

E Archaeological Desk Based Assessment and Gazetteer



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Summary

Wessex Archaeology was commissioned by ABPmer to prepare an archaeological desk based assessment that will in turn inform an Environmental Statement chapter for marine aggregates Exploration and Option Area 531 and Area 470 Extension. The area is situated in the lower Severn Estuary, approximately 5.5 km north west of Clevedon, Wales and 9 km south of Newport, England.

Documentary evidence and geophysical data have been combined to assess and verify the location and condition of the known and potential archaeological resource within Licence Areas 470 and 531 with regard to seabed prehistory and maritime and aviation archaeology. A discussion on the historic seascape character had also been undertaken for the area. Documentary sources consulted for the assessment include: United Kingdom Hydrographic Office wrecks and obstructions database; National Record of the Historic Environment database and the National Monuments Record of Wales database that contain details of terrestrial and marine archaeological sites and Recorded Losses.

Site specific survey data that have been assessed for their archaeological potential comprise sub-bottom profiler, sidescan sonar and multibeam bathymetry data.

The known archaeological resource within Areas 470 and 531 is summarised as follows:

- the potential for organic deposits containing material of palaeoenvironmental interest within the north west extent of the study area;
- one recorded sites comprising of a section of suction pipe, lost from the suction dredger/sand carrier *Welsh Piper* in 1988, that was not identified from the geophysical data (A3);
- three geophysical anomalies of possible archaeological potential (A2);
- no known aircraft crash sites; and
- the Historic Seascape Character comprising: navigational activity and hazards; shipping activity; extractive industry (minerals); and cultural topography (marine).

There is potential for the proposed dredging activities to impact as yet unknown archaeological sites related to seabed prehistory, shipwrecks and aircraft crash sites, although no geophysical anomalies of high archaeological potential, or distinct palaeographic features, were identified during the geophysical assessment.

The key mitigation to reduce the significance of effects with regard to the loss of archaeological material within the volume of aggregate, and to deal with new discoveries once they occur, is the existing Marine Aggregate Industry Protocol for reporting finds of archaeological interest, including the provision for Temporary Exclusion Zones (TEZs) should archaeological material of importance be discovered during dredging works. Additional mitigation could include the implementation of Archaeological Exclusion Zones (AEZs) to prevent direct impacts to known archaeological receptors. Preservation by record and archaeological watching briefs are also methods of offsetting and reducing disturbance to sites.

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This project was commissioned by ABPmer and Wessex Archaeology is grateful to Dr Suzanne Rupp-Armstrong in this respect.

Wessex Archaeology would like to thank Titan Environmental Surveys Limited for supplying the geophysical survey data.

Abby Mynett undertook the archaeological assessment of the geophysical data and compiled the findings for this report. The remainder of the archaeological desk based assessment was researched and written by Stephanie Said. The illustrations were prepared by Kenneth Lymer. Dr Andrew Bicket managed the project on behalf of Wessex Archaeology. QA was provided by David Howell, Dr Louise Tizzard and Dr Andrew Bicket.



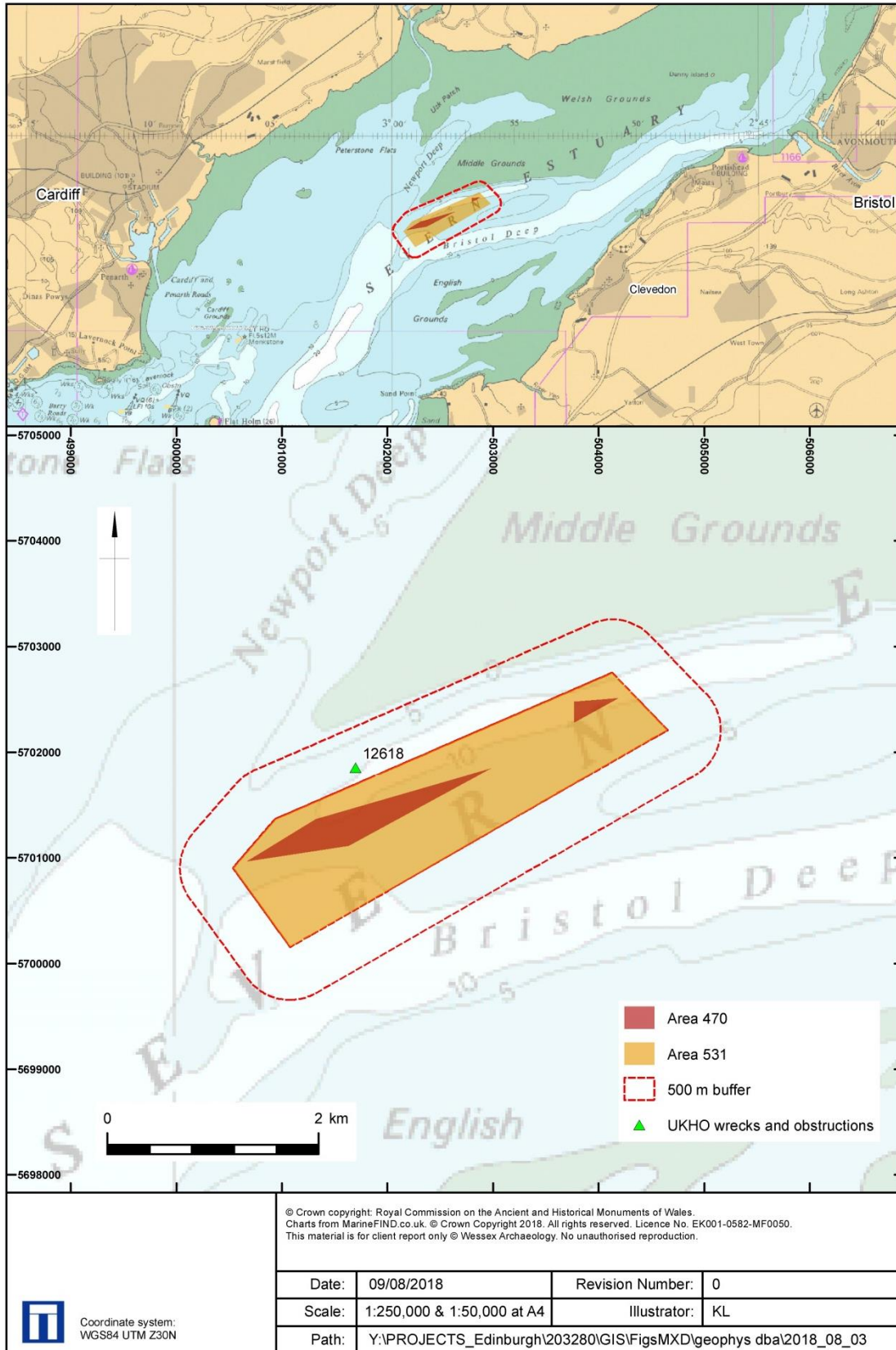
Area 470 Extension Aggregated Exploration and Option Area 531

Archaeological Desk Based Assessment

1 INTRODUCTION

1.1 Project Background

- 1.1.1 Wessex Archaeology was commissioned by ABP Marine Environmental Research (ABPmer) to prepare a marine archaeological desk based assessment (DBA), which included an assessment of marine geophysical survey data in order to assess the potential for cultural heritage material to be present within the Licenced Areas 470 and 531.
- 1.1.1 The study area is defined as the limits of Licence Areas 470 and 531 (hereafter known as 'Area 531'), plus a 500 m buffer zone. Area 470 comprises two smaller polygon areas situated within the extents of Licence Area 531, as shown in **Figure 1**.
- 1.1.2 Area 531, North Bristol Deep Extension, is situated in the lower Severn Estuary, approximately 5.5 km north west of Clevedon, Wales and 9 km south of Newport, England. Area 531 crosses the boundary of English and Welsh devolved waters, with 2.15 km² located in English waters and 1.68 km² in Welsh waters, covering a total area of 3.47 km².



Site location

Figure 1

Figure 1 Site Location

1.2 Development Proposal

- 1.2.1 The Resource Management Association (RMA) is seeking consent to undertake trailer suction hopper dredging and screening activities in Area 531. The penetration depth of trailer suction hopper dredging, depending on the nature of the seabed and the speed of the dredger, is typically around 1.5 to 3 m in width and up to 0.5 m in depth per individual furrow.

1.3 Survey and Dredging History

- 1.3.1 The Marine Aggregate Prospecting Area 531: Marine Archaeology Scoping Report produced in March 2018 includes a brief overview of the baseline environment for cultural heritage receptors undertaken by Wessex Archaeology (2018).

1.4 Scope of Document

- 1.4.1 The purpose of this assessment is to determine, as far as possible from existing information and bespoke survey data, the nature, extent and significance of the known and potential marine archaeological resource within the boundary of the proposed project.

1.5 Aims and Objectives

- 1.5.1 The aim of this marine archaeological DBA is to summarise the known and potential archaeological baseline within Area 531 to inform the production of the Environmental Statement (ES) for the project.
- 1.5.2 The objectives of the baseline characterisation are:
- to provide details of relevant legislation, national and local planning policy and best practice guidance relating to the historic environment within Area 531;
 - to provide a desk based overview of the historic environment in Area 531, based on existing archaeological records, secondary sources and available geophysical data;
 - to outline the known prehistoric, maritime and aviation sites present within Area 531;
 - to summarise the potential for the presence of as yet unknown prehistoric, maritime and aviation sites that may be present within Area 531;
 - to summarise the historic seascape character of the area; and
 - to assess the significance of the known and potential marine archaeological resource through weighted consideration of their valued components and in accordance with established frameworks for assessing archaeological value.

1.6 Copyright

- 1.6.1 This report may contain material that is non-Wessex Archaeology copyright (e.g. Ordnance Survey, British Geological Survey (BGS), Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 with regard to multiple copying and electronic dissemination of the report.

2 LEGISLATION, GUIDANCE AND POLICY

2.1 Introduction

- 2.1.1 Area 531 crosses the boundary of English and Welsh devolved waters.
- 2.1.2 Historic England is responsible for the archaeological resource within England's territorial waters (to the 12 nautical miles (nm) limit).
- 2.1.3 Cadw administers the responsibilities of the Ministers of the Welsh Assembly Government with regard to archaeological and built heritage matters within the Welsh territorial waters (up to 12 nm).
- 2.1.4 A summary of legislation and guidance relevant to the marine archaeological environment is outlined below, with more comprehensive details provided in **Appendix I**.

UK Marine Policy

- 2.1.5 The Marine and Coastal Access Act (MCAA) 2009 is the primary legislation relevant to marine aggregate dredging proposals. Under this legislation, marine plans must be consistent with the Marine Policy Statement (MPS) (Department for Environment, Food and Rural Affairs (DEFRA) 2011) and fully reflect the requirements of the MPS at a local level. Marine plans must also be in accordance with other UK national policy, including the National Planning Policy Framework (NPPF) (Department for Communities and Local Government (DCLG) 2012).
- 2.1.6 The MPS sets out the framework for preparing Marine Plans and making decisions affecting the marine environment. The MPS also states that Marine Plans must ensure a sustainable marine environment that will protect heritage assets.
- 2.1.7 Inshore and offshore waters have been divided into 11 plan areas for which Marine Plans are to be produced. Area 531 is located within the Inshore Region of the Welsh National Marine Plan (WNMP) and the Inshore Region of the South West Inshore Marine Plan Area, for the Welsh and English sub-areas respectively. Both plans are currently being developed by the Welsh and English Government; a completion date has not yet been confirmed for either plan.

National Planning Policy Framework (NPPF)

- 2.1.8 The NPPF was first published by the DCLG in March 2012, replacing Planning Policy Statement 5. This has been revised in July 2018, implementing around 85 reforms announced previously through the Housing White Paper and other consultations.
- 2.1.9 Section 16 of the revised NPPF entitled 'Conserving and enhancing the historic environment' sets out the principal national guidance on the importance, management and safeguarding of heritage assets within the planning process. The aim of NPPF Section 16 is to ensure that Regional Planning Bodies and Local Planning Authorities, developers and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them. The government guidance provides a framework that:
 - recognises that heritage assets are an irreplaceable resource;

- requires applicants to provide proportionate information on the significance of heritage assets affected by the proposals and an impact appraisal of the proposed development on that significance;
- takes into account the desirability of sustaining and enhancing the significance of heritage assets and their setting;
- places weight on the conservation of designated heritage assets;
- requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible; and
- promotes the conservation of heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life for this and future generations.

Welsh Legislation and Policy

2.1.10 Welsh legislation and policy relevant to the Study Area include:

- Seas, Shores and Coastal Areas: Maritime Policy (Countryside Council for Wales 1996); and
- Well-being of Future Generations (Wales) Act 2015.

2.1.11 The Interim Marine Aggregates Dredging Policy (IMADP), South Wales, sets out the Welsh Assembly's draft strategic level policy in relation to the extraction of marine sand and gravel for aggregates from Welsh waters within the Bristol Channel and Severn Estuary (Welsh Assembly Government 2004). The purpose of the document is to steer industry towards areas where dredging is likely to be acceptable, thus providing greater certainty to advise long term planning and investment decisions in relation to applications for dredging licences. The requirements of IMADP (including any amendments/updates to the Policy incorporated within the WNMP) will be taken fully into account when undertaking the Environmental Impact Assessment (EIA) for Area 531.

2.1.12 The Planning (Wales) Act 2015 was passed on the 6 July 2015. This makes provision for the preparation and revision of a new National Development Framework for Wales and the production of Strategic Development Plans. Although planning law only applies within the territory of local authorities, which generally extends only to the low water mark, Cadw is fully aware of the significance of seabed prehistory and submerged landscapes, and the importance of a seamless approach to protection.

2.1.13 Planning Policy Wales (PPW), edition 9, was initially published by the Welsh Government in March 2002 and last updated in November 2016. This document is the principal national guidance on the importance, management and safeguarding of the historic environment within the planning process in Wales and provides advice on all aspects of planning policy in Wales.

2.1.14 PPW is supplemented by a series of Technical Advice Notes (TANs) and Circulars issued by the Welsh Office and the National Assembly of Wales. PPW, the TANs, Circulars and policy clarification letters comprise national planning policy in Wales.

- 2.1.15 The aforementioned Circulars, as well as Chapter 6 of PPW, have been updated as part of the passing of the new Historic Environment (Wales) Act 2016 and as part of the development of the new National Development Framework for Wales. The Historic Environment (Wales) Act was passed on 9 February 2016 and became law on 21 March 2016. In conjunction with this Cadw have started to prepare several policy, advice and guidance documents relating to managing the historic environment that will be subject to amendment as the provisions of the Act are enforced and will be subject to full public consultation before adoption. This includes Technical Advice Note 24: Historic Environment that will provide guidance on local development plans, designated assets and archaeological remains.

Marine Legislation

- 2.1.16 Area 531 is located within English and Welsh Territorial Seas (up to 12 nm from the coast), and the following legislation applies:

- Protection of Wrecks Act (PWA) 1973: Section One and Two;
- Ancient Monuments and Archaeological Areas Act (AMAA) 1979 (as amended);
- Protection of Military Remains Act (PMRA) 1986; and
- Merchant Shipping Act (MSA) 1995.

- 2.1.17 The above legislation provides protection for wrecks of high historical, archaeological or artistic value, as well as allowing military wrecks to be protected. Ownership of any wreck remains is determined in accordance with the MSA 1995.

Guidance

- 2.1.18 This assessment was carried out in a manner consistent with available guidance as described below in chronological order of issue:

- *Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England) 1998);*
- *Managing Lithic Scatters: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England) 2000);*
- *Marine Mineral Guidance 1: Extraction by dredging from the English seabed (DCLG 2002);*
- *Military Aircraft Crash Sites: Guidance on their Significance and Future Management (English Heritage (now Historic England) 2002);*
- *Marine Aggregate Dredging and the Historic Environment Guidance Note (Wessex Archaeology 2003);*
- *The Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee and The Crown Estate 2006);*
- *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England) 2008);*

- *Our Seas - A Shared Resource: High Level Marine Objectives (DEFRA 2009);*
- *Conservation Principles for the Sustainable Management of the Historic Environment in Wales (Cadw 2011);*
- *Historic Seascape Characterisation: Bristol Channel and Severn Estuary (Cornwall Council and SeaZone Solutions 2011a; 2011b);*
- *Ships and Boats: Prehistory to Present - Designation Selection Guide (English Heritage (now Historic England) 2012);*
- *Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Bates et al. 2013); and*
- *Proposed Technical Advice Note (TAN) 24: The Historic Environment (Cadw 2016).*

2.2 Licence and Consent

Exploration and Agreements with The Crown Estate

- 2.2.1 The Crown Estate owns the seabed out to 12 nm and the mineral rights to the limit of the UK Territorial Waters.

Marine Licence

- 2.2.2 The Marine Management Organisation (MMO) is the responsible regulatory authority for implementing marine licensing necessary for dredging to extract aggregates within the seas around England to ensure they are carried out in a sustainable way (MMO 2016).
- 2.2.3 Natural Resources Wales (NRW) is responsible for licensing, regulating and planning marine activities, including dredging, in the seas around Wales to ensure they are carried out in a sustainable way.

3 METHODOLOGY

3.1 Study Area

- 3.1.1 The area assessed in this report is defined by the extent of the proposed aggregate option as provided by the Client, which is located within English and Welsh Territorial Seas. When referring to the archaeological desk based assessment Study Area, this includes a 500 m buffer zone.
- 3.1.2 The wider search area allows for a greater understanding of the wider archaeological baseline environment, with the dual purpose of enabling any archaeological trends within the region to be recognised and to allow any heritage assets identified to be represented in a broader archaeological context.
- 3.1.3 All data for heritage assets located within this search area are stored on the Wessex Archaeology archive network and can be made available on request.

3.2 Archaeological Des-Based Assessment

- 3.2.1 The methodology employed during this assessment reflects the requirements of Environmental Assessment as set out in European Council Directive 85/337/EEC as named by Directive 97/11/EC. This follows best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for Historic Environment Desk Based Assessment* (updated in 2017).
- 3.2.2 The main themes relevant to the marine archaeological baseline as assessed in this report are:
- seabed prehistory (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes);
 - seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris); and
 - historic seascape character.

Data Sources

- 3.2.3 A number of sources of primary and synthesised information were consulted in order to compile this archaeological desk based assessment (DBA). Data generated from marine geophysical and geotechnical surveys were also a main component of the data.
- 3.2.4 The following data sources were sought for this assessment:
- geophysical survey data acquired by Titan, and the accompanying results report;
 - the United Kingdom Hydrographic Office (UKHO) data for charted wrecks and obstructions;
 - the National Record of the Historic Environment (NRHE) maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events;

- National Monuments Record of Wales (NMRW) curated by the Royal Commission on the Ancient and Historical Monuments of Wales;
- the National Heritage List for England maintained by Historic England, comprising data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973;
- Statutory designation datasets maintained by Cadw;
- records from the Regional Historic Environment Record curated by Glamorgan Gwent Archaeological Trust (GGAT HER), comprising a database of all recorded archaeological sites, find spots, and archaeological events within the county and offshore;
- Somerset Historic Environment Record (SHER), comprising a database of all recorded terrestrial and marine archaeological sites, find spots and archaeological events within the county and offshore;
- background geological data for the area produced by the British Geological Survey (BGS), historical maps, Ordnance Survey maps and Admiralty Charts;
- previous work undertaken in the Severn Estuary and Bristol Channel regions by Wessex Archaeology; and,
- relevant primary and secondary documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeology Data Service and other websites. Both published and unpublished archaeological reports relating to excavations and observations in the area around the study area were reviewed.

3.2.5 For clarity, duplicate entries (i.e. heritage assets or archaeological events that had been listed in more than one dataset) have been removed, with only a single listing for each heritage asset remaining. Maritime Recorded Losses are referred to in the text using the NRHE identification number.

3.2.6 A bibliography of documentary sources consulted is presented in the Reference section of this report. Full datasets for heritage assets are stored on the Wessex Archaeology archive network and can be made available on request.

Data Structure

3.2.7 This report is based on a Geographic Information System (GIS) using ArcGIS 10.5, incorporating the positional information of the various data sources listed in above, allowing the data to be spatially analysed. The data were subsequently compiled into gazetteers of the prehistoric, maritime and aviation resources; these were used to inform the assessment of geophysical data.

3.2.8 Within this assessment, the gazetteers of datasets are compiled and illustrated in Universal Transverse Mercator (UTM) zone 30 North projected from a WGS84 datum.

Chronology

3.2.9 Archaeological material is generally studied within a framework of 'periods' or 'ages' that reflect the activities and cultural changes taking place over time. All dates are referred to as BC (before Christ), BP (before present) or AD (anno domini) within the text. By convention, cal. BC refers to calibrated radiocarbon chronology that can be considered

equivalent to calendar years. BP or ka (thousand years ago) dates are used for periods of time older than c.10,000 years ago.

- 3.2.10 A list of the main archaeological periods referred to in the text, along with their broadly defined dates are presented in **Appendix II**.

Seabed Prehistory

- 3.2.11 The baseline summary for seabed prehistory was based on a review of geological mapping of seabed sediments, solid geology and bathymetry from published BGS sources. This has been enhanced by the geoarchaeological review of geophysical datasets gathered for the project to produce a stratigraphic framework for understanding the archaeological potential of the Quaternary geology within the area investigated. This assessment was further supported by the examination of models of past sea level, palaeoshorelines and submerged prehistoric landscapes. This palaeogeographic review, alongside the known archaeological record, formed the basis upon which the potential for submerged prehistory is developed and discussed in support of the subsequent ES Chapter.

Marine and Aviation Archaeology

- 3.2.12 The sources of data for maritime and aviation history and archaeology listed in section 3.2.4 above have been collated and summarised in order to develop a baseline of marine cultural heritage for the Study Area, and the potential for encountering unknown shipwreck and aircraft crash sites (**Section 5**).
- 3.2.13 The data obtained were reviewed and those within the Study Area were extracted and compiled to form a gazetteer as part of the known maritime and aviation baseline. These records were each given a unique identifier beginning with **70000** and continuing sequentially (**Appendix III**) and were added to the project GIS.
- 3.2.14 The research for maritime and aviation history was then combined with the archaeological assessment of geophysical survey data. Records for wrecks and obstructions in the Study Area are held by Wessex Archaeology and can be provided on request.
- 3.2.15 Records relating to Recorded Losses were also extracted from the data sources. Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. The locations of the Recorded Losses do not refer to the position of material on the seabed, except by chance, but rather the record of a loss that has been assigned to a Named Location, often a navigational hazard, such as a sand bank or rocks, or a local landmark, such as a particular bay, in the area. The positional data of these records is unreliable and serve only to provide an indication of the types of vessels that passed through the Study Area and the wrecking incidents that are known to have occurred in a locality. Whilst the remains of these vessels are expected to exist somewhere on the seabed, their location is unknown. As such, they reflect the potential maritime and aviation resource.
- 3.2.16 Details regarding Recorded Losses are presented in a gazetteer format (**Appendix IV**). These records have retained their original identification assigned by the NRHE for ease of cross-referencing. Where records are duplicated between datasets all corresponding identification numbers have been included. The Gazetteer does not include positional data due to the inaccuracies therein.
- 3.2.17 The baseline assessment of maritime and aviation archaeology was further supplemented by a review of relevant primary and secondary source material in order to provide an

indication on the nature of maritime and aviation activity across the Study Area. As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the Study Area (Historic England 2002; Wessex Archaeology 2008a).

Assumptions and Limitations

- 3.2.18 Data used to compile this report consists of primary geophysical data and secondary information derived from a variety of sources. The assumption is made that the secondary data, as well as that derived from other secondary sources, is reasonably accurate.
- 3.2.19 The documentary sources outlined in paragraph 3.2.4 are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.
- 3.2.20 There were no records located within the Study Area held by GGAT HER or SHER.

3.3 Geophysical Methodology

Geophysical data - technical specifications

- 3.3.1 Geophysical data were acquired by Titan between 6 February and 13 March 2018. The survey had a primary line spacing of 50 m orientated at 060° - 240°, and orthogonal cross lines run every 500 m (Titan 2018). Further details on the equipment used is in **Table 1**.

Table 1 Summary of survey equipment

Survey Company	Survey Vessel	Data Type	Equipment	Data Format
Titan	Titan Explorer	SBP	Applied Acoustics Surface Tow Boomer	.sgy
		MBES	Kongsberg GeoSwath 4 (250 kHz)	.xyz
		SSS	Edgetech 4200-FS (100 / 400 kHz, 75 m range)	.xtf
		Positioning	Trimble HYDROpro	N/A

Geophysical data – processing

- 3.3.2 A number of datasets were assessed over the study area; each dataset was processed separately using the following software (**Table 2**).

Table 2 Software used for geophysical assessment

Dataset	Processing Software	Interpretation and rationalisation
SBP	CodaOctopus Survey Engine v5.5	ArcMap v10.5
MBES	QPS Fledermaus v7.7.5	
SSS	CodaOctopus Survey Engine v5.5	

- 3.3.3 The SBP and MBES data were used as the primary datasets for the palaeographic assessment, and the SSS and MBES datasets were used for the seabed features assessment.

- 3.3.4 The SBP data were processed using CodaOctopus Survey Engine 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 sedimentary boundaries and shallow geological features that might be of archaeological interest.
- 3.3.5 The SBP 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 1,600 ms⁻¹. This is a standard estimate for shallow, unconsolidated sediments.
- 3.3.6 The SBP data can also be used to record small reflectors which appear to be buried material such as a wreck site covered by sediment. The position and dimensions of any such objects were also 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.
- 3.3.7 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 1 m and analysed using QPS Fledermaus software, which enables a 3-D visualisation of the acquired data and geo-picking of seabed anomalies. The MBES data were also used in the palaeogeographic assessment, to identify any buried palaeogeographic features that may still have surface expression (e.g. underfilled palaeochannels).
- 3.3.8 The high frequency .xtf SSS data files were processed using CodaOctopus Survey Engine Sidescan+ software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were 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.
- 3.3.9 A mosaic of the SSS is produced during this process to assess the quality of the sonar towfish positioning. This process allows the position of anomalies to be checked between different survey lines and for the positioning to be further refined if necessary.
- 3.3.10 The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of 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 as a result of past impacts from, for example, dredging or fishing.

Geophysical data – data quality

- 3.3.11 Once processed, the geophysical data sets were individually assessed for quality and their suitability for archaeological purposes and rated using the following criteria (**Table 3**). The SSS and MBES data were assessed in their entirety, whilst 20% of the SBP data was initially interpreted, with additional infill lines added where necessary.

Table 3 Criteria for assigning data quality rating

Data quality	Description
Good	Data which are clear and unaffected or only slightly affected by weather conditions, sea state, background noise or data artefacts. Seabed datasets are suitable for the interpretation of upstanding and partially buried wrecks, debris fields, and small individual anomalies. The structure of wrecks is clear, allowing assessments on wreck condition to be made. Subtle reflectors are clear within SBP data. These data provide the highest probability that anomalies of archaeological potential will be identified.
Average	Data which are moderately affected by weather conditions, sea state and noise. Seabed datasets are suitable for the identification of upstanding and partially buried wrecks, the larger elements of debris fields and dispersed sites, and larger individual anomalies. Dispersed and/or partially buried wrecks may be difficult to identify. Interpretation of continuous reflectors in SBP data is problematic. These data are not considered to be detrimentally affected to a significant degree.
Below Average	Data which are affected by weather conditions, sea state and noise to a significant degree. Seabed datasets are suitable for the identification of relatively intact, upstanding wrecks and large individual anomalies. Dispersed and/or partially buried wrecks, or small isolated anomalies may not be clearly resolved. Small palaeogeographic features, or internal structure may not be resolved in SBP data.
Variable	This category contains datasets where the individual lines range in quality. Confidence of interpretation is subsequently likely to vary within the study area.

- 3.3.12 The quality of the SBP data has been rated as 'Good' using the above criteria. Some slight weather noise was visible in a small number of files though this was not significant enough to affect the assessment.
- 3.3.13 The MBES data were rated as 'Good' using the above criteria. The data quality and resolution of 1 m was found to be of a good standard and suitable for archaeological assessment of objects and debris over 1 m in size. The data were also suitable for identifying bedform patterns and topography across the study area.
- 3.3.14 The SSS data have been rated as 'Average' using the above criteria table. A number of lines displayed signs of poor weather conditions. The range was set at 75 m, however this was not always achieved in the high frequency files. As such, all of the low frequency files were assessed, with a number of high frequency files also assessed as a quality check and to provide full coverage of the study area. Combined, these were found to be suitable for archaeological assessment.

Geophysical data - anomaly grouping and discrimination

- 3.3.15 The previous section describes the initial interpretation of all available geophysical datasets which were conducted independently of one another. 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 exploration area.
- 3.3.16 To address this fact the anomalies were grouped together; allowing one ID number to be assigned to a single object for which there may be, for example, a UKHO record and multiple SSS anomalies.
- 3.3.17 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. For anomalies located on the seabed, these flags are ascribed as follows (**Table 4**).

Table 4 Criteria discriminating relevance of identified features to proposed scheme

Overview classification	Discrimination	Criteria	Data type
Archaeological	A1	Anthropogenic origin of archaeological interest	MBES, SSS
Archaeological	A2	Uncertain origin of possible archaeological interest	MBES, SSS
Archaeological	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly	MBES, SSS
Non-archaeological	U1	Not of anthropogenic origin	MBES, SSS
Non-archaeological	U2	Known non-archaeological feature / Feature of non-archaeological interest	MBES, SSS, SBP
Non-archaeological	U3	Recorded loss	MBES, SSS

3.3.18 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.

3.3.19 Any sites that are located outside the boundary of Area 531 are deemed beyond the scope of the current assessment and are subsequently not included in this report. Furthermore, sites that are identified as known charted wrecks according to the UKHO wreck and obstruction database but are not visible on the sidescan sonar data due to its limited coverage of the area, are referred to as A3s.

3.4 Environmental Impact Assessment Criteria - Asset Value and Sensitivity

3.4.1 The perceived value of each marine archaeological asset is generally assessed and assigned on a site-by-site basis, depending on the criteria listed in **Table 5**. The UK MPS (DEFRA 2011: 90) describes a heritage asset as holding a degree of significance. Significance relates to the heritage interest of an asset that may be archaeological, architectural, artistic or historic.

3.4.2 The sensitivity of an asset is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. The sensitivity of the asset will be assessed with regard to the following factors:

- adaptability - the degree to which an asset can avoid or adapt to an effect;
- tolerance - the ability of an asset to accommodate temporary or permanent change without significant adverse impact;
- recoverability - the temporal scale over and extent to which an asset will recover following an effect; and
- value - a measure of the asset's importance, rarity and worth.

- 3.4.3 Archaeological and cultural heritage assets cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each asset is predominantly quantified only by their value.
- 3.4.4 Based on Historic England's *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (Historic England 2008: 21), the significance of a historic asset 'embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it'.
- 3.4.5 Within this document, significance is weighed by consideration of the potential for the asset to demonstrate the following value criteria:
- evidential value - deriving from the potential of a place to yield evidence about past human activity;
 - historical value - deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;
 - aesthetic value - deriving from the ways in which people draw sensory and intellectual stimulation from a place; and
 - communal value - deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values, but tend to have additional and specific aspects.
- 3.4.6 With regards to assessing the value of shipwrecks, the following criteria listed in Historic England's *Ships and Boats: Prehistory to Present - Designation Selection Guide* (Historic England 2012) can be used to assess an asset in terms of its value:
- period;
 - rarity;
 - documentation;
 - group value;
 - survival/condition; and
 - potential.
- 3.4.7 These aspects help to characterise each asset whilst also comparing them to other similar assets. The criteria also enable the potential to contribute to knowledge, understanding and outreach to be assessed.
- 3.4.8 The value of known archaeological and cultural heritage assets were assessed on a five-point scale using professional judgement informed by criteria provided in **Table 5** below.

Table 5 Criteria to assess the archaeological value of assets

Value	Definition
Very High	Best known or only example and/or significant potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable international dimension to their importance are likely to fall within this category. Wrecked ships and aircraft that are protected under the PWA 1973, AMAA 1979 or PMRA 1986 with an international dimension to their importance, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. Known submerged prehistoric sites and landscapes with the confirmed presence of largely <i>in situ</i> artefactual material.
High	Above average example and/or high potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable national dimension to their importance are likely to fall within this category. All other wrecked ships and aircraft with statutory protection under the PWA 1973, AMAA 1979 or PMRA 1986, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. Palaeogeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.
Low	Below average example and/or low potential to contribute to knowledge and understanding and/or outreach. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Negligible	Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach. Assets with little or no surviving archaeological interest.

3.4.9 Furthermore, *On the Importance of Shipwrecks* (Wessex Archaeology 2006) suggests importance can be assessed through the following criteria: build, use, loss, survival and investigation.

3.4.10 In general, the *Selection Guide on Boats and Ships in Archaeological Contexts* (Wessex Archaeology 2008c) drew some generalisations about importance based on the age of the wreck:

- little is known about prehistoric maritime activities or the types of craft that were available to early communities, and on this basis, any material from this period would be considered of special interest solely due to the rarity of any such finds;
- the relative paucity of archaeological evidence for shipwrecks dating prior to the post-medieval period mean that any discoveries from this period would be of special interest;
- remains of boats and ships from 1500-1815 are also rare, and would therefore be of special interest;

- from 1815-1914, there are more examples of boats and ships in the archaeological record, so greater discrimination is warranted in determining which ones are of special interest. However, boats and ships that make a distinct contribution to understanding how vessels were built and used, or how this changed over time, would be of special interest;
- the high level of losses between 1914 and 1945, combined with the increased likelihood of discovering wrecks from this period means that only wrecks contributing to an understanding of technological changes and to local and global activities during this period are likely to be of special importance. However, many vessels of little archaeological importance may have additional importance with regard to loss of life or through identifiable connections with significant events; and
- any boats or ships lost post-1945 would need a strong case in order to be considered of archaeological interest.

3.5 Assessment of Historic Seascape Character

- 3.5.1 In accordance with the European Landscape Convention, 'landscape' can be defined as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe 2000: Article 1). The term 'seascape' can be defined as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (ibid.). With reference to the historic environment, the MPS states that seascapes include 'landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other' (DEFRA 2009).
- 3.5.2 Seascape assessment reflects the holistic approach to landscape of the European Landscape Convention, extending it to the sea. Seascape Character Areas include coastal land, intertidal and marine environments and cover the offshore environment to the territorial limit (12 nm). HSC assessment is the identification and interpretation of the historic dimension of the present day coastal and marine environment (Natural England, 2012: 33).

4 ARCHAEOLOGICAL BASELINE: SEABED PREHISTORY

4.1 Geological Baseline and Archaeological Potential

- 4.1.1 The basal geology of the Severn Estuary area is Cretaceous or older in origin, with sloping bedrock platforms consisting of Triassic mudstones, Lias limestones and Carboniferous limestones (Brown 2005). However, the modern Severn Estuary is thought to have its origins in the Tertiary period, as large, regional uplift after the end of the Cretaceous resulted in the estuary and surrounding areas being exposed as a subaerial environment (Tappin et al. 1994). The result of this was general erosion of the underlying geology, but with deposition of terrestrial sediment in some areas following the development of a fluvial system along the present estuary (ibid., 36).
- 4.1.2 Due to this mainly erosional regime, limited remnant Tertiary sediments are present within the area, with any significant areas of deposition generally centred on fault zones (Tappin et al. 1994). This situation continued into the Quaternary, and very little evidence remains from this period until the mid to late Pleistocene (ibid., 76).
- 4.1.3 As with the rest of the UK, the Pleistocene history of the area is dominated by successive glacial advance/retreat cycles and the associated changes in sea level and sediment regimes. Only the Anglian glaciation (c. 480,000 - 423,000 BP) is thought to have actually covered the area, although the later Devensian glacial maximum (c. 18,000 BP) is thought to have reached as far as the northern edge of the Bristol Channel (Ehlers et al. 2011).
- 4.1.4 Despite this, the changes in sediment regime created by the successive glacial advances and retreats will have greatly affected the area, and, as such, it is thought that most Pleistocene sediments once present within the area will have been reworked and/or removed due to these changing environmental conditions (Tappin et al. 1994).
- 4.1.5 Deposits expected to have survived in the area are those dating from between the Devensian glacial maximum and the present day. At the glacial maximum, sea levels are interpreted to have been approximately 120 m lower than the present day. Work undertaken by the University of Birmingham as part of the West Coast Palaeolandscapes project (Fitch and Gaffney 2011) suggests that the Bristol Channel at this time was a broad, relatively flat plain containing numerous rivers, lakes and floodplains.
- 4.1.6 The Severn Estuary has been a focus for human settlement and subsistence for millennia. For long periods since the first recorded hominid activity in Britain around 970,000 BP (Parfitt et al. 2005; Parfitt et al. 2010), much of the Severn Estuary would have been exposed at times of lower sea level and has been modified by fluvial processes and repeated marine transgressions and regressions during the Pleistocene. The most recent marine transgression developed around 12,000 years ago (Sturt et al. 2013), and this resulted in the formation of the Bristol Channel.
- 4.1.7 At times when more temperate conditions coincided with these low sea levels, areas that are now submerged would have been suitable for human occupation (Sturt et al. 2016). Consequently, these palaeolandscapes would have been available for prehistoric hominins to traverse and exploit leaving similar prehistoric material as is found in present-day terrestrial settings. Finds recovered from the foreshore in the Severn Estuary have included Palaeolithic hand axes, Mesolithic footprints and stone tool scatters.
- 4.1.8 There are no recorded prehistoric sites within the study area, however the potential for prehistoric material and find spots to exist should not be discounted. Although often

associated with fluvial environments, these sites may have been many miles from the sea at the time they were being exploited by our ancestors (Oxley and O'Regan 2001).

- 4.1.9 The Severn Estuary has one of the richest and most varied archaeological landscapes in Europe (Sturt et al. 2016). It is possible that further remains relating to such early human activity are present in the study area, particularly if organic-rich deposits are encountered. Surviving evidence of prehistoric activity on the seabed can manifest as landscape features (commonly linked to subsistence strategies), palaeoenvironmental remains, or physical artefacts such as worked flints.
- 4.1.10 It is assumed that most prehistoric archaeological finds from the Bristol Channel will be of Palaeolithic or earlier Mesolithic date (see Bell 2000; Bell et al. 2000). The recovery of material from later periods (i.e. since 8,000 BP) will generally be confined to intertidal and nearshore locations due to their post-dating the principal episode(s) of Holocene marine transgression (Sturt et al. 2013). In practical terms, post-depositional factors can dictate that very little material will be in primary context and it will retain the similarly limited spatial and temporal integrity as terrestrial assemblages, thus restricting the level of interpretation that can be attempted.
- 4.1.11 Although out of context, any recovered prehistoric material would almost certainly have the potential to provide insights into patterns of past human land use and demography (Hosfield et al. 2009).
- 4.1.12 The gradual rise in sea level following the Devensian glacial maximum resulted in a retreat of the shoreline to its approximate present-day position by around 8,000 BP (Tappin et al. 1994). The sediments associated with the post-Devensian landscape may be preserved in places within the Severn Estuary, although, especially considering the high tidal range and current strengths within the channel, they may have been eroded and/or reworked into the modern seabed sediment.
- 4.1.13 From grab sample evidence the BGS has identified a number of modern sediment units present in the region. In some areas an erosion surface across glaciomarine deposits has been identified. Overlying these are often shallow-water deposits (SL2 member of the Surface Sands Formation), along with the present seabed sediments (SL1 member of the Surface Sands Formation). In the Severn Estuary, the SL1 member deposits can be seen as highly mobile sand waves (Tappin et al. 1994).
- 4.1.14 Currently the Severn Estuary is a fully marine/estuarine environment, with any new sediment being either of fully marine origin or derived from fluvial sources which drain into the channel.

4.2 Palaeogeographic Assessment Results

- 4.2.1 The identified geology within the study area has been divided into three units, as described below:

Table 6 Shallow stratigraphy of the study area

Unit	Unit Name	Geophysical Characteristics ⁽¹⁾	Sediment Type ⁽²⁾	Archaeological Potential
3	Holocene Seabed Sediments (SL1 member)	Generally observed as a veneer or thickening into large sand wave and bank features. Boundary between surficial sediments and underlying units not always discernible	Shelly sands, gravels and muds, sand waves and ripples indicate sediment is mobile	Considered of low potential in itself, but possibly contains re-worked artefacts and can cover wreck sites and other cultural heritage
2	Pleistocene / Early Holocene deposits (SL2 member)	Cut and fills and infilled depressions within the bedrock	Sand and gravels, some estuarine silts and peats	Potential to contain <i>in situ</i> and derived archaeological material
1	Mercia Mudstone Group. Triassic	A very distinct bedrock unit present across the site and in some areas at the surface, well layered unit in places with some faulting	Mudstone, claystone and sandstone	No potential
⁽¹⁾ Based on geophysical data				
⁽²⁾ Based on BGS data and Tappin <i>et al.</i> , (1992)				

- 4.2.2 Three shallow geological units have been identified within the study area. Unit 1 is interpreted to be part of the Mercia Mudstone Group dating from the Triassic period (Tappin *et al.* 1994). This is visible as a distinct bedrock unit that has been identified across almost the entire study area. The bedrock is often overlain by only a thin veneer of seabed sediment, and in some areas is close to the seabed. The unit appears to become closer to the seabed towards the north and north-eastern extents of the study area. Where visible, the unit appears well layered with some faulting visible in the SBP data.
- 4.2.3 This Triassic bedrock would have at one time been an exposed land surface during periods of lowered sea level. In the northwest extents of the study area, possible higher amplitude reflectors have been identified in the geophysical data which might suggest that there is a thin organic deposit situated on top of this surface. However, these layers proved too discontinuous to map definitively. Organic deposits such as these have the potential to contain preserved palaeoenvironmental material. However, as a Triassic deposit, Unit 1 is not considered of archaeological potential in itself.
- 4.2.4 Unit 2 is characterised as infilled depressions and possible cut and fill features cut into the bedrock across large expanses of the study area (**see Figure 2**). This unit is of possible Pleistocene/Early Holocene age of the Surface Sands Formation SL2 member (Tappin *et al.* 1994). This unit is composed of deposits laid down across an erosional surface created during the early stages of the Devensian late-glacial and postglacial marine transgression, and generally comprises reworked lag gravels and sands. In the Severn Wetlands, borehole evidence has revealed this unit contains estuarine silts and peats (*ibid*). These deposits completely cover the western area of Area 470 but are not present within the eastern area. The majority of Area 531 contains this unit with the exception of

the north-eastern extent and the south-western corner. As a predominantly reworked Pleistocene deposit, Unit 2 has the potential to contain both in situ and derived archaeological material in a secondary context. Please see **Figure 3** for a sub-bottom profiler data example.

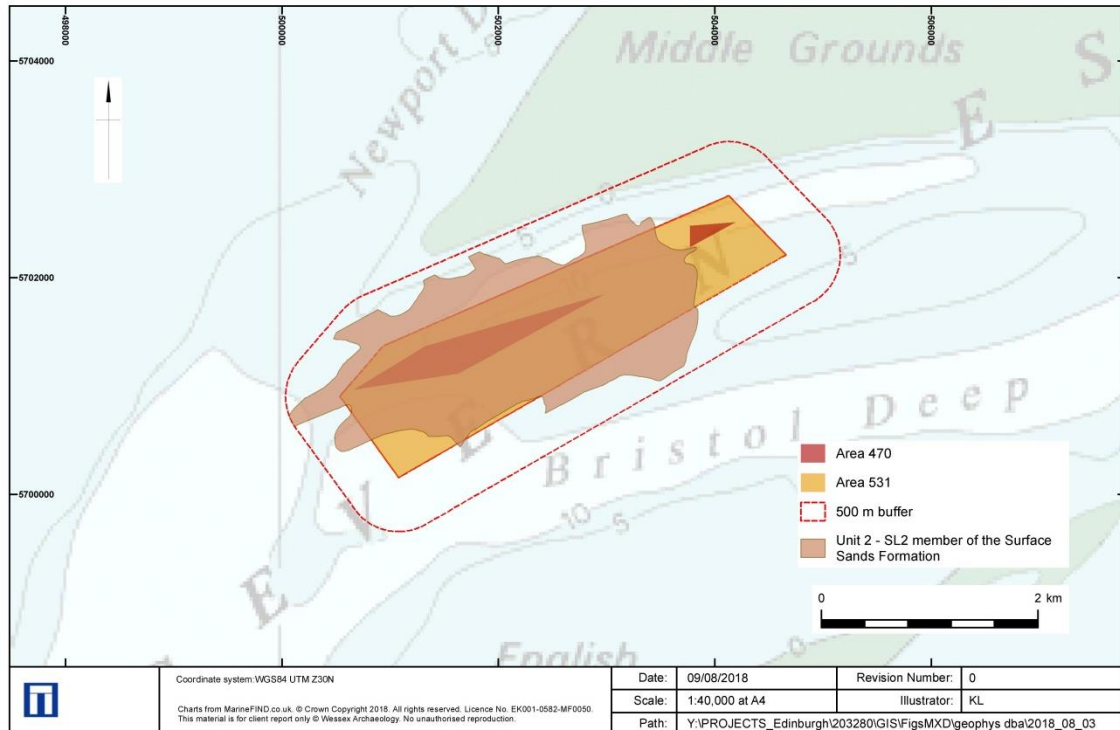


Figure 2 Palaeogeographic areas of archaeological potential

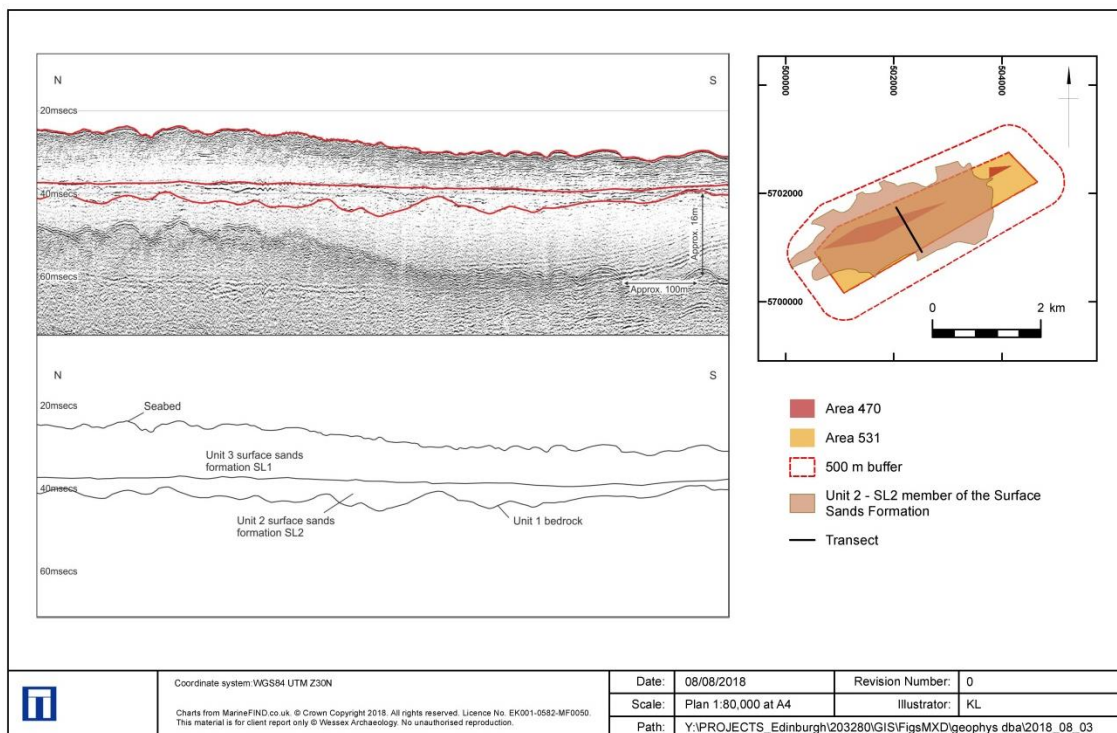


Figure 3 Sub-bottom profiler data example



- 4.2.5 Situated above the bedrock and Pleistocene deposits are Holocene dated sediments belonging to the Surface Sands Formation SL1 member. Unit 3 is visible in the SBP data as well layered shelly sands, gravels and muds. In some areas of the study area the sediments are poorly sorted and in rare instances are absent. This unit is a mobile sediment where it is exposed at the seabed (Tappin et al. 1994).
- 4.2.6 The majority of the study area is covered by megaripples and large sand waves with crests aligned in a northwest to southeast orientation as seen in the MBES data. These sediments are highly mobile and, although they are not of palaeoenvironmental significance, they do have the potential to contain reworked archaeological material and to cover archaeological sites (e.g. wrecks).
- 4.2.7 No individual palaeogeographic features (e.g. palaeochannels) of archaeological potential have been identified within the study area.

5 ARCHAEOLOGICAL BASELINE: MARITIME AND AVIATION SITES

5.1 Introduction

5.1.1 The following assessment of the maritime resource is based on records of known shipwrecks, aircraft crash sites and obstructions combined with archaeological assessments of geophysical data.

5.2 Geophysical Seabed Features Assessment

5.2.1 Post the Holocene marine transgression, the archaeological potential of the study area shifts to the represent the maritime history of the UK. The geophysical data were assessed to identify features of archaeological potential relating to maritime and aviation activity.

5.2.2 The results of this assessment are collated in gazetteer format detailed in **Appendix III** and illustrated in **Figures 4-5**.

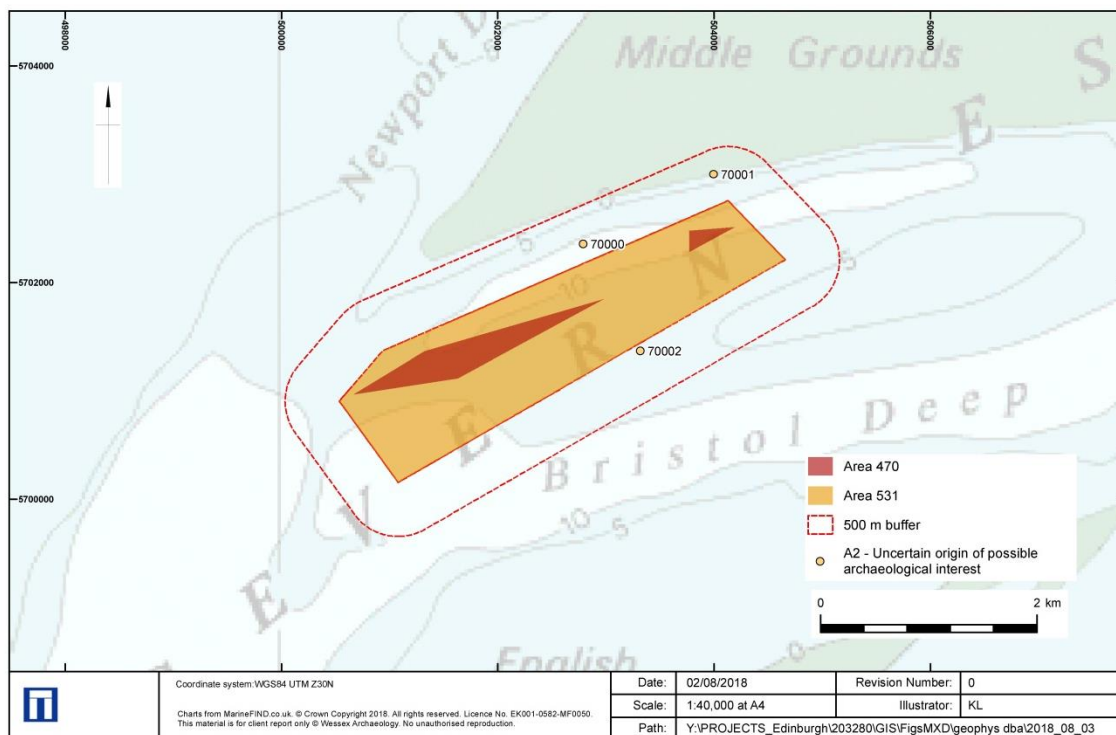


Figure 4 Geophysical anomalies with archaeological potential

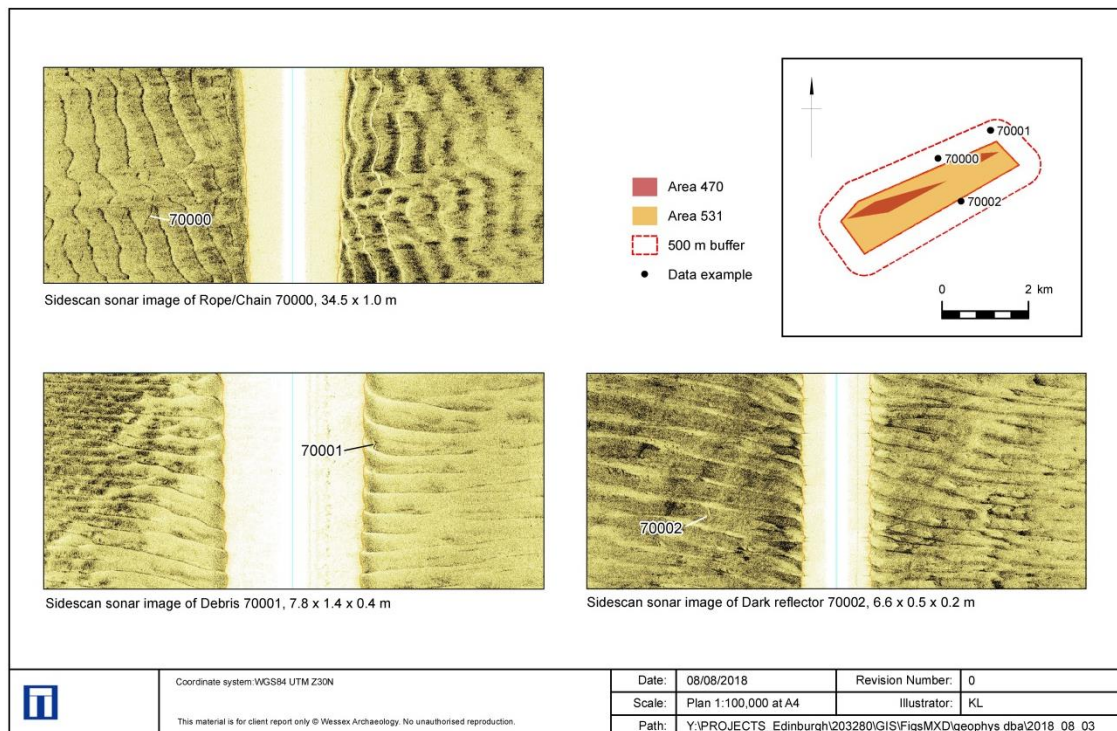


Figure 5 Sidescan sonar data example

5.2.3 Three features have been identified as being of possible archaeological potential within the study area and are discriminated as shown in **Table 7**.

Table 7 Anomalies of archaeological potential within the study area

Archaeological discrimination	Quantity	Interpretation
A2	3	Uncertain origin of possible archaeological interest
Total	3	

5.2.1 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance (**Table 8**).

Table 8 Types of anomalies identified

Anomaly classification	Definition	Number of anomalies
Debris	Distinct objects on the seabed, generally exhibiting height or with evidence of structure, that are potentially anthropogenic in origin	1
Rope/chain	Curvilinear dark reflectors, often with a small amount of height, indicating rope or chain (if ferrous)	1
Dark reflector	Individual objects or areas of high reflectivity, displaying some anthropogenic characteristics. Precise nature is uncertain	1
Total		3

- 5.2.2 One possible item of debris (**70001**) has been identified within the north-eastern extent of the 500 m buffer zone. This is a distinct curvilinear shaped dark reflector object with a bright shadow that is situated on the edge of a sand wave. The object has dimensions of 7.8 x 1.4 x 0.4 m and is isolated on a sand wave rich area of the seabed (**Figure 5**).
- 5.2.3 A possible rope or chain has been identified in the northern extent of the 500 m buffer. Anomaly **70000** is visible in the SSS data as a long and slightly curvilinear, thick, dark reflector object without a shadow. The feature has dimensions of 34.5 x 1.0 m and is aligned in a parallel direction to the large sand waves. (**Figure 5**).
- 5.2.4 Dark reflector (**70002**) is situated in the southern extent of the 500 m buffer. This is visible in the SSS data as a distinct linear dark reflector with a shadow. The object is lying perpendicular to the crests of sand waves and has dimensions of 6.6 x 0.5 x 0.2 m. This may be a natural feature or possible item of debris (**Figure 5**).
- 5.2.5 The study area is covered by highly mobile mega ripples and sands waves, and there is the potential for objects not identified by the current data set to be buried within these features.

5.3 Known Maritime and Aviation Sites

- 5.3.1 No records were found within the datasets of the GGAT HER and SHER. There is one reported maritime site charted by the UKHO within the 500m buffer zone, summarised in **Table 9** and illustrated in **Figure 1**. This site is a section of suction pipe, lost from the suction dredger/sand carrier Welsh Piper in 1988. This has not been found in searches since.

Table 9 UKHO sites

Wreck ID (UKHO)	Name/Type	Date Lost	Easting	Northing
12618	Dredger suction pipe section	1988	501699	5701856

5.4 Maritime Archaeological Potential

- 5.4.1 The assessment of potential for the discovery of shipwreck and shipwreck-derived material within the Study Area draws on the results of the geophysical survey and desk based research combined with further research of the wider area.

Navigational Hazards

- 5.4.2 The Study Area falls within the Bristol Approach, an area of medium potential for navigational hazard. The area predominantly consists of a sandy seabed and foreshore with a partially sheltered shallow coastal area. The river estuary is sheltered from all wind directions.
- 5.4.3 The Study Area falls within an area of significant shipping and navigation activity. These include the passage of merchant vessels, recreational craft, military vessels, and vessels engaged on specialist operations such as aggregate dredgers.

Recorded Losses

- 5.4.4 As discussed in **section 3.2**, Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped together by their general area of loss into Maritime Named Locations (displayed spatially as polygons or centre points of polygons, often associated with NRHE data), however many records (particularly from the HER dataset) are given co-ordinates (displayed spatially as points), although these are similarly unsubstantiated.

- 5.4.5 Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the Study Area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost or for which no physical wreck remains have ever been identified. **Table 10** shows the distribution of these documented losses according to the date of loss for those records whose positions fall within the Study Area. Details regarding these losses are presented in **Appendix IV**.

Table 10 Recorded Losses based on NMRW data

Period	Number of Losses
Medieval	-
Post-medieval	-
19th century	2
Modern	-
Unknown	1
Total	3

- 5.4.6 The two documented wrecks, *Rhoudda* and *Mary Ann*, are recorded as having sunk near the English and Welsh Grounds Lightship, listed within Area 531.
- 5.4.7 The unknown record is that of a buoy listed in the NMRW which falls within Area 531. This is the Middle Grounds Buoy, which marked one side of the entrance to a navigable channel around the Middle Grounds. The location for this buoy was derived from an admiralty chart first published in 1860.

Overview of Potential

- 5.4.8 In addition to the charted maritime sites and Recorded Losses, there is also the potential for the presence of archaeological material of a maritime nature, currently uncharted, to exist within Area 531 spanning from the Mesolithic period to the present day.
- 5.4.9 The Bristol Channel, an area that has historically been synonymous with shipping, has been traversed by a vast number and diverse array of boats and ships, ranging from prehistoric craft to modern warships and submarines. These vessels embody some of the most complex attributes of any society, not only in terms of their technology but also their organisation, communication and trade. Area 531 is located within a navigational corridor in the Bristol Channel which was used by ships accessing the English ports of Bridgwater and Bristol, and the Welsh ports of Newport and Cardiff. In this capacity, the maritime prominence of the Bristol Channel provided access to, and intensive usage of, the Irish Sea, Western Atlantic, and English Channel as major shipping routes from the late medieval period up to the present day. Many of these ports became major conurbations during the late medieval period and the intervening centuries saw expanding trade and industry with a resultant increase in the commercial use of the Bristol Channel, which continues to facilitate a large volume of maritime traffic (MarineSpace et al. 2012: 105).
- 5.4.10 Wrecks have been identified within the Severn Estuary covering various periods of history. For example, a Bronze Age boat has been recorded at Caldicot and a Roman boat found close to the inland margin of the levels at Magor, Gwent, from what was then a tidal creek. Similarly, the 'Newport Ship' was discovered during the excavation for a new arts centre in Newport and is one of the most complete examples of a late medieval ship, believed to be built circa 1465 (Severn Estuary Partnership, 2018).
- 5.4.11 The evidence for coastal and maritime activity within the vicinity of the Study Area is considered with reference to the composite time line for shipwrecks around England, produced by Wessex Archaeology (2008b) (see **Table 11**). The timeline takes into

account the broad chronology of shipbuilding and employment and draws out a few generalisations regarding the age and special interest of vessels.

Table 11 Summary of key areas of maritime potential

Period	Summary
Pre-1508 AD	Potential for material associated with prehistoric maritime activities. Prehistoric maritime activities include coastal travel, fishing and the exploitation of other marine and coastal resources. Vessels of this period include rafts, hide covered watercraft and log boats.
	Potential for material associated with later prehistoric maritime activities, including seaworthy watercraft suitable for overseas voyages to facilitate trade and the exploitation of deep water resources. Such remains are likely to comprise larger boat types, including those representing new technologies such as the Bronze Age sewn plank boats that are associated with a growing scale of seafaring activities.
	Potential for material of Romano-British/Romano-Gallo date, associated with the expansion and diversification of trade with the Continent. Watercraft of this period, where present, may be representative of a distinct shipbuilding tradition known as 'Romano-Celtic' shipbuilding, often considered to represent a fusion of Roman and northern European methods.
	Potential for material associated with coastal and seafaring activity in the 'Dark Ages', associated with the renewed expansion of trade routes and Germanic and Norse invasion and migration. Vessels of this period may be representative of new shipbuilding traditions including changes in technique.
	Potential for material associated with medieval maritime activity, including that associated with increasing trade between the UK and Europe, the development of established ports around the southern North Sea and the expansion of fishing fleets and the herring industry. Vessels of this period are representative of a shipbuilding industry which encompassed a wide range of vessel types (comprising both larger ships and vernacular boats). Such wrecks may also be representative of new technologies (e.g. the use of flush-laid strakes in construction), developments in propulsion, the development of reliable navigation techniques and the use of ordnance.
1509 to 1815 AD	Increasing potential for post-medieval shipwrecks representative of continuing technological advances in the construction, fitting and arming of ships, and in navigation, sailing and steering techniques. Vessels of this period continued to variously represent both the clinker techniques and construction utilising the flush-laid strakes technique.
	Increasing potential for post-medieval shipwrecks associated with the expansion of transoceanic communications and the opening up of the New World.
	Increasing potential for post-medieval shipwrecks associated with the establishment of the Royal Navy during the Tudor period and the increasing scale of battles at sea.
	Increasing potential for post-medieval shipwrecks associated with continuing local trade and marine exploitation including the transport of goods associated with the agricultural revolution.
1816 to 1913 AD	Increasing potential for the discovery of shipwrecks associated with the introduction of iron and later steel in shipbuilding techniques. Such vessels may also be representative of other fundamental changes associated with the industrial revolution, particularly with regards to propulsion and the emergence of steam propulsion and the increasing use of paddle and screw propelled vessels.
	Potential for the discovery of shipwrecks demonstrating a diverse array of vernacular boat types evolved for use in specific environments.
	Potential for wrecks associated with large scale worldwide trade, the fishing industry or coastal maritime activity including marine exploitation.
1914 to 1945 AD	Potential for the discovery of shipwrecks associated with the two world wars including both naval vessels and merchant ships. Wrecks of this period may also be associated with the increased shipping responding to the demand to fulfil military requirements. A large number of vessels dating to this period were lost as a result of enemy action.
Post 1946	Potential for wrecks associated with a wide range of maritime activities, including military, commerce, fishing and leisure. Although ships and boats of this period are more numerous, losses decline due to increased safety coupled with the absence of any major hostilities. Vessels dating to this period are predominantly lost as a result of any number of isolated or interrelated factors including human error, adverse weather conditions, collision with other vessels or navigational hazards or mechanical faults.

- 5.4.12 Whilst potential is certainly reflected in the recorded losses and shipping casualties within the immediate vicinity of the Study Area, there is the potential for further maritime wreck material to survive *in situ*.

5.5 Aviation Archaeological Potential

- 5.5.1 The assessment of potential for the discovery of aircraft crash sites and aircraft derived material within the Study Area draws on the results of the geophysical survey and desk based research combined with further research of the wider area.

- 5.5.2 There are no known aircraft crash sites recorded in the Study Area. However, there is still potential for the discovery of previously unknown aircraft material.

Overview of Potential

- 5.5.3 The assessment of potential for the discovery of aircraft crash sites and aircraft derived material within the Study Area draws on the results of the geophysical survey and desk based research combined with further research of the wider area.

- 5.5.4 There are no known aircraft crash sites recorded in the Study Area. However, there is still potential for the discovery of previously unknown aircraft material.

Overview of Potential

- 5.5.5 There is potential for the presence of aviation material dating from the early 20th century until more recent times, with a concentration dating to the World Wars and in particular the Second World War, 1939-45 (WWII). Discoveries may occur anywhere within the Study Area, but potential may increase nearer the coastlines.

- 5.5.6 The key areas of aviation potential that may be uncovered within the study area are summarised in **Table 12**.

Table 12 Summary of key areas of aviation potential

Period	Summary
Pre-1939	Minimum potential for material associated with the early development of aircraft. Aircraft of this period may represent early construction techniques (e.g. those constructed of canvas covered wooden frames) or may be associated with the mass-production of fixed wing aircraft in large numbers during WWI.
	Minimum potential for material associated with the development of civil aviation during the 1920s and 1930s, associated with the expansion of civilian flight from the UK to a number of European and worldwide destinations.
1939 to 1945	Very high potential for WWII aviation remains, particularly as the east coast acted as a hub for hostile activity. Aircraft of this period are likely to be representative of technological innovations propelled by the necessities of war which extended the reliability and range of aircraft. This potential is signified by the three aircraft Recorded Losses outlined above.
Post-1945	Potential for aviation remains associated with military activities dominated by the Cold War, the evolution of commercial travel and recreational flying and the intensification of offshore industry (including helicopter remains). Aircraft of this period may be representative of advances in aerospace engineering and the development of the jet engine

- 5.5.7 All aircraft that crashed while in military service are automatically protected under the PMRA 1986. If present, such sites would represent statutory constraints upon the proposed development. This legislation means any activities impacting upon the aircraft remains must cease pending assessment by the Ministry of Defence (MoD).

6 ARCHAEOLOGICAL BASELINE: HISTORIC SEASCAPE CHARACTER

English Waters

- 6.1.1 As part of the National Heritage Protection Plan (NHPP), English Heritage (now Historic England) commissioned a Historic Seascape Characterisation (HSC) for the Bristol Channel and Severn Estuary, and the work was undertaken by the projects teams of Cornwall Council and SeaZone Solutions Limited (2011a &b).
- 6.1.2 The Bristol Channel and Severn Estuary HSC project aimed to complete strategic-level HSC in accord with the national HSC Method that extends and applies the principles already in use for Historic Landscape Characterisation (HLC) to the coast and seas. The method assesses and defines areas with Historic Seascape Character types that promote an understanding of historic trends and processes in order to inform the sustainable management of change over time. This is achieved by addressing the multi-level character of the sea by splitting the marine zone into four tiered levels; the sea surface, the water column, the sea floor and the sub-sea floor. The characterisation is GIS-based, enabling key characteristics within the study area to be identified, and are summarised below.
- 6.1.3 The known and potential prehistoric, maritime and aviation heritage assets that form part of the HSC have been discussed in the relevant baseline characterisations above. The character descriptions below refer only to the cultural processes which have shaped the historic seascape of the study area.
- 6.1.4 The Bristol Channel and Severn Estuary project identified several areas that are within or intersect with the Study Area, shown in **Table 13**.

Table 13 HSC – primary cultural processes in the Study Area

Present Broad Character Types	Present Character Sub-Types
Cultural Topography (Marine)	Marine sand banks with sand waves
	Palaeolandscapes
Communications	Submarine telecommunication cables
Fishing	Aquaculture – cultivated shellfish
	Inshore fisheries
	Offshore fishing grounds – trawling, netting, longline, potting
Industry	Energy industry – renewable energy installation; commercial shipping
	Extractive industry – marine aggregates dredging
Military	Military defence and fortification
Navigation	Maritime safety – lighthouse
	Anchorage
	Navigation route / Historic Channel

- 6.1.5 A full description of each character type are present in the Section 3: Character Text Description of the HSC report (Cornwall Council and SeaZone Solutions 2011b).

Welsh Waters

- 6.1.6 An equivalent HSC assessment has not been undertaken for Wales, however, in order to inform the Welsh National Marine Plan, a National Seascape Assessment for the Welsh Inshore Waters has been carried out (LUC 2015). The methodology used for this assessment was carried out in line with the English equivalent developed by the MMO in

order to provide consistency with cross-border planning, and also takes into account previous regional and national seascape assessments for Wales (*ibid.*).

6.1.7 The National Seascape Assessment covers an area extending from the High Water Mark out to the Welsh territorial limit (12 nm) and as a result, it has identified 29 National Marine Character Areas (MCAs), which are defined by their character and not by their visual attributes.

6.1.8 The Welsh element of the Study Area is situated within one MCA - 29: Severn Estuary (Wales). The MCA is summarised below with characteristics relevant to this assessment:

- *Soft Triassic and Jurassic rocks exposed along the shore, with mud, sand and gravel sediments deposited in the Holocene period producing a varied seabed of flats and bars, with associated shallow waters and numerous shoals presenting hazards to navigation;*
- *Local trawlers catch plaice, turbot, whiting and rays from the sandbanks. Recreational charters and beach-based fishing are important economic activities;*
- *Number of shipwrecks on the seabed tracing the historic shipping routes, including those as a result of collisions and others mined during WWII;*
- *Long standing busy transport and trade route serving the major ports of South Wales and South West England; and,*
- *Views to major commercial, port and industrial development at Cardiff and Avonmouth.*

Assessment Summary

6.1.9 In general, the main character of this seascape is one of local, national and international maritime trade and commerce since at least the Mesolithic period, and especially in historic times. As a main entry point into Britain, the Bristol Channel has seen considerable marine traffic, and even today high numbers of commercial ships travel along the Channel on a daily basis, reinforcing its strong maritime setting and role as a major seafaring route.

6.1.10 More recently, the offshore aggregate dredging industry has also become a key element of the seascape character in the area due to the presence of the sand banks comprising sands and gravels. Aggregate areas in the vicinity of Area 531 include North Middle Ground (Areas 455 and 459), Culver Sands (Area 472 and Area 526) and North Bristol Deep (Areas 470/1 and 470/2).

7 VALUE AND SENSITIVITY

7.1 Introduction

- 7.1.1 This section will apply the assessment of value criteria set out in **Section 3.4** and within **Table 5** to the known and potential archaeological receptors outlined in **Sections 4 - 5**.

7.2 Seabed Prehistory

Value

- 7.2.1 Although there are no records of any known prehistoric sites within the Study Area, there is potential for the presence of as yet undiscovered *in situ* prehistoric sites and finds. For example, *in situ* archaeology that may be associated with identified palaeogeographic features (**Figure 3**), and **Unit 2** in general, would be considered as **high value**.

7.3 Seabed Features: Maritime

Value

- 7.3.1 There are no wrecks with statutory designations within the English and Welsh elements of the Study Area.
- 7.3.2 There is one known site (12618 UKHO) consisting of a section of a suction pipe which was lost from the suction dredger/sand carrier in 1988. This is considered to be of **negligible value**.
- 7.3.3 For all three A2 anomalies, there is insufficient data to assess the value of each individual anomaly at this point. As such, all A2 anomalies must be considered to potentially have archaeological value, to a greater or lesser degree and, in accordance with the precautionary principle, and in EIA terms, are considered as **high value** receptors.
- 7.3.4 Similarly, as the value of potential wrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of high value.

7.4 Seabed Features: Aviation

Value

- 7.4.1 There are no known aircraft crash sites in the English and Welsh elements of the Study Area. Nonetheless, there is the potential for aircraft or aircraft-related debris to exist on the seafloor within the Study Area. Given the identified potential of the area for military aircraft crashes, particularly relating to WWII, the likelihood would be for any aircraft crash to be of military origin, which would be protected under PMRA 1986 and therefore would be of **high value**.
- 7.4.2 This would include both Allied and Axis aircraft and would relate to both complete aircraft wrecks and debris scatters.

7.5 Sensitivity of Heritage Assets

- 7.5.1 All archaeological receptors have the potential to be physically damaged, destabilised or destroyed if they are directly or indirectly impacted. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial to limit further impact. Archaeological receptors have no recoverability if they are affected by a direct or indirect physical impact. As such, all potential receptors should be regarded as having **high sensitivity** to direct and indirect physical impacts.

8 ENVIRONMENTAL APPRAISAL AND RECOMMENDATIONS

8.1 High-Level Environmental Appraisal

- 8.1.1 Archaeological assets relating to seabed prehistory, maritime and aviation archaeology have been identified within the Study Area, as has the potential for further assets to be discovered. Marine aggregate licence Areas 470 and 531 have the potential to physically and adversely impact known and potential archaeological receptors within the construction footprint and area of effect of indirect physical effects such as changes in seabed sediment regimes, scour etc.
- 8.1.2 Typically, adequate and appropriate mitigation is required to ensure that the archaeological value of the baseline within this report is maintained. Recommendations for appropriate mitigation are set out below.

8.2 Recommendations

Avoidance

- 8.2.1 The primary mitigation for the protection of known archaeological assets is avoidance. This is achieved through the implementation and monitoring of Archaeological Exclusion Zones (AEZs), which are proposed for identified high value seabed features of anthropogenic origin (i.e. A1 classified geophysical anomalies). No A1 receptors have been identified.
- 8.2.2 The mitigation will establish appropriately sized AEZs around receptors which have been considered to be of high archaeological potential, in consultation with Historic England and CADW. These areas would be out of bounds to construction activities and to anchoring. Monitoring of any AEZs to ensure there is no disturbance to them will be part of this mitigation.
- 8.2.3 For features assigned A2 archaeological discrimination rating, no AEZs are recommended at this time. However, avoidance of these features is recommended should the proposed dredging programme directly impact any of these anomalies.
- 8.2.4 It is recommended that if any objects of possible archaeological interest are recovered during any dredging operations, they should be reported using the established Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest (BMAPA, English Heritage and The Crown Estate 2005).

Reduction

- 8.2.5 Through further investigation of assets with an uncertain archaeological value, such as A2 anomalies, their true nature can be understood (**Appendix III**). This can be completed through further archaeological assessment of marine geophysics, assessment of diver or ROV footage during other pre-construction mitigation such as UXO clearance or a sampling strategy such as clamshell grab sediment sampling.
- 8.2.6 Appropriate mitigation in this way should mean that these anomalies can either have their archaeological value removed, if they prove to be of non-anthropogenic nature or modern, or their value as archaeological assets confirmed, in which case mitigation in the form of either avoidance (which may be enacted by the implementation of an AEZ) or through remedying or offsetting (through targeted removal through archaeological excavation or lifting) and reporting of the find through mechanisms such as a Protocol for Archaeological Discoveries.

Remedying and Offsetting

- 8.2.7 No individual palaeogeographic features of archaeological potential have been identified across the study area. However higher amplitude reflectors identified in the northwest extent of the study area may indicate the presence of thin organic deposits which would be of potential palaeoenvironmental interest.
- 8.2.8 Unit 2 has been identified across large expanses of the study area which are interpreted to be Pleistocene/Early Holocene deposits, possibly of the Surface Sands Formation SL2. These sediments have the potential to contain both *in situ* and derived artefacts in a secondary context.
- 8.2.9 In cases where avoidance is either inappropriate or impossible, the damage to archaeological assets should be offset. In the case of seabed prehistoric features, this may be through future geoarchaeological assessment and sampling of geotechnical boreholes or through artefact recovery. Recovery of artefacts and/or other archaeological receptors should be a final resort, when all other mitigation has failed. Any recovery should be completed under the supervision of an appropriately qualified and experienced marine archaeologist. Safe archaeological recovery can take many forms, from clamshell grabs of individual artefacts, to ROV collection, to full diver assisted lifts. Due to the vast differences in practice and implementation between these methods, each will be covered by a specific Method Statement, approved by the Archaeological Curator, should they be implemented.

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APPENDICES

Appendix I: Legislation, Policy and Guidance

Global Policy and Legislation

Legislation/Policy	Summary
The World Heritage Convention 1972	The Convention provides for the identification, protection, conservation and presentation of cultural and natural sites of 'outstanding universal value' for inscription on the World Heritage List. The Convention sets out the duties of the countries (States Parties) in identifying potential sites and their role in protecting and preserving them. By signing the Convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. The 1972 UNESCO World Heritage Convention was ratified by the UK in 1984 and it currently has 29 World Heritage Sites.
The United Nations Convention on the Law of the Sea 1982	UNCLOS 1982 was ratified by the UK in 1997. Article 149 applies only to those archaeological and historical objects that lie outside national jurisdiction and stipulates that 'all objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin'. 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 nm, though the UK has not introduced any measures to implement this right.
International Council of Monuments and Sites Charter on the Protection and Management of Underwater Cultural Heritage 1996 (the Sofia Charter)	The Charter upon which the Annex of the UNESCO Convention is largely based 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 the International Council of Monuments and Sites.
UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001)	The UNESCO Convention was concluded in 2001 and is a comprehensive attempt to codify the law internationally with regards to underwater archaeological heritage. The UK abstained in the vote on the final draft of the Convention, however, it has stated that it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the UK is not a signatory, the Convention entered into force on 2 January 2009 having been signed or ratified by 20 member states. It has since been ratified or accepted by an additional 40 states.

European Policy and Legislation

Legislation/Policy	Summary
The European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (the Valletta Convention)	The Articles of the Valletta Convention tackle various aspects. Article 1 deals with the inventorying and protection of sites and areas; Article 2 deals with the mandatory reporting of chance finds and providing for 'archaeological reserves' on land or underwater; Article 3 promotes high standards for all archaeological work undertaken by suitably qualified people; Article 4 requires the conservation of excavated sites and the safe-keeping of finds; and Article 5 is concerned with consultation that should take place between planning authorities and developers to avoid damage to archaeological remains. 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.
European Landscape Convention 2000	The European Landscape Convention 2000 has been signed and adopted by the UK. Its principal clauses require the Government to protect and manage landscapes and to integrate landscape into regional and town planning policies including its cultural, environmental, agricultural, social and economic policies. The Convention applies to the entire territory of the UK and includes land, inland water and marine areas. It is not regarded as applying to sea areas regulated by the UK that lie beyond territorial waters.
European Directives for Environmental Impact Assessments (2014/52/EU)	The EIA Directive entered into force on 15 May 2014 to simplify the rules for assessing the potential effects of projects on the environment. The newly amended directive replaces former directives (85/337/EEC; 97/11/EC; 2003/35/EC; 2009/31/EC; 2011/92/EU) and Member States must apply these from 16 May 2017 at the latest.

United Kingdom Policy and Legislation

Legislation/Policy	Summary
Ancient Monuments and Archaeological Areas Act 1979 (as amended)	Scheduled Monuments and Areas of Archaeological Importance (AAIs or their equivalent) are afforded statutory protection and the consent of the Secretary of State (DCMS), as advised by Historic England, is required for any works. This Act is primarily land based, but in recent years it has also been used to provide some level of protection for underwater sites.
NPPF: Conserving and enhancing the historic environment. Para. 189	In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk based assessment and, where necessary, a field evaluation.



Legislation/Policy	Summary
NPPF: Conserving and enhancing the historic environment. Para. 190	Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.
NPPF: Conserving and enhancing the historic environment. Para. 193	When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be.
NPPF: Conserving and enhancing the historic environment. Para. 197	The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.
NPPF: Conserving and enhancing the historic environment. Para. 199	Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites and within the setting of heritage assets to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably.
NPPF: Conserving and enhancing the historic environment. Para. 200	Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible.
Protection of Wrecks Act 1973: Section One	Wrecks and wreckage of historical, archaeological or artistic importance can be protected by way of designation. It is an offence to carry out certain activities in a defined area surrounding a wreck that has been designated, unless a licence for those activities has been obtained through Historic England.
Protection of Wrecks Act 1973: Section Two	This provides protection for wrecks that are designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency through the Receiver of Wreck.
Protection of Military Remains Act 1986	All aircraft that have crashed in military service are automatically protected. Maritime vessels lost during military service are not automatically protected although the MoD has powers to protect any vessel that was in military service when lost. The MoD can designate 'controlled sites' around wrecks whose position is known and can designate named vessels as 'protected places' even if the position of the wreck is not known. It is not necessary to demonstrate the presence of human remains at either 'controlled sites' or 'protected places'.

Legislation/Policy	Summary
Merchant Shipping Act 1995	This Act sets out the procedures for determining the ownership of underwater finds that turn out to be 'wreck', defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any such finds are brought ashore, the salvor is required to give notice to the Receiver of Wreck that he/she has found or taken possession of them and, as directed by the Receiver, either hold them pending the Receiver's order or deliver them to the Receiver. The act is administered by the Maritime and Coastguard Agency. Beyond the 12 nm limit the Merchant Shipping Act 1995 covers wreck found or taken into possession outside UK waters and stipulates that, if brought into UK waters, finds must be reported to the Receiver of Wreck. The provisions of the Protection of Military Remains Act 1986 regarding Controlled Sites are applicable in international waters, though they are only enforceable with respect to British-controlled ships, British citizens and British companies.
Marine and Coastal Access Act 2009 (Marine Policy Statement 2011)	Under this Act the UK was divided into marine planning regions with an associated plan authority responsible for preparing a marine plan for that area. Welsh ministers responsible for developing a marine plan or plans for the Welsh marine area (inshore and offshore). The marine plan/s will set out policies for sustainable development in these areas.
Marine Policy Statement 2011	The Marine Policy Statement was jointly published by all UK Administrations in March 2011 as part of a new system of marine planning being introduced across UK seas.
Enterprise and Regulatory Reform Act 2013	In April 2013 a further Act was given Royal Assent which has implications for listed buildings and conservation areas. A provision for the reduction of legislative burdens as part of the Act includes heritage planning regulation (Schedule 17) with amendments to the National Heritage Act 1983, the Town and Country Planning Act 1990 and the Planning (Listed Buildings and Conservation Areas) Act 1990.

Welsh Policy and Legislation

Legislation/Policy	Summary
Historic Environment (Wales) Act (2016)	The Act forms part of a suite of legislation, policy, advice and guidance that makes improvements to the existing systems for the protection and sustainable management of the Welsh historic environment. It includes provision to give a statutory basis for local Historic Environment records, makes it more difficult for individuals to escape prosecution for criminal damage by claiming ignorance of a monument's status or location, and gives Ministers powers to take immediate action if a Scheduled Monument is threatened.
Well-being of Future Generations (Wales) Act 2015	Also forming part of the primary legislation for the historic environment in Wales is the Well-being of Future Generations (Wales) Act 2015 which defines sustainable development as 'the process of improving the economic, social, environmental and cultural well-being of Wales' with the promotion and protection of culture as part of one of its seven well-being goals.
Conservation Principles for the sustainable management of the historic environment in Wales (Cadw 2011)	This document sets out an approach for making decisions about all aspects of the historic environment, and provides guidance on reconciling the protection of the historic environment with the economic and social needs of the people who live in it.



Legislation/Policy	Summary
Planning Guidelines (Wales), Welsh Office 1996	This document outlines planning guidelines for Wales.
Planning and the Historic Environment: Archaeology (Welsh Office Circular 60/96)	Sets out the importance of archaeology and provides advice on the handling of archaeological matters in the planning process. Replaced PPG16 (Wales).
Planning and the Historic Environment Historic Buildings and Conservation Areas (Welsh Office Circular 60/69):	This provides detailed advice on best practice and supplies guidance in relation to historic buildings and conservation areas. It details scheduling criteria, gives sources and recommends procedures for assessment, evaluation, preservation and mitigation.
Planning Policy Wales 2002, 2014, 2016	Provides the strategic policy framework for the effective preparation of local planning authorities' development plans. This, in conjunction with Welsh Office Circular 60/96 'Planning and the Historic Environment: Archaeology' and Welsh Office Circular 61/96 'Planning and the Historic Environment: Historic Buildings and Conservation Areas', provides the framework for the protection of archaeology in Wales within the planning process.
Seas, Shores and Coastal Areas: Maritime Policy (Countryside Council for Wales 1996)	This policy covers cultural heritage, historic landscapes and amenity issues. It also stresses the need for sustainable development and holistic management.

Guidance

Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee (Joint Nautical Archaeology Policy Committee 2006)	This voluntary Code provides a framework for seabed developers similar to the principles found in current policy and practice on land. The aim of the Code is to ensure a best practice model for seabed development. The Code offers guidance to developers on issues such as risk management and legislative implications.
Standard and guidance for historic environment desk based assessment (Chartered Institute for Archaeologists 2014)	This guidance seeks to define good practice for the execution and reporting of desk based assessment, in line with the by-laws of the Chartered Institute for Archaeologists. The standard and guidance was formally adopted as approved practice at the Annual General Meeting of the Institute held on 14 October 1994. This revision recognises the new Chartered status of the Institute.
Marine Aggregate Dredging and the Historic Environment Guidance Note (Wessex Archaeology 2003)	The Guidance Note aims to provide practical guidelines on dealing with archaeological issues for marine aggregate developers, consultants, curators, contractors and industry regulators. Since 2003, the Guidance Note has become a standard reference for all environmental impact assessments for dredging licence applications with the approaches highlighted now widely accepted as best practice.



Appendix II: Terminology

Glossary

The terminology used in this assessment follows definitions contained within the UK's National Planning Policy Framework (Department for Communities and Local Government, 2012: 50-57):

Archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Conservation heritage policy) (for	The process of maintaining and managing change to a heritage asset in a way that sustains and, where appropriate, enhances its significance.
Designated heritage asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
Development Plan	This includes adopted Local Plans, neighbourhood plans and the London Plan, and is defined in section 38 of the Planning and Compulsory Purchase Act 2004.
Environmental Impact Assessment	A procedure to be followed for certain types of projects to ensure that decisions are made in full knowledge of any likely significant effects on the environment.
Heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).
Heritage coast	Areas of undeveloped coastline which are managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors.
Historic environment	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, and landscaped and planted or managed flora.
Historic environment record	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use.
Significance heritage policy) (for	The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.



Chronology

Where reference to in the text, the main archaeological periods in Britain are broadly defined by the following date ranges:

Period	Date Range
Palaeolithic	c. 900,000 BP– 9500 BC
Early Post-glacial	9500 – 8500 BC
Mesolithic	8500 – 4000 BC
Neolithic	4000 – 2200 BC
Bronze Age	2200 – 700 BC
Iron Age	700 BC – AD 43
Romano-British	AD 43 – 410
Early Medieval	410 – 1085
Medieval	1085 – 1500
Post-medieval	1500 – 1800
19th century	1800 – 1899
Modern	1900 – present day

The geological periods and associated Marine Isotope Stages are defined by the following date ranges:

Period	Date Range	MIS
Holocene	11,700 – present day	1
Devensian	115,000 – 11,700 BP	5d – 2
Ipswichian	130,000 – 115,000 BP	5e
Saalian	374,000 – 130,000 BP	10 – 6
Hoxnian	424,000 – 374,000 BP	11
Anglian	478,000 – 424,000 BP	12
Pre-Anglian	>478,000 BP	>12



Appendix III: Seabed Features of Archaeological Potential

ID Number	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Description	Area
70000	Rope/chain	502792	5702355	A2	34.5	1.0	0.0	A long and slightly curvilinear, thick dark reflector object with no shadow, this may be a rope or chain situated within sand waves.	500 m Buffer
70001	Debris	503996	5702998	A2	7.8	1.4	0.4	A distinct curvilinear shaped dark reflector object with a bright shadow that is situated on the edge of a sand wave. This is an isolated object that could be an item of debris.	500 m Buffer
70002	Dark reflector	503319	5701367	A2	6.6	0.5	0.2	A distinct linear dark reflector with a shadow, this object is lying perpendicular to the sand waves and could be a natural feature or debris object.	500 m Buffer

1. Co-ordinates are in WGS84 UTM30N
2. Positional accuracy estimated ± 10 m

Appendix IV: Recorded Losses of Vessel

NMRW Mon ID	Other Data Sources	Name	Period	Lost	Description	Area
274568		<i>Rhoudda</i>	19th century	1885	The <i>Rhoudda</i> was a 626nt iron-hulled steamship. At the time of loss on 20 March 1885, the vessel was owned by Edwards & Robinson of Cardiff and under the command of master W.E. Silley. The steamship was en-route from Bristol to Cardiff carrying passengers when it was in collision with the Bristol registered steamship <i>Brooklyn City</i> . The <i>Rhoudda</i> subsequently foundered near the English and Welsh Grounds lightship.	Area 531
274583		<i>Mary Ann</i>	19th century	1894	The <i>Mary Ann</i> was a 31nt wooden trow built in 1868. At the time of loss, the vessel was owned by W. Hickery and under the command of master F. Thomas. The trow was carrying a cargo of coal from Newport to Bristol when it foundered 0.5 mile east by north of the English and Welsh Grounds lightship on 24 February 1894.	Area 531