried metal wrecks and their character and associated debris field. These data also provide the highest chance of identifying wooden wrecks and debris.
Average	Data which are affected by weather conditions and sea state to a slight or moderate degree. The dataset is suitable for the identification and partial interpretation of standing and partially buried metal wrecks, and the larger elements of their debris fields. Wooden wrecks may be visible in the data, but their identification as such is likely to be difficult.
Variable	This category contains datasets with the quality of individual lines ranging from good to average to below average. The dataset is suitable for the identification of standing and some partially buried metal wrecks. Detailed interpretation of the wrecks and debris field is likely to be problematic. Wooden wrecks are unlikely to be identified.

Table 4: Geophysical survey data quality categorisation.

37 A particular issue which adversely affected the quality of the data appears to have been variable weather conditions encountered during both of the surveys. This has resulted in a minor to high degree of noise being present on both the sub-bottom profiler and sidescan sonar datasets, though the sidescan sonar appeared more detrimentally affected. As a result of this, it is not possible to guarantee that all the potential archaeological features in the data have been correctly identified during archaeological assessment by WA.

Geophysical Data –Technical Specifications

38 The data were obtained during two separate surveys. The first was conducted by Emu Ltd. (Emu 2008) between the 13th and 18th September 2007 on the *FPV Morven*, and the second by Osiris Projects Ltd. (Osiris 2010) between the 3rd September and 26th October 2010 on the *MV Lia*. Both datasets consisted of sidescan sonar, sub-bottom profiler, multibeam bathymetry and marine magnetometer data.

39 Emu used a Klein 3000 dual frequency (100kHz and 500kHz) sidescan sonar system operated at 100m range, with positioning provided by manual layback applied during processing. Data were recorded digitally using SonarPro software and provided to WA as *.xtf* files. Osiris used a GeoAcoustics 159D dual frequency (110kHz and 410kHz) sidescan sonar towfish operated at 75m range, again with laybacks applied during processing. Data were digitally recorded using a Coda DA2000 acquisition system and provided to WA as *.cod* files.

40 For the sub-bottom profiler data, both Emu and Osiris used a surface-towed Applied Acoustics AA200 Boomer, with either a C-Products (Emu 2008) or Applied Acoustics (Osiris 2010) 8 element trailing hydrophone. The systems were operated at a power of 100J and 250ms firing rate. Data were digitally recorded using a Coda DA2000 acquisition system in both cases, with the data being provided to WA as *.cod* files.

41 The magnetic data for both surveys was acquired using a Geometrics G882 Caesium Vapour magnetometer, with the data being logged directly by the

navigational computer. The data were provided to WA as *.txt* files by Emu and as *.csv* files by Osiris.

42 To acquire the multibeam bathymetry data, Emu used a Reson Seabat 8101 240kHz swathe head and QINSy 8 acquisition software. The data were provided to WA as *.txt* files. Osiris used a GeoAcoustics GeoSwath 250kHz sytem with a Valeport Mini SVS providing real time SVP data. Data were recorded using GeoSwath Plus software, and provided to WA as *.txt* files.

43 For the 2007 survey, positioning was provided by a CS1 Minimax DGPS system, receiving corrections from the EGNOS differential network. For the 2010 survey, primary positioning was provided by C-Nav 3050M system receiving corrections from the EGNOS differential network, whilst secondary positioning was provided by a Leica GX 1230 Smartnet RTK GPS system.

Geophysical Data - Processing

44 The sidescan sonar data were processed by WA using Coda Geosurvey software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were initially scanned to give an understanding of the geological nature of the area and were then interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.

45 A mosaic of the sidescan sonar data is produced during this process to assess the quality of the sonar towfish positioning. The survey lines are smoothed, and the navigation corrected either with CNV files provided by the survey company who acquired the data or individual fixed laybacks as recorded in the survey logs. This allows the position of anomalies to be checked between different survey lines and for the layback values to be further refined if necessary.

46 The form, size, and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature, and therefore of its potential archaeological interest. A single, small, but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may define the edges of a buried but intact feature, or it may be all that remains of a feature as a result of past impacts from, for example, dredging or fishing. The application of a ratings system is therefore a means of prioritising sites in order to inform further staged of the interpretation process, and on its own is not definitive.

47 The shallow seismic data were studied in order to detect any in-filled palaeochannels, ravinement surfaces and peat/fine-grained sediment horizons that may have archaeological potential.

48 The shallow seismic data were processed by WA using Coda Seismic+ software. This software allows the data to be visualised with user selected filters and gain settings in order to optimise the appearance of the data for interpretation. The software then allows an interpretation to be applied to the data by identifying and selecting a sedimentary boundary that might be of archaeological interest.

49 The shallow seismic data were interpreted with a two-way travel time (TWTT) along the z-axis. In order to convert from TWTT to depth, the velocity of the seismic waves was estimated to be 1,600ms^{-1}. This is a standard estimate for shallow, unconsolidated sediments.

50 Any small reflectors which appear to be buried material such as a wreck site covered by sediment were also recorded, the position and dimensions of any such objects noted in a gazetteer, and an image of each anomaly acquired. It should be noted that anomalies of this type are rare, as the sensors must pass directly over such an object in order to produce an anomaly.

51 The magnetometer data were processed by WA using Geometrics MagPick software in order to identify any discrete magnetic contacts which could represent buried metallic debris or structures such as wrecks.

52 The software enables both visualisation of individual lines of data and gridding of data to produce a magnetic anomaly map. Smoothed averages of the data were first calculated, and the subtracted from the raw data values in order to reduce the effect of natural variations in the magnetic field such as changes in geology or water depth.

53 The multibeam bathymetry data were used to provide a vertical reference for the sub-bottom profiler data, and were fully analysed to identify any unusual seabed structure that could be shipwrecks or other anthropogenic debris. The data were gridded and analysed using Fledermaus software, which enables 3-D visualisation of the acquired data and geo-picking of seabed anomalies

Geophysical Data – Anomaly Grouping & Discrimination

54 The previous section describes the initial interpretation of all available geophysical datasets, which were conducted independently of each other. This inevitably leads to the possibility of any one object being the cause of numerous anomalies in different datasets and apparently overstating the number of archaeological features in the study area.

55 To address this fact, the anomalies were grouped together along with the results of the desk-based study of known archaeological sites. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record, a magnetic anomaly, and multiple sidescan sonar anomalies.

56 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to the record in order to discriminate against those which are not thought to be of an archaeological concern. These flags are ascribed as follows:

Non-Archaeological	U1	Not of anthropogenic origin
	U2	Known non-archaeological feature
	U3	Non-archaeological hazard
Archaeological	A1	Anthropogenic origin of archaeological interest
	A2	Uncertain origin of possible archaeological interest
	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly

Table 5: Criteria discriminating relevance of feature to proposed scheme.

57 All the sites that have been identified within the study areas are presented in **Appendix A.4** and discussed in this report.

58 The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment for further evaluation should more information become available.

1.2.4 Key Guidance Documents

59 There is various archaeological guidance applicable to offshore developments, details of which may be found here (see references for full details, **section 4**):

- The Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee 2006 (JNAPC 2006)
- Historic Environment Guidance for the Offshore Renewable Energy Sector, COWRIE 2007 (Wessex Archaeology 2007)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment; from Offshore Renewable Energy, COWRIE 2008 (Oxford Archaeology & George Lambrick Archaeology and Heritage 2008)
- Protocol for Archaeological Discoveries: Offshore Renewables Projects, The Crown Estate, 2010 (Wessex Archaeology 2010)
- Towards a Strategy for Scotland's Marine Historic Environment (Historic Scotland 2009) http://www.historic-scotland.gov.uk/marine-strategy.pdf

2 BASELINE DESCRIPTION

60 In order to assess the existing marine and maritime archaeological record within the MSA and the potential for encountering other cultural heritage assets during the course of future development activity, a baseline is discussed below.

61 The **known cultural heritage assets** are identified primarily through the archaeological assessment of geophysical survey data and integrated where possible with documentary sources.

- Palaeolandscape features visible on sub-bottom profiler (SBP) survey lines are identified and discussed within the regional geological and palaeogeographical literature
- Seabed features identified from sonar and magnetometry survey datasets are then discussed, focusing upon wrecks and obstructions that are preserved on the seabed, where possible, in conjunction with documented losses

62 The potential for encountering further cultural heritage assets within the MSA is then discussed with specific reference to regional records of prehistoric archaeology and submerged Holocene palaeolandscapes preserved at or beneath the modern seabed. This potential is directly focused on the data-led assessment of the geophysical survey reported below where possible. In some cases it is necessary to provide a broader overview in order to highlight the range of issues that may encountered by offshore developments of all kinds.

63 Later prehistory and maritime history are then discussed for the north-east region of Scotland and Aberdeen Bay within an increasing focus upon vessels as rising sea-levels reached modern levels by the Neolithic (*c.* 4000 BC).

2.1 Archaeological Assessment of Geophysical Survey Data

2.1.1 Sub-bottom Profiler (SBP) Assessment

64 Both Emu and Osiris used a surface-towed boomer and trailing hydrophone to acquire the shallow seismic data from the survey area. Of the dataset collected by EMU and Osiris, 20% was archaeologically assessed by WA for the purpose of this report, in line with current practice.

65 The broad geological sequence across the survey area can be summarised as follows (interpreted from the current geophysical data, BGS 1986, Gatliff *et al.* 1994, and Stoker *et al.* 2008):

Unit	Description
1	Recent (Holocene) seabed sediments, silty sand.
2	Late Devensian / Early Holocene fluvio-deltaic and marine sands (**Forth Formation (FH)**, **St. Andrew's Bay Member**)
3	Late Devensian Till (**Wee Bankie Formation**)
4	Devonian Bedrock (**Old Red Sandstone**)

Table 6: General geological sequence from the survey area.

66 Not all of the sequence described above is present across the entire geophysical survey area, with some of the units being absent in places. The geological units are individually described below.

67 **Unit 4** is the oldest unit and forms the basement geology across the MSA. The unit is often very shallow and outcrops at the seabed in places along the western edge of the survey area, though is seen to dip towards the east. BGS reports indicate the sequence is Old Red Sandstone of Devonian age, and is therefore considered too old to be of possible archaeological potential. It is possible that the upper surface of the unit could have once been a land surface upon which archaeological material could have been deposited, though it is expected that any land surfaces which were once present have been subsequently removed by ice erosion during the Devensian glaciation.

68 **Unit 3** directly overlies **Unit 4** across most of the survey area, although it is possibly absent in places. The upper reflector of the unit is irregular and often shows high relief creating a unit of variable thickness. As with Unit 4, it outcrops at seabed towards the west of the survey are and, in general, dips towards the east. The internal structure is generally chaotic. This unit is interpreted as being the Wee Bankie Formation, a glacial till of Late Devensian Age. Due to its glacial nature, this unit is again not considered of possible archaeological potential.

69 **Unit 2** is present across most of the survey area. In the west it fills hollows formed by the irregular relief of **Unit 3** and gradually thickens to the east where it appears as a more uniform blanket deposit. This is interpreted as being the St. Andrew's Bay Member of the Forth Formation (FH, **Figure 3**), a deposit of Late Devensian / Early Holocene fluvio-deltaic and marine sand (Gatcliff *et al.* 1994).

70 Previous work in the wider region (Stoker *et al.* 2008) has suggested that this deposit is part of a prograding shoreline created during periods of relative sea-level change (caused by glacial melting and isostatic rebound) after the last glacial maximum, and that it is divided into four distinct lithozones. A poorly defined reflector (**7505**), observed dipping gently eastwards from a line approximately shore-parallel across the centre of the survey area, could indicate a boundary between two of these lithozones (**Figure 3**).

71 Five small possible cut and fills (**7500**, **7501**, **7502**, **7503** and **7504**) have also been identified in the surface of **Unit 3**. These are shallow, relatively small features and, since it has not been possible to trace them between adjacent lines, they are expected to be isolated depressions and not part of a coherent palaeochannel system.

72 **Unit 2** is potentially of some palaeoenvironmental interest as it contains a record of sea-level change and coastal position since the last glacial maximum. However, the generally sandy nature of the sediments indicate it is unlikely that any organic matter would be preserved within the unit, and it has been previously found that even more inorganic microfossils (e.g. foraminifera) are sparse within this sequence (Stoker *et al.* 2008), reducing its significance from this point of view. Additionally, while there is the potential for some archaeological material to be present within **Unit 2**, this potential is low, and any material that does survive is likely to be re-deposited and not in a primary context.

73 **Unit 1** comprises the Holocene seabed sediment across the study area, and for the most part consists of a thin veneer of silty sand with numerous patches of finer grained sediment. **Unit 1** is not present across the entire site, and is absent in patches towards the west of the study area where **Unit 4** and **Unit 3** outcrop at the

seabed. A curvilinear, roughly shore-parallel sand bank up to approximately 5m high has been identified running along the western edge of the survey area, and represents the thickest localised accumulation of superficial seabed sediment. This is expected to be a Holocene feature, probably comprising older, re-worked sediment.

74 Holocene seabed sediments are not considered archaeologically important in themselves, though where they form large mobile sand waves and banks they can potentially cover archaeological sites including shipwrecks. However, due to the generally thin nature of **Unit 1** in the study area, the potential for this to occur is low.

2.1.2 Seabed Features Assessment

75 A total of 87 sidescan sonar anomalies plus 154 magnetometer anomalies were individually identified within the MSA using data collected by EMU Ltd and Osiris Projects Ltd. These were grouped, together with any recorded wrecks and obstructions as identified by the UKHO within the area covered by the geophysical data, to produce a list of 103 sites of potential archaeological interest. Additionally, 2 of these 103 features are recorded wrecks or obstructions provided by the UKHO and NMR searches. Being located outside of the geophysical survey area in the MSA buffer they are listed as A3 features as they have not been observed. These were all characterised as follows:

Archaeological Discrimination	Number of Anomalies	Interpretation
A1	2	Anthropogenic origin of archaeological interest
A2	97	Uncertain origin of possible archaeological interest
A3	4	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total:	**103**	

Table 7: Archaeological assessment of identified geophysical anomalies.

76 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance:

Anomaly Classification	Number of Anomalies
Recorded Wreck / Obstruction (*based solely on documentary sources*)	4
Wreck (*features identified solely by geophysical assessment*)	1
Debris	23
Seafloor Disturbance	1
Dark Reflector	13
Rope / chain	3
Magnetic	58
Total	**103**

Table 8: Classification of geophysical anomalies.

77 The individual sites identified in the geophysical survey are discussed below. Further detail can be found in **Appendix A.4** and **Figure 4**.

78 Documented wrecks with accurate positions within the MSA are presented in **Figure 4** (see **Appendix A.2**). Following geophysical assessment it was not possible to identify or confirm the presence of these features as they were either outside of the geophysical survey area (although still within the overall MSA) or their recorded positions were not accurate. See **Figure 4** for details of the dataset used to underpin the conclusions of this report.

79 Only one definite wreck site (**WA 7071**) was identified across the entire survey area, located approximately 60m north-west from the proposed location of Turbine 8 (**Figure 5**). The wreck measures (approximately 25m x 6.5m x 0.7m), and exhibits structure and height suggesting it is upright and relatively intact, though it is possibly partially buried. Multibeam bathymetry data indicate it is located in a very shallow (<0.5m deep) scour, and an associated magnetic anomaly of 58nT (magnetic amplitude (nT)) indicate the structure is at least partially ferrous in composition. The name and history of the structure is unknown, as it was not present in the provided UKHO data, suggesting it is a previously unknown structure. The wreck is illustrated in **Figure 5**.

80 Lavery (2001:78-79) describes steam trawlers of similar dimensions dating to throughout the later 19th and 20th centuries and Aberdeen was a centre for shipbuilding with local vessel types a distinctive aspect of the maritime history of the area as discussed in the maritime baseline (**Section 2.4**). Further information will be required to enable an assessment of the archaeological importance of this wreck.

81 Additionally, four previously documented wrecks or obstructions (**WA 7046**, **7093**, **7102** and **7103**) were not identified by the geophysical survey. **WA 7102** and **7103**, the given locations of the wrecks of the *Sheriffmuir* and the *Coastal Emperor* respectively, were located outside of the geophysical survey area and so their presence/location/current condition cannot be commented upon at this time.

82 **WA 7093** is the given location of the wreck of the SS *Archangel*, which was not identified by any of the survey equipment despite the UKHO records indicating it is a large vessel and probably contains a number of ferrous elements. The last amended survey date is given as 1977, which may indicate that this position is inaccurate and the wreck is actually located elsewhere beyond the boundaries of the survey area.

83 **WA 7046** is recorded as the location of a seabed obstruction, specifically an anchor and shackles abandoned on the seabed. This was not identified by any of the geophysical equipment, and could either be located a short distance away outside of the geophysical survey area, or be buried by seabed sediments at the time of survey.

84 Three sites (**WA 7000**, **7047** and **7051**) comprise curvilinear dark reflectors, with a small acoustic shadow and small magnetic anomaly in the case of **WA 7000**. These are interpreted as possible lengths of rope or chain. Lengths of rope or chain such as this could be pieces of modern debris abandoned on the seabed, or could be all that is visible of mostly buried structures or those that have been damaged by wave action or fishing.

85 23 sites (**WA 7001**, **7006**, **7019**, **7020**, **7023**, **7024**, **7027**, **7029**, **7038**, **7045**, **7049**, **7052**, **7069**, **7072**, **7073**, **7074**, **7076**, **7085**, **7086**, **7087**, **7090**, **7097** and **7100**)

have been classified as possible pieces of anthropogenic debris (A2 - **Table 5**). Of these, **WA 7001**, **7038**, **7045** and **7087** have been found associated with magnetic anomalies and are interpreted as being at least partially ferrous in nature. **WA 7038** in particular, a rounded dark reflector with an acoustic shadow and associated scour, is associated with a magnetic anomaly of 53nT and is possibly highly ferrous in nature.

86 The remainder of the debris sites are interpreted as being non-ferrous. **WA 7006**, **7049**, **7052**, **7074**, **7076**, **7085**, **7086** and **7100** are short, linear reflectors (or linear alignments of individual reflectors) and are possibly the visible portions of partially buried structures **WA 7069** is a longer linear reflector and possibly a length of rope or chain, but the data is unclear. **WA 7090** is a very long, straight dark reflector extending seawards from an outfall pipe observed on the magnetometer data. This is possibly a piece of debris caught on the edge of the outfall pipe, though the pipe itself is not easily visible. **WA 7029** is a curvilinear dark reflector linking a number of small point contacts, and could possibly be fishing gear.

87 **WA 7019** and **7020** are limited areas of small, irregular dark reflectors and are potential small scatters of badly degraded non-ferrous debris. The remainder (**WA 7023**, **7024**, **7027**, **7072**, **7073** and **7097**) are individual, generally isolated features, generally with acoustic shadows, and could be individual large pieces of non-ferrous debris. Site **WA 7072** is of particular note, as it is located close to wreck **WA 7071** and is possibly debris relating to the structure.

88 13 of the sites (**WA 7002**, **7013**, **7022**, **7025**, **7028**, **7030**, **7031**, **7032**, **7033**, **7034**, **7075**, **7098** and **7099**) have been interpreted as dark reflectors. These are all generally isolated, poorly defined contacts without magnetic anomalies which could either be natural features, likely in an area where the bedrock outcrops at seabed periodically, or pieces of non-ferrous anthropogenic debris.

89 One site (**WA 7021**) has been classified as an area of seafloor disturbance, and is characterised by a small area of low seabed reflectivity containing small dark reflectors. Due to the data quality on the survey line where this site was identified, the feature is poorly resolved and so its precise nature is uncertain. It could either be of anthropogenic or natural origin.

90 The remaining 58 sites (see **Appendix A.4** for full list) are magnetic anomalies without any apparent sidescan sonar or multibeam bathymetry contact. Of these, 38 are relatively small in size (<20nT) and could represent either small pieces of buried debris or natural changes in the seabed geology. A further 16 are slightly larger, and are more likely to represent small pieces of buried ferrous debris than natural features.

91 Four sites (**WA 7065**, **7081**, **7091** and **7092**) are significantly larger. **WA 7065** (68nT) is an isolated magnetic anomaly and could possibly represent the presence of a large piece of buried ferrous debris. **WA 7081** (183nT) is the largest magnetic anomaly and is situated on the western edge of the survey area, close to the shoreline. This position indicates it could be an anthropogenic coastal structure (e.g. pipe), though it could be the remains of a now buried beached shipwreck. **WA 7091** (47nT) is located close to the end of an outfall pipe (itself identified by a linear alignment of strong magnetic anomalies) and could be either ferrous debris from a marine context, or terrestrial material introduced into the area via the pipe. **WA 7092** (45nT) is located at the far northern edge of the survey area. It could represent a piece of buried ferrous debris, though its position at the end of a survey

line indicates it could also have been caused by continuing logging of data as the survey equipment was pulled in.

92 Additionally, a large area of very strong magnetic anomalies is present towards the south-west of the survey area (**Figure 4**). This is too large to have been caused by an anthropogenic feature, and is instead interpreted as representing an igneous intrusion at depth, beyond the penetration of the sub-bottom profiler equipment. Such intrusions are known to be present on land in the area (GSGB 1957), and it is conceivable that they continue offshore in the region of the survey area.

2.2 Environmental Baseline – Pertaining to Cultural Heritage Asset Potential

2.2.1 Introduction

93 The potential for the presence of submerged prehistoric archaeology within the region is dependent upon the age and nature of the sedimentary units present at and offshore of the coast, and is closely related to relative sea-level change through time (**Figure 2**). Therefore an outline of the relevant known shallow geological, sea-level, topographical and climate change data relating to the region and the impact that they are likely to have on archaeological potential is given below.

94 An assessment of sea-level is important because at various times during prehistory the sea-level will have been low enough for the offshore areas of eastern Scotland in the North Sea Basin to have been dry land, and therefore available for exploitation by humans. This occurred when water that would otherwise be held in oceans and seas was locked into ice sheets during periods of glaciation.

2.2.1.1 Site formation - Taphonomy

95 The taphonomy (contributory formation processes) of archaeological deposits is of central importance to assessing the nature, development and significance of the archaeological record. Archaeological material can be preserved in primary contexts, where the spatial relationship between finds has not substantially altered since deposition, and in secondary contexts, where artefacts have been 'derived' or moved from their original positions. Secondary context sites can be associated with fluvial re-deposition, glacial processes, marine transgression and other processes of disturbance.

96 The formation, preservation, survival and discovery of submerged prehistoric sites and deposits (in primary and secondary contexts) are dependent on a number of factors. With respect to environmental conditions, they are likely to have been affected by:

- Beach and offshore gradient
- Speed of transgression
- Fetch magnitude, influencing wave amplitude and wavelength
- The degree of cohesiveness of the deposit being submerged
- Local topography, in terms of coastal forms, presence/absence of estuaries, sediment bars and islands
- The presence of frozen ground or permafrost at inundation

2.2.1.2 Geomorphology and Hydrology

97 Dune-backed sandy beaches characterise much of the coast of eastern Scotland at river mouths and sheltered embayments (e.g. Aberdeen Bay), interspersed with rocky coastline. Estuaries and tidal reaches of major rivers are also areas of archaeological interest such as at Montrose, the Tay and Forth. Broadly speaking, nearshore areas off the east Scottish coast slope gently from Mean Low Water (MLW) to an extensive and generally flat offshore platform at a depth of 50-70m.

98 Wave direction along the eastern coast is predominantly from the east or south-east. Significant wave heights of 2m can be expected for 10% of the year (Flemming 2004). Along the Scottish east coast there is a general southern flood and northern ebb tidal flow.

2.2.1.3 Climate

99 The climate during the last 780,000 years (Cromerian Complex stages OIS 13 to 17) alternated between cold and warm phases. At least six distinct temperate phases have been identified, between approximately 450,000 and 780,000 BP (Preece 1995). Since then there has been a similar sequence of alternating cold and relatively warm periods. The cold periods correspond with the glacial advances noted below.

2.2.1.4 Sea-level Change and Glaciation

100 There were at least two glacial phases (MIS 14 and 16) during the Cromerian (**Figure 2**). Since then the Northern European landscape was shaped by a further three major glaciations which are known as the Anglian (480,000-425,000 BP), Wolstonian (380,000-130,000 BP) and Devensian (70,000-12,000 BP). During these glaciations north-eastern Scotland would probably have been covered by ice sheets, though the exact extents of ice sheets during different glaciations and the time of maximum extents at different points on the margins of the ice sheets is still the subject of considerable debate (Merritt *et al.* 1995; Shennan and Horton 2002; Ballantyne 2004).

101 Most of the Scottish continental shelf was covered by these successive ice sheets, although at least six phases of growth and retreat have been identified (Ballantyne 2004). The ice sheets were centred upon the Scottish Highlands and extended as far as the continental shelf to the north and north-west.

102 In northern Scotland the Devensian glacial maximum occurred some time after 26,000 BP, with deglaciation well advanced by 15,000 BP (Ballantyne 2004). By 13,000 BP the ice sheets had completely melted in lowland areas, although there was a brief period of renewed ice cover during the Loch Lomond stadial at about 11-10,000 BP (Ballantyne 2004). Allowing for the uncertainties of isobase mapping, north-east Scotland (Aberdeenshire) probably ceased to be covered by the ice sheet at some point between 18,000 and 14,000 BP (Lambeck 1995) with more southerly areas becoming ice free by the Holocene (10,000 BP) (**Figure 6**).

2.2.1.5 Suitability for Human Occupation

103 Ethnographic evidence shows that human hunting cultures can operate successfully along the margins of ice and sea (Blankholm 2004). That this was the

same in the past is demonstrated by the discovery of a number of sites in the Russian high Arctic (Pitulko *et al.* 2004, Pavlov *et al.* 2001) and observations made of native Inuit populations in the Canadian Arctic by early European explorers strongly suggests that cold was not the principal limiting factor for the spread of early human populations.

104 Suitability for human occupation instead depended upon the availability of food. The nature of available food sources would have varied with climate. There is no evidence for agriculture in Britain prior to the Neolithic and earlier human populations would have been dependent upon a hunter-gatherer mode of subsistence.

105 The region is likely to have been suitable for early human populations whenever it was not covered by ice or submerged (**Figure 6**). During the cooler periods plant resources would have been relatively sparse, and populations would have been largely reliant on animal resources, either marine or terrestrial. Such animals are likely to have been present within the region, during cooler periods perhaps on a migratory basis and during warmer periods on a permanent basis.

2.3 Cultural Heritage Baseline - NE Scotland & Blackdog, Aberdeen Bay

2.3.1 Lower, Middle and Early Upper Palaeolithic (>780,000 – 12,000 BP)

2.3.1.1 Introduction

106 During the Lower and Middle Palaeolithic Britain would have been occupied by a range of hominins, including *Homo heidelbergensis* and *Homo neanderthalensis*. During the Upper Palaeolithic, these populations would have been replaced by modern humans - *Homo sapiens* (**Figure 2**).

107 The dominant palaeogeographic setting of Britain for the majority of the late Pleistocene is that of a peninsula connected directly to mainland Europe across a broad front; from southern Scandinavia to north-west France. The flux of eustatic sea-level during inter-glacial periods has periodically flooded the English Channel and areas of the North Sea to create an island Britain. For the majority of the last 1 million years, especially during glacial periods, lower sea-level meant that Britain and Scotland were, to a greater or lesser extent directly connected to continental Europe (**Figure 2**, **Figure 6**).

2.3.1.2 Evidence of Human Occupation in Scotland

108 No well-provenanced and reliable archaeological evidence of human occupation during the Lower, Middle and Early Upper Palaeolithic is known from Scotland. (Wickham-Jones 1994). The cave site excavated in 1926 at Creag nan Uamh in Sutherland contained an accumulation of reindeer bones dating from between 44,000 and 22,000 BP. It has been interpreted as evidence of early hunting by humans but plausible alternative interpretations are possible (Lawson 1981). Nevertheless, whilst it may not prove the presence of humans, it does prove the presence of suitable prey species (Fleming 2004: 8).

2.3.1.3 Potential for Submerged Palaeolithic Prehistory at Blackdog

109 Any assessment of the archaeological potential of the east Scotland coast must take into account the more general records of Lower, Middle and Early Upper Palaeolithic human occupation of Britain, as well as local climatic and geological conditions.

110 Recent work at the terrestrial site of Happisburgh 3, Suffolk, (Parfitt *et al.* 2010) has produced lithic evidence of human activity in an interglacial environment that dates to between 780,000 to 1,000,000 BP (OIS 17 or earlier) (**Figure 2**). It is therefore theoretically possible for a human presence in eastern Scotland from at least this time onwards when climate conditions were cold but potentially favourable and the area was not submerged or covered by ice.

111 As noted above, the region has been subject to considerable glacial action, culminating in the Late Devensian glacial maximum. Although the survival of archaeological material in primary contexts under ice is possible (Cook and Ashton 1991), it is unusual. Therefore any earlier archaeological deposits are likely to have been destroyed or buried under glacial deposits and any surviving artefacts may be some distance from their original site of deposition. The potential for the presence of Palaeolithic material within the region pre-dating the Devensian glaciation is therefore probably extremely low.

112 The principal Quaternary and Holocene geology is defined by the Wee Bankie Formation which is overlain by the Forth Formation. The latter formations are contemporaneous during their early deposition. The modern seabed is generally of sand-sized sediments (**Table 6**) (Gatcliff *et al.* 1994).

113 The Wee Bankie Formation is a diamicton (glacial deposit of poorly sorted sediments i.e. complex mixture ranging from boulders to clay-sized particles) of up to 40m thick probably of basal till from glacial down-wasting during the end of the last glacial period (i.e. Devensian). Diagnostic faunal and floral material is present but reworked (and therefore out of context).

114 The archaeological potential for encountering *in situ* Palaeolithic material from the Wee Bankie Formation (i.e. from offshore of the entire east coast of Scotland) is likely to be reduced as a result of the turbated nature of the formation however it may be possible to encounter artefacts in secondary contexts, although the chances are likely to be low.

115 The Late Glacial age of the deposits suggests there is potential for archaeological sites and material to have been located on the “uneven, ridged upper surface” lying conformably below the Forth Formation; and also within the Forth Formation sediments that subsequently accumulated during the late Glacial and Holocene.

2.3.2 Late Upper Palaeolithic and Mesolithic (12,000 BP – 4,000 BC)

2.3.2.1 Climate

116 The Late Devensian ice sheet had completely melted by *c.* 13,000-12,000 BP (Ballantyne 2004). Although there was a temporary return to cooler conditions during the Loch Lomond Stadial between 10,800 and 10,000 BP, the climate would not have precluded human occupation outwith the core glacial and periglacial area. Coasts may have been principal areas of activity as maritime climates are less

extreme. After 10,000 BP temperatures rose quickly and by 8,500 BP appear to have been slightly higher than today (Ballantyne 2004). A general scheme for Holocene climate based on the Blytt and Sernander peat scheme is presented below (**Table 9**). It must be remembered that short-term, high-magnitude events during the early Holocene made the environment, climate and sea-level change very dynamic (e.g. meltwater pulses, the 8200 BP event, **section 124**). The influence upon Mesolithic people's behaviour and subsistence strategies for example is likely to be complex and highly variable between groups and over space and time (Warren 2005, Bailey and Spikins 2008).

Period	Inferred Climate	Evidence	Approximate Age (BP)
Pre-Boreal	Subarctic (cool-dry)	Macrofossils of subarctic plants in peat	10,000 – 9500
Boreal	Warm-dry	Pine stumps in humified peat	9500 – 7000
Atlantic	Warm-wet	Poorly humified Sphagnum peat	7000 – 5000
Sub-Boreal	Warm-dry	Pine stumps in humified peat	5000 – 2500
Sub-Atlantic	Cool-wet	Poorly humified Sphagnum peat	2500 – present

Table 9: General scheme of Holocene climate (Blytt-Sernander) adapted from Lowe & Walker, 1997; Warren 2005).

2.3.2.2 Suitability for Human Occupation

117 Following deglaciation (*c.*18,000-14,000 BP) the climate became increasingly suitable for human occupation (Ballantyne 2004). As conditions became warmer, tundra would have given way to open grassland and then woodland. Ultimately open woodland predominated with birch, hazel, oak and pine (Wickham-Jones 2004). Even at the start of this period, suitable food resources are likely to have been available for hunter-gatherer populations. The recently discovered site at Howburn Farm, South Lanarkshire, is dated on typological grounds to *c*. 12,000 BP and demonstrates the potential for later Upper Palaeolithic sites in Scotland (Ballin *et al.* 2010). Given the probable rate of decay of the Scottish ice sheet it may be speculated that occupation evidence might survive in the north-east from this period, or perhaps even as early as 13,000 BP.

118 The only marine find from the Late Upper Palaeolithic occupation is a single worked flint obtained during vibrocoring close to Viking Bank, 150km north-east of Shetland. Sedimentary deposits below the tool date it to post-11,000 BP (Wickham-Jones and Dawson 2006).

119 The climatic amelioration from 13,000 BP, even allowing for the slight hiatus in the form of the Loch Lomond Stadial (*c.*11,000-10,000 BP), would have driven environmental change, so that while the broad suitability of the region for human occupation would have probably improved over the course of the early to mid Holocene, the nature of the environment that humans would have had to deal with would have changed significantly over this period.

120 Another key form of environmental change would have been changes in hydrological regime associated with marine transgression (rising sea-level

inundating the land). As sea-level rose the effective gradient of local river systems would have lessened, causing channel aggradation and flood plain formation, potentially leading to the formation of wetlands. It has been proposed, for example, that the area where Aberdeen stands would have been an area of wetland during the early Holocene (Warren 2005). Such environments are known to be ecologically diverse and to offer a wide range of resources for human exploitation.

2.3.2.3 Sea-level & Rapid Coastal Change in the early Holocene

121 Modelling of the sea-level history of Scotland during the Holocene (the last 10,000 years) is greatly complicated by the presence and varying thickness of the ice sheet that covered the land during the Late Devensian glaciation and variable rates of glacio-isostatic rebound as a result (**Figure 7**).

122 Glacio-isostatic uplift following deglaciation was greater and more rapid in areas that lay close to the centre of the last ice sheet. This centre was in the area of Rannoch Moor in the Western Grampian Highlands. In areas farther from the centre, such as the east of Scotland, uplift was slower and less pronounced. The figures for relative sea-level change from reconstruction models should therefore be applied with caution – e.g. Funnel (1995:4), Westley, Dix and Quinn (2004:67-80), Holocene sea-levels from Lambeck (1995), Shennan & Horton (2002) and Smith *et al.* (2007).

123 The principal work on late Devensian and Holocene relative sea-level change in the region is based on work on the river valleys of the Ythan and the Philorth (Smith *et al.* 2004), and the Montrose Basin (e.g. Smith, Cullingford & Seymour 1982; Smith, Cullingford & Brooks 2006; Smith and Cullingford 1985). This work suggests that between 18,000 and about 14,000 BP relative sea-level could have been approximately -5m, falling to about -10m by 10,000 BP. From 9,000-8,000 BP relative sea-level rose 8 m and then continued to rise until it was approximately 4 m above present sea-level by c. 5,000 BP, before dropping gradually to current levels (Shennan and Horton 2002). This pattern of relative sea-level rise and then fall reflects the interplay of varying rates eustatic sea-level rise and glacio-isostatic recovery, with eustatic rise initially outpacing but then being overtaken by glacio-isostatic recovery (Ballantyne 2004).

The Storegga Landslide and Tsunami – c. 8100 BP

124 Around 8100 BP, a massive undersea landslide off the coast of north-west Norway caused a tsunami wave. Evidence for the Storegga tsunami has been found along palaeo-shorelines in Scandinavia, north-west Europe and northern and eastern Scotland as a clear sandy horizon. Mesolithic sites at Inverness and Morton, Fife are preserved beneath the Storegga tsunami deposit suggesting human groups on the coast were directly affected (Dawson *et al.* 1990; Weninger *et al.* 2008). The tsunami also had a widespread effect inland, penetrating along major rivers like the Forth (Smith *et al.* 2010). The destruction of camp sites, and disruption to coastal food resources, in addition to a loss of life, would have had a significant effect upon Mesolithic groups' ability to successfully exploit affected coastal, estuarine and riverine environments across eastern and northern Scotland. The tsunami may also have contributed to the final flooding of 'Doggerland' in the southern North Sea (Weninger *et al.* 2008; Gehrels 2010). In conjunction with (and not to be confused with) the so-called 8200 BP event (a rapid and large-magnitude oscillation to cold, regionally arid conditions) (Alley *et al.* 1997; Barber *et al.* 1999), and rapid sea-level rise after *c.*8000 BP, the regional climate was dynamic in the

early Holocene. This may have had significant effects upon human groups in Scotland during this time.

2.3.2.4 Distribution of Evidence

125 There is a degree of geographical bias in the distribution of known, and in particular intensively investigated, sites within Scotland, with much effort expended on the west coast, Inner Hebrides and recently the south-west (Warren 2005). This, unusually in modern British archaeology, probably tends to reflect research effort rather than development impacts: by contrast a number of the Mesolithic sites in the north-east of Scotland have been excavated as a result of development mitigation (e.g. Murray 1982, Suddaby 2007, Murray *et al.* 2009).

126 Findspots and recorded sites along the east coast compiled in the Aberdeenshire SMR suggest that along the modern coast directly adjacent to the proposed EOWDC there are several flint working and lithic scatter sites of prehistoric age, several are Mesolithic age within coastal dune complexes (**Table 10**). Sub-bottom profiling assessed as part of this project has identified geomorphological deposits indicative of a prograding coastline preserved offshore suggesting there is potential for similar Mesolithic sites to be present in submerged contexts.

Name	Aberdeenshire SMR ID	CANMORE ID	Site type	Description	Source
Easter Hatton	NJ91NE0071	NJ91NE58	Findspot	Flint scatter – prehistoric.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ91NE0071
Menie	NJ92SE0028	NJ92SE6	Findspot	Site of findspot of microliths and flints; shows evidence of Mesolithic occupation.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ92SE0028
Drumside Links	NJ91NE0094		Findspot	Former beach deposit, worked flints.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ91NE0094
Menie Links	NJ92SE0005	NJ92SE13	Findspot	Multiple sites of findspot of flints and flint working.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ92SE0005
Menie Links	NJ92SE0021	NJ92SE6	Findspot	Site of findspot of a number of flints; found in the sand dunes on Menie Links.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ92SE0021
Balmedie Country Park	NJ91NE0095		Findspot	Site of findspot of a flint knife – unknown age.	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ91NE0095
Belhelvie	NJ91NE0004	NJ91NE5	Findspot	Site of findspot of flint flakes and two anvil stones found - prehistoric	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?refno=NJ91NE0004

Leyton Farm	NJ92SE0004	NJ92SE7	Findspot	Site of findspot of flint artifacts & a stone bead with hour-glass perforation – poss. Neolithic	http://www.aberdeenshire.gov.uk/smrpub/shire/detail.aspx?tab=main&refno=NJ92SE0004

Table 10: Selected sites indicative of Mesolithic & prehistoric findspots contextualising early Holocene coastal palaeogeography in the vicinity of the MSA.

127 Flint scatters, as a class, is very wide ranging from a few lithics to large sites incorporating a variety of lithic materials and forms (Warren 2007). As a class it reflects the durability of stone tools, and any associated working debris, rather than a functional distinction in terms of site use. Lithic material may be associated with any other type of site, such as shelter structures, middens and caves. The ephemeral nature of stone tools scatters will make identification in intertidal and offshore contexts difficult.

2.3.3 Potential for Holocene Submerged Palaeolandscapes

128 At the coast, the Forth Formation outcrops (Gatcliff, *et al.* 1994) (**Figure 3**). The St Andrews Bay member presents a significant target for investigating the perceived potential for encountering submerged Upper Palaeolithic and Mesolithic archaeological and palaeoenvironmental material in primary contexts along much of the east coast of Scotland. The geological sequence, associated with the Forth Formation, is very extensive, extending as far south as St. Andrew's and possibly as far north as Peterhead (Gatcliff, *et al.* 1994).

129 The sandy nature of the Holocene sediments suggests that in conjunction with lower sea-levels, human occupation could have occurred throughout the early Holocene and very late Pleistocene in a transgressive coastal environment (i.e. the shoreline at a given period progressively moves inland as sea-level rises relative to earlier incarnations). Indeed the forms of the deposits have been described as "coastal sand bars created from sediment delivered by rivers flowing from Scotland" (Gatcliff *et al.* 1994: 93). Where encountered, the **St Andrews Bay member** of the **Forth Formation** would be of primary archaeological interest for assessing Upper Palaeolithic and latterly Mesolithic offshore archaeological potential in the east coast of Scotland (**Figure 8**, **Table** 6).

130 Sea-level models suggest that the rate of land uplift and sea – level rise on the east Aberdeenshire coast are generally emerging at a rate of around 0.5 mm/yr relative to Eustatic sea- level rise (Gehrels 2010). This would suggest that nearshore sediments containing submerged prehistoric material could have been uplifted around 2.5m in the last 5000 years; for example, Mesolithic remains may then exist at a shallower depth than could be assumed from general estimates of Holocene sea-level rise alone.

131 Archaeological deposits in the region post-dating 13,000 BP will not have been affected directly by glaciation, although periglacial effects may have occurred. The available archaeological and sea-level data suggests that the potential for the presence of archaeological sites and materials in terrestrial settings in the region exists from about 13-12,000 BP. In lower lying coastal and estuarine settings there may be a hiatus after 7000 to 6500 BP until 5000-3500 BP due to the Main Holocene Transgression (**Figures 6** & **7**).

132 The **St Andrews Bay Member** of the **Forth Formation** which may frequently outcrop at the coast is of primary archaeological interest for late Pleistocene and early Holocene archaeological and palaeoenvironmental investigation. The sands (and clays) in the form of coastal geomorphic structures such as sand bars indicate that coastal bedforms are preserved; and by inference potentially archaeological remains (if any) where local conditions permit.

2.3.4 Regional Archaeological Potential and Wider Relationships

133 The presence of relatively large areas of (now submerged) land to the south should be noted: 'Doggerland' (Coles 1998) would have formed both a relatively near route to Scotland from other regions of Europe, and a population reservoir for colonists moving northwards as climatic conditions ameliorated.

134 There is potential for the presence of submerged late Upper Palaeolithic and Mesolithic archaeology along the coast of the north-east of Scotland. The various reconstructions of landscape around the late Devensian and early Holocene (from 13,000 to 8000 BP) suggest a relatively narrow strip, perhaps in the order of several kilometres of submerged landscape along the coast from eastern Yorkshire to the north-eastern tip of Aberdeenshire, in contrast with the very extensive areas of now-submerged landscape in the southern North Sea and the Moray Firth.

135 The relatively narrow dimensions of the modern offshore area that has the potential for the presence of submerged Late Upper Palaeolithic and Mesolithic remains, together with a presumed preference by early populations for coastal settings for settlement and exploitation, implies that the density of remains may be relatively high if present and preserved but the spatial extent of development activity will be a primary factor in the potential for encountering such remains.

136 The cultural remains of the Later Upper Palaeolithic and Mesolithic tend to be relatively small-scale, ephemeral, and largely lithic in nature. This renders these remains particularly vulnerable to disturbance processes, both cultural and natural. In an offshore environment the factors listed above will largely determine the degree of disturbance such remains undergo. When these factors work against preservation, the effects on primary contexts can be severe. Where these factors favour preservation, primary contexts may be much better preserved than the majority of onshore sites. In particular, long term cultural disturbance will generally have been excluded.

137 The sandy nature of the offshore sediments is similar to the coastal dunes known to contain early prehistoric lithic remains not necessarily in the presence of palaeoenvironmental material. It is currently not possible to assess potential of likely impacts upon these types of cultural heritage assets.

2.4 Potential for Maritime Archaeology

138 The potential exists for archaeological evidence of maritime sites of all periods from the Mesolithic to the present day to be recoverable from within the MSA. Given the offshore location of the MSA, Maritime sites considered shall consist of either vessels (wrecks) or debris accidentally or deliberately lost overboard from a vessel.

139 The potential for evidence of maritime activity within the MSA from the Post–medieval and Modern periods can be expected to be greatest because of the

increasing volume of trade and other marine activities in the area during these periods, and because of the relatively short period of time since its deposition on the seabed. Potential for the survival of evidence of medieval or earlier date is likely to be low, although certain classes of material, such as stone ballast, can be expected to survive for very long periods and the survival of more vulnerable organic material can occur in the right circumstances.

140 Estimates for the density of shipping losses around the coast of the UK estimate eight to 40 wrecks for every mile of coastline. This does not include losses in open water, which are particularly difficult to quantify. Records such as Lloyd's Lists contain many references to ships that are 'overdue' and for which no knowledge of their fate has ever been recovered.

141 As a result, the currently known maritime casualties in UK waters probably only represent a small percentage of actual losses. The positions of losses are often vague or inaccurate, and hence require interpretation. It is perhaps reasonable to assume that post–medieval wreck recording close to important ports such as Aberdeen will be more reliable, but nevertheless it is likely to be incomplete.

142 The nature of the loss record also means that it is heavily weighted towards Industrial and 20th century period wrecks (**Appendix A.5**). Whilst it is undoubtedly the case that there was an increase in vessel numbers traversing the MSA during this period, the record is almost certainly misleading in this respect. The record is also likely to be weighted towards larger vessels, with this bias continuing into the 20th century.

143 There are no protected places or controlled sites, as recorded by the Ministry of Defence that would be subject to statutory protection, within or in the vicinity of the MSA.

2.4.1 Shipping Losses – Causal Factors

144 The North East Scottish coast focused upon Aberdeenshire is characterized by a combination of rugged cliffs interspersed by long sandy shores. Shipping losses along this coast have been caused by a wide range of factors. However the principal causes can be summarised as follows:

- South easterly gales. The shape of the coastline makes shipping that is reliant upon sail power particularly vulnerable and severe storms have historically caused catastrophic losses, such as in 1800 and 1876
- Haar or coastal fog, particularly during the summer months when dense fog could last for days. Prior to the widespread introduction of radar, fog was a significant factor in many shipping losses
- Lack of reliable navigational tools. Although Lindsay's A Rutter of the Scottish Seas was published in 1540 it was not until Grenville Collins' work in the early 17th century that more reliable charting became available
- Enemy action, principally during the two World Wars of the 20th century

145 There are three major concentrations of shipping losses in Scotland: around the major ports of Aberdeen and Wick; and at the extreme north–east coast of Aberdeenshire (Ferguson 1991: 4). Historically shipping losses in the vicinity of the ports of Aberdeen and Wick have mainly been caused by ships being driven ashore whilst trying to lie off or enter the ports in heavy weather (Ferguson 1991:

4). It therefore follows that sailing vessels should have been the principal victims and that the greatest risk was from east and south–easterly gales.

146 Aberdeen harbour entrance, with its long piers has proved to be a hazard in itself. Construction of these piers in the 18th century greatly improved access to the harbour by reducing the impact of the bar at the mouth of the Dee. However, it is clear from the available loss records (**Appendix A.5**) that numerous casualties resulted from vessels either colliding with the piers or missing them altogether.

147 The approach to the harbour is quite confined and difficulties could be experienced in wind against tide conditions, particularly if the wind was blowing strongly from the south–east. Once a vessel missed the harbour entrance it was likely to go aground near the piers or be driven ashore on the beach, unless it was able to escape the threat by bearing away to the north. Several recorded losses and recorded wrecks in the MSA are reported run aground on the beach at Blackdog following difficulties in bad weather trying to navigate the approaches to Aberdeen harbour.

2.4.2 Prehistoric Seafaring (before AD 79)

148 Human settlement patterns in north-west Europe suggest that sea voyages were conducted as early as 7,000 BC, during the Mesolithic. No archaeological remains of vessels that pre – date the Mesolithic have been found in Western Europe. This may reflect the very low probability of organic remains of this type surviving. However, the simple technology required to construct a small boat will almost certainly have existed. The Mesolithic record currently consists exclusively of log boats.

149 Extensive coastal and continental trade and sea fishing increased during the Neolithic, Bronze Age and Iron Age. Small ports or anchorages developed in Britain as the scale of this activity grew. Log boats, hide boats and plank boats were all used and there is evidence of significant advances in technology and vessel size from the Bronze Age onwards.

150 The earliest boat found in Scotland is the log boat found at Catherine Field in Dumfriesshire which dates to the early Bronze Age. A log boat with a separate transom and dating to about 1,500 BC has also been found in Loch Tay. A further late Bronze Age log boat has been found in the Tay Estuary, dating between about 1130 – 970 BC. Other boat finds from Scotland are Iron Age or later. Of the approximately 150 log boats found in Scotland, most are medieval. No Prehistoric boat finds of more complex construction or demonstrably capable of being used in open, maritime water have been found in Scotland.

151 Mesolithic artefacts have been recovered from terrestrial contexts in the Aberdeen area. Although the extent of Mesolithic occupation is not known, this does suggest that there is potential for archaeological evidence of prehistoric seafaring within the MSA from the Mesolithic onwards.

2.4.3 Roman Seafaring (AD 79 – 410)

152 For most of this period, Aberdeen and the surrounding area lay outside the Roman Empire, although not necessarily beyond Roman influence. A Roman military camp has been found at Normandykes on the outskirts of modern Aberdeen and finds of Roman coins and other artefacts have been made in the area. Additionally, the

Alexandrian geographer Ptolemy's map of Scotland of AD 145 shows Devana, 'the town of the two waters' (the Rivers Dee and Don), a town or settlement on the Deva Fluvius. Devana appears to have been within the greater Aberdeen area. Its appearance on Ptolemy's map indicates that it must have been a settlement of some size or importance.

153 Although it is not a safe anchorage, Aberdeen Bay is likely to have been traversed by coastal trading vessels and fishing boats throughout this period. The existence of the riverside Devana settlement somewhere in the area may mean that this activity was at a relatively high level for the north–east coast of Scotland. In addition, the camp at Normandykes may have been supplied by sea, with ships approaching through the Dee Estuary. There is therefore potential for the presence of archaeological evidence of Roman period seafaring within the MSA.

2.4.4 Early Historic (AD 411 – 700) & Early Medieval (AD 700 – 1100) Seafaring

154 The region around modern Aberdeen appears to have been dominated by Pictish tribes during the Early Historic period, a group of indigenous people first referred to in the 3rd century by Roman writers as Picti meaning either 'painted ones' or 'people of the designs' (Foster 2004: 1). The Picts are known to have been seafarers and depictions of their vessels are known, such as from St Orland's Stone from Cossans in Angus (Graham-Campbell and Batey 1998: 8).

155 The estuary of the Dee provides a sheltered anchorage and it is likely that some use was made of it. Vessels, in the form of fishing boats and coastal trading vessels (perhaps capable of long distance voyages) will have traversed the MSA. It is also possible that some use was made of the River Don and the River Ythan to the north.

156 Terrestrial archaeological evidence from the Early Medieval period has been recovered from the Aberdeen area. Given that there is historical evidence that Aberdeen had a significant harbour by 1136, the probability of there being a harbour and therefore maritime activity in the vicinity of the MSA during this period is high. In addition to coastal trade and fishing, trade and other maritime interaction with Scandinavia is also probable.

2.4.5 Medieval Seafaring (AD 1100 – 1540)

157 There is no direct archaeological evidence for medieval maritime activity in the MSA in the form of shipwrecks or seabed debris. However, the historical and terrestrial archaeological evidence is relatively plentiful and documentary evidence becomes available for the first time. The first reference to a shipwreck in the vicinity of the MSA occurs during this period, in 1444.

158 Aberdeen was a significant port during this period and is clearly crucial to the maritime significance of the MSA. By 1136 it was busy enough for David I to grant Bishop Nectan the right to levy a charge on shipping using the harbour (Turner 1986: 3). It was also significant enough to attract hostile attention and in the late 12th century the Norse King Eystein raided 'Apardion'.

159 Aberdeen was also important enough to attract traders from the Continent. King David I is known to have encouraged Scottish merchants to engage in foreign trade in the 12th century. Aberdeen's earliest recorded trade with mainland Europe was with Flanders. This trade, based upon the export of wool, appears to have

been well established by the late 13th century when Philip IV of France ordered Count Guy de Dampierre to allow Scottish merchants freedom to trade in Flanders (Turner 1986: 4). Merchants trading through Aberdeen subsequently appear to have established trading posts on the Continent.

160 Piracy was a problem off the Scottish east coast in the 14th century. This appears to have impacted on the number of vessels trading with Aberdeen. By 1368 the number of vessels entering the port was reduced to ten and by 1398 just six (Turner 1986: 4). Trade recovered in the 15th century, despite disputes with the Hanseatic League and with Flanders in the first half of the century. By the mid – 15th century Aberdeen and Leith held a joint monopoly on the Scottish wool trade with Flanders. Wool, cloth, hides, fur, wood and salmon were exported and wheat, provisions, wine and luxury goods were imported. Mention of other ports is made at this time, including some in Scandinavia, although goods exported from Aberdeen seem to have been largely transhipped from Flanders.

161 There is documentary evidence of a quay on the north side of the Dee by 1453, when the quay is recorded as having been enlarged. Navigation beacons were also established at the mouth of the estuary in 1484. Furthermore in the early 16th century the Town Council commissioned a local pilot to produce a sea chart for the use of Aberdeen ships. Nevertheless Aberdeen does not appear to have been regarded as having good harbour facilities (Turner 1986: 6).

162 During the reign of Alexander II (1241 – 1286), Aberdeen gained a reputation as a fish exporter. Fish curing was a specialism of the town and in 1281 Edward I of England apparently sent agents to obtain salt fish provisions for his campaign in Wales (Turner 1986: 133). In 1290 Aberdeen fish were shipped to Yarmouth, the premier fishing port of England and thence to Norway. However, it seems that during this period fishing was confined to the River Dee and in the immediate environs of the estuary. Salmon would have been the main catch and Robert I (the Bruce) granted rights in this respect to the town in 1319. As a result of the probable increase in maritime activity in the vicinity of the MSA, the probability of wreck – related evidence of maritime activity surviving is greater than for earlier periods.

2.4.6 Post – medieval Seafaring (AD 1540 – 1700)

163 Trade between Aberdeen and the Baltic expanded greatly during the 16th century. Ports to which reference is made at this time include Dantzig, Campveere, Bruges, Middleburg, Antwerp and Stralsund. Substantial numbers of the poor, and refugees from both political and religious strife emigrated through Aberdeen to both the Netherlands and Poland.

164 Competition arose during the 16th century as Peterhead, Newburgh (14 miles north of Aberdeen) and smaller harbours in the area all sought to compete for business. Aberdeen responding with an aggressive enforcement of its rights and by undertaking works to improve the harbour.

165 Navigating the entrance to the harbour had become a serious problem by the mid – 17th century, despite efforts to improve matters, including the building of a bulwark in a failed attempt to defeat the threat of the bar in 1607. In 1656 it was reported that the harbour was “less useful of late than formerly” and it appears that at low tide there was only about two feet (0.61m) of water at the bar (Turner 1986).

2.4.7 Industrial Seafaring (1700 – 1900)

166 The Act of Union in 1707 opened up the English market, particularly London and the English colonies to Aberdeen merchants. Trade with the American colonies became particularly important, with woollen and linen goods, salmon, salted herrings and French wine being exported, together with emigrants. A wide variety of raw materials were imported from the Americas, but principally sugar and tobacco. Goods were also exported to Norway, Holland, Portugal, Sweden, Spain, Germany and Italy.

167 By the end of the 18th century Aberdeen was handling 73 inward and 248 outward cargoes annually. Most of the trade was coastwise around the UK, although cargo was exported to 14 different overseas countries and part of the coastwise trade appears to have been of goods destined for export through other ports. Trade with the Low Countries declined as Aberdeen merchants exploited new markets.

168 In 1769 one of the most significant events in the maritime history of the Aberdeen area occurred. The great 18th century engineer John Smeaton was invited to investigate the harbour entrance and suggest remedial measures to deal with the problem of the bar. Smeaton was one of a number of great engineers, including Telford and Rennie, to be involved in the development of the port of Aberdeen. He reported in 1770 and recommended the construction of a pier on the north side of the entrance. The pier was duly built and was successful because it had the effect of enhancing the natural scour of the river. As a result, the number of vessels using the port rose quickly.

169 Smeaton's scheme was subsequently improved, with the north pier being lengthened. A south pier was constructed to prevent swell entering the harbour from the east. In addition, the course of the Dee was altered, allowing for an extensive complex of docks to be built in the 19th century.

170 In the late 18th century the number of ships engaged in foreign trade using the port declined, probably as a result of the wars in Europe, although coastal trade increased. However, during the 19th century Aberdeen's trade increased beyond recognition. Numbers of commercial vessels and total tonnage using the port had increased to 3368 vessels totalling 956,496 tons by 1899, with almost 1.25 million tons of cargo being handled annually (Turner 1986: 43).

171 The first steamship service to Aberdeen commenced in 1821 and by 1855, 16 steamers were operating from the port. By the turn of the century this number had grown to 83 (Turner 1986: 118). The rise of steam reduced the dangers of entry into the harbour and gave vessels which missed the entrance in poor weather a greater chance of avoiding going ashore.

172 This period also saw a dramatic rise in the importance and scale of the fishing and whaling businesses off Aberdeen. The first reference to whaling activity was in 1752 and by 1817 there were 14 Aberdeen whaling vessels (Turner 1986: 136).

2.4.8 20th Century Maritime Activity

173 With regard to the fishing industry, whereas it had previously been largely salmon-based and inshore in character, the Aberdeen fleet gradually moved offshore and into trawling. Chief amongst the offshore catch was the herring, and the herring boom from the 1870s and the First World War brought seasonally hectic activity to the port. A large fleet of Aberdeen vessels, mainly small sailing boats or yawls

called 'Zulus' and 'Fifties', followed the annual migration of these fish south (Edwards 2004: 107).

174 In addition, other fish were pursued in great quantities, with numerous line fishing boats plying the inshore waters of the MSA. Smaller harbours and beaches around Aberdeen were also used by fishing vessels of all types.

175 The first half of the 20th century was the great era of the steam trawlers, which had been gradually introduced in the 19th century. By 1910, 217 of the Scottish fleet of 320 steam trawlers operated out of Aberdeen. In 1888 there were 10,810 arrivals of fishing craft, largely small sailing craft.

176 By the outbreak of the First World War in 1914, Aberdeen was the most important fishing port in the British Isles. 1925 marked the peak of the trade in terms of catch landed. By then 83% of arrivals were steam trawlers and only a small proportion were sailing vessels. Thereafter the fishing fleet declined and by the end of the 20th century the number of fishing vessel arrivals at Aberdeen represented only a very small proportion of that at the turn of the century.

177 The 20th century was an era of other short term changes for the port. The import business of the port became increasingly important. In 1901 coal dominated this trade, but by mid – century this had changed to fuel and other oils. Granite shipments, destined for use as carriageway stones, became a significant export. The early 20th century also saw the last large commercial sailing vessels to use the port. Between the two world wars the pattern of trade did not change significantly. The ferry and, to a lesser extent, liner business built up in the 19th century continued to be important. Following the Second World War import cargoes increased and coastwise traffic declined as a result of the increasing reliance on rail and particularly road transport, and the increasing importance of ferry ports in the southern UK.

2.4.9 Late 20th Century Offshore Activity

178 Undoubtedly the most significant recent development in vessel movements in and around Aberdeen has been the development of the North Sea oil and gas industry. Aberdeen became the major European base for this industry in the 1970s and this caused a dramatic rise in the number of large vessels using the port on a regular basis. Although this is now starting to decline as the industry matures, it is still responsible for a major proportion of vessel movements into or out of the harbour. Several wrecks beached within Aberdeen Bay are rig support vessels highlighting the potential for modern (as well as historic wrecks) to be present.

2.5 Potential for Aviation Archaeology

179 A qualitative assessment of the potential for encountering aircraft crash sites, especially of military origin which may be protected under the Protection of Military Remains Act (PMRA) 1986 was conducted. Air-Sea rescue maps relating to the general locations of rescue missions around the British Isles during World War II and other documentary sources have been compiled by Wessex Archaeology for the Aggregates Levy Sustainability Fund (ALSF) project *Aircraft crash sites at sea* (2008). Positions of specific crash sites and rescue missions are not accurate but relate to the general area of crash reports made at the time. They are useful to provide a means of assessing areas of increased potential.

180 Although no specific aircraft wrecks are noted in the documentary sources consulted for the MSA, there is a moderate concentration of offshore aircraft losses along the north-east coast of Scotland, in the vicinity of Aberdeen. There is potential for encountering unrecorded, unidentified aircraft losses that are buried but this is regarded as low following the geophysical assessment.

3 SUMMARY

3.1 Maritime Cultural Heritage Assets

181 The proposed EOWDC comprises 11 wind turbines, and associated inter-turbine and export electrical cables within the MSA.

182 A total of two sites designated as '*Anthropogenic origin of archaeological interest*' (**WA 7071** and **7072**) have been identified within the marine survey area, the sites are located approximately 40m apart, around 50m north-west of turbine 8. Of these, one is a previously uncharted wreck site (**WA 7071**) and the other is possibly a large piece of debris relating to a wreck (**WA 7072**).

183 It is not currently possible to clearly define the name and type of the unidentified wreck (**WA 7071**) located by the geophysical survey within the MSA, north-west of the proposed position of Turbine 8. The sonar dimensions of the vessel are 25 m long by 6.5 m wide and it is partially buried from the east. The wreck is associated with a small magnetic anomaly suggesting it could be of partly metal construction.

184 Lavery (2001:78-79) describes steam trawlers of similar dimensions dating to throughout the later 19th and 20th centuries and Aberdeen was a centre for shipbuilding with local vessel types a distinctive aspect of the maritime history of the area. Further evidence from the wreck site would be required for a more accurate assessment of archaeological importance to be made.

185 Wreck **WA 7071** exhibits a magnetometer contact and therefore may be of partly metal construction, with dimensions similar to that of a small trawler or sailing vessel. Identification is not possible with the available evidence.

3.2 Submerged Prehistory & Palaeo-landscape Potential

186 The shallow geological sequence of much of the survey area represents a prograding shoreline sequence relating to the Forth Formation (**WA 7505**) (**Figure 3**). This type of deposit records changes in sea-level in the area since the Last Glacial Maximum. These deposits are therefore potentially an important palaeogeographical and palaeoenvironmental sequence in relation to local and regional patterns of Mesolithic coastal activity and now-submerged archaeological landscapes. Any cultural heritage assets of early prehistoric origin encountered in an offshore, primary (*in situ*) context would be of national importance.

187 The nature of the local Mesolithic records of lithic scatters associated with coastal sand dunes directly adjacent to the MSA suggests there may be potential for encountering lithic finds in offshore sediments of appropriate age.

188 Five small possible cut and fills (**7500**, **7501**, **7502**, **7503** and **7504**) have also been identified in the south-west of the MSA. These are shallow, relatively small features and, since it has not been possible to trace them between adjacent lines, they are expected to be isolated depressions and not part of a coherent palaeochannel system. Reworked archaeological material in secondary contexts may be present in the fills of these features.

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4.2 Web Resources

CANMORE, RCAHMS http://canmore.rcahms.gov.uk/

CANMAP, RCAHMS http://jura.rcahms.gov.uk/CANMAP/Map

Aberdeenshire SMR, map query
http://www.aberdeenshire.gov.uk/smrpub/shire/mapquery.aspx)

A APPENDICES

A.1 Legislation Guidance

A.1.1 Summary

189 Description of the domestic, European and international legal framework, including:

- Existing statutory mechanisms relevant to the archaeological heritage
- The application of marine consent and licensing procedures
- The implications of proposed changes associated with the Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009
- National and regional plans, policies and guidance relating to marine archaeology

A.1.2 Legal and Policy Framework

A.1.2.1 Outline

190 This section presents the legal and policy framework applicable to marine archaeology within the UK Continental Shelf (UKCS), encompassing UK territorial waters and the UKCS itself.

191 The legal framework applicable to marine archaeology is subject to a variety of jurisdictional divisions. It is generally accepted in international law that states have jurisdiction in respect of heritage within their territorial waters (to 12 nautical miles (nm)). Accordingly, the UK exercises authority in respect of marine archaeology to 12nm on the basis of UK-wide legislation. However, as cultural issues are generally devolved, marine archaeology is administered separately by different authorities in each of the home countries, in the case of Scotland, Historic Scotland are the relevant authority.

192 Some aspects of the law relating to marine archaeology, such as the Marine and Coastal Access Act 2009, Protection of Military Remains Act 1986 and the Merchant Shipping Act 1995, are administered by authorities with UK-wide powers.

193 Administration beyond 12nm is not devolved, so that – in principal – marine archaeology on the UKCS is addressed UK-wide. However, in practice the UK-wide authorities with powers relating to archaeology beyond 12nm generally call upon the expertise of the heritage agency responsible for the adjacent territorial waters.

A.1.3 UK-wide

A.1.3.1 Introduction

194 There are two different pieces of legislation under which wrecks of archaeological interest may be designated, namely the Protection of Wrecks

Act 1973 (PWA 1973, which has two relevant sections) and the Protection of Military Remains Act 1986 (PMRA 1986). Designation of wrecks is also possible under a third act, the Ancient Monuments and Archaeological Areas Act 1979 (AMAA 1979), which applies to England, Scotland and Wales, but not Northern Ireland which has its own equivalent legislation.

195 N.B. Scotland's Marine Act (2010; see below), will allow for new Scottish-specific legislation and protection to be implemented.

196 In addition, there are UK-wide provisions applying generally to people who find or take possession of wreck – including wreck of archaeological interest – under the Merchant Shipping Act 1995 (MSA 1985).

197 The Protection of Military Remains Act 1986 and the Merchant Shipping Act 1995 are administered UK-wide by the Ministry of Defence (MOD) and the Maritime and Coastguard Agency (MCA) respectively. Section Two of the Protection of Wrecks Act 1973, which deals with dangerous wrecks, is also administered UK-wide by the MCA. However, Section One of the Protection of Wrecks Act 1973, which deals with wrecks of historic or archaeological importance, is administered by the heritage agencies of each of the home countries. The Ancient Monuments and Archaeological Areas Act 1979 is also administered by the heritage agencies of England, Scotland and Wales.

A.1.3.2 Protection of Wrecks Act 1973: Section One

198 The following paragraphs set out the general provisions and background of Section One of the PWA 1973. Further details relating to its administration in each home country are dealt with subsequently, under the heading for each country.

199 Section One of the Protection of Wrecks Act 1973 enables the Secretary of State to protect wreck sites from unauthorised interference if they are of historic, archaeological or artistic importance.

200 Under the Act it is an offence to carry out certain activities in a defined area surrounding the site, unless a licence for those activities has been obtained from the Government.

201 Section One of the PWA 1973 is administered by each of the home country heritage agencies, largely independently.

202 The relevant Secretary of State (or Scottish Government) must consult appropriate advisors prior to designation, though it is possible to designate a wreck in an emergency without first seeking advice. Advice on designations is provided by the heritage agencies.

203 There are currently a total of 61 sites protected under Section One of the Act http://www.english-heritage.org.uk/daysout/maritime-heritage/map/. The sites range in date and character from dispersed cargoes of Bronze Age metalwork to the largely intact remains of the submarine A1, lost in 1911.

204 Generally, sites are designated following an extended consultation process. However, there have been instances (such as the Swash Channel wreck) where an emergency designation order has been obtained after detection by geophysical investigations in the course of Environmental Impact Assessment

(EIA). The Act does provide for the rapid protection of wrecks at risk, if necessary.

A.1.3.3 Protection of Wrecks Act 1973: Section Two.

205 Section Two of the Protection of Wrecks Act 1973 provides protection for wrecks that are designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency (MCA) through the Receiver of Wreck (ROW).

206 There are currently two wrecks designated as dangerous wrecks under Section Two of the Act: the wreck of the Richard Montgomery off Sheerness; and the wreck of the SS Castilian, East Platters, Anglesey http://www.mcga.gov.uk/c4mca/mcga07-home/emergencyresponse/mcga-receiverofwreck/mcga-protectedwrecks/mcga-protectedwrecks-wrecksact1973_3.htm.

207 Section Two of the PWA 1973 is not used to designate sites because of their archaeological interest, but it is possible that a dangerous wreck designated under this section might also be of archaeological or historic interest.

A.1.3.4 The Protection of Military Remains Act 1986

208 Under the Protection of Military Remains Act 1986 the Ministry of Defence has powers to protect vessels that were in military service when they were wrecked. The definition of 'military service' has been examined in detail in the course of judicial review and subsequent appeal, such that in some circumstances merchant vessels are eligible for protection (for example http://en.wikipedia.org/wiki/SS_Storaa).

209 The MOD can designate named vessels as Protected Places even if the position of the wreck is not known. In addition, the MOD can designate Controlled Sites around wrecks whose position is known. In the case of Protected Places, the vessel must have been lost after the 4th August 1914, whereas in the case of a wreck protected as Controlled Sites, no more than 200 years must have elapsed since loss (MOD 2001). In neither case is it necessary to demonstrate the presence of human remains.

210 Diving is not prohibited at a Protected Place but it is an offence to tamper with, damage, move or remove sensitive remains. Diving, salvage and excavation are all prohibited on Controlled Sites. Licences to undertake otherwise restricted activities can be sought from the MOD.

211 The provisions of the PMRA 1986 in respect of Protected Places and Controlled Sites are applicable in international waters, which would include the UK Continental Shelf, although they are only enforceable in respect of British-controlled ships, British citizens, and British companies.

212 The MOD is undergoing a rolling programme of identification and assessment that has resulted in several groups of wrecks being designated under the PMRA 1986 http://www.mod.uk/DefenceInternet/AboutDefence/WhatWeDo/Personnel/SPVA/AviationArchaeology.htm%20.

213 The most recent tranche came into effect on 1st May 2008. There are now a total of 12 controlled sites and 55 protected places around the world.

214 Records of vessels lost while in military service do not always give an exact location for the loss. Given the extent of military activity on the UKCS, the potential for wrecks eligible for further designation under the PMRA 1986 is high.

215 Under the Protection of Military Remains Act 1986, all aircraft that have crashed in military service automatically constitute a Protected Place. As such, it is an offence to tamper with, damage, move or remove any remains of military aircraft unless authorised by a licence. The provisions of the PMRA 1986 relating to aircraft are administered by the MOD Joint Casualty and Compassionate Centre.

216 It should also be noted that it is an offence under the PMRA 1986 to carry out unauthorised excavations for the purpose of discovering whether any place in UK waters contains remains of a vessel which has crashed, sunk or been stranded while in military service.

A.1.3.5 Ancient Monuments and Archaeological Areas Act 1979

217 The main legislation used to protect archaeological remains in the UK is the Ancient Monuments and Archaeological Areas Act 1979. This Act primarily deals with terrestrial sites but there is provision to designate sites in territorial waters as Scheduled Monuments.

218 Monuments are defined by the AMAA 1979 as including buildings, structures, works, caves, excavations, vehicles, vessels, aircraft or other movable structures. Monuments can only be scheduled if they are of national importance. Section 53 extends the AMAA 1979 to monuments situated in, on or under the seabed within UK territorial waters.

219 Once a monument has been Scheduled, visiting or diving on the site is not necessarily restricted. It is, however, an offence to demolish, destroy, alter or repair the monument without prior authorisation, in the form of Scheduled Monument Consent.

220 Examples of wreck sites that have been designated as Scheduled Monuments in UK waters (http://www.mcga.gov.uk/c4mca/mcga07-home/emergencyresponse/mcga-receiverofwreck/mcga-protectedwrecks/mcga-protectedwrecks-ancient.htm) include the following:

- The Light Cruisers Brummer, Dresden, Karlsruhe and Koln, along with the Battleships Konig, Kronprinz Wilhelm and Markgraf of the German High Seas Flee. All scuttled at Scapa Flow, Orkney, on 21st June, 1919
- The Kilspindie Hulks Nos.1-8. Examples of 19th to 20th century 'Fifie' sailing fishing vessels, Kilspindie, Aberlady Bay, Lothian
- The Louisa, a 19th century seagoing merchant vessel, Grangetown, Cardiff. This vessel was first protected in 2001 and now forms part of the Cardiff land reclamation scheme

A.1.3.6 Merchant Shipping Act 1995

221 The Merchant Shipping Act 1995 (MSA 1995) http://www.legislation.gov.uk/ukpga/1995/21/contents?view=plain is used to regulate the reporting and disposal of wreck – including wreck of archaeological interest – found or recovered from UK waters, or found or recovered outside UK waters but brought within those waters. Within the context of the MSA 1995, wreck refers to flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ships, aircraft and hovercraft, parts of these, their cargo and equipment.

222 All wreck that is found or taken into possession must be notified to the Receiver of Wreck by the finder. The wreck is then delivered to the Receiver, or, more commonly, held by the finder to the order of the Receiver.

223 The ownership and disposal of wreck is decided according to procedures contained within the MSA 1995. Provision is made for original owners to come forward to claim their property. Ownership of unclaimed wreck from within territorial waters lies with the Crown Estate or in a person to whom rights of wreck have previously been granted by the Crown.

224 The Receiver has a duty to ensure that finders who report their finds according to the legislation, receive an appropriate salvage payment. In the case of material considered to be of historic or archaeological importance, a suitable museum is asked to buy the material at the current valuation and the finder receives the net proceeds of the sale as a salvage payment. If the right to, or the amount of salvage cannot be agreed, either between owner and finder or between competing salvors, the Receiver will hold the wreck until the matter is settled, either through amicable agreement or by court judgement.

A.1.3.7 Archaeological Material other than Wreck

225 The Merchant Shipping Act 1995 applies only to archaeological material that is 'wreck', i.e. material that is derived in some way from a ship or aircraft.

A.1.3.8 Marine & Coastal Access Act 2009

226 The Marine & Coastal Access Act (MCAA) 2009 (http://www.defra.org.uk/environment/marine/legislation/mcaa/index.htm) has fundamentally changed the management of the UKCS, introducing the Marine Management Organisation (MMO), a system of Marine plans for managing coastal activities and development, a revised system licensing marine development, a new system of marine conservation zones (MCZs), and new fisheries management mechanisms.

227 Licensing and enforcement is devolved to Scottish, Welsh and Northern Irish authorities at various levels, to organisations including the Marine Management Organisation in England and Marine Scotland.

228 The Marine Policy Statement (MPS) (http://www.defra.gov.uk/corporate/consult/marine-policy/100721-marine-policy-statement.pdf%20), currently in draft form (Dec 2010), will be the framework for marine planning and decisions affecting the marine area. Marine Plans will set out how the MPS will be implemented in specific areas,

extending to mean high water and overlapping with terrestrial planning schemes. Marine policy guidance and Marine Plans will seek to complement rather than replace terrestrial schemes, recognising that both systems may adapt and evolve over time.

229 The MCAA 2009 itself does not contain specific provisions relating to the historic environment; however the MPS provides the policy context and framework within which all aspects of the historic environment should be managed.

230 The MPS defines the historic environment as including 'all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged. Those elements of the historic environment – buildings, monuments, sites or landscapes – that hold particular significance due to their historic, archaeological, architectural or artistic interest are called heritage assets'. The MPS uses the term historic environment to include all heritage assets of whether they are afforded statutory protection or not.

231 In relation to the requirements for EIA's under Environmental Impact Assessment (EIA) Directive (Directive 85/337/EEC), the MPS outlines a number of principles to be used, specifically that decisions should:

- Be taken using a risk-based approach that allows for uncertainty, recognising the need to use sound science responsibly
- Be sensitive to potential impacts on sites of particular significance – including designated marine heritage assets
- Look to mitigate negative impacts where possible at various stages of development (in line with legal obligations) in a manner that is proportionate to the potential impacts of the proposal under consideration. Where alternative site selection or design could mitigate effects this should be considered, where appropriate

232 The MPS states that the protection and management of marine cultural heritage should be in a manner appropriate and proportionate to their significance. Significance is defined as 'the value of a heritage asset to this and future generations because of its heritage interests'. It is also highlighted within the MPS that many heritage assets with archaeological interest in coastal and offshore areas are not designated but are of equivalent significance. The MPS states that the 'absence of designation for such assets does not necessarily indicate lower significance' and that the same policy principles should be applied to them as to designated heritage assets.

233 In relation to the management of heritage assets, the MPS identifies the desirability of 'sustaining and enhancing the significance of heritage assets' and a general presumption in favour of the conservation of heritage assets should be adopted. The more significant the asset, the greater the presumption in favour of its conservation. Substantial loss or damage to heritage assets through development activities should be exceptional. Where loss or harm is unavoidable, appropriate mitigation should be considered.

234 In relation to mitigation measures, the MPS requires opportunities for acquiring new information from heritage assets should be taken, and made publicly available, particularly if a heritage asset is to be lost.' It goes further

to state that 'In England and Wales, where development resulting in the loss of a heritage asset's significance is justified, the marine plan authority should require developers to record the asset's significance before it is lost, and to deposit copies of the resulting reports with the relevant local authority planning authority, historic environment record and national heritage agency.'

235 Also of relevance to the historic environment, are the MPS's statements in relation to seascapes, which it defines as 'landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other'. The MPS states that the visual, cultural, historical and archaeological impacts on seascapes should be considered for all coastal areas.

A.1.3.9 Other UK Plans, Policies and Guidance

236 Of direct relevance to offshore renewables development is COWRIE's Historic Environment Guidance for the Offshore Renewables Sector (2007) (http://www.offshorewindfarms.co.uk/Assets/archaeo_guidance.pdf). This guidance is UK-wide and provides information on all aspects of dealing with the historic environment in planning and implementing offshore renewable schemes. The guidance is also generally relevant to other forms of marine development, including oil and gas. COWRIE has also published Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (http://www.offshorewindfarms.co.uk/Assets/cowrie_ciarch%20web.pdf%20) (2008).

237 The Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development is a UK-wide code developed in conjunction with key industries. The JNAPC Code is voluntary but provides a framework that can be used in the course of development to ensure that activities are conducted in an archaeologically sensitivity manner (http://www.thecrownestate.co.uk/jnapc_code_of_practice.pdf).

238 The Crown Estate has recently commissioned Wessex Archaeology to prepare a guidance note on assessing, evaluating, mitigating and monitoring the archaeological effects of offshore renewables projects, Protocol for Archaeological Discoveries: Offshore Renewables Projects, (http://www.scribd.com/doc/45787868/The-Crown-Estate-Protocol-for-Archaeological-Discoveries) (The Crown Estate, 2010).

239 As general context for best-practice, English Heritage's general guidance with respect to wind energy is set out in 'Wind Energy and the Historic Environment' (October 2005), which includes a short section on offshore renewables (http://www.english-heritage.org.uk/publications/wind-energy-and-the-historic-environment/).

240 English Heritage has also developed a methodology for Historic Seascape Characterisation, which 'maps a cultural understanding of coastal and marine landscapes' to 'provide area based cultural context our marine management decision-making'. The character areas have no formal legal or planning status, but provide a framework within which seascapes can be understood and managed (http://www.english-heritage.org.uk/professional/advice/advice-by-topic/landscape-and-areas/characterisation/seaschape-character/).

241 English Heritage has recently circulated a consultation document on views, entitled 'Seeing the History in the View: a methodology for assessing heritage significance within views' (April 2008). As implied by the title, the consultation draft sets out a methodology that can be used for 'any view that may have heritage significance', with particular reference to development proposals and environmental impact assessment. English Heritage intends to use the methodology in its own decisions relating to developments affecting views, and also to encourage planning authorities to adopt the same approach. The document includes a methodology for assessing impacts to views in the course of EIA. Although the case studies presented in the document are urban, its potential application to heritage significance within views to and from the coast is apparent (http://www.english-heritage.org.uk/professional/advice/advice-by-topic/setting-and-views/seeing-the-history-in-the-view/).

242 In effect, these principles mean that the historic environment must be a material consideration in development control, that preservation in situ is the preferred approach for heritage assets, that developers are responsible for the recording, publication and dissemination of investigations of heritage assets that cannot be preserved in situ, and that consents are issued subject to sufficient information on archaeological impacts and mitigation.

243 The implications for the historic environment of wind energy developments should be reflected in Regional Spatial Strategies, Local Development Frameworks and Supplementary Planning Documents.

244 The effects of wind energy programmes and projects on the historic environment should be evaluated in all levels of environmental impact assessment.

- Consideration of the historic environment should include World Heritage Sites; marine, coastal and terrestrial archaeology; historic buildings and areas; designed landscapes; and the historic character of the wider landscape
- The significance of internationally and nationally designated sites should be safeguarded, and physical damage to historic sites should be avoided
- The impact of wind energy developments on the setting and visual amenity of historic places should also be considered
- Where wind energy developments affect historic sites, national planning policies on the historic environment should be taken into account
- Consideration should always be given to the reversibility of wind energy projects

A.1.4 Scotland

245 Historic Scotland (HS) carries the responsibilities of Scottish Ministers with regard to nationally important archaeological and built heritage matters, which extend offshore to the 12 nautical mile (nm) territorial limit under the Marine (Scotland) Act 2010. These responsibilities are carried out in collaboration

with other bodies such as Marine Scotland, public authorities and marine planning authorities where appropriate on matters of marine planning or licensing (http://www.scotland.gov.uk/Topics/marine/seamanagement/marineact).

246 There are three relevant pieces of legislation from which direct responsibilities arise: the Marine (Scotland) Act 2010, the Ancient Monuments and Archaeological Areas Act 1979 (http://www.legislation.gov.uk/ukpga/1979/46/contents) and the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. Amendments to the latter two acts, are currently going through the Scottish Parliament as part of the The Ancient Monuments and Listed Buildings (Amendment) (Scotland) Bill (see below).

247 Under the Marine & Coastal Access Act 2009, Scottish Ministers now have powers over marine planning, licensing and conservation over the Scottish Marine Area from 12 - 200 nm offshore. UK Marine Policy Statement and resultant regional marine plans (due by 2012) will outline specific priorities and policy within 12 – 200 nm offshore.

248 Historic Scotland has used the definitions in AMAA 1979 as a basis for designating sites of archaeological interest. Amendments currently being considered in the The Ancient Monuments and Listed Buildings (Amendment) (Scotland) Bill (http://www.historic-scotland.gov.uk/amlb-bill.pdf), (December 2010) clarify what is regarded as a 'monument'. The proposed change to the definition cites "any site comprising and thing, or group of things, that evidences previous human activity" (p22). This would therefore include artefact scatters, palaeoenvironmentally important sediments containing artefacts, i.e. archaeological material that does not fit under the previous definition that focused upon 'structure' or 'work'. These kinds of archaeological remains are principal components in the archaeological record of submerged prehistoric sites and landscapes and wrecks sites where no vessel has been located. Therefore these proposed amendments are important considerations for the protection of marine archaeology and future guidance.

A.1.4.1 Marine (Scotland) Act 2010

249 The definitions of significance and importance set out in AMAA 1979 have been incorporated into the newly assented Marine (Scotland) Act 2010 and underpin the provisional policies (http://www.scottish.parliament.uk/s3/committees/rae/bills/Marine%20bill/documents/20100110CabSecSGS2Committments-ProvisionalpoliciesforHistoricMPAs-circulationtoparliament.pdf) based upon the Act which replaces the PWA 1973 in Scotland. Under section 4 of the Act, Scottish Ministers have the power to designate an area as an Historic Marine Protected Area (MPA) in order to preserve "a marine historic asset of national importance located, or believed to be located, in the area".

250 A marine historic asset is defined as:

- a vessel, vehicle or aircraft (or a part of a vessel, vehicle or aircraft)
- the remains of a vessel, vehicle or aircraft (or a part of such remains)
- an object contained in, or formerly contained in, a vessel, vehicle or aircraft

- a building or other structure (or a part of a building or structure)
- a cave or excavation
- a deposit or artefact (whether or not formerly part of a cargo of a ship) or any other thing which evidences, or groups of things which evidence, previous human activity

251 Ministers would also be obliged to consider other environmental characteristics of the marine area with respect to biodiversity and geodiversity policy aims and planning and licensing proposals.

252 Scottish Ministers are required to publish notice and hold a consultation for a proposed Historic MPA designation, however if there is a perceived need to rapidly protect a marine historic asset a designation may be enforced without this process enabling protection for up to 2 years. Specific preservation objectives pertaining to an individual Historic MPA would be defined by Scottish Ministers through Marine Conservation Orders (MCOs) which could prohibit, restrict or regulate a wide range of activities not controlled by other means. The status of designations would be assessed in an ongoing process in relation to the changing state of knowledge and future requirements.

253 Within an MPA it would be an offence to "intentionally or recklessly carry out a prohibited act that significantly hinders or may significantly hinder the achievement of the state preservation objectives for the protected area". Prohibited acts would be to:

- carry out works or activities (or which are likely to) damage or interfere with a marine historic asset or have a significant impact on the protected area
- remove, alter or disturb a marine historic asset
- to contravene an MCO

254 Exceptions may apply when in accordance with a permit or authorisation issued by the Scottish Ministers.

255 Further to powers of protection, marine planning and some licensing powers (under the Marine and Coastal Access Act 2009) would be devolved to Scottish Ministers through the Marine (Scotland) Act 2010 covering the Scottish Marine Area.

A.1.4.2 Planning and the Historic Environment (Scotland)

256 The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 contains the bulk of built heritage conservation planning law for Scotland. It requires Scottish Ministers to compile lists of buildings of archaeological or historic importance and provides for the designation of conservation areas. This Act is currently being discussed in the Scottish Parliament (December 2010) in conjunction with The Ancient Monuments and Listed Buildings (Amendment) (Scotland) Bill which aims to update The Historic Buildings and Ancient Monuments Act 1953, The Ancient Monuments and Archaeological Areas Act 1979 and Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 in order to harmonise existing legislation for the management of the historic environment.

257 Under the proposed broader definition of the archaeological record (as per Historic Environment (Amendment) (Scotland) Bill artefact scatters and archaeological important sediments containing evidence of past human activity could be protected once 'cultural significance' and 'national importance' have been discerned under the defined criteria. For example, this type of situation would be well-described by the known submerged prehistoric landscapes and stone tool scatters that define the Mesolithic and Palaeolithic archaeological record in the North Sea.

258 The scope of statutory planning control associated with legislation such as the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 and Town & Country Planning (Scotland) Act 1997 ends at the mean low water mark and it is therefore not possible for buildings or sites that are permanently submerged to be listed. However, it is possible for structures which are sometimes or partly below the sea to be listed, such as ports and harbours. Under the M(S)A 2010 the scope of The Act defines the "Sea" as including the mean high water spring tide, therefore in the case of the intertidal zone, there are overlapping jurisdictions between marine and terrestrial planning legislation and various public bodies including Local Planning authorities and Historic Scotland for example. The resolution of planning decisions in the intertidal zone will be achieved through the national marine plan, and regional marine plans as prepared by Government and regional Marine Planning Partnerships, respectively. The process of producing marine plans (national and regional) is set to take 2 years from the Royal Assent of the M(S)A (10th March 2010).

259 The strategic policies of Scottish Ministers to the historic environment are being set out in a new set of documents entitled Scottish Historic Environment Policies (SHEPs). These documents provide immediate context for advice arising from Historic Scotland, but importantly the SHEPS are effectively cross-governmental and can be expected to guide decisions across the range of authorities responsible to Scottish Ministers. Scotland's Historic Environment (SHEP 1 sets out an overall vision and brings together a broad range of existing guidance and a consolidated volume of the existing SHEPs has recently been prepared (http://www.historic-scotland.gov.uk/shep-july-2009.pdf); however, a document pertaining to the Marine Historic Environment is forthcoming. The consultation period on a draft SHEP on The Marine Historic Environment (http://www.historic-scotland.gov.uk/shep_marine.pdf) has now closed and is likely to be published during 2011-12 (pers. comm. Historic Scotland, December 2010).

260 *Scottish Planning Policy* (SPP) has recently been consolidated to provide a more focused statement of national planning policy (http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf), whilst revoking some previous SPP guidance notes, in particular superseding *SPP 23: Planning and the Historic Environment*, Planning Advice Notes (PANs) (pertaining to coastal planning only) and National Planning Policy Guidelines (NPPGs) including *NPPG 18: Planning and the Historic Environment* and *NPPG 5:Archaeology and Planning*.

261 *SPP* sets out policy on how archaeological remains and discoveries should be handled. The guidance is aimed at planning authorities in Scotland, and is also of direct relevance to developers, owners, statutory undertakers, government departments, conservation organisations and others whose actions have a direct physical impact upon the natural or built environment as

it underlines the requirements of development plans to consider the historic environment.

262 The Planning Advice Note: Archaeology 42 - the Planning Process and Scheduled Monument Procedures (PAN 42 - http://www.scotland.gov.uk/Publications/1994/01/17081/21711) gives more detailed advice on planning procedures and the separate controls over scheduled monuments. With the current assessment of the Monuments and Listed Buildings (Amendment) (Scotland) Bill discussed above, this may be updated or changed in the future.

263 Although it is primarily concerned with development on land, a recent document on scoping wind farm proposals in Scotland from Historic Scotland (http://www.historic-scotland.gov.uk/eia_and_gdpo_scoping_setting.pdf) may also be relevant to offshore wind farms.

A.1.5 Local Authority – Aberdeenshire Council Planning

264 The Strategic Development Planning Authority (SDPA, 2010) of Aberdeen City and Shire Council has declared several targets for Quality of the Environment within the 2009 Structure Plan of particular note to archaeology and the historic environment is QE/T1, which is actively monitored during the planning application process:

- To make sure that development improves and does not lead to the loss of, or damage to, built, natural or cultural heritage assets

265 The structure plan highlights “The structure plan area has many sites of significant of built, natural and cultural value. Appropriate monitoring will be developed through 2010 to ensure that development does not have a detrimental effect.” (SDPA, 2010:27).

A.1.6 Relevant International Instruments

266 A broader context is provided by international law, represented by customary law and the conventions to which the UK is party. The United Nations Convention on the Law of the Sea 1982 (UNCLOS 1982 - http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm), the European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (the Valletta Convention), the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001 (UNESCO 2001 - http://unesdoc.unesco.org/images/0012/001260/12065e.pdf) and the European Landscape Convention 2000 (ELC 2000 - http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=176&CM=8&DF=5/19/2009&CL=ENG) are all relevant in this regard, as is the (ICOMOS) Charter on the Protection and Management of Underwater Cultural Heritage 1996.

267 UNCLOS 1982 was ratified by the UK in 1997. Article 303 stipulates that ‘states have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose’. Article 303 also provides for coastal states to exert a degree of control over the archaeological heritage to 24 nautical miles, though the UK has not introduced any measures to implement this right.

268 The Valletta Convention was ratified by the UK Government in 2000 and came into force in 2001. The convention binds the UK to implement protective measures for the archaeological heritage within the jurisdiction of each party, including sea areas. Insofar as the UK exerts jurisdiction over the Continental Shelf, then it would appear that the provisions of the Valletta Convention apply to that jurisdiction.

269 The UNESCO Convention 2001 is a comprehensive attempt to codify the law internationally in respect of the underwater archaeological heritage. Although the UK abstained in the vote on the final draft of the Convention, it has stated that it has adopted the Annex of the Convention – which governs the conduct of archaeological investigations – as best practice for archaeology (http://www.unesco.org/new/en/unesco/themes/underwater-cultural-heritage/).

270 The ELC 2000 became binding on the UK from 1 March 2007. Its principal clauses require the Government:

- to recognise landscapes in law as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity
- to establish and implement landscape policies aimed at landscape protection, management and planning through the adoption of … specific measures
- to establish procedures for the participation of the general public, local and regional authorities, and other parties with an interest in the definition and implementation of the landscape policies mentioned in paragraph b above
- to integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape

271 The Convention applies to the entire territory of the UK and includes land, inland water and marine areas.

272 One further international measure is worth noting, namely the International Council on Monuments and Sites (ICOMOS) Charter on the Protection and Management of Underwater Cultural Heritage 1996 (the Sofia Charter). The Charter includes a series of statements regarding best practice, intending 'to ensure that all investigations are explicit in their aims, methodology and anticipated results so that the intention of each project is transparent to all'. The UK is a member of ICOMOS.

A.2 Gazetteer of Documented Wrecks and Features

(Subsequently compiled into the geophysical assessment of seabed features (section A.4) (co-numbered in Figure 4).

WA_ID (corresponding geophysical feature record)	**RCAHMS ID**	**UKHO ID**	**State**	**Easting**	**Northing**	**Name**	**Type**	**Length (m)**	**Beam (m)**	**Draught (m)**	**Date lost**
2000 (7093)	NJ91NE 8005	2145	Live	560106	6345633	*Archangel*	Steam Ship	101	13	6	16/05/1941
2001 (7103)		2170	Live	557170	6342158	*Coastal Emperor*	Motor Rig stand-by trawler	35	8	4	06/12/1978
2002 (7046)		71209	Live	561558	6340796		Anchor & cable				
2003 (7102)		2144	Live	556542	6340201	*Sherriffmuir*	Motor Fishing	31	7	3	01/10/1976

A.3 Gazetteer of Sub-bottom Features

WA ID	Name / Classification	Archaeological Discrimination	Description	Sources
7500	Simple Cut and Fill	A2	Small, shallow, possible simple cut and fill in the surface of FH, though could just be an internal reflector. Not definitively observed on adjacent lines, but in the vicinity of 7501 and possibly related. Depth Range: 1.0m - 2.9m BSB.	6500
7501	Simple Cut and Fill	A2	Possible simple cut and fill in the surface of FH, though could just be an internal reflector. Not definitively observed on adjacent lines, but in the vicinity of 7500 and possibly related. Depth Range: 0.4m - 3.7m BSB.	6501
7502	Simple Cut and Fill	A2	Small, shallow, possible simple cut and fill in the surface of FH, though could just be an internal reflector. Not definitively observed on adjacent lines, but in the vicinity of 7503 and 7504 and possibly related. Depth Range: 0.4m - 2.3m BSB.	6502
7503	Simple Cut and Fill	A2	Possible simple cut and fill in the surface of FH, though could just be an internal reflector. Not definitively observed on adjacent lines, but in the vicinity of 7502 and 7504 and possibly related. Depth Range: 1.6m - 6.1m BSB.	6503
7504	Simple Cut and Fill	A2	Possible simple cut and fill in the surface of FH, though could just be an internal reflector. Not definitively observed on adjacent lines, but in the vicinity of 7502 and 7503 and possibly related. Depth Range: 2.3m - 4.7m BSB.	6504
7505	Erosion Surface	A2	Generally fairly poorly defined but laterally continuous reflector within the FH. Appears at seabed just east of the centre of the survey area, in a line running approximately parallel to the shoreline, and dips gently eastwards. Possible erosion surface within FH, possibly representing the internal structure of a prograding palaeoshoreline. Depth Range: 1.4m - 8.3m BSB.	6506

A.4 Gazetteer of Seabed Features

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7000	Rope / Chain	556368	6338517	A2	106.9	0.2	0.1	17	Long, curvilinear dark reflector with a small shadow associated with a small magnetic anomaly. Possible length of rope or chain.	6035	-
7001	Debris	556655	6338337	A2	11.8	1.2	0.4	7	Large dark reflector with large shadow located adjacent to a similar, smaller dark reflector. Associated with a small magnetic anomaly, and possibly both part of the same partially buried piece of ferrous debris.	6036	-
7002	Dark Reflector	556729	6338404	A2	5.7	0.7	0.2	-	Elongate dark reflector with shadow but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6037	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7003	Magnetic	556721	6338252	A2	-	-	-	12	Small magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. In an area of variable seabed reflectivity and geology and could be due to natural reasons or a piece of buried ferrous debris.	6038	-
7004	Magnetic	557116	6338253	A2	-	-	-	23	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be a piece of buried ferrous debris, or caused by natural changes in the seabed geology.	6039	-
7005	Magnetic	557167	6338425	A2	-	-	-	23	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be a piece of buried ferrous debris, or caused by natural changes in the seabed geology.	6040	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7006	Debris	557386	6338562	A2	7.9	0.1	0.0	-	Short but well-defined linear dark reflector without a shadow or associated magnetic anomaly. Possible piece of linear non-ferrous debris.	6041	-
7007	Magnetic	557703	6338644	A2	-	-	-	5	Magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. Anomaly is small but a definite spike compared with the background. Could be caused by natural changes in seabed geology or represent a piece of buried ferrous debris.	6042	-
7008	Magnetic	557447	6338914	A2	-	-	-	24	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly a piece of buried ferrous debris.	6043	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7009	Magnetic	556700	6338738	A2	-	-	-	28	Medium magnetic anomaly with two positive peaks. No associated sidescan sonar or multibeam bathymetry contact, and possibly a piece of buried ferrous debris.	6044	-
7010	Magnetic	556655	6339020	A2	-	-	-	13	Small magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. In an area of variable seabed reflectivity and could be due to natural geological variations or a piece of buried ferrous debris.	6045	-
7011	Magnetic	556638	6338913	A2	-	-	-	16	Small magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. In an area of variable seabed reflectivity and could be due to natural geological variations or a piece of buried ferrous debris.	6046	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7012	Magnetic	556454	6338955	A2	-	-	-	23	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. In an area of variable seabed reflectivity and could be due to natural geological variations or a piece of buried ferrous debris.	6047	-
7013	Dark Reflector	556695	6339095	A2	5.7	2.9	0.7	10	Very large dark reflector with very large shadow, possibly associated with a small magnetic anomaly, though the large number of scattered anomalies in the vicinity indicate this could not be the case. Located adjacent to an area of high seabed reflectivity containing numerous similar, but smaller, contacts so could be a natural feature. However is slightly apart from these, so could be a piece of ferrous debris.	6048	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7014	Magnetic	556551	6339186	A2	-	-	-	30	Two adjacent medium magnetic anomalies, probably part of the same broader feature. No associated sidescan sonar or multibeam bathymetry contacts, but is located in an area of variable seabed reflectivity so could be due to natural geological variations or a piece of buried ferrous debris.	6049	-
7015	Magnetic	556557	6339336	A2	-	-	-	27	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. In an area of variable seabed reflectivity and could be due to natural geological variations or a piece of buried ferrous debris.	6050	-
7016	Magnetic	556896	6339182	A2	-	-	-	6	A linear alignment of three small magnetic anomalies, possibly part of the same broad anomaly though this is uncertain. Could be due to natural changes in seabed geology or represent a piece of elongate, buried ferrous debris (e.g. chain).	6051	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7017	Magnetic	557477	6339608	A2	-	-	-	14	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6053	-
7018	Magnetic	558399	6339593	A2	-	-	-	9	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6054	-
7019	Debris	558823	6339137	A2	20.1	4.1	0.0	-	Group of irregular dark reflectors without a shadow or associated magnetic anomaly. Could be natural or a small scatter of non-ferrous debris.	6055	
7020	Debris	558995	6339921	A2	8.4	4.9	0.3	-	Small area of dark reflectors, some with shadows but without an associated magnetic anomaly. Possible small scatter of non-ferrous debris.	6057	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7021	Seafloor Disturbance	559875	6339635	A2	10.1	4.6	0.0	-	Small area of low seabed reflectivity containing small dark reflectors, possible area of seafloor disturbance. Data is poor and feature is poorly resolved. Not associated with a magnetic anomaly, could be natural or anthropogenic in origin.	6064	-
7022	Dark Reflector	560039	6339560	A2	3.2	0.9	0.5	-	Dark reflector with shadow but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6065	-
7023	Debris	560261	6339599	A2	2.9	0.6	0.6	-	Small, elongate dark reflector with small shadow but without an associated magnetic anomaly. Feature appears irregular and surround by a small area of disturbed seabed. Possible piece of partially buried non-ferrous debris.	6066	-
7024	Debris	557820	6340910	A2	15.9	1.9	0.0	-	Two adjacent, poorly defined, short linear dark reflectors without shadows or an associated magnetic anomaly. Possibly non-ferrous debris.	6067	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7025	DarkReflector	558423	6340262	A2	7.3	2.3	0.0	-	Poorly defined dark reflector or cluster of small dark reflectors without shadows or associated magnetic anomalies. Could be a natural feature or non-ferrous debris.	6069	-
7026	Magnetic	558680	6340514	A2	-	-	-	18	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6070	-
7027	Debris	558237	6341081	A2	7.6	3.6	0.0	-	Small, irregular dark reflector without a shadow or associated magnetic anomaly. Possible piece of non-ferrous debris.	6071	-
7028	Dark Reflector	558662	6341183	A2	5.4	3.7	0.7	-	Two adjacent large dark reflectors with shadows but no associated magnetic anomaly. Could be natural or a piece of debris.	6076	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7029	Debris	559669	6341721	A2	57.6	0.2	0.0	-	A poorly defined curvilinear dark reflector linking two or three small dark reflectors with shadows. No associated magnetic anomaly, but could be an area of non-ferrous debris.	6088	-
7030	Dark Reflector	560154	6341600	A2	2.4	0.1	0.0	-	Short, indistinct dark reflector without a shadow or associated magnetic anomaly. Located in an area of poor data, and could be a piece of debris or noise.	6092	-
7031	Dark Reflector	560168	6342224	A2	5.3	1.8	0.0	-	Short, indistinct dark reflector without a shadow or associated magnetic anomaly. Located in an area of poor data, and could be a piece of debris or noise.	6093	-
7032	Dark Reflector	560525	6341860	A2	5.2	0.9	0.3	-	Elongate dark reflector with shadow but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6094	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7033	Dark Reflector	560550	6341691	A2	2.2	0.8	0.1	-	Small dark reflector without a shadow or associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6095	-
7034	Dark Reflector	557063	6339094	A2	2.7	0.7	0.3	-	Poorly defined area of dark reflectors forming a rectangular shape. No shadows or associated magnetic anomalies. Possibly a natural feature or an area of non-ferrous debris.	6099	-
7035	Magnetic	556686	6339874	A2	-	-	-	22	Two adjacent medium magnetic anomalies, probably part of the same short linear anomaly. No associated sidescan sonar or multibeam bathymetry contact, but could represent a piece of buried linear ferrous debris.	6102	-
7036	Magnetic	556653	6340003	A2	-	-	-	14	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6103	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7037	Magnetic	557195	6340055	A2	-	-	-	16	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6104	-
7038	Debris	557009	6340182	A2	3.0	2.8	0.5	53	Isolated, rounded dark reflector with small shadow and associated scour. Possibly associated with a medium magnetic anomaly, though this was identified approx 50m away. Possible piece of ferrous debris.	6105	-
7039	Magnetic	556835	6340238	A2	-	-	-	32	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris.	6106	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7040	Magnetic	557250	6340545	A2	-	-	-	32	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris. Located in an area of similar contacts at the end of a possible outfall pipe, so could be debris from the pipe.	6107	-
7041	Magnetic	557175	6340485	A2	-	-	-	16	Small magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris. Located in an area of similar contacts at the end of a possible outfall pipe, so could be debris from the pipe.	6108	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7042	Magnetic	557113	6340448	A2	-	-	-	18	Small magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris. Located in an area of similar contacts at the end of a possible outfall pipe, so could be debris from the pipe.	6109	-
7043	Magnetic	557083	6340538	A2	-	-	-	34	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris. Located in an area of similar contacts at the end of a possible outfall pipe, so could be debris from the pipe.	6110	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7044	Magnetic	557020	6340495	A2	-	-	-	13	Small magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possible piece of buried ferrous debris. Located in an area of similar contacts at the end of a possible outfall pipe, so could be debris from the pipe.	6111	-
7045	Debris	557077	6340342	A2	4.2	1.7	1.3	23	Rectangular dark reflector with shadow, scour and associated medium magnetic anomaly. Possible piece of ferrous debris.	6112	-
7046	Recorded Obstruction	561558	6340796	A3	-	-	-	-	Given location of a seabed obstruction, recorded as an anchor and cable. Not identified by any of the geophysical equipment and could be located elsewhere or currently buried.	6115, 2002	71209 (UKHO)
7047	Rope / Chain	560862	6341169	A2	42.7	1.0	0.0	-	Poorly defined curvilinear dark reflector without a shadow or associated magnetic anomaly. Could be a partially buried length of rope or chain.	6117	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7048	Magnetic	560982	6342050	A2	-	-	-	15	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Possibly represents a small piece of buried ferrous debris.	6118	-
7049	Debris	561746	6341897	A2	14.4	0.5	0.2	-	Short linear dark reflector with small shadow but no associated magnetic anomaly. Possible piece of linear debris.	6119, 6120	-
7051	Rope / Chain	557387	6342034	A2	77.1	0.5	0.0	-	Long, poorly defined curvilinear dark reflector without a shadow or associated magnetic anomaly. Possible length of rope or chain.	6124	-
7052	Debris	557694	6342261	A2	9.7	0.9	0.0	-	Short linear dark reflector without a shadow or associated magnetic anomaly. Possibly a piece of linear non-ferrous debris.	6125	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7053	Magnetic	557806	6343320	A2	-	-	-	8	Two adjacent small but distinct magnetic anomalies, possibly part of the same feature. No associated sidescan sonar or multibeam bathymetry contacts. Could be natural in origin or indicative of a piece of buried ferrous debris.	6129	-
7054	Magnetic	557765	6343110	A2	-	-	-	7	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6131	-
7055	Magnetic	558178	6342835	A2	-	-	-	21	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6132	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7056	Magnetic	558523	6342853	A2	-	-	-	8	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6133	-
7057	Magnetic	558325	6342645	A2	-	-	-	9	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6135	-
7058	Magnetic	558185	6342965	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6136	-
7059	Magnetic	558545	6343103	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6137	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7060	Magnetic	558378	6344343	A2	-	-	-	12	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6141	-
7061	Magnetic	558368	6344145	A2	-	-	-	11	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6142	-
7062	Magnetic	558673	6344048	A2	-	-	-	8	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6143	-
7063	Magnetic	558648	6344283	A2	-	-	-	8	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6144	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7064	Magnetic	558998	6343508	A2	-	-	-	13	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6147	-
7065	Magnetic	559168	6343233	A2	-	-	-	68	Isolated medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a piece of buried ferrous debris.	6148	-
7066	Magnetic	559755	6343090	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6149	-
7067	Magnetic	558965	6342600	A2	-	-	-	15	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6151	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7068	Magnetic	559193	6342323	A2	-	-	-	5	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6152	-
7069	Debris	559509	6342605	A2	20.2	5.8	0.1	15	Irregular shaped dark reflector with a small shadow and associated with two small magnetic anomalies. Possible ferrous debris, could be a length of rope or chain but data is unclear.	6153	-
7070	Magnetic	559580	6342703	A2	-	-	-	22	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Located close to possible ferrous debris 7069, and could be a piece of associated buried ferrous debris.	6154	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7071	Wreck	561077	6342919	A1	25.0	6.5	0.7	58	Wreck not present in the given UKHO or NMR data. Appears upright and fairly intact, still showing structure and height, though is possibly partially buried. No debris field was observed, though one possible piece of discrete debris was located approx. 35m NW. Multibeam bathymetry data indicate the structure is located in a very small (<0.5m deep) scour.	6155	-
7072	Debris	561038	6342931	A1	2.1	1.1	0.2	-	Small dark reflector with a small shadow. Magnetic signature unknown due to the high response created by nearby wreck 7071. Possibly a piece of debris related to the wreck.	6156	-
7073	Debris	562359	6343072	A2	4.8	2.0	0.4	-	Irregular elongate dark reflector with shadow but no associated magnetic anomaly. Possible piece of non-ferrous debris.	6157	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7074	Debris	562363	6343516	A2	4.3	0.4	0.0	-	Short linear dark reflector without a shadow or associated magnetic anomaly. Possible piece of linear non-ferrous debris.	6158	-
7075	Dark Reflector	561821	6343582	A2	3.8	0.9	0.4	-	Isolated dark reflector with shadow but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6159	-
7076	Debris	561217	6343496	A2	9.8	0.7	0.1	-	Short linear dark reflector or alignment of individual dark reflectors, with a very small shadow but no associated magnetic anomaly. Possible piece of partially buried non-ferrous debris.	6160	-
7077	Magnetic	560093	6344288	A2	-	-	-	7	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6166	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7078	Magnetic	559363	6344785	A2	-	-	-	22	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6167	-
7079	Magnetic	559495	6344720	A2	-	-	-	15	Small but definite magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6168	-
7080	Magnetic	558970	6344655	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6169	-
7081	Magnetic	558363	6345125	A2	-	-	-	183	Large magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. No know wrecks or structures in the area, and origin of the anomaly is unknown. Possibly a buried shoreline structure.	6170	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7082	Magnetic	558695	6345140	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6171	-
7083	Magnetic	558745	6345160	A2	-	-	-	6	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6172	-
7084	Magnetic	558658	6345208	A2	-	-	-	17	Small but definite magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6173	-
7085	Debris	558552	6345391	A2	5.1	0.4	0.0	-	Small linear dark reflector without a shadow or associated magnetic anomaly. Possible piece of non-ferrous debris.	6175	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7086	Debris	558530	6345401	A2	5.7	0.4	0.0	-	Small linear dark reflector without a shadow or associated magnetic anomaly. Possible piece of non-ferrous debris.	6176	-
7087	Debris	558468	6345520	A2	11.2	0.4	0.0	18	Small linear dark reflector without a shadow but possibly associated with a small magnetic anomaly. Possible piece of ferrous debris.	6177	-
7088	Magnetic	558763	6346265	A2	-	-	-	22	Two adjacent medium anomalies, possibly part of the same feature. No associated sidescan sonar or multibeam bathymetry contact. Could be a natural feature or indicative of buried ferrous debris.	6179	-
7089	Magnetic	559238	6346023	A2	-	-	-	8	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6180	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7090	Debris	559201	6345459	A2	37.7	2.8	0.2	-	Long, linear dark reflector without a shadow. Extending from the outfall pipe exit away from the shore, and is possibly related debris.	6183	-
7091	Magnetic	559348	6345393	A2	-	-	-	47	Medium magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contacts. Possibly indicative of a buried piece of ferrous debris. Located a short distance from the mouth of an outfall pipe, so could be recent debris washed in from onshore.	6184	-
7092	Magnetic	560063	6345973	A2	-	-	-	45	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6185	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7093	Recorded Wreck	560106	6345633	A3	-	-	-	-	Given location of the wreck of the SS *Archangel*, not identified by any of the geophysical equipment. UKHO records show it was last surveyed in 1977, suggesting the positioning may not be accurate and it could lie elsewhere outside of the survey area.	6187, 2000	2145 (UKHO)
7094	Magnetic	560170	6344850	A2	-	-	-	22	Medium magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Possibly indicative of a small piece of buried ferrous debris.	6189	-
7095	Magnetic	560320	6345318	A2	-	-	-	12	Small but definite magnetic anomaly without any associated sidescan sonar or multibeam bathymetry contact. Could be natural or indicative of a small piece of buried ferrous debris.	6190	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7096	Magnetic	560390	6345093	A2	-	-	-	15	Two adjacent small magnetic anomalies, possibly part of the same feature. No associated sidescan sonar or multibeam bathymetry contact. Could be a natural feature or indicative of buried ferrous debris.	6191	-
7097	Debris	561127	6345539	A2	2.3	1.4	0.7	-	Well defined, irregular dark reflector with shadow but no associated magnetic anomaly. Possible piece of non-ferrous debris.	6192	-
7098	DarkReflector	561104	6344923	A2	2.0	1.2	0.4	-	Poorly defined rounded dark reflector with shadow and some scour, but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6194	-
7099	Dark Reflector	560950	6344554	A2	2.7	0.7	0.3	-	Small isolated dark reflector with small shadow but no associated magnetic anomaly. Could be natural or a piece of non-ferrous debris.	6193, 6195	-

WA ID	Name / Class.	Easting	Northing	Arch. Discrim.	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	Sources	External References
7100	Debris	561855	6345765	A2	15.7	11.0	0.0	-	Collection of short linear dark reflectors without shadows, possible partially buried object/debris. Length of rope or chain possibly extending from one end. No associated magnetic anomaly identified.	6196	-
7101	Magnetic	562015	6345405	A2	-	-	-	8	Medium, complex magnetic anomaly without an associated sidescan sonar or multibeam bathymetry contact. Could be a natural feature or indicative of buried ferrous debris.	6198	-
7102	Recorded Wreck	556542	6340201	A3	-	-	-	-	Given location of the wreck of the *Sheriffmuir*. Located outside of the geophysical survey area, so the current condition of the structure cannot be commented upon.	2003	2144 (UKHO)
7103	Recorded Wreck	557170	6342158	A3	-	-	-	-	Given location of the wreck of the *Coastal Emperor*. Located outside of the geophysical survey area, so the current condition of the structure cannot be commented upon.	2001	2170 (UKHO)

A.5 Gazetteer of Recorded Losses

(Vessels known to have been lost in the vicinity of the MSA, with absent or poor positional information).

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Unknown		1444	Medieval	Barge	Near Aberdeen	From Ferguson 1991, 5
Falcoun		1584	Post-Medieval		Aberdeen	From Ferguson 1991, 6
Elizabeth		1697	Post-Medieval		Mouth of the Dee	Stranded on the bar; from Ferguson 1991, 10
Levant/Smyrna Galley		1707	Industrial	Galley?	Belhevie	6 miles N of Aberdeen; from Ferguson 1991, 11
Fussroun Geertruy		1707	Industrial	Dogger	Belhevie	6 miles N of Aberdeen; from Ferguson 1991, 11
St Andrew	NJ90NE 8248	1723	Industrial		Mouth of the Dee	
Unknown	NJ90NE 8016	1774	Industrial		Aberdeen Bay	
Dolphin	NJ90NE 8018	1768	Industrial		Aberdeen Harbour	
Unknown	NJ90NE 8019	1768	Industrial	Brig	Aberdeen	
Friendship	NJ90NE 8020	1774	Industrial		Aberdeen	
Jenny	NJ90NE 8021	1774	Industrial		Aberdeen	
Unknown	NJ90NE 8023	1783	Industrial		Aberdeen	
Unknown	NJ90NE 8024	1783	Industrial		Aberdeen	
Unknown	NJ90NE 8025	1783	Industrial		Aberdeen	
Active	NJ90NE 8027	1793	Industrial		Near Aberdeen	
Mary	NJ90NE 8028	1793	Industrial		Near Aberdeen	
Mary	NJ90NE 8029	1797	Industrial		Ashore E of Aberdeen	
Martha		1800	Industrial		Belhevie	From Ferguson 1991, 23
Lord Saltoun		1800	Industrial	Brigantine	Belhevie	From Ferguson 1991, 23
Neptune		1800	Industrial		Belhevie	From Ferguson 1991, 23
Unknown		1800	Industrial	Brig	Aberdeen	From Ferguson 1991, 23
Unknown		1800	Industrial	Brig	Aberdeen	From Ferguson 1991, 23
Lord Saltoun		1800	Industrial	Brig	Aberdeen Beach	From Ferguson 1991, 24

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Peggy and Mary		1800	Industrial	Sloop	Aberdeen Beach	From Ferguson 1991, 24
Good Intent	NJ90NE 8030	1803	Industrial		Near Aberdeen	
Amaris	NJ90NE 8031	1803	Industrial		Aberdeen	
Persuit / Pursuit	NJ90NE 8221/8032	1803	Industrial		Near Aberdeen	
Mary		1803	Industrial		Blackdog, Belhevie Sands	From Ferguson 1991, 27
Thetis	NJ90NE 8035	1805	Industrial		Aberdeen	
Barbara	NJ90NE 8037	1807	Industrial		Near Aberdeen	
Luna	NJ90NE 8038	1807	Industrial		Near Aberdeen	Ashore, may have been refloated
Alert	NJ90NE 8039	1808	Industrial		Aberdeen	Broad Hill (?)
Fortune	NJ90NE 8040	1809	Industrial		Near Aberdeen	Ashore
Hawke	NJ90NE 8041	1809	Industrial		Near Aberdeen	Ashore
Jane	NJ90NE 8043	1809	Industrial		Near Aberdeen	Ashore
Nancy	NJ90NE 8044	1809	Industrial		Aberdeen coast	
Caesar	NJ90NE 8045	1810	Industrial	Ship	Near Aberdeen	
Hercules	NJ90NE 8047	1813	Industrial		Aberdeen harbour entrance, back of N Pier	
Joanna	NJ90NE 8049	1813	Industrial	Brig	Aberdeen harbour entrance, back of S Pier	
St Andrew	NJ90NE 8225	1813	Industrial		Aberdeen harbour entrance, back of N Pier	
Caledonian	NJ90NE 8010	1815	Industrial	Brig	Aberdeen Harbour Entrance	
Thames	NJ90NE 8050	1815	Industrial	Smack	Aberdeen Harbour Entrance	

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Charsten and Perter Larsen	NJ90NE 8228/8229	1815	Industrial	Galliot	Aberdeen Harbour, N Pier	
Peggy	NJ90NE 8052	1816	Industrial		Near Aberdeen	
Admiral Nelson	NJ91SE 8005	1816	Industrial		Aberdeen	Stranded at Black Dog, appears to have subsequently moved
Gibraltar	NJ90NE 8054	1817	Industrial	Brig	Black Dog	Lost 2 miles N of Aberdeen
James and Mary	NJ90NE 8055	1817	Industrial	Schooner	Aberdeen	Collision 1 mile NNW of Girdle Ness
Gleaner	NJ90NE 8058	1817	Industrial	Brig	Aberdeen Harbour Entrance	
Expedition	NJ90NE 8059	1818	Industrial	Ship	Black Dog	
Sheepfold	NJ90NE 8061	1819	Industrial	Schooner	Aberdeen Harbour Entrance	
Perfect	NJ90NE 8062	1820	Industrial	Brig	Aberdeen Harbour, Breakwater	Lost S of breakwater (S pier?) on rocks
Jean	NJ90NE 8063	1821	Industrial	Whaler/Brig	Aberdeen Harbour, N Pier Head	
Ann	NJ90NE 8230	1821	Industrial		Aberdeen Harbour Entrance	Breakwater
Alpha	NJ90NE 8066	1822	Industrial	Sloop	Mouth of the Don	
Deveron	NJ91SE 8019	1825	Industrial		Mouth of the Don	N of
Friends	NJ90NE 8215	1826	Industrial	Sloop	Aberdeen Harbour, S Pier Head	
Friendship	NJ91SE 8020	1826	Industrial		Mouth of the Don	To the N of
Friendship	NJ90NE 8235	1827	Industrial		Mouth of the Don	To the N of
Corsair	NJ90NE 8236	1828	Industrial	Schooner	Aberdeen Harbour, Pier Head	
Unknown	NJ90NE 8070	1830	Industrial		Aberdeen	
Grampion / Grampian	NJ90NE 8239	1830	Industrial	Brigantine	Aberdeen Harbour, N Pier	

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Fame		1830	Industrial	Fishing Smack	Blackdog	6 miles N of Aberdeen; from Ferguson 1991, 35
Lady Forbes	NJ90NE 8073	1832	Industrial		Near the mouth of the Dee	
Caledonia	NJ90NE 8074	1832	Industrial		Aberdeen	
Pirate	NJ91SE 8006	1832	Industrial	Smack	Aberdeen Beach	3 miles N of Aberdeen
William and Mary	NJ90NE 8075	1833	Industrial	Sloop	Near Aberdeen	
Margaret	NJ90NE 8242	1834	Industrial		Off Aberdeen	
Marquis of Huntly	NJ90NE 8245	1835	Industrial	Smack	Aberdeen Beach	1 mile N of N Pier
Unknown	NJ90NE 8077	1838	Industrial		Aberdeen	
Unknown	NJ90NE 8078	1838	Industrial		Aberdeen	
Brilliant	NJ90NE 8251	1839	Industrial	Steamship	Aberdeen Harbour, N Pier	
Tinker		1841	Industrial	Schooner	Aberdeen Beach	Opposite the bathing station
Migvie	NJ90NE 8080	1842	Industrial	Brig	Aberdeen Harbour Entrance	Within the bar
Migvie	NJ90NE 8081	1844	Industrial		Aberdeen Beach	Between N Pier and Don Mouth
Frau Anna Katharina	NJ90NE 8254	1844	Industrial		Aberdeen Harbour, N Pier	
Nimrod	NJ90NE 8255	1844	Industrial	Hermaphrodite Brig	Aberdeen Harbour, N Pier Head	
George and Mary	NJ90NE 8247	1845	Industrial	Sloop	Aberdeen harbour entrance, back of N Pier	
Aurora	NJ91SE 8021	1845	Industrial	Brig	Blackdog Links	3 miles N of Don Mouth / 4 miles N of Aberdeen
Lord Reidhaven	NJ90NE 8173	1847	Industrial	Sloop	Aberdeen Harbour Entrance	Stranded outside the breakwater

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Paquebot Du Havre Et Bourdeaux	NJ90NE 8261	1848	Industrial	Brig	Aberdeen Beach	
Elizabeth	NJ90NE 8262	1848	Industrial		Aberdeen Harbour, N Pier	
Velocity	NJ90NE 8263	1848	Industrial	Paddle Steamer	Aberdeen Harbour Entrance, Pier	
Margarets	NJ90NE 8264	1848	Industrial	Brig	Aberdeen Harbour, N Pier	
Union	NJ90NE 8265	1849	Industrial	Schooner	Aberdeen Harbour, N Pier	
Unknown	NJ91SE 8022	1849	Industrial	Brig	Mouth of Don	N of
Bamboro' Castle	NJ90NE 8174	1850	Industrial	Schooner	Aberdeen Bay	
Venus	NJ90NE 8177	1852	Industrial	Brig	Aberdeen Beach	1 mile N of Aberdeen?
Annistead	NJ90NE 8084	1852	Industrial	Brig	Aberdeen Beach	
Duke of Sutherland	NJ90NE 8085	1853	Industrial	Paddle steamer	Aberdeen Harbour Entrance	
Margaret and Jane	NJ90NE 8256	1854	Industrial		Aberdeen Harbour Entrance	Ashore between the Pier (?) and Girdle Ness
Dargs	NJ90NE 8272	1857	Industrial	Sloop	Aberdeen Harbour Entrance	S side
Mackintosh	NJ90NE 8273	1857	Industrial		Near Aberdeen	
Hero	NJ90NE 8249	1858	Industrial	Schooner	Aberdeen Harbour Entrance	
Lion	NJ90NE 8089	1858	Industrial	Brig	Aberdeen Bay	Stranded whilst attempting to enter the harbour
Scottish Maid	NJ90NE 8090	1858	Industrial	Barque	Aberdeen Harbour Entrance	Stranded on the Bar, not clear whether vessel lost
Earl of Caithness	NJ90NE 8091	1859	Industrial	Steamship	Aberdeen Harbour Entrance	Stranded near S Pier, not clear whether vessel lost
Saint Nicholas	NJ90NE 8092	1859	Industrial	Brigantine	Aberdeen Bay	Ashore near harbour entrance
Duke of Richmond	NJ91SE 8007	1859	Industrial	Paddle Steamer	Blackdog	4 miles N of Aberdeen

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Ocean Bride	NJ91SE 8023	1859	Industrial		Blackdog	4 miles N of Aberdeen
Ellen And Catherine	NJ90NE 8086	1860	Industrial	Schooner	Aberdeen	Possibly offshore
Chance	NJ90NE 8274	1860	Industrial	Dandy	Aberdeen harbour entrance, back of S Pier	
Britannia	NJ90NE 8275	1860	Industrial	Brig	Aberdeen Harbour Entrance	
Elida	NJ91SE 8024	1860	Industrial	Schooner	Aberdeen	May have been offshore
Eagle	NJ90NE 8087	1861	Industrial	Brig	Aberdeen Harbour Entrance	
Tyne Packet	NJ90NE 8283/4	1861	Industrial	Sloop	Aberdeen Beach	0.5 miles N of Aberdeen; may have been salvaged
Wave	NJ90NE 8093	1864	Industrial	Schooner	Off Aberdeen	Probably offshore
David	NJ90NE 8094	1865	Industrial	Schooner	Aberdeen Bay	Stranded 3/4 mile N of Aberdeen Pier
Agricola	NJ90NE 8095	1866	Industrial	Brig	Aberdeen Beach	Near N Pier
Mercury	NJ90NE 8096	1866	Industrial	Schooner	Aberdeen Harbour, N Pier Head	
Mary	NJ90NE 8276	1866	Industrial	Schooner	Aberdeen Harbour Entrance	
Oxford	NJ90NE 8281	1866	Industrial	Barque	Aberdeen Harbour Entrance	May have been salvaged
Liverpool Packet	NJ90NE 8277	1867	Industrial	Schooner	Aberdeen Beach	
Jeannie	NJ90NE 8097	1869	Industrial	Schooner	Aberdeen Harbour, N Pier Head	
Isabella Davidson	NJ90NE 8279	1870	Industrial	Schooner	Aberdeen Harbour, N Pier	
Helen Scott	NJ90NE 8282	1870	Industrial	Brig	Aberdeen Harbour, N Pier	
Charles	NJ90NE 8183	1871	Industrial	Brig	Aberdeen Beach	2 miles N of the mouth of the Don

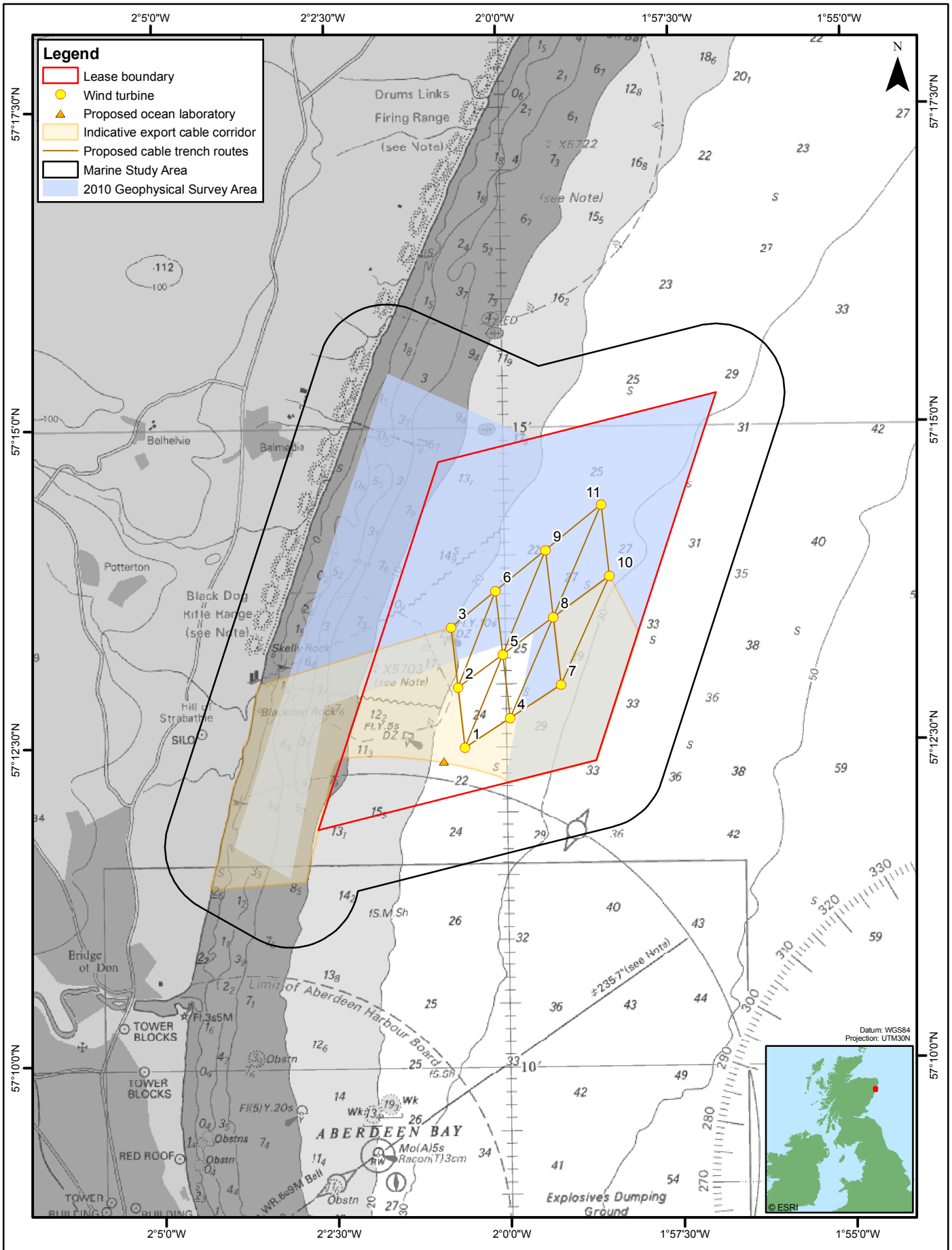
Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Belina	NJ90NE 8199	1872	Industrial	Brigantine	Aberdeen Beach	S of the mouth of the Don, high on beach
Elizabeth	NJ90NE 8185	1874	Industrial	Fishing Lugger	Aberdeen Harbour Entrance	0.5 miles NE of Aberdeen Harbour Entrance
Agnes	NJ90NE 8186	1874	Industrial	Fishing Lugger	Aberdeen Harbour Entrance	S side
Dunchattan	NJ90NE 8099	1876	Industrial	Schooner	Aberdeen harbour entrance, back of N Pier	
Christina / Christine	NJ90NE 8100	1876	Industrial	Brig	Aberdeen Beach	2.5 miles N of the mouth of the Don
Johanna	NJ90NE 8205 / NJ91SE 8008	1876	Industrial	Brig	Near Aberdeen / Berryhill	Berryhill is 4 miles N of Aberdeen
Vider	NJ90NE 8205	1876	Industrial		Near Aberdeen	May have been offshore
Enighed	NJ90NE 8205	1876	Industrial	Brig	Balmedie Links	Loss may have been offshore
Unknown	NJ90NE 8205	1876	Industrial	Barque	Near Aberdeen	May have been offshore
De Goede Vrede	NJ91SE 8018	1876	Industrial	Barque	Balgownie Links (?)	Reported as both 4 and 9 miles N of Aberdeen, near Belhevie
William		1876	Industrial	Brig	Balmedie Links	From Ferguson 1991:129
Louise Elizabeth		1876	Industrial	Barque	Blackdog	From Ferguson 1991:129
Countess of Seafield	NJ90NE 8101	1877	Industrial	Brig	Aberdeen Beach	0.5 miles S of the mouth of the Don
Nina	NJ90NE 8102	1877	Industrial	Brig	Aberdeen Beach	2 miles S of the mouth of the Don
Charles Green	NJ90NE 8103	1878	Industrial	Schooner	Aberdeen Harbour, N Pier	
Gustav	NJ91SE 8009	1878	Industrial	Brig	Blackdog Rock	6 miles N of Aberdeen
Hurbottle Castle	NJ90NE 8098	1879	Industrial	Schooner	Aberdeen Bay	Lost 1/2 mile from Harbour entrance on approach
Nineveh	NJ91SE 8017	1879	Industrial	Sloop	Mouth of Don	1 mile N of

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Isabella	NJ90NE 8104	1880	Industrial	Schooner	Aberdeen Harbour, N Pier	
Diligentta	NJ90NE 8105	1880	Industrial	Brig	Aberdeen Harbour, N Pier	
Cassowary	NJ90NE 8106	1880	Industrial	Schooner	Near Aberdeen	
Mars	NJ90NE 8107	1881	Industrial	Brig	Aberdeen Harbour Entrance	
Ben Rhydding	NJ90NE 8108	1881	Industrial	Ship	Black Dog	About 6 miles N of Aberdeen
Morford and Trubey	NJ90NE 8109	1881	Industrial	Schooner	Mouth of the Don	
Elizabeth	NJ90NE 8110	1881	Industrial	Schooner	Aberdeen Bay	
Thomas Cochran	NJ90NE 8111	1881	Industrial	Barque	Aberdeen Beach	1 mile S of the mouth of the Don
Margaret Milne	NJ90NE 8189	1881	Industrial	Barque	Aberdeen Beach	300 yards N of N (?) Pier
Venus	NJ90NE 8190	1881	Industrial	Brigantine	Aberdeen Beach	
St Clair	NJ90NE 8220	1881	Industrial	Schooner	Aberdeen Bay	1 mile N of Aberdeen N (?) pier
Ann Williams	NJ91SE 8010	1881	Industrial	Schooner	Blackdog	
Helen		1881	Industrial	Schooner	Menie Links	Balmenie?; from Ferguson 1991:133
Josef		1881	Industrial	Brig	Aberdeen Bay	2 miles S of Ythanmouth; from Ferguson 1991:133
Wanderer		1881	Industrial	Schooner	Blackdog	2 miles N of; from Ferguson 1991:133
Duchess	NJ90NE 8112	1883	Industrial	Steamship	Aberdeen Harbour Entrance	Inside harbour entrance
Tom Duff	NJ90NE 8113	1883	Industrial	Schooner	Aberdeen Harbour, N Pier	Inside harbour entrance
Queen	NJ90NE 8114	1883	Industrial	Schooner	Aberdeen Harbour, N Pier	0.5m N of N Pier
Tasmania	NJ91SE 8011	1883	Industrial	Ship	Mouth of the Don	3/4 mile N of

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Walter Raleigh	NJ90NE 8181	1885	Industrial	Fishing Lugger	Off Aberdeen	2 miles off Aberdeen
Mizpah	NJ90NE 8116	1885	Industrial	Fishing Lugger	Aberdeen Bay	
Comply	NJ90NE 8117	1887	Industrial	Fishing Lugger	Off Aberdeen	
Bon Accord	NJ91SE 8012	1889	Industrial	Steam paddle tug	Balgownie Links	1 mile S of Blackdog Rock
Mountaineer	NJ90NE 8180	1890	Industrial	Fishing Lugger	Aberdeen Harbour Entrance	
William Meff	NJ90NE 8118	1890	Industrial	Fishing Lugger	Near Aberdeen	
Delight	NJ90NE 8120	1896	Industrial	Fishing Lugger	Aberdeen Harbour Entrance	
Indian Prince	NJ90NE 8121	1897	Industrial	Steam trawler	Aberdeen Harbour, N Pier	
Vine	NJ90NE 8123	1897	Industrial	Schooner	Aberdeen Harbour, N Pier Head	
Levang	NJ90NE 8124	1898	Industrial	Schooner	Aberdeen	
Watchful	NJ90NE 8125	1898	Industrial	Fishing Lugger	Aberdeen Harbour Entrance	
Ranger	NJ90NE 8126	1899	Industrial	Fishing Lugger	Aberdeen Harbour, N Pier	
Annie	NJ91NE 8013	1899	Industrial	Barquentine	Balgownie Links	3 miles S of Belhevie
Welcome Home	NJ90NE 8128	1900	20th Century	Schooner	Aberdeen Harbour, N Pier	
Anna	NJ90NE 8286	1900	20th Century	Sloop	Mouth of the Don	
Mary of Banff	NJ91NE 8002	1900	20th Century	Schooner	Balmedie Beach	SMR: NJ91NE0024
Metis	NJ90NE 8129	1901	20th Century	Steam Trawler	Mouth of the Don	
Black Prince	NJ91SE 8014	1902	20th Century	Steam Trawler	Balgownie Links	
Campania	NJ90NE 8130	1904	20th Century	Steam Trawler	Aberdeen Harbour Entrance	

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Fisher Lassie	NJ90NE 8132	1906	20th Century	Fishing Lugger	Aberdeen Harbour Entrance	
Brothers	NJ90NE 8135	1908	20th Century	Fishing Lugger	Aberdeen Harbour Entrance	
William Osten	NJ90NE 8136	1909	20th Century	Steam Trawler	Aberdeen Harbour, S Pier	
Duchess of Montrose	NJ90NE 8137	1909	20th Century	Steam Trawler	Aberdeen Harbour	
Lillie	NJ90NE 8138	1912	20th Century	Steam Drifter	Aberdeen Beach	
Fairweather	NJ90NE 8139	1912	20th Century	Steam Tug	Aberdeen Harbour Entrance	
Strathyre	NJ90NE 8140	1912	20th Century	Steam Trawler	Aberdeen Harbour, N Pier	
Braconhill	NJ90NE 8141	1913	20th Century	Steam Trawler	Aberdeen Harbour, N Pier	
Onward (H 980)	NJ90NE 8146	1916	20th Century	Requisitioned Steam Trawler	Off Aberdeen	
Nellie Nutten (Gn 69)	NJ90NE 8147	1916	20th Century	Requisitioned Steam Trawler	Off Aberdeen	
Era	NJ90NE 8148	1916	20th Century	Steam Trawler	Off Aberdeen	
Sercia	NJ90NE 8150	1918	20th Century	Steamship	Aberdeen	
North-West	NJ90NE 8151	1918	20th Century	Steam Trawler	Aberdeen Harbour Entrance	
Cepherus	NJ90NE 8153	1920	20th Century	Steam trawler	Aberdeen Harbour Entrance	
Craig Island	NJ90NE 8154	1922	20th Century	Steam Trawler	Aberdeen Harbour Entrance	
Imperial Prince	NJ91SE 8015	1923	20th Century	Steam Trawler	Hill of Strabathie	N of Balgownie Links

Name	RCAHMS ID	Date Lost or Reported	Period	Type	Location	Comment
Editor	NJ90NE 8157	1933	20th Century	Steam Trawler	Off Aberdeen	
Liva	NJ90NE 8158	1933	20th Century	Steam Trawler	Aberdeen	
George Stroud	NJ90NE 8159	1935	20th Century	Steam Trawler	Aberdeen Harbour Entrance	
Fairy	NJ91NE 8004	1937	20th Century	Steamship	Millden Links	N of Blackdog Rock; broken up on beach; Ferguson 1991: 111. SMR: NJ91NE0026
Robert Bowen	NJ90NE 8161	1940	20th Century	Steam Trawler	Off Aberdeen	
Fort Royal	NJ90NE 8162	1940	20th Century	Steam Trawler	Off Aberdeen	
Fruitful Bough (Bounty)	NJ91NE 8003	1961	20th Century	Motor Trawler	Balmedie Beach	SMR: NJ91NE0025
Christine	NJ91SE 8001	1981	20th Century	Fishing Vessel	Black Dog	
Unknown	NK11NW 8001				Balmedie	
Unknown	NK12SE 8001				Belhelvie-Balmedie	



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Technip

0 0.5 1 km

0 0.25 0.5 nm

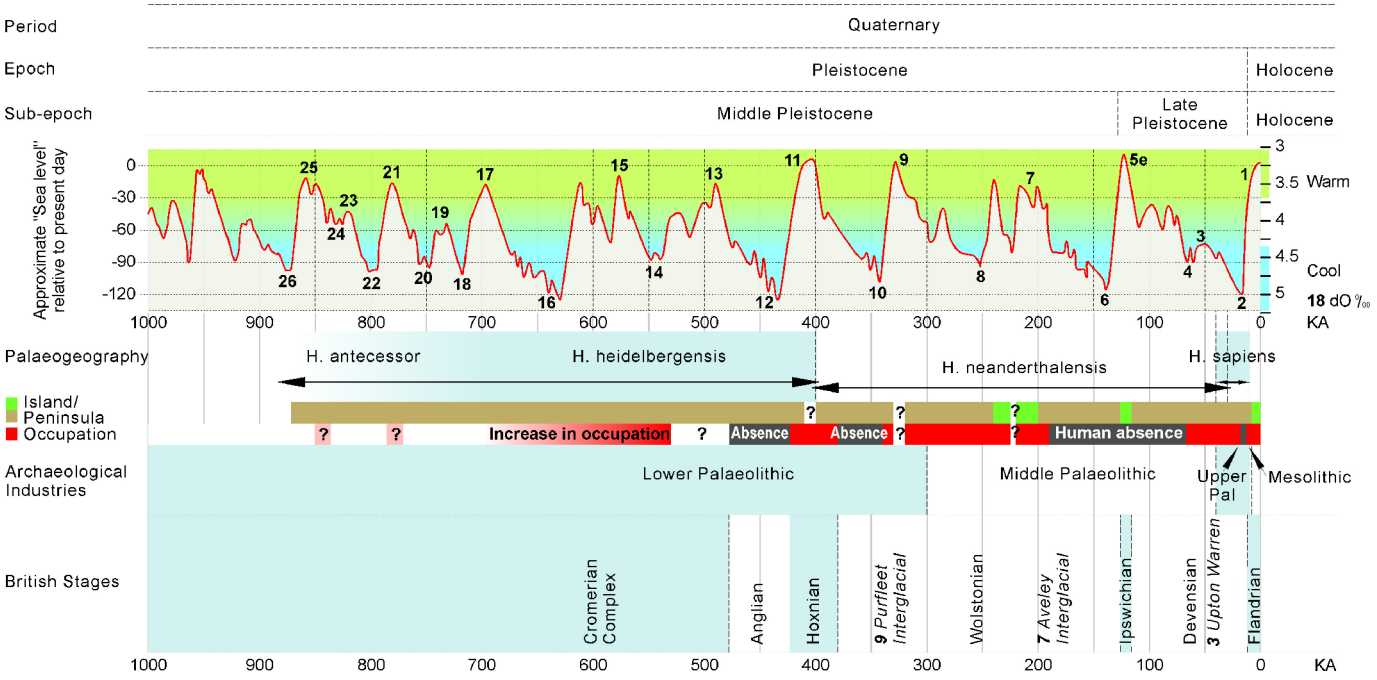
Original A4 Plot Scale 1:75,000

European Offshore Wind Deployment Centre

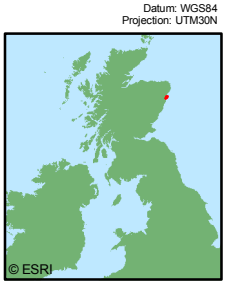
Site location

Layout	By	Date	Rev	Dwg No.
LABER039	KB	03/05/2011	B	6129-530-PW-001

Figure 1



(Incorporating Lisiecki & Raymo, 2005 doi:10.1029/2004PA001071)



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Original A4
Plot Scale
N/A

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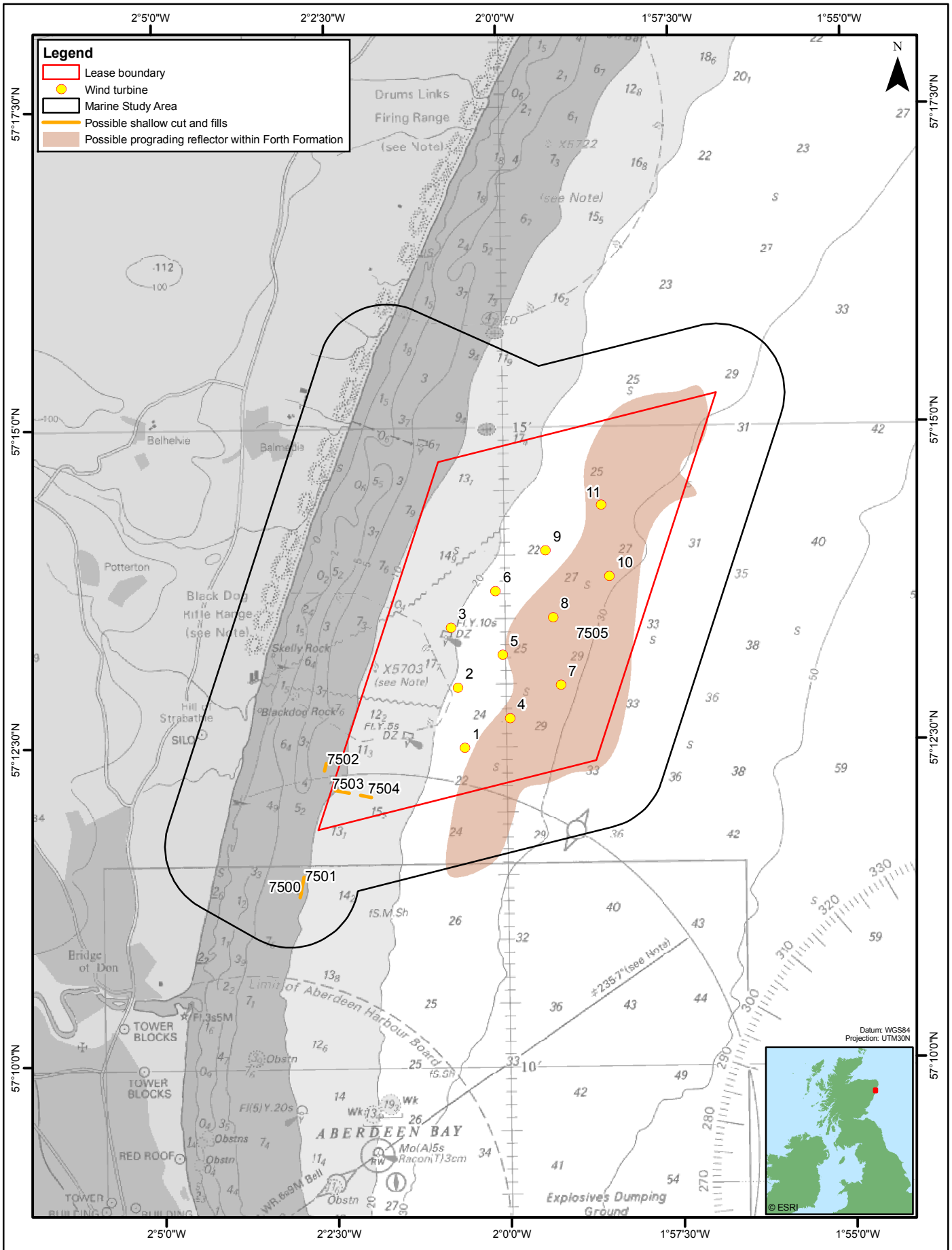
Chronostratigraphy of the British archaeological, geological records and sea level change during the last 1 million years

Layout	By	Date	Rev	Dwg No.
LABER039	KB	03/05/2011	A	6129-530-PW-002

Figure 2



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Technip

0 0.5 1 km

0 0.25 0.5 nm

Original A4 Plot Scale 1:75,000

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Map illustrating the shallow geological features across the survey area

Layout	By	Date	Rev	Dwg No.
LABER039	KB	03/05/2011	B	6129-530-PW-003

Figure 3

EUROPEAN OFFSHORE WIND DEPLOYMENT CENTRE

FIGURE 4

Wreck sites and featues as suggested by documentary sources (UKHO & SeaZone) and sites of potential archaeological interest based on geophysical assessment

Legend

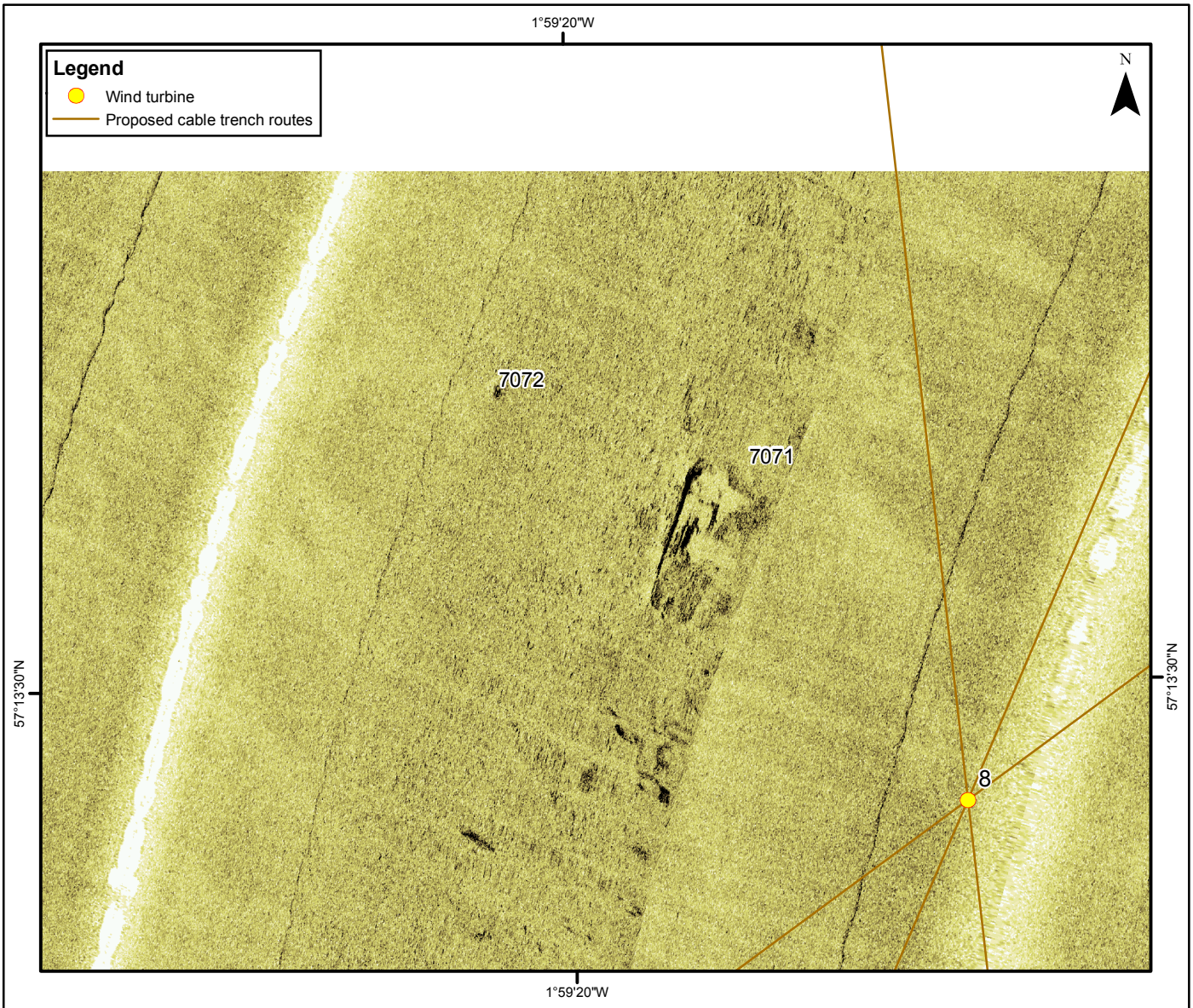
- Lease boundary
- Wind turbine
- Marine Study Area
- A1 - Anthropogenic origin of archaeological interest
- A2 - Uncertain origin of possible archaeological interest
- A3 - Historic record of possible archaeological interest
- Area of strong magnetic anomalies

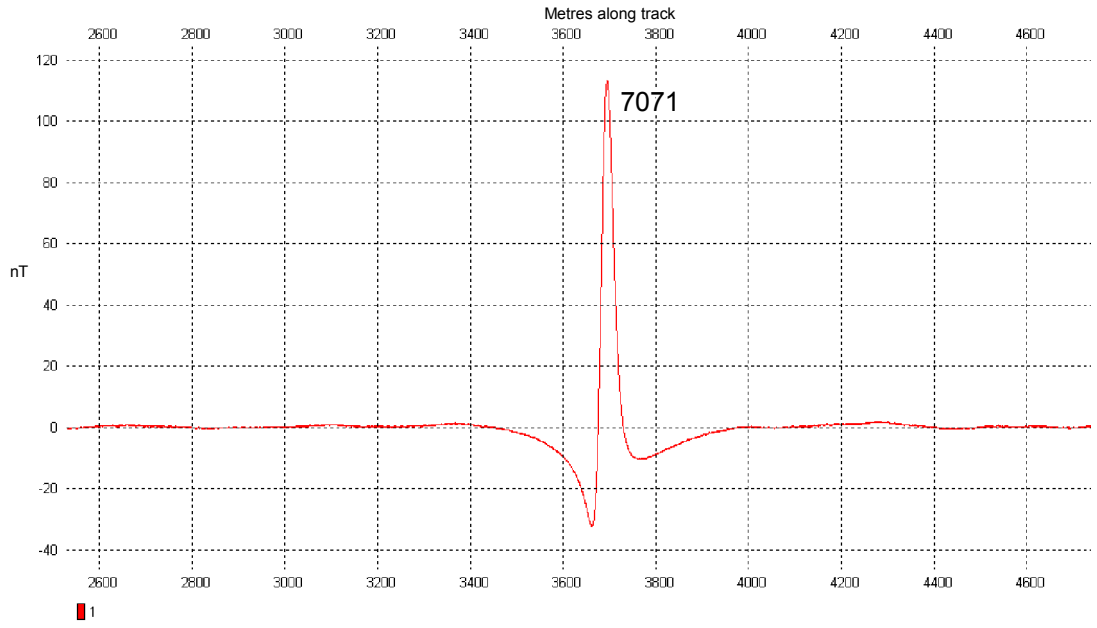
Notes
1 Do not scale

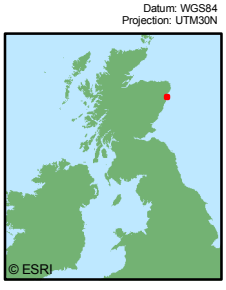
0 0.5 1 km 0 0.5 nm
Original A3 Plot Scale 1:40,000

Drg No	6129-530-PW-004		
Rev	B	Date	03/05/2011
By	KB	Layout	LABER039

Figure 4







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0 20 m

0 0.01 nm

Original A4 Plot Scale 1:1,000

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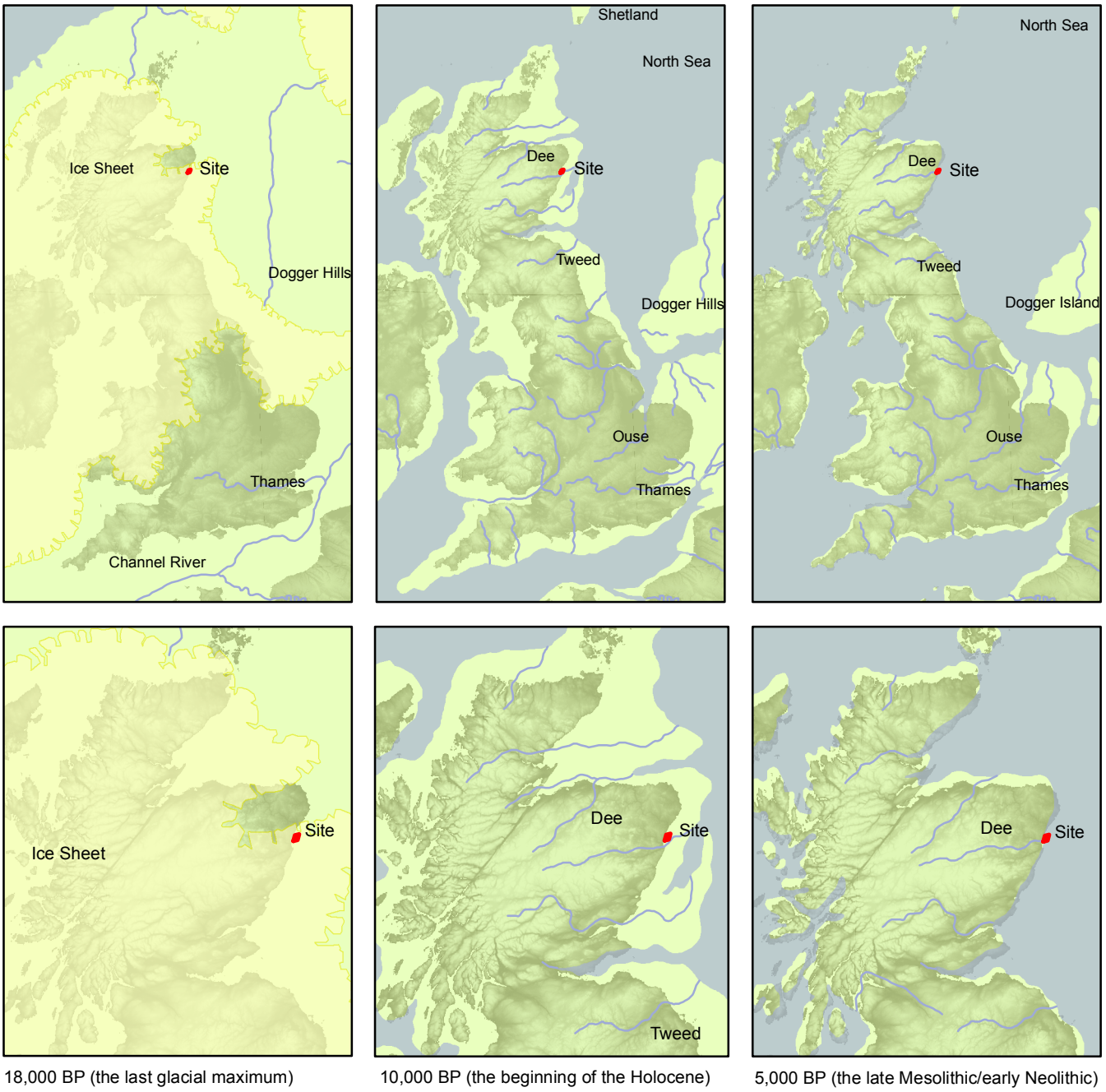
Sidescan sonar data example and magnetometer profile illustrating wreck 7071

Layout	By	Date	Rev	Dwg No.
LABER039	KB	03/05/2011	B	6129-530-PW-005

Figure 5



18,000 BP (the last glacial maximum)

10,000 BP (the beginning of the Holocene)

5,000 BP (the late Mesolithic/early Neolithic)

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Plot Scale
N/A

After Coles, 1998.
Jarvis A., H.I. Reuter, A. Nelson, E. Guevara, 2008, Hole-filled seamless SRTM data V4, International Centre for Tropical Agriculture (CIAT), available from http://srtm.csi.cgiar.org.

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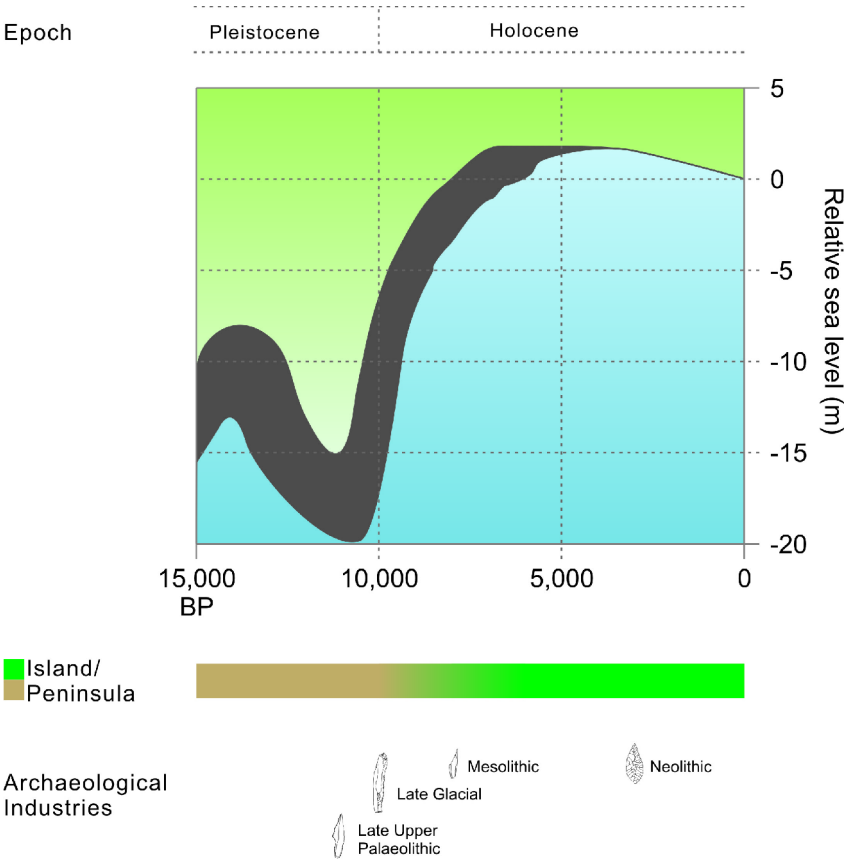
Palaeogeography of Britain

Layout	By	Date	Rev	Dwg No.
NA	KB	03/05/2011	B	6129-530-PW-006

Figure 6



Adapted from Shennan and Horton, 2002, and Stoker *et al.*, 2008

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Plot Scale
N/A

Adapted from Shennan and Horton, 2002, and Stoker *et al.*, 2008

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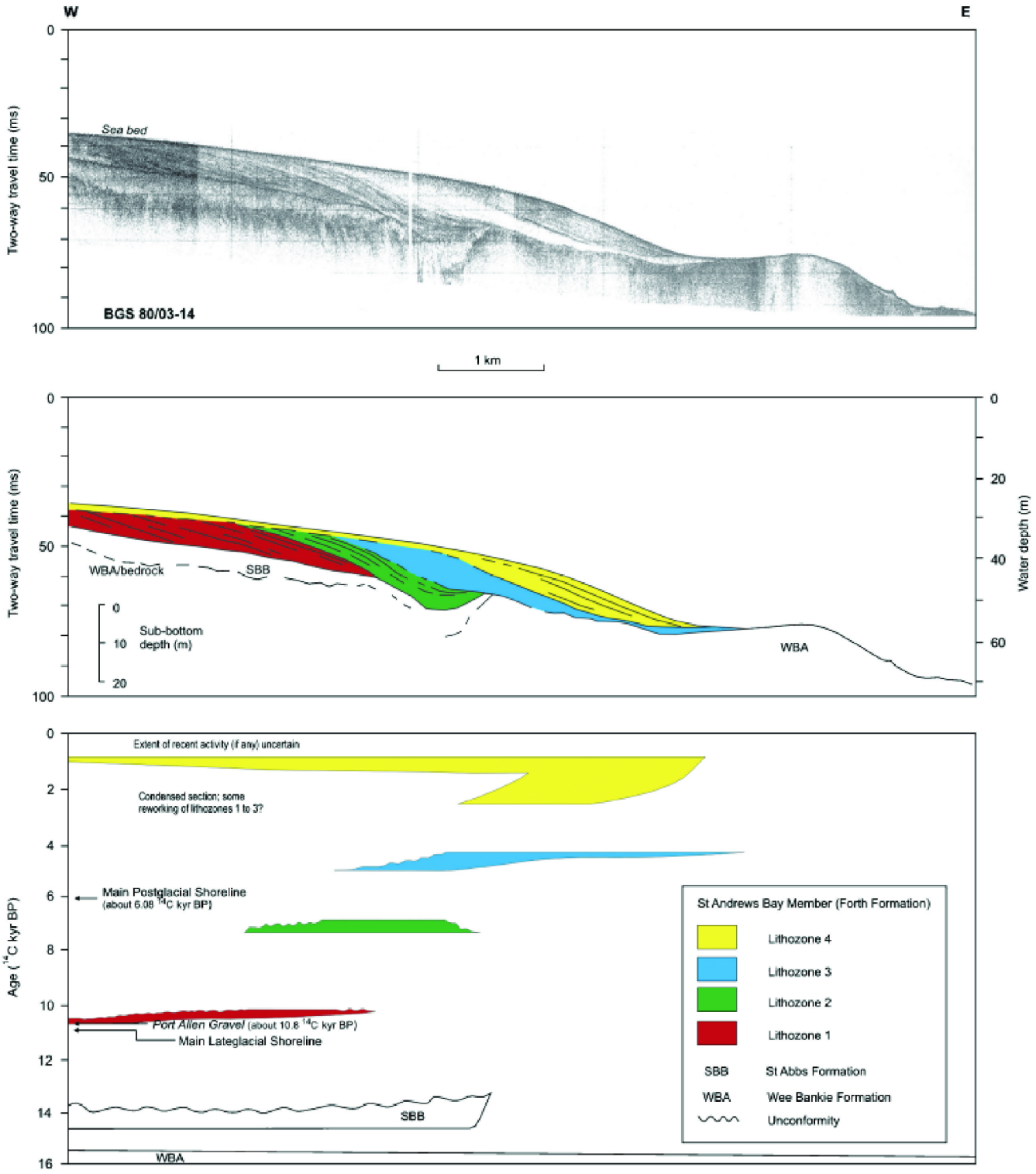
General scheme of post-glacial relative sea-level in north-east Scotland

Layout	By	Date	Rev	Dwg No.
NA	KB	03/05/2011	B	6129-530-PW-007

Figure 7



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Plot Scale
N/A

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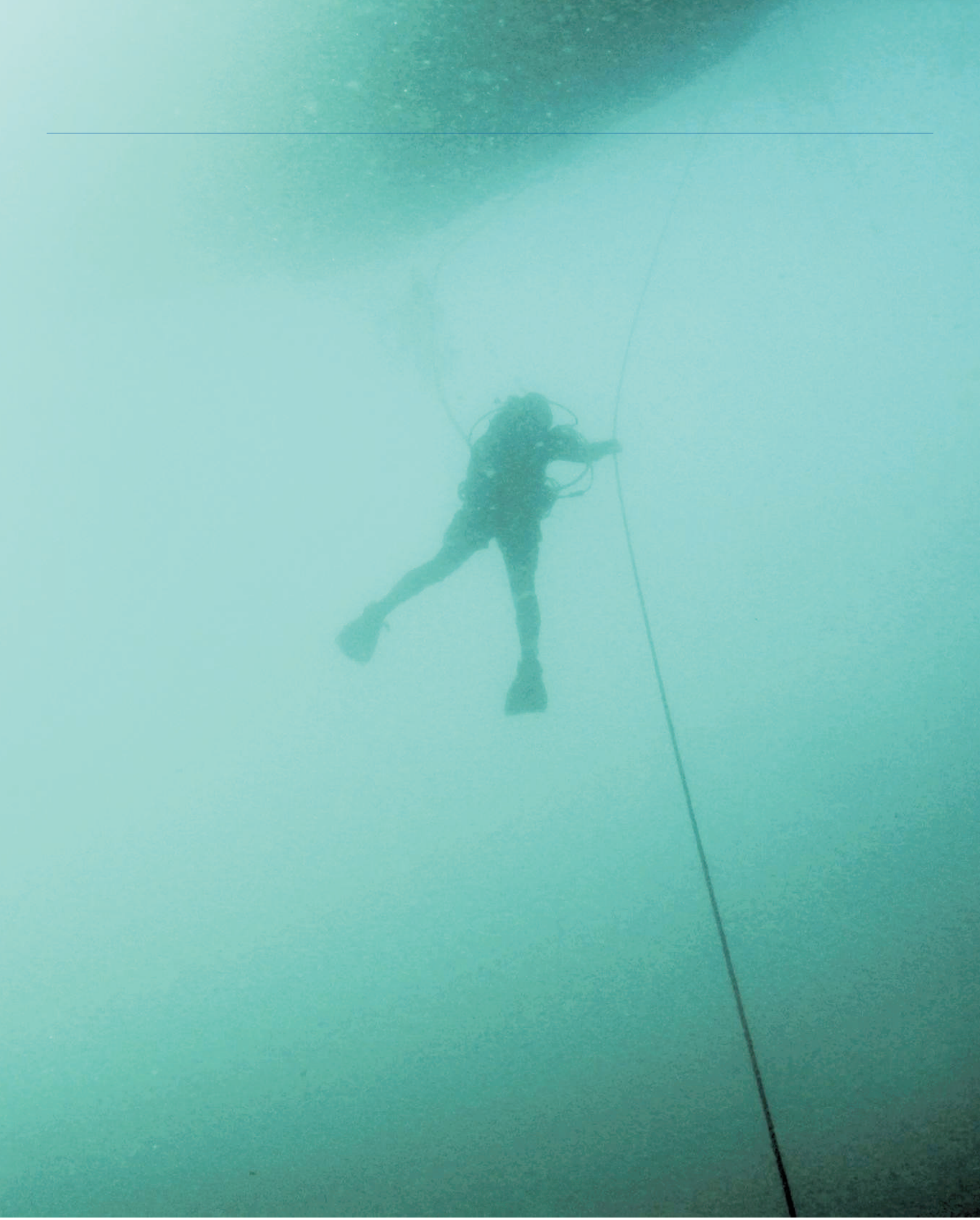
Post-glacial lithozones of the St Andrews Bay member of the Forth Formation (Stoker *et al*., 2008)

Layout	By	Date	Rev	Dwg No.
NA	KB	03/05/2011	A	6129-530-PW-008

Figure 8

Stoker *et al*., 2008



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