HORIZON NUCLEAR POWER

WYLFA NEWYDD

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Holyhead Deep Disposal Site

Marine Archaeological Baseline Report

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Summary

Wessex Archaeology was commissioned by Jacobs U.K. Limited on behalf of Horizon Nuclear Power Wylfa Limited to prepare a Marine Archaeological Baseline Report for an area in which excess dredged material arising from the construction of the proposed Wylfa Newydd Generating Station could be disposed of, within Holyhead Deep off Anglesey.

The aim of this report is to establish the baseline for the marine historic environment for a Study Area defined as the Holyhead Deep Disposal Site and a 1 km buffer around it. Six charted marine heritage assets are located within the Study Area (one of which is located within the Holyhead North Disposal Site IS043), along with 40 geophysical anomalies of archaeological interest and seven palaeogeographic features. There is also the potential for unknown marine heritage assets to be present within the Study Area. Due to the degree of uncertainty regarding the nature of known and unknown marine heritage assets within the Study Area, they have been assessed to be of Unknown value.

This report has also explored the historic element of the seascape character of the Study Area. Two Seascape Character Areas and two Regional Seascape Units have been identified within the Study Area. These have been assessed to be of Low to Medium value.

Holyhead Deep Disposal Site

Marine Archaeological Baseline Report

Acknowledgements

This project was commissioned by Jacobs U.K. Limited, on behalf of Horizon Nuclear Power Wylfa Limited.

Data was provided by the United Kingdom Hydrographic Office and the National Monuments Record of Wales. Wessex Archaeology is grateful to the staff of all the above organisations for their co-operation during the project.

The report was researched and compiled by Diana Donohue with contributions from Victoria Lambert, and illustrations prepared by Kitty Foster. Toby Gane managed the project on behalf of Wessex Archaeology.

Holyhead Deep Disposal Site

Marine Archaeological Baseline Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Jacobs U.K. Limited on behalf of Horizon Nuclear Power Wylfa Limited (Horizon), to undertake a Marine Archaeological Baseline Report of the former Holyhead Deep Disposal Site IS040 (hereafter 'the Site', **Figure 1**) and a 1 km buffer around it (together these are referred to as the 'the Study Area').

1.1.2 This report comprises a marine archaeological baseline study of the Study Area, which has been prepared based on a review of records held by national and local inventories and secondary sources relating to the marine historic environment. It also includes an assessment of the value and sensitivity of any identified marine archaeological assets within the Study Area.

1.2 Development proposal

1.2.1 This report has been prepared in support of an application to re-designate part of the Site so that a licence can be granted for Horizon to dispose of excess dredgings arising from the construction of the proposed Wylfa Newydd Generating Station.

1.3 The Site

1.3.1 The Site comprises a rectangular area measuring 12.9 km by 4.4 km located approximately 6 km west of the coastline of Holyhead, Anglesey, North Wales and includes the Holyhead North Disposal Site IS043 (**Figure 1**). It encompasses most of Holyhead Deep, a large depression in the seabed to the west of Anglesey. Survey of the area between 2013 and 2014 indicated that the depths ranged from 42.83 m to 96.75 m (Minesto 2015).

1.3.2 The Site was used for the disposal of dredge material (IS040), with licences granted to the following companies since the mid-1980s:

- *Cyngor Dosbarth Dwyfor;*
- *Stena Line Ports Limited (previously Sealink Harbours Limited);*
- *Mouchel Consulting Limited (including LG Mouchel and Partners Limited);*
- *Anglesey Boat Company Limited;*
- *Welsh Water;*
- *PVW International; and*
- *Anglesey Aluminium Metal Renewables Limited.*

1.3.3 Since 1983, a total of 1,569,411 tonnes of material have been disposed at the site comprising 1,052,203 tonnes of capital dredge spoil and 517,208 tonnes of maintenance dredge spoil. The annual average is 52,314 tonnes of deposition, but this depends on the year. For instance, capital dredging occurs less frequently, five times in the last 30 years, but the amount of material disposed can be in large quantities, often exceeding 100,000 tonnes. Whereas maintenance dredging occurs more frequently but never exceeds 100,000 tonnes in a single year. This reflects the on-going maintenance dredging required for Holyhead Harbour, undertaken by Stena Line Ports Limited.

1.3.4 Since at least 2009, only Stena Line Ports Limited have used the disposal site and is currently the only licensee (DML1648), which allows a deposit of no more than 99,000 tonnes of spoil per year (Minesto 2015, 23).

1.3.5 Material recently deposited into the disposal site has originated from the entrance to and exit from Holyhead Harbour and comprises soft fine sediments in the silt range (*ibid*., 24).

1.4 Scope of document

1.4.1 The purpose of this survey is to establish the baseline for the marine historic environment of the Study Area.

1.4.2 For the purposes of this report, marine heritage assets are taken to comprise:

- *seabed prehistory, including prehistoric archaeological remains and palaeogeographic features;*
- *maritime and aviation archaeology, and*
- *historic seascape character.*

1.5 Aims

1.5.1 The specific aims of this report are to:

- *identify known marine heritage assets and identify the potential for unknown marine heritage assets within the Study Area based on a review of existing information within the Study Area; and*
- *assess the value and sensitivity of known marine heritage assets through weighted consideration of their valued components.*

2 LEGISLATION, GUIDANCE AND POLICY

2.1 Introduction

2.1.1 The Site is located within the Welsh territorial waters, up to 12 nautical miles (nm) from the Welsh coast. Cadw administers the responsibilities of the Ministers of the Welsh Government with regard to archaeological and built heritage matters, which extend offshore to the 12 nm territorial limit, while the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are also consultees for marine licences. Heritage advice to Isle of Anglesey County Council (IACC) is provided by Gwynedd Archaeological Planning Service (GAPS).

2.1.2 The following section provides a summary of the national, regional and local planning and legislative framework which governs the treatment of the marine historic environment in the planning process. More comprehensive details are provided in **Appendix 1**.

2.2 Marine Policy

2.2.1 The *Marine and Coastal Access Act 2009* (MCAA) is the primary legislation relevant to marine development plans. Under this legislation, marine plans must be consistent with the Marine Policy Statement (MPS; Department for Environment, Food and Rural Affairs 2011) which outlines high level objectives for marine planning, which have directed development of the Plan at a local level. Marine plans must also be in accordance with other relevant national policy, including *Planning Policy Wales* (PPW) (Welsh Government 2016).

2.2.2 Under the MCAA, the UK has been divided into marine planning regions, with an associated authority responsible for preparing a Marine Plan for that area. 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.

2.2.3 The Site is located within the inshore region of the Welsh National Marine Plan area. At the time of compiling this document, the Welsh National Marine Plan was available in draft format, dated November 2015 (Welsh Government 2015).

2.2.4 This document has also been prepared in accordance with the relevant National Policy Statements (NPS), the principal decision-making documents for Nationally Significant Infrastructure Projects. Those relevant to the marine archaeological resource with respect to the proposed Holyhead Deep Disposal Site are:

- *Overarching NPS for Energy (EN-1) (July 2011) (Department of Energy and Climate Change 2011a); and*
- *NPS for Nuclear Power Generation (EN-6) Volumes 1 and 2 (July 2011) (Department of Energy and Climate Change 2011b).*

National Planning Policy in Wales and the Historic Environment (Wales) Act

2.2.5 PPW was first published by the Welsh Government in March 2002 and most recently updated in November 2016 (edition 9). 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.

2.2.6 PPW's *Chapter 6: 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 Chapter 6 is to ensure that 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.

2.2.7 To summarise, government guidance provides a framework that:

- *recognises that heritage assets are a finite non-renewable resource;*
- *requires an assessment and/or evaluation of the historic environment resource affected by the proposals and an impact assessment of the proposed development on the importance of the heritage assets;*
- *takes into account the desirability of preserving and enhancing the importance of heritage assets and their setting; and*
- *places weight on the conservation of designated heritage assets.*

2.2.8 PPW is supplemented by a series of Technical Advice Notes (TANs). *Technical Advice Note 24: Historic Environment (*Welsh Government, 2017) provides guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building applications.

2.2.9 The *Historic Environment (Wales) Act 2016* became law on 21 March 2016. This Act amended certain aspects of the law relating to Scheduled Monuments and Listed Buildings. It created a statutory Register of Historic Parks and Gardens, requires Local Planning Authorities to establish a historic environment record relating to their area, and established an Advisory Panel for the Welsh Historic Environment to advise on environment policy and strategy at a national level.

Welsh Maritime Policy

2.2.10 *Seas, Shores and Coastal Areas: Maritime Policy* (Countryside Council for Wales 1996) covers cultural heritage, historic landscapes and amenity issues. It also stresses the need for sustainable development and holistic management.

2.3 Marine Legislation

2.3.1 The Site is located in the Welsh territorial waters and is within the UK Exclusive Economic Zone (EEZ). In addition to the *Marine and Coastal Access Act 2009* (see Section 2.2 above) the following legislation applies within the Welsh territorial waters:

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

2.3.2 The above legislation provides protection for wrecks of high historical, archaeological or artistic value, as well as allowing military wrecks and aircraft remains to be protected. Ownership of any wreck remains is determined in accordance with the *Merchant Shipping Act 1995*.

Planning (Wales) Act 2015

2.3.3 The *Planning (Wales) Act 2015* was passed on 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.

2.3.4 Also forming part of the primary legislation for the historic environment in Wales is the *Well-being of Future Generations (Wales) Act 2015* that 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.

2.3.5 More information regarding the details of each piece of legislation is presented in **Appendix 1**.

2.4 Marine Guidance

2.4.1 This report 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);*
- *Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England) 2002);*
- *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); and*
- *Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England) 2012).*

3 METHODOLOGY

3.1 Study Area

3.1.1 The Study Area comprised a 1 km buffer around the Site. The Study Area was used as the search area for obtaining records from relevant archive databases which informed the marine historic environment baseline review summarised in Section 4 of this document. A 1km study area was used to allow adequate characterisation of the marine archaeological baseline of the Site and also to identify heritage assets on which the development may have an indirect effect.

3.2 Methodology

3.2.1 The methodology employed during this report reflects the requirements of Environmental Impact 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' *Standard and guidance for historic environment desk-based assessment* (CIfA 2017).

Sources

3.2.2 A number of sources of primary and synthesised information were consulted in order to compile this report. The sources include:

- United Kingdom Hydrographic Office (UKHO) records of wrecks and obstructions;
- records from the National Monuments Record of Wales (NMRW) curated by the RCAHMW;
- statutory designation datasets maintained by Cadw;
- records from Gwynedd Archaeological Trust Historic Environment Record (GAT HER) (however no offshore records were produced);

- records of discoveries reported through the Marine Aggregates Industry Protocol for the Reporting of Finds of Archaeological Interest;
- Welsh seascapes and their sensitivity to offshore developments: Method Report (Briggs and White 2009);
- Anglesey Seascape Character Assessment (Fiona Fyfe Associates et al. 2013); and
- relevant documentary sources and grey literature held by Wessex Archaeology (presented in 'References' - Section 9 of this document).

3.2.3 The results of a previous archaeological assessment undertaken for the Deep Green Holyhead Deep Tidal project have also been incorporated to this report where relevant (Wessex Archaeology 2015). The study area for the Deep Green Holyhead Deep Tidal project desk-based assessment overlaps the southern extent of the Study Area. Seabed features and anomalies within this area of overlap are included as part of the baseline report, where relevant.

3.2.4 The report examined seabed prehistory through a review of the geological mapping of seabed sediments, solid geology and bathymetry from published British Geological Survey (BGS) sources. This report was further supported by the examination of models of past sea level, palaeoshorelines and submerged prehistoric landscapes to effectively communicate the relationship of the Study Area to the extent of inhabitable land throughout the late Pleistocene and Holocene (i.e. the last 15,000 years BP (before present)). This palaeogeographic review, alongside the known archaeological record, formed the basis upon which the potential for submerged prehistory could be developed and discussed.

3.2.5 The various sources of data for maritime and aviation history have been collated in order to develop a baseline of regional archaeological and cultural heritage and the potential for encountering unknown wreck and aircraft crash sites. The records of wrecks, aircraft and seabed features obtained from the UKHO and NMRW were compiled to form a gazetteer (**Appendix 2**) and each given a numerical sequence beginning with 2000. No sites within the Study Area were identified from the GAT HER.

3.2.6 Data relating to Recorded Losses were also identified from the above 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 positional data of these records are unreliable and serve only to provide an indication on the types of vessels which passed through the area and the wrecking incidents that are known to have occurred in the general area. Whilst the remains of these vessels are expected to exist somewhere on the seafloor, their location is unknown. It is not uncommon for records held by the UKHO to also be better regarded as Recorded Losses. Although UKHO wrecks are regarded as charted sites, on occasion the records are based on the sinking position of the vessel in question and contain no hydrographic survey data at the recorded wreck location. As such, they too signify the potential marine and aviation resource. No Recorded Losses are currently documented within the Study Area, although a number of the UKHO records reviewed contained no record of tangible remains ever having been discovered on the seafloor for a number of the charted sites and as such, are better regarded as Recorded Losses.

3.2.7 Information from the above sources was collated in a Geographic Information System (GIS) using ArcGIS 10. For the purposes of this report, data are illustrated in Universal Transverse Mercator (UTM) zone 30 north projected from a WGS84 datum. The spatial analysis of the records through the GIS identified positional discrepancies between

datasets. This could be due to a co-ordinate conversion error. For the purposes of this report, records with duplicate positions between datasets were amalgamated and their co-ordinates are taken from the UKHO dataset as the raw data therein are based on hydrographic survey data. The NMRW datasets are primary terrestrial datasets expressed in British National Grid, and are considered to be less accurate offshore.

Chronology

3.2.8 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. BC refers to calibrated radiocarbon chronology that can be considered equivalent to calendar years. BP dates are used for periods of time older than *c*. 10,000 years ago.

3.2.9 A list of the main archaeological periods in Britain referred to in the text, along with their broadly defined dates, is shown in **Appendix 3**.

Assumptions and Limitations

3.2.10 Data used to compile this report consist of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this report. The assumption is made that the secondary data, as well as that derived from other secondary sources, are reasonably accurate.

3.2.11 The records held by the UKHO, NMRW, GAT HER and the other sources used in this report 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.

Copyright

3.2.12 The copyright in all drawings, reports, specifications, bills of quantities, calculations and other documents and information prepared by or on behalf of Wessex Archaeology in connection with this report are vested in Jacobs U.K. Limited and Horizon.

3.3 Methodology for Assessment of Value

Assessment for Cultural Heritage Assets

3.3.1 The value of a cultural heritage asset can often be inferred from its level of designation, for example, archaeological sites of high international value that are designated as World Heritage Sites. However, in the marine context, there are a limited number of sites that have been designated, and therefore undesignated sites must be evaluated on a case by case basis to assess their value. The assessment of undesignated sites was undertaken using the guidance discussed below.

3.3.2 The *Conservation Principles for the sustainable management of the historic environment in Wales* (Cadw, 2011), indicates that the overall value of cultural heritage assets needs to be assessed through four values. These are:

- *Evidential values – which provide evidence about past human activity including its physical remains;*
- *Historical values – which include historical associations of heritage assets, for example with notable people, events or movements;*

- *Aesthetic values – which derive from how people experience the cultural heritage asset, through sensory and intellectual stimulation; and*
- *Communal values – which derive from the meanings that cultural heritage assets have for the people who relate to them.*

3.3.3 Value can also be assessed based on the importance of an asset. With regards to assessing the value of shipwrecks, further guidance can be employed, including *On the Importance of Shipwrecks* (Wessex Archaeology 2006), which suggests importance can be assessed through the following criteria: build, use, loss, survival, and investigation (or BULSI for short). A quick guide to interpreting importance based on the age of a shipwreck can be found in **Appendix 4**. The overall value can then be determined by compiling the assessment of each criterion. The criteria can also, to some extent, be used to assess the importance of aircraft crash sites.

3.3.4 The value of known cultural heritage assets were assessed on a six point scale of **Very High**, **High**, **Medium**, **Low**, **Negligible** and **Unknown** using professional judgement informed by the criteria provided in **Table 1** below.

Table 1: Criteria to assess the archaeological value of offshore assets

Value	Definition
Very High	· World Heritage Sites (including nominated sites). · Assets of acknowledged international importance. · Assets that can contribute significantly to acknowledged international research objectives. · Using the Conservation Principles: sites with very high evidential, historical, aesthetic and/or communal values. · Using BULSI: a wreck of a unique build; a use linked to an internationally important historic event or industry; a particularly dramatic loss; extremely well preserved remains; and well investigated with potential for further investigation.
High	· Scheduled Monuments (including proposed sites). · Protected under the *Protection of Wrecks Act 1973*. · Undesignated assets of quality and importance worthy of designation. · Assets that can contribute significantly to acknowledged national research objectives. · This is broadly equivalent to Category A (Sites and Monuments of National Importance) under the categorisation used by the Welsh Archaeological Trusts. · Using the Conservation Principles: sites with high evidential, historical, aesthetic and/or communal values. · Using BULSI: a wreck of a build from a time of which there are few examples in the archaeological record, or that highlights changes in technology; a use linked to a nationally important historic event or industry; a well-known loss; a well preserved remains; and an investigated site with potential for further investigation.
Medium	· Designated or undesignated assets that contribute to acknowledged regional research objectives. · This is broadly equivalent to Category B (Sites and Monuments of Regional Importance) under the categorisation used by the Welsh Archaeological Trusts. · Using the Conservation Principles: sites with medium evidential, historical, aesthetic and/or communal values. · Using BULSI: a wreck with a build that illustrates changes in technology; a use linked to a regionally important event or industry; a known, recorded loss; some level of survival of material remains; and possibly previous investigations with potential for further investigation.
Low	· Designated and undesignated assets of local importance. · Assets compromised by poor preservation and/or poor survival of contextual

Value	Definition
	associations. · Assets of limited value, but with potential to contribute to local research objectives. · This is broadly equivalent to Category C (Sites/Features of Local Importance) under the categorisation used by the Welsh Archaeological Trusts. · Using the Conservation Principles: sites with low evidential, historical, aesthetic and/or communal values. · Using BULSI: a wreck with a build that is common in the archaeological record; a use linked to a local event or industry; a loss of little interest; minimal survival of material on the seabed; and little potential for further investigations
Negligible	· Assets with very little or no surviving archaeological interest. · This is broadly equivalent to Category D (Minor and Damaged/Sites/Features) under the categorisation used by the Welsh Archaeological Trusts. · Using the Conservation Principles: sites with negligible evidential, historical, aesthetic and/or communal values. · Using BULSI: a wreck with a build that is very common; a use of little interest; a loss of little interest; little or no surviving archaeological material on the seabed; and no potential for further investigation.
Unknown	· The sensitivity of the site has not been ascertained. · This is broadly equivalent to Category U (Features Needing Further Investigation) under the categorisation used by the Welsh Archaeological Trusts.

3.3.5 Since heritage assets cannot adapt, tolerate or recover from direct impacts caused by a proposed development, then for the purpose of this report, the sensitivity of each asset will be quantified only by their value.

Assessment for Seascapes

Introduction

3.3.6 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 a subset of 'landscape' and has *'an area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land and sea, by natural and/or human factors'* (*ibid*.).

3.3.7 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). Historic Seascape Characterisation (HSC) assessment is the identification and interpretation of the historic dimension of the present day coastal and marine environment.

3.3.8 The sensitivity of Welsh seascapes to offshore developments has been assessed through a project commissioned by the Countryside Council for Wales (Briggs and White 2009). The project characterised seascapes around Wales, focusing on the visual or scenic aspects of the coastline within geological, land use, historic and cultural contexts. The characterisation of Regional Seascape Units (RSUs) was designed to facilitate the decision-making process surrounding development proposals, protection and conservation.

3.3.9 In 2013, a more detailed local level Seascape Character Assessment was undertaken for Anglesey (Fiona Fyfe Associates *et al.* 2013). The purposes of the project were to: contribute to marine special planning; inform reviews of the Management Plans for

Anglesey Coast Area of Outstanding Natural Beauty (AONB); extend the coverage of seascape assessment beyond the AONB boundaries in order to help ascertain the potential impacts of coastal and offshore developments on these protected landscapes; inform planning policy with regard to offshore development including energy generation; and to capture the perceptual and experiential qualities of the coast. It provided characterisation of Seascape Character Areas (SCAs) and their sensitivity.

Assessment of Seascapes

3.3.10 For Registered Historic Landscapes, assessment can be made through the non-statutory, advisory guidance provided in the *Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process: Revised (2nd) Edition Including Revisions to the Assessment Process* (ASIDOHL 2; Countryside Council for Wales *et al.* 2007). However, ASIDOHL 2 is intended to be undertaken as a five-staged process for the assessment of the significance of impact of development, and requires an assessment of the types of potential impact as part of the overall assessment.

3.3.11 There are no designated seascapes, and there is no equivalent assessment methodology or guidance related to seascape assessment. This assessment uses the RSUs to provide an overview of the overall sensitivity of the wider area, then utilises the finer-grained approach of the SCAs to refine the level of value, based on the criteria in **Table 2**.

Table 2: Criteria to assess the value of seascapes

Value	Definition
High	· Historic seascapes of high quality and importance and of demonstrable national value, well preserved historic seascapes, exhibiting considerable coherence, time-depth or other critical factor(s). · Historic seascapes that are very sensitive to change, or have little capacity to accommodate change.
Medium	· Historic seascapes of regional value. · Historic seascapes that are moderately sensitive to change, or have a moderate capacity to accommodate change.
Low	· Historic seascapes of local importance e.g. robust historic seascapes, those historic seascapes with importance to local interest groups, historic seascapes whose value is limited by poor preservation and/or poor survival of contextual associations. · Historic seascapes that are not particularly sensitive to change, or have considerable capacity to accommodate change.
Negligible	· Historic seascapes with little or no significant historical interest. · Historic seascapes that are not sensitive to change, or have very considerable capacity to accommodate change.
Unknown	· The value of the historic seascape cannot be ascertained based on existing information and professional judgement.

4 BASELINE RESOURCE

4.1 Introduction

4.1.1 The following section provides a summary of the marine historic environment of the Study Area, established from the sources identified in Section 3 above. For the purposes of this report, the marine historic environment comprises:

- *seabed prehistory, including prehistoric archaeological remains and palaeogeographic features;*
- *maritime and aviation archaeology, and*
- *historic seascape character.*

4.1.2 All marine heritage assets identified within the Study Area are presented in **Appendix 2**, **Appendix 5** and **Appendix 7**. Entries are given a **WA** prefix in the text for ease of reference. 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.

4.1.3 Marine archaeological baseline assessments typically include reference to archaeological or documentary evidence relating to the surrounding environs of the Study Area and wider region as a whole in order to serve as an indication on the potential for currently unknown sites to exist within the Study Area itself. The records within the Study Area on which the known marine archaeological baseline has been established are limited and non-exhaustive, and the potential exists for additional currently unknown and unrecorded archaeological finds and sites to exist within marine contexts. An assessment of the potential marine archaeological baseline therefore relies on a variety of available data (see Section 3.1) which can be considered as indicative of this potential. This may include reference to sites, find spots and deposits beyond the limits of the Study Area where it is felt that such data are relevant.

4.2 Seabed Prehistory

Geology

4.2.1 The Site is located within an area of seabed referred to as Holyhead Deep, a north-south trending bathymetric low within the Irish Sea located approximately 6.5 km SSW of South Stack, Holy Island, Anglesey.

4.2.2 The bedrock geology[1] of the Study Area is characterised as a Pre-Cambrian Mona Complex, comprising a sequence of quartzite and green mica schists (Jackson *et al.* 1995, Mouchel Heritage 2009). Previous magnetic anomaly data for the area further indicate the presence of a rock landform trending north-west to south-east, comprising several intrusive igneous dikes extending from Holy Island into the Irish Sea (Jackson *et al.* 1995).

4.2.3 The bedrock geology is variously exposed at the surface in outcrops and overlain by a veneer of younger sediment (BGS 1990). The oldest overlying sediment appears to be Quaternary in age, with the boundary between solid geology and overlying sediments thereby representing a depositional hiatus.

4.2.4 Quaternary deposits for the majority of the UK are complex and typically form a sedimentary depositional environment representative of the series of glacial and inter-glacial episodes and accompanying rise and fall in relative sea level. Quaternary sediments in the Irish Sea generally comprise glacial till separated by pro-glacial fluvial and glaciomarine deposits, with more recent pro-deltaic and marine deposits at the top of the sequence. BGS data indicate the survival of numerous relict glacial features on the seabed within the Irish Sea, including periglacial patterned ground and pingos (Jackson *et al.* 1995).

[1] Defined by the BGS as the main mass of rocks forming the Earth (www.bgs.ac.uk)

4.2.5 BGS information indicates that the Pre-Cambrian bedrock should be present at the seabed in areas towards the east of the Study Area (BGS 1990). For the remainder of the Study Area, BGS data indicate the presence of the Devensian Cardigan Bay Formation and the Late Devensian Western Irish Sea Formation on the seabed, overlying the bedrock. The latter of these formations is complex and contains a number of facies.

4.2.6 Current evidence suggests that during the retreat of the Devensian ice sheet, relative sea levels in the Irish Sea remained low, exposing the Study Area as a terrestrial environment, during which time terrestrial sediments may have been deposited. Sea level models indicate that the Study Area is likely to have been inundated by approximately 6,000-7,000 BP (Shennan and Horton 2002). Although inundation is likely to have been relatively rapid, evidence in the wider area suggests that there were periods during which the coastline was potentially relatively stable. Deposits of the Early Holocene Surface Sands Formation comprising peaty/terrestrial layers, estuarine muds and reed swamp deposits, and submerged peats have previously been identified to the west of Holyhead harbour (Mouchel Heritage 2009). Although beyond the limits of the Study Area, the presence of submerged peat beds testifies the relative stability of the coastline, thereby indicating the potential for organic deposits to exist within the Study Area. Seven simple cut and fill features identified in sub-bottom profiler data assessed as part of the Deep Green tidal project and located within the Study Area (**WA 7500** - **WA 7505** and **WA 7507**) have been identified as possibly containing Surface Sands Formation of early Holocene date (SL2 member), comprising pre-transgression terrestrial sand, silt and clay (Jackson *et al.* 1995, Wessex Archaeology 2015) (**Figure 2**, **Appendix 5**). Four such features are located within the Site (**WA 7500** - **WA 7503**) with the remaining three features located within the Study Area.

4.2.7 Modern seabed sediments in the Study Area comprise thin deposits of sand and gravel (Surface Sands Formation SL1 member), with bedforms largely confined to bedrock outcrops or relict periglacial features (BGS 1990, Jackson *et al.* 1995).

Designated Prehistoric Archaeological Remains

4.2.8 There are no designated prehistoric archaeological remains located within the Study Area.

Non-designated Prehistoric Archaeological Remains

4.2.9 There are no non-designated prehistoric archaeological remains located within the Study Area.

Potential for Prehistoric Archaeological Remains

4.2.10 Although there are no known prehistoric archaeological remains within the Study Area, the potential for archaeological material of a prehistoric date to exist within the area cannot be discounted. The potential for prehistoric archaeological remains to exist within the Study Area is based on a review of the presence of geological sediments which have the potential to contain or conceal prehistoric archaeological material or palaeoenvironmental remains. The periods with the highest potential for unknown prehistoric archaeological remains to be present are identified in **Table 3**. The potential of the Study Area for the presence of unknown prehistoric archaeological remains is discussed in detail in **Appendix 6**. It should be noted that no seabed sampling (e.g. borehole or vibrocore) logs have been consulted during this report, and the interpretation has been based on maps produced by the BGS (BGS 1990). The sediment types present within the proposed stratigraphy can only be confirmed by direct sampling.

Table 3: Summary of periods with the highest potential for the presence of unknown prehistoric archaeological remains

Period	Summary
Pre-Devensian *c*. 970,000-110,000 BP	Material of this date, if present within the Study Area, is most likely to occur in secondary contexts, having been derived or moved during the re-working of the landscape as a result of the Devensian ice sheet. Pre-Devensian deposits appear to be confined to the Pre-Cambrian Mona Complex, a basal unit which pre-dates the earliest evidence for early human activity. This deposit has no potential for archaeological material within it, though it may have provided surfaces upon which archaeological material has been deposited. Later Pre-Devensian deposits are likely to have been stripped away during the basal erosion which took place during the Devensian glaciation.
Devensian to Last Glacial Maximum (LGM) *c.* 110,000-18,000	Material of this date within the Study Area is likely to be rare. Although the Study Area may have been inhabitable at the onset of the Devensian glaciation, the UK's terrestrial record suggests that Britain was uninhabited between c. 180,000-60,000 BP. In the period approaching the LGM, the Study Area would have been concealed by an ice sheet and would have been uninhabitable for early human exploitation and activity. Deposits of this date in the Study Area are represented by the Cardigan Bay Formation. As this formation is a glacial deposit, it is not considered to be of archaeological potential. The lower facies (Chaotic Facies) of the Western Irish Sea Formation recorded in the Study Area is also thought to have formed during the LGM. The Chaotic Facies formed as an ice proximal glaciomarine or glaciolacustrine deposit. The age and environment indicate this facies is unlikely to be of archaeological potential.
Post-LGM and Early Holocene *c.* 18,000-6,000 BP	There is potential for material of this date to exist within either primary or secondary contexts within the Study Area. The UK's terrestrial archaeological record indicates that Britain was re-colonised by humans approximately 12,000 BP and by 10,000 BP the climate began to ameliorate with the onset of the Holocene period. Deposits of this date in the Study Area include the middle facies (Prograded Facies) of the Western Irish Sea Formation, a glacial outwash deposit created very close to the ice front during deglaciation. This periglacial outwash deposit is likely to have been deposited close to the retreating ice sheet at a time when the environment is likely to have been too hostile for settlement by humans. Other deposits of this date include the upper facies (Mud Facies) of the Western Irish Sea Formation, which is interpreted as a Late Pleistocene/Early Holocene ice distal glaciolacustrine or glaciomarine deposit. The facies often contain gas accumulations, suggesting the presence of preserved organic material which may be of palaeoenvironmental importance. Seven simple cut and fill features have been identified within the Study Area (**WA 7500** - **WA 7505** and **WA 7507**) as possibly containing pre-transgression terrestrial sand, silt and clay of early Holocene date.

4.3 Maritime and Aviation Archaeology

4.3.1 The following assessment of the maritime resource is based on records of known shipwrecks, aircraft crash sites and obstructions (based on UKHO and NMRW data).

Designated Maritime and Aviation Sites

4.3.2 There are currently no sites within the Study Area that are subject to statutory protection from the *Protection of Wrecks Act 1973*, the *Protection of Military Remains Act 1986* or

the *Ancient Monuments and Archaeological Areas Act 1979*; the three legislative acts that could be used to protect marine archaeological sites.

Non-designated Maritime and Aviation Sites

4.3.3 There are six charted sites[2] within the Study Area (**WA 2000** - **WA 2005**). For four such sites (**WA 2002** - **WA 2005**), the records are based on the loss location of a vessel or the contemporary sightings of an obstruction, with no tangible remains observed to date on the seafloor. As a result, these sites are better regarded as Recorded Losses (see Section 3.1.14) although they are summarised below for ease of reference. One further site (**WA 2000**) is recorded as likely to be based on an erroneous location, with its true location likely to exist beyond the boundary of the Study Area. The remaining site (**WA 2001**) was a potential wreck site observed as a sonar contact in 1945 but not found on hydrographic surveys in subsequent years. As a result, **WA 2001** has been amended to 'dead'[3] by the UKHO, although the potential for buried or fragmentary remains to exist at its charted location should not be discounted. A summary of the charted sites can be found in **Table 4** below, including their general location (e.g. within the Site or the Study Area). These are illustrated on **Figure 3** and further details can be found in **Appendix 2**.

Table 4: Non-designated charted sites

WA ID	Description	Location
2000	The remains of a metal-hulled fishing vessel, observed by divers in 1978. However, as the depth of water at this location is some 55 m, diving on the site is unlikely being at the limit of air range diving and since it is located within a rip current that limits diving to 40 m this location is therefore considered to be erroneous. Furthermore, nothing was found at the location in a later survey in 1980 and subsequently this record has been amended to dead.	Site
2001	An unknown wreck seen as a sonar contact in 1945. Subsequent hydrographic surveys were unable to locate the wreck and as a result, this record has been amended to dead.	Study Area
2002	This record relates to the steamship *Cognac,* a British iron-hulled ship built in 1860 and lost in 1898 as a result of a collision. This record relates to the sinking position of the vessel rather than its tangible remains on the seafloor and is therefore better regarded as a recorded loss. The record has since been amended to dead.	Site
2003	This record relates to the steamship *Slieve Bloom,* a British cargo vessel which foundered following a collision in 1918. This record relates to the sinking position of the vessel rather than its tangible remains on the seafloor and is therefore better regarded as a recorded loss.	Site
2004	An unknown seabed obstruction originally recorded as a non-submarine contact in 1945. No remains have been found on the seabed as a result of subsequent hydrographic surveys. This record does not relate to tangible remains on the seafloor and is therefore better regarded as a recorded loss. The record has since been amended to dead.	Study Area

[2] Charted sites comprise both wrecks and seabed obstructions recorded on Admiralty Charts as maintained by the UKHO.
[3] A 'dead' wreck is defined by the UKHO as one 'not detected by repeated surveys, therefore considered not to exist'.

WA ID	Description	Location
2005	An unknown seabed obstruction originally recorded by a convoy escort group during WWII. No remains have been found on the seabed during subsequent hydrographic surveys. This record does not relate to tangible remains on the seafloor and is therefore better regarded as a recorded loss. The record has since been amended to dead.	Site (Holyhead North Disposal Site IS043)

Geophysical Anomalies

4.3.4 As part of the Deep Green Holyhead Deep Tidal project (Wessex Archaeology 2015), numerous currently unidentified seabed features were identified as the result of the archaeological assessment of geophysical data. Forty such features were identified, of which 33 are located within the Site. These anomalies have all been classified as A2 anomalies i.e. they are of uncertain origin and of possible archaeological interest. These are detailed in **Appendix 7**, summarised in **Table 5** below and illustrated on **Figure 3**.

Table 5: Geophysical anomalies

Anomaly Classification	Number of Anomalies
Debris	11
Debris Field	1
Dark Reflector[4]	8
Mound	2
Rope/Chain	3
Magnetic	15
Total	**40**

4.3.5 While they may be non-archaeological in origin, it is possible that A2 geophysical anomalies of unknown origin could relate to shipwreck or aircraft crash site material.

Potential for Unknown Maritime Archaeological Remains

4.3.6 There is the potential for currently unknown wreck sites and other maritime-related remains to be present within the Study Area. The difficulties of navigating around the coast of Anglesey have been noted, with tides and currents funnelled around the coast (McGrail 1987). In addition to the general prehistoric maritime potential in the region, several historic shipping routes developed during the 16th-17th centuries across the coast of Anglesey between ports such as Liverpool, Chester and Preston bound for Bristol or further afield (Wessex Archaeology 2003 and 2004).

4.3.7 In general, the potential for the preservation of wooden wrecks in the Study Area is likely to be relatively low (Merritt *et al.* 2007), although localised areas of modern seabed sediments in which coarse-grained sands and gravels (SL1 member of the Surface Sands Formation; Wessex Archaeology 2015) infill hollows within and around the Study Area may be suitable for preserving wooden wreck material. Unexpected discoveries including fixtures and fittings, more robust items of cargo, and personal effects may also occur.

4.3.8 Prehistoric wooden and hide wrecks are unlikely to survive except in very favourable and stable buried contexts. More modern steel and composite construction vessels are more

[4] Dark reflector – this is a strong reflector that reflects a large amount of energy; likely to be hard objects, such as metal wrecks or rocks.

likely to survive on the more exposed bedrock areas of the development area but tidal and wave energy will actively deteriorate the condition of these wrecks over time.

4.3.9 There is potential for unknown maritime archaeological remains spanning from the Mesolithic period to the present day within the Study Area. Prior to the advent of the Lloyds of London list of shipping casualties in 1741, there was no central record of ship losses, and as such, the potential for unknown wrecks to exist within the Study Area is difficult to substantiate. Of the vessels that passed through the Study Area, it is possible that some were lost as a result of natural causes, human error, mechanical malfunction or war. On this basis, the potential for unknown maritime archaeological remains to exist is explored through a regional account of maritime history as an indication of vessel traffic through the area. This approach also provides a context for the potential for maritime material to exist, with a particular emphasis on the wider region of the Study Area. This account is discussed in detail in **Appendix 8** and summarised in **Table 6**.

Table 6: Summary of key areas of maritime potential

Period	Summary
Pre-1508 AD	Potential for material associated with prehistoric maritime activities, including 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 watercraft suitable for cross-channel voyages to facilitate trade and the exploitation of marine and coastal resource. Long distance trade and exchange of cultures are predominantly indicated by the presence of artefacts rather than material evidence of maritime networks, for instance the circulation of polished stone axes between Ireland and Wales. Such remains may comprise larger boat types, including those representing new technologies such as the Bronze Age sewn-plank boats which are associated with a growing scale of seafaring activities. Vessels of this date may be associated with the transportation of copper, mined at Parys Mountain from the Bronze Age onwards.
	Potential for material of Romano-British date in association with flourishing trade, cultural contact and defence against Irish raiders. 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, as indicated by the Barland's Farm boat discovered on the Severn Estuary built using elements of Roman and local non-Roman traditions.
	Potential for material associated with coastal and seafaring activity in the 'Dark Ages', associated with the renewed expansion of trade routes. 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 overseas trade and the development of established ports around the Welsh coast (including Llanfaes on the Isle of Anglesey). 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. Material evidence for such a vessel has been discovered in the Severn Estuary; a vessel dating to the 13th century, Magor Pill 1, was carrying a cargo of iron ore.

Period	Summary
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, marine exploitation and the rapid expansion in industry as evidenced by the Pwll Fanog slate wreck located in the Menai Strait which dates to the 14th to mid-16th century.
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 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.

Potential for Unknown Aviation Archaeological Remains

4.3.10 A guidance note published by Historic England entitled *Military Aircraft Crash Sites* (English Heritage 2002) outlined a case for recognising the importance of aircraft crash sites, specifically with regard to existing and planned development proposals which may have an impact on such sites. The guidance note argues that aircraft crash sites not only have significance for remembrance and commemoration, but they also have an implicit cultural value as historic artefacts, providing information on the aircraft itself and also the circumstances of its loss (English Heritage 2002, 2). All aircraft that crashed while in military service are automatically protected under the *Protection of Military Remains Act 1986.* There is the potential for modern aircraft remains to exist within the Study Area.

4.3.11 Site survival is largely determined by the cause of loss. With a few exceptions, aircraft come to be on the seabed as a result of an in-flight accident or enemy action and remains are often highly fragmented and widely dispersed as a result of mid-air explosion or the high impact of hitting the water at speed. Aircraft which come to rest on the seabed as a result of controlled ditching are more likely to be better preserved. The factors which

determine the survival of an aircraft crash site are not yet fully understood although marine environments generally offer favourable conditions for the preservation of artefacts, enhancing the potential for the survival of aircraft crash sites on the seabed.

4.3.12 There is potential for the presence of archaeological material of an aviation nature spanning from the early 20th century to the present day within the Study Area. Analysis of maps showing the location of WWII Air/Sea Rescue Operations that took place within the vicinity of the Study Area (**Figure 4**) indicated that there were two recorded Air/Sea Rescue Operations to rescue the aircraft crew, one of which was recorded as unsuccessful (**Figure 4H**). However, the mapped location of these operations is not necessarily reliable, rather, the locations provide a useful guide to the general distribution, and suggest the potential for discovery of military aircraft crash sites in the Study Area. This potential is summarised in **Table 7** and discussed in detail in **Appendix 9**.

Table 7: 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	Potential for WWII aviation remains, particularly in association with the flying convoy patrols of RAF Valley, located on the west of Anglesey and even perhaps the airfield bombing decoy at Newborough built to protect RAF Valley to the north-west. 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.
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. Losses in the area may have occurred as a result of training activities or search and rescue operations known to have taken place at RAF Valley during this period.

4.4 Historic Seascape Character

Introduction

4.4.1 Seascape can be defined as *'an area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land and sea, by natural and/or human factors'* (Briggs and White 2009). The *Anglesey Area of Outstanding Natural Beauty Management Plan* (IACC 2015) also identifies the importance of seascapes as a highly valued part of the Welsh scenery that are some of the last 'wild' landscape areas and support a wealth of natural heritage.

4.4.2 The assessment of Seascape is consistent with 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 (12nm).

4.4.3 The sensitivity of Welsh seascapes to offshore developments has been assessed through a project commissioned by the Countryside Council for Wales (Briggs and White 2009). The project characterised seascapes around Wales, focusing on the visual or scenic aspects of the coastline within geological, land use, historic and cultural contexts. The characterisation was designed to facilitate the decision-making process surrounding development proposals, protection and conservation.

Anglesey Seascape Character Assessment

4.4.4 In 2013, a more local-level Seascape Character Assessment was undertaken for the Anglesey/Snowdonia coastlines (Fiona Fyfe Associates et al. 2013) commissioned by IACC. The assessment divides the area into Seascape Character Types (SCTs) that are areas of recognisable character that occur across the study area, and Seascape Character Areas (SCAs) that are geographically distinct areas with a unique sense of place, and comprise different combinations of SCTs (*ibid.*).

4.4.5 The Study Area falls into two SCAs: North-west of Anglesey (SCA 30); and West of Anglesey (SCA 31). Each SCA is summarised below with characteristics relevant to this assessment. The Study Area falls predominantly into SCA 31 with its north-eastern extent in SCA 30.

4.4.6 SCA 30 – North-west of Anglesey is characterised by the following:

- *a deep water environment with an undulating and rocky seafloor and high energy levels due to the tidal currents that flow parallel to the coast;*
- *considerable amounts of boat traffic including commercial shipping to Liverpool and north-west England, Holyhead-Dublin ferries, and recreational ships and boats entering the port of Holyhead; and*
- *many wrecks (ships and aircraft) are present representing a rich maritime heritage including sailing vessel losses and wartime losses.*

4.4.7 SCA 31 – West of Anglesey is characterised by the following:

- *rocky seabed with moderate energy environment in the eastern part;*
- *further offshore the seabed becomes deeper and dominated by sediment, although patches of rock remain;*
- *a treacherous coastline containing many offshore rocks and the patterns of wrecks reflect this, including wartime losses;*
- *Holyhead Mountain is a prominent landmark onshore and gives a strong sense of place and orientation; and*
- *there is a long and continuing tradition of maritime communications, particularly with Ireland.*

Regional Seascape Assessment

4.4.8 The Study Area is situated within two Regional Seascape Units (RSUs): RSU 8 – Carmel Head to Holyhead Mountain and North Stack; and RSU 9 – Holyhead Mountain, North Stack to Penrhyn Mawr (Briggs and White 2009).

RSU 8 – Carmel Head to Holyhead Mountain and North Stack

4.4.9 The key characteristics of the RSU are:

- *Holyhead Mountain is the dominant landform with rocky cliffs around North Stack;*
- *Holyhead is a busy ferry port with a large harbour and protective seawall. The tall chimney stack of the aluminium smelter is prominent to the south of Holyhead;*
- *the west-facing coastline is exposed but partly sheltered by Holy Island to the west and south;*
- *views to and from respective landforms; and*
- *principal cultural associations with the town and port of Holyhead and its links with Ireland.*

4.4.10 The degree of intervisibility between the land and sea within this seascape is mainly limited to the coastal strip and from a few high points such as Holyhead Mountain. Numerous key views to sea are apparent within this RSU including the Anglesey Coastal Path, Holyhead Mountain, railway and road crossing the Alaw estuary and Penrhos Coastal Park, whilst views to land are from Holyhead ferries and leisure boats.

4.4.11 The key forces for change in the terrestrial area include development associated with settlement especially Holyhead, port expansion/change, and climate change and sea level rise effects on facilities.

RSU 9 – Holyhead Mountain, North Stack to Penrhyn Mawr

4.4.12 The key characteristics of the RSU are:

- *an indented and precipitous west and north-west facing rocky coast with high cliffs backed by Holyhead Mountain and exposed island headlands;*
- *semi-natural vegetation on Holyhead Mountain and Penrhyn Mawr with pastoral farming elsewhere;*
- *limited settlement;*
- *the sea is exposed and open with large waves; and*
- *long open views across the Irish Sea and from ferries.*

4.4.13 The degree of intervisibility between the land and sea within this seascape is limited by Holyhead Mountain acting as a visual barrier. Numerous key views to sea are experienced from the coastal path, Caer y Twr hillfort and the RSPB nature reserve, whilst views to the land are from ferries and occasional yachts.

5 VALUE AND SENSITIVITY

5.1 Value

5.1.1 Based on information available to date, the marine archaeological baseline environment within the Study Area comprises:

- *seven palaeogeographic features;*
- *six charted sites;*
- *40 geophysical anomalies of uncertain origin of possible archaeological interest;*
- *the potential for discovering material relating to seabed prehistory, maritime and aviation archaeology, and*
- *areas pertaining to seascape character.*

5.1.2 This section identifies the value and sensitivity of the known marine heritage assets, the potential for unknown marine heritage assets, and the historic seascape characters, as summarised in the baseline above. The nature of the marine archaeological resource is such that there is often a high level of uncertainty regarding the presence/absence, distribution, extent and nature of archaeological assets on the seafloor.

Seabed prehistory

5.1.3 There are no records of any known prehistoric sites from offshore contexts within the Study Area. Seven simple cut and fill palaeogeographic features were identified in sub-bottom profiler data assessed for the Deep Green tidal project and located within the Study Area that possibly contain Surface Sands Formation of early Holocene date (**Figure 2**), which could contain *in situ* or derived artefacts. As such there is potential for *in situ* and derived prehistoric material to exist in the area, which should be considered as having **Unknown** value until it can be determined.

Maritime

5.1.4 Within the Study Area there are six charted sites and 40 A2 geophysical anomalies of uncertain origin of possible archaeological interest that may relate to maritime wreck sites or associated material.

5.1.5 Of the six charted wrecks within the Study Area, five are considered possible wrecks rather than known wrecks. For sites **WA 2002** – **WA 2005**, this is due to the nature of the records in question, which do not relate directly to tangible remains on the seafloor and as such, are better regarded as Recorded Losses. The record for site **WA 2000** is considered to be based on erroneous data and as such, this is also considered to represent part of the potential, rather than known, marine archaeological resource.

5.1.6 The value of these heritage assets, including the named wrecks of *Cognac* (**WA 2002**) and *Slieve Bloom* (**WA 2003**) cannot be fully assessed without an understanding of the nature of the remains on the seafloor. As such the value of these heritage assets has currently been assessed to be of **Unknown** value.

5.1.7 The value of the 40 A2 geophysical anomalies of uncertain origin of possible archaeological interest that may relate to maritime wreck sites or associated material have also been assessed to be of **Unknown** value.

5.1.8 The potential also exists for previously unknown wreck sites, wreck-related material or derived artefacts to be present within the Study Area. Based on the criteria presented in **Table 1**, the value of any maritime-related site, debris or derived artefacts discovered should be considered as **Unknown** at present.

Aviation

5.1.9 There are no known aircraft crash sites in the Study Area, however it is possible that any of the 40 A2 geophysical anomalies of uncertain origin of possible archaeological interest located within the Study Area could relate to aircraft material. Therefore, there is the potential for aircraft or aircraft-related debris to exist on the seafloor of the Study Area and it is still possible to comment on the value of such discoveries. Based on the criteria presented in **Table 1**, the value of any aircraft or aircraft-related debris discovered should be considered as **Unknown**.

5.1.10 Aircraft lost at sea prior to 1939 would be considered of value due to their relative rarity, and the lightweight construction of earlier airframes means that they are less likely to survive in the marine environment unless buried within seabed sediments.

5.1.11 Aircraft lost as a result of military action during World War II would have value associated with that international event, however, the level of conservation of material on the seabed, the rarity of the aircraft type, the potential for the discovery of human remains associated with the aircraft, and a number of other factors, for example those outlined in the BULSI guidance, would need to be considered to confirm its value.

5.1.12 Any aircraft lost after World War II will likely have been reported and recorded, and are more likely to represent types that are still known today. Therefore, a special case would likely need to be made for any recent material.

5.1.13 Wales does not presently have guidance specifically for the assessment of the significance of military and/or other aircraft, however, guidance produced by Historic England with regards to military aircraft crash sites, their significance and future management (English Heritage 2002) can provide a framework.

5.1.14 Although not related to the historical value of a potential aircraft site, all aircraft lost while in military service are automatically protected under the *Protection of Military Remains Act 1986*.

5.2 Sensitivity

5.2.1 The archaeological resource is finite and non-renewable, and represents a unique aspect of cultural heritage (UK Marine Policy Statement 2011, 21). All heritage assets have the potential to be damaged or destroyed if they are exposed to direct or indirect impacts arising from offshore developments. Archaeological features have no adaptability, tolerance or recoverability, and subsequently any damage will be permanent and irreversible. As such, all sites and material should be regarded as vulnerable.

5.3 Historic Seascape Character

Value and Sensitivity

5.3.1 With direct reference to the Regional Seascapes Assessment (Briggs and White 2009), RSU 8 and 9 are both considered to have a low to moderate sensitivity to change caused by offshore industry, and therefore, based on the criteria in Table 2, would have a **Low** to **Medium** value.

5.3.2 This assessment of value is based on the area's important and prolonged maritime history, the sections of designated heritage coastline, and the open views across the Irish Sea that are currently experienced from the designated and undesignated terrestrial heritage assets present on the western coast of Holy Island.

6 REFERENCES

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7 APPENDICES

7.1 Appendix 1: Legislative, 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 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 the UK currently has 28 World Heritage Sites.
United Nations Convention on the Law of the Sea 1982	UNCLOS 1982 was ratified by the UK in 1997. Article 303 stipulates that 'states have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose'. Article 303 also provides for coastal states to exert a degree of control over the archaeological heritage to 24 nautical miles, though the UK has not introduced any measures to implement this right.
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 2nd January 2009 having been signed or ratified by 20 member states.

European Policy and Legislation

Legislation/Policy	Summary
European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (the Valletta Convention)	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) became binding on the UK from 1 March 2007. 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.

United Kingdom Policy and Legislation

Legislation/Policy	Summary
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.
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.
Ancient Monuments and Archaeological Areas Act 1979 (as amended)	This Act is primarily land based, but in recent years it has also been used to provide some level of protection for underwater sites. Scheduled Monuments and Areas of Archaeological Importance are afforded statutory protection by the Secretary of State, and consent is required for any major works. The law is administered by Historic England and the Department for Culture, Media and Sport.
The Planning (Listed Buildings and Conservation Areas) Act 1990	Works affecting Listed Buildings or structures and Conservation Areas are subject to additional planning controls administered by Local Planning Authorities (LPAs).
Protection of Military Remains Act 1986	Under the 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'.
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.
Marine and Coastal Access Act 2009	Under the *Marine and Coastal Access Act (2009)* the UK was divided into marine planning regions with an associated plan authority responsible for preparing a marine plan for that area.
Revised Draft *Overarching National Policy Statement for Energy (EN-1)* (Department of Energy and Climate Change) 2011	This National Policy Statement (NPS) sets out national policy for energy infrastructure and the importance of archaeological assessment in the development process.

Legislation/Policy	Summary
Revised Draft *National Policy Statement for Nuclear Power Generation (EN-6)* Volumes 1 and 2 (Department of Energy and Climate Change) 2011	This NPS, taken together with the overarching NPS (EN-1) provides for decision making on applications regarding nuclear power stations and over and other electricity networks associated with a Nationally Significant Infrastructure Project e.g. substations and converted stations.
UK 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 royal assent was given to a further Act which has implications for listed buildings and conservation areas. A provision for the reduction of legislative burdens as part of the 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. The Act was passed by the National Assembly Wales on 9 February 2016 and became law on 21 March 2016 after receiving royal assent. Several documents have also been drafted to complement the Act, including: · Technical Advice Note (TAN) 24: The Historic Environment; · Heritage Impact Assessment in Wales; · Managing Change in World Heritage Sites in Wales; · Managing Conservation Areas in Wales; · Setting of Historic Assets in Wales; · Historic Environment Records in Wales: Compilation and Use; · Managing Listed Buildings at Risk in Wales; · Managing Change to Registered Historic Parks and Gardens in Wales; and · Managing Historic Character in Wales. For more information, go to: http://senedd.assembly.wales/mgIssueHistoryHome.aspx?IId=12573
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.
Planning Policy Wales 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.
Marine and Coastal Access Act 2009 (Marine Policy Statement 2011)	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. Disposal at sea is licenced under Part 4 of this act, which contains the framework for the new regulatory regime for Marine Licencing overseen by the Marine Management Organisation (MMO). The Welsh Government is the licensing authority for the Welsh inshore region and the Marine Licensing Team in Natural Resources Wales administers marine licenses on their behalf, whilst the MMO is responsible for licensing in offshore regions across the UK.

Legislation/Policy	Summary
Technical Advice Note (TAN) 24: Historic Environment	This Technical Advice Note provides guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building applications.
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.
The Welsh National Marine Plan (Welsh Government 2015)	This document is currently available as an initial pre-consultation draft of the Welsh National Marine Plan. The document has been prepared with the aim of guiding the sustainable development of marine areas through the sustainable management of marine natural resources and can be applied to both inshore and offshore waters.

Guidance

Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee (JNAPC 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, 2017)	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.

Local Planning Policy

Isle of Anglesey County Council, Anglesey and Gwynedd Joint Local Development Plan	
Developing the Vison, Key Objectives and Strategic Options **Available at: http://www.anglesey.gov.uk/Journals/2013/05/08/q/v/c/Developing-the-Vision-Objectives-and-Strategic-Options.pdf, accessed February 2017**	
27	xiv - Catering for visitors to the area in sustainable ways and, at the same time, promoting the area's heritage and culture.
50	Work – focus on making more use of the academic strengths of Bangor University and providing advanced leisure facilities, as well as contributing to the region's wider tourism market (especially cultural heritage).
The Consultation Draft Preferred Strategy Document **Available at: http://www.anglesey.gov.uk/Journals/2013/05/09/b/c/b/Preferred_Strategy_May_2013.pdf, accessed February 2017**	
4.12	Environment – these environmental and heritage assets are under pressure from development. It is the quality of these assets that contributes to the quality of life and of communities bit they also bring economic and social benefits.
KI 8	The need to improve and manage the 'all year' tourist provision in the area in a sustainable way whilst at the same time

Isle of Anglesey County Council, Anglesey and Gwynedd Joint Local Development Plan	
Developing the Vison, Key Objectives and Strategic Options **Available at: http://www.anglesey.gov.uk/Journals/2013/05/08/q/v/c/Developing-the-Vision-Objectives-and-Strategic-Options.pdf, accessed February 2017**	
	promoting the heritage, the Welsh language and Welsh culture of the area.
Strategic Policy PS15 – Protecting and enhancing cultural and heritage assets	In seeking to support the wider economic and social needs of the Plan area, the Councils will protect and, where appropriate, enhance its unique cultural and heritage assets by: 1. Protecting, enhancing the following cultural and heritage assets, and where appropriate, their setting and significant views: 2. Enhancing heritage assets through heritage and regeneration initiatives

7.2 Appendix 2: Charted Sites Gazetteer

WA ID	Name or Classification	Type	Year Lost	Description	Summary	WGS 84 UTM 30N		Source
						Easting	Northing	
2000	Unknown	Wreck (Fishing Vessel)	Unknown	A possible metal hulled fishing vessel measuring *c.* 7-9 m in length. The record for this wreck indicates that its location may be erroneous. The recorded location is 55 m deep and yet the original record is based on diver observations. As such, the report has been amended to dead and the wreck believed to be located elsewhere.	Dead Wreck	379950	5910710	UKHO 7180
2001	Unknown	Wreck	Unknown	A possible wreck, first observed as a sonar contact in 1945 recorded to measure some 52 m in length and 11 m in height. Subsequent hydrographic surveys were unable to locate the wreck and it has since been amended to dead.	Dead Wreck	378282	5906300	UKHO 7196; NMRW 272149
2002	*Cognac*	Wreck	1898	This record relates to the steamship *Cognac,* a British iron-hulled vessel built in 1860 by T. Vernon and Sons, Liverpool. At its time of loss it was owned by Charente SS Co limited. The vessel was steam propelled and equipped with one boiler, a single shaft and a compound expansion engine. Its machinery was manufactured by Lees, Anderson and Co, Glasgow. The *Cognac* sank following a collision with the SS *Voltaic* whilst en route from Charente for Liverpool. This record relates to the recorded sinking location of the vessel rather than to any tangible remains on the seafloor. As a result it is more appropriately regarded as a Recorded Loss.	Dead Wreck	383303	5907102	UKHO 7203
2003	*Slieve Bloom*	Wreck	1918	This record relates to the steamship *Slieve Bloom,* a British cargo vessel which was lost following a collision with a US destroyer on 30 March 1918. At its time of loss the vessel was en route from Dublin to Holyhead carrying general cargo. This record relates to the recorded sinking location of the vessel rather than to any tangible remains on the seafloor. As a result it is more appropriately regarded as a Recorded Loss.	Dead Wreck	379346	5904419	UKHO 7257
2004	Unknown	Obstruction	Unknown	An unknown obstruction, first reported in 1945. Subsequent hydrographic surveys were unable to locate the wreck and it has since been amended to dead. The record indicates that no tangible remains have been observed on the seafloor and as such, this record is better regarded as a Recorded Loss.	Dead Obstruction	380760	5916439	UKHO 7271; NMRW 506667
2005	Unknown	Obstruction	Unknown	An unknown obstruction, first reported by a convoy escort	Dead	377894	5912802	UKHO

WA ID	Name or Classification	Type	Year Lost	Description	Summary	WGS 84 UTM 30N		Source
						Easting	Northing	
				group during WWII, Subsequent hydrographic surveys were unable to locate the wreck and it has since been amended to dead. The record indicates that no tangible remains have been observed on the seafloor and as such, this record is better regarded as a Recorded Loss.	Obstruction			7285; NMRW 506666

7.3 Appendix 3: Chronology

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

Prehistoric		**Historic**	
Palaeolithic	970,000 – 9500 BC	**Romano-British**	AD 43 – 410
Early Post-glacial	9500 – 8500 BC	**Saxon**	AD 410 – 1066
Mesolithic	8500 – 4000 BC	**Medieval**	AD 1066 – 1500
Neolithic	4000 – 2400 BC	**Post-medieval**	AD 1500 – 1800
Bronze Age	2400 – 700 BC	**19th Century**	AD 1800 – 1899
Iron Age	700 BC – AD 43	**Modern**	1900 – present day

7.4 Appendix 4: Framework for Assessment of Shipwrecks by Date

7.4.1 Previous archaeological assessments have indicated that the importance of any shipwreck remains will depend on their nature, age and condition (Davidson 2010, 22). Each of these needs to be assessed individually, but the Selection Guide on Boats and Ships in Archaeological Contexts (Wessex Archaeology 2008b) provides some generalisations based on the age of the wreck:

- *Very 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 to be 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 to be made to be considered to be of archaeological interest.*

7.5 Appendix 5: Palaeogeographic features of archaeological potential within the Study Area

WA ID	Classification	Archaeological Discrimination	Description
7500	Simple cut and fill	P2	Very small, possible cut and fill feature cut into Western Irish Sea Formation, identified on a number of survey lines. Irregular basal reflector with single phase of unstructured fill. Possible SL2 sediments, although could be internal structure. Depth range: 0.5m - 2.6m below seabed (BSB).
7501	Simple cut and fill	P2	Poorly defined possible cut and fill feature cut into Western Irish Sea Formation, identified on more than one survey line. Irregular basal reflector with single phase of unstructured fill. Possible SL2 sediments, although could be an infilled depression. Depth range: 0.4m - 2.3m BSB.
7502	Simple cut and fill	P2	Poorly defined possible cut and fill feature cut into Western Irish Sea Formation, identified on more than one survey line. Irregular basal reflector with single phase of unstructured fill. Possible SL2 sediments, although could be an infilled depression. Depth range: 0.4m - 2.4m BSB.
7503	Simple cut and fill	P2	Small, poorly defined possible cut and fill feature cut into Western Irish Sea Formation, only identified on one survey line. Irregular basal reflector with single phase of unstructured fill. Possible SL2 sediments, although could be an infilled depression. Depth range: 0.6m - 1.8m BSB.
7504	Simple cut and fill	P2	Small but distinct, shallow cut and fill feature cut into WIS. Irregular basal reflector with single phase of layered fill. Possible SL2 sediments. Depth range: 0.5m - 2.0m BSB.
7505	Simple cut and fill	P2	Small, poorly defined possible cut and fill feature cut into Western Irish Sea Formation, only identified on one survey line. Irregular basal reflector with single phase of unstructured fill. Possible SL2 sediments, although could be an infilled depression. Depth range: 0.7m - 1.9m BSB.
7507	Simple cut and fill	P2	Possible broad, poorly defined cut and fill feature cut into bedrock/till. Undulating basal reflector with single phase of acoustically unstructured fill. Possible SL2 sediments, although could be localised thicker deposit of seabed sediment. Depth range: 0.6m - 3.2m BSB.

7.6 Appendix 6: Potential for Unkown Prehistoric Archaeological Remains

7.6.1 The archaeological baseline for the major phases of hominin activity is described below. Due to the fluctuations of Quaternary glaciations, the corresponding rises and falls in eustatic sea-level and major reconfigurations of the landscape during the last million years the archaeological record is phased between long periods of hiatus when environmental conditions or high sea levels constrained access to Britain (Hijma *et al.* 2012, Pettitt and White 2012). Reported finds from offshore activity have to date produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower Middle and Upper Palaeolithic periods (Wessex Archaeology 2013), with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Momber *et al*. 2011, Wessex Archaeology 2013).

7.6.2 The earliest evidence of hominid/human activity in the UK dates back some 970,000 years BP (Parfitt *et al.* 2005; 2010). During the Pre-Devensian period (970,000-110,000 BP) the entire north-west European landscape has been shaped by a series of marine transgressions and regressions that are associated with fluctuating glacial and interglacial conditions arising from changes in global climate. As a result of a fall in relative sea level, the Study Area would have been periodically sub-aerially exposed, and therefore suitable for human/hominid exploitation at various times in the past. The presence of Palaeolithic cave sites along the North Wales coast indicate that such occupation of the area during times of low relative sea level was potentially possible in the Palaeolithic period.

7.6.3 Despite the potential for early humans to have exploited the Study Area at various times in the Pre-Devensian period, basal erosion resulting from ice movement during the Devensian glaciation is considered to have stripped away Pre-Devensian sediments in the area. As such, Pre-Devensian formations in the Study Area appear to be confined to the Pre-Cambrian Mona Complex, which pre-dates the earliest evidence of hominid/human activity in Britain and thus has no potential for archaeological material within it, though it may have provided surfaces upon which archaeological material has been deposited. However, any such archaeological material is likely to have been moved during the re-working of the landscape caused by the encroaching ice sheet. Pre-Devensian finds and sites, if present within the Study Area, are most likely to occur in secondary contexts. Artefacts discovered within their secondary contexts are those which have been derived or moved from their original positions by natural processes. Although discoveries from secondary contexts are by their very nature, derived artefacts, they have the potential to provide information on patterns of human land use and demography (Ashton and Lewis 2002; Hotsfield and Chambers 2004).

7.6.4 The Devensian glaciation (110,000 - 13,500 BP) was the last glacial stage to occur before the present climate amelioration. At the height of the Devensian (the Last Glacial Maximum (LGM) 18,000 BP), the water locked up in ice sheets caused a lowering of sea level to approximately 120m below its current level. This phase is known as the Dimlington Stadial, named after the type site just north of Easington in south-east Holderness. With the southern edge of the ice sheet extending in a line from the Severn to the Wash (Flemming 2002, 7), the Study Area would have been concealed by an ice sheet during this period and would have been uninhabitable for early human exploitation and activity. Deposits of this date in the Study Area are represented by the Cardigan Bay Formation. As this formation is a glacial deposit, it is not considered to be of archaeological potential. The lower facies (Chaotic Facies) of the Western Irish Sea Formation recorded in the Study Area is also thought to have formed during the LGM. The Chaotic Facies is an unsorted deposit of mud, sand, cobbles and boulders, which likely formed as an ice proximal glaciomarine or glaciolacustrine deposit. This age and environment indicate this facies is unlikely to be of archaeological potential.

7.6.5 Following the LGM, the Devensian ice sheet began to retreat. The UK's terrestrial archaeological record indicates that Britain was re-colonised by humans approximately 12,000 BP and by 10,000 BP the climate began to ameliorate with the onset of the Holocene period. Deposits of this date in the Study Area include the middle facies (Prograded Facies) of the Western Irish Sea Formation, comprising a series of tabular stratified sands containing prograding reflectors which are generally found infilling previous erosive features, such as the Holyhead Deep. These are expected to be glacial outwash deposits created very close to the ice front during deglaciation. Although deposited post-LGM during a period of time when the Study Area was exposed as a terrestrial environment, any periglacial outwash deposits within the Study Area are likely to have been deposited close to the retreating ice sheet at a time when the environment is likely to have been too hostile for settlement by humans, and are therefore not interpreted to be of archaeological potential.

7.6.6 By the Mesolithic period, the retreat of the Devensian ice sheet alongside the Holocene marine transgression saw a coastline approaching that of today's, with the Study Area likely to have been on the coastline or just offshore (Shennan and Horton 2002). The Mesolithic record of the British Isles suggests a strong relationship between human activity and coasts, wetlands, rivers and streams. These areas provide rich sources of food and resources for these hunter/gatherer groups, as well as important transport routes inland or between islands. Any surviving sedimentary deposits from this period could potentially contain both in situ and derived artefacts from a time when these coastal and littoral landscapes, now submerged by the sea, were utilised intensively by human populations.

7.6.7 The upper facies (Mud Facies) of the Western Irish Sea Formation is interpreted as a Late Pleistocene/Early Holocene ice distal glaciolacustrine or glaciomarine deposit. The facies often contains gas accumulations, suggesting the presence of preserved organic material which may be of palaeoenvironmental importance. Although not distinctly mapped in the Study Area, the presence of undivided deposits relating to the Western Irish Sea Formations indicates the potential presence of this facies to exist within the Study Area and therefore the potential for palaeoenvironmental evidence to be present dating to the Upper Palaeolithic/Mesolithic. Scattered pockets of early Holocene terrestrial sediment have been observed directly to the west of the Study Area as part of the Deep Green project which may contain a range of sediment fills, such as sand, silt and clay (Wessex Archaeology 2015). It is possible that similar features exist within the Study Area.

7.6.8 Surface sediments within the Study Area include a thin veneer of sands and gravels, regarded as modern deposits. These are not considered to be of prehistoric archaeological potential.

7.6.9 It should be noted that no seabed sampling (e.g. borehole or vibrocore) logs have been consulted during this report, and the interpretation has been based on BGS information alone. The sediment types present within the proposed stratigraphy can only be confirmed by direct sampling.

7.7 Appendix 7: Seabed anomalies of archaeological potential within the Study Area

Co-ordinates are in UTM z30 north. The positional accuracy of features recorded from the archaeological assessment of geophysical survey data is ±10m. These anomalies were identified as part of the Deep Green Holyhead Deep Tidal Project (Wessex Archaeology 2015).

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Notes
7003	Dark reflector	380591	5907677	A2	3.6	1.0	0.4	-	Medium sized, well-defined and rectangular shaped dark reflector with a faint tapered shadow. Feature appears to be in a very large depression and distinct on a flat and even area of the seabed with scouring around the east edge
7004	Dark reflector	381277	5908287	A2	5.2.	1.8	1.1	-	Distinct and slightly right angled linear dark reflector with a bright and large shadow, feature is located on a very sandy and smooth area of the seabed with some scouring present orientated north to south and measuring 15m
7005	Debris	381363	5908478	A2	2.9	1.4	0.5	-	Distinct and slightly right angled dark reflector with a long and tapered bright shadow and situated in a depression. Looks more anthropogenic than surrounding anomalies
7006	Dark reflector	380472	5907026	A2	3.3	0.7	1.0	-	Distinct 'v' shaped dark reflector with a long and bright shadow, looks more anthropogenic than surrounding anomalies on a gravelly and boulder rich area of the seabed
7007	Dark reflector	380513	5907205	A2	5.3	0.2	0.1	-	Long and thin distinct edged linear dark reflector with a short but well-defined shadow, looks more anthropogenic than surrounding seabed anomalies
7008	Dark reflector	380661	5907445	A2	1.6	1.3	0.6	-	Rectangular shaped dark reflector with a long and tapered bright shadow, feature is in a slight depression and distinct on a sandy and gravelly part of the seabed
7009	Debris	381855	5909174	A2	3.0	1.8	1.3	-	Well-defined 'v' shaped dark reflector with a bright and tapered shadow, very distinct and anthropogenic looking anomaly, possibly debris
7010	Debris	381208	5907446	A2	6.5	1.0	0.9	-	Large curvilinear shaped dark reflector with a large and long shadow and situated in a depression. Possible debris remains, very distinct and anomalous to the

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Notes
									surrounding seabed
7011	Dark reflector	380676	5906663	A2	2.6	0.4	0.3	-	Distinct thin linear dark reflector with a short but bright shadow and in a slight depression, looks anthropogenic on a sandy and even area of the seabed
7012	Debris	381567	5907831	A2	3.4	1.6	1.3	-	Medium sized triangular shaped dark reflector with a long, bright and tapered shadow. Very distinct feature on a sandy and gravelly area of the seabed. Possible debris
7013	Dark reflector	382669	5909729	A2	5.5	1.3	1.3	-	Large rectangular shaped dark reflector with a very long and bright shadow that possibly extends beyond the edge of the data range. Feature is slightly distorted by data
7014	Debris	382403	5909173	A2	7.1	1.8	0.6	-	Thick curvilinear shaped dark reflector with a bright and tapered shadow and in a large depression, isolated and distinct possible debris feature
7015	Debris	381219	5907406	A2	9.0	7.0	2.8	-	Large debris feature, oval shaped anomaly with a distinct appearance and long tapered, bright shadow. Possibly anthropogenic debris. In the MBES a non-ferrous small and distinct mound located within a surrounding scour or depression. Possible debris or drop stone on a sandy and even area of the seabed
7016	Debris	383248	5910255	A2	2.4	1.6	1.8	18	A medium sized well-defined rounded dark reflector with a long, bright and tapered shadow, distinct ferrous debris feature next to a rope or chain
7017	Rope/chain	383261	5910226	A2	80.7	1.4	1.1	44	Long length of rope or chain with a medium sized magnetic anomaly associated, very diffuse linear dark reflector with a short but bright shadow, orientated north-east to south-west, close to a debris feature (24m) and may be related
7018	Mound	381332	5907342	A2	6.0	6.0	0.8	-	Small and distinct mound located within a surrounding scour or depression, visible in the SSS data as a bright reflector with slight scouring orientated to the north and measuring 15m. Possible debris or drop stone.
7019	Debris	381218	5906989	A2	4.3	0.8	1.3	-	Distinct linear dark reflector with a large and bright shadow, anthropogenic looking feature, possibly debris

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Notes
7020	Debris	381029	5906447	A2	4.2	1.4	0.5	-	Very distinct rectangular shaped dark reflector with a bright, large shadow and situated in a depression. Possible debris feature with scouring orientated north and measuring >20m
7021	Dark reflector	382270	5908112	A2	4.4	0.5	1.0	-	Well-defined curvilinear shaped dark reflector with a bright shadow and isolated on a sandy/gravelly area of the seabed. Feature is surrounded by scour measuring 25m
7022	Debris	382537	5908228	A2	8.0	1.8	1.5	-	Large and distinctive dark reflector with a large and very bright shadow situated in a slight depression with some sediment build up to the north and south of feature measuring 15 m diameter. Non-ferrous debris
7023	Debris field	382423	5907802	A2	19.0	2.7	0.7	-	Group of distinct dark reflectors with bright shadows, Large spread of possible debris but individually made up of small linears and rounded dark reflectors, largest of which is 3.2 m, has anthropogenic characteristics
7025	Rope/chain	383686	5909191	A2	197.9	0.7	0.3	-	Very thin and long rope or chain feature, visible as a long and curvilinear shaped dark reflector with a short, bright shadow that appears partially buried in places. Non-ferrous feature lying on the seabed in a north-east south-west direction
7026	Rope/chain	382587	5907680	A2	30.0	0.3	0.1	-	Curvilinear long length of possible rope/chain feature orientated in a north-east south-west direction. Appears as a diffuse dark reflector with a bright shadow on a gravelly area of the seabed, non-ferrous material
7027	Debris	383481	5908793	A2	3.4	0.4	0.7	-	Medium sized curvilinear shaped well-defined dark reflector with a bright shadow, very distinct anomaly in a slight depression on a sandy and even area of the seabed
7046	Mound	381616	5908025	A2	6.0	5.0	1.6	-	Small and distinct mound located within a surrounding scour or depression. Possible debris or drop stone.
7047	Magnetic	381724	5908903	A2	-	-	-	32	Medium sized dipole over a few lines, possibly buried ferrous debris
7048	Magnetic	380233	5907122	A2	-	-	-	13	Small negative monopole close to dipole feature, possibly buried ferrous debris

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Notes
7049	Magnetic	380258	5907156	A2	-	-	-	13	Small isolated dipole, distinct feature, possibly buried ferrous debris
7050	Magnetic	380996	5906975	A2	-	-	-	17	Very distinct small dipole on cross line, possibly buried ferrous debris
7051	Magnetic	382233	5909297	A2	-	-	-	10	Small but distinct dipole on one line, possibly buried ferrous debris
7052	Magnetic	383121	5908467	A2	-	-	-	21	Very distinct medium sized isolated dipole, possibly buried ferrous debris
7055	Magnetic	380434	5906138	A2	-	-	-	14	Small and isolated dipole, possibly buried ferrous debris
7056	Magnetic	380539	5906285	A2	-	-	-	6	Small and distinct dipole, possibly buried ferrous debris
7057	Magnetic	382412	5908984	A2	-	-	-	27	Medium sized distinct and isolated dipole, possibly buried ferrous debris
7058	Magnetic	380467	5906062	A2	-	-	-	8	Small but distinct dipole, possibly in an alignment though not present on every line, possibly buried ferrous debris
7059	Magnetic	380628	5906697	A2	-	-	-	8	Small dipole on one line, distinct in data, possibly buried ferrous debris
7060	Magnetic	382606	5908656	A2	-	-	-	85	Asymmetric large dipole, possibly buried ferrous debris
7061	Magnetic	383615	5910178	A2	-	-	-	97	Possible spike not removed, large dipole within wreck anomalies, possibly buried ferrous debris
7062	Magnetic	383558	5909846	A2	-	-	-	110	Large asymmetric dipole in noisy area over two lines, possibly buried ferrous debris
7063	Magnetic	380936	5905909	A2	-	-	-	11	Small but distinct dipole over two lines, possibly buried ferrous debris

7.8 Appendix 8: Maritime Archaeological Potential

7.8.1 As a result of the Holocene marine transgression, the Study Area is likely to have been a fully marine environment towards the end of the Mesolithic period. As such, the potential exists for maritime related material dating to this period onwards.

7.8.2 There is limited archaeological evidence for Mesolithic maritime activities, although discoveries of Mesolithic logboats (e.g. McGrail 2001) demonstrate the ability for these early communities to build such watercraft. The resources required for Mesolithic people to construct rafts and hide boats were also available, although direct evidence for such watercraft is not yet present in the archaeological record. The use of watercraft is also suggested by patterns of human settlement across the UK near rivers and in coastal environments.

7.8.3 The available archaeological evidence of the Neolithic period in the UK suggests the continued use of logboats. The movement of goods across the sea during this period is also suggested. The most obvious archaeological evidence for seafaring in the Neolithic is indirect – for instance, it includes the adoption of agriculture which required the introduction of non-indigenous species of plants and animals for food (Murphy 2002, 49) and the circulation of polished stone axes between Britain and Ireland (Breen and Forsythe 2004, 32).

7.8.4 Seaborne contact continues to be represented by the archaeological record into the Bronze Age. During this period, larger sedentary settlement sites that were supported by intensive farming and the development of field systems. Areas with good trade links were preferred and thus coastal locations became desirable for settlement, with a subsequent increase in marine traffic (Murphy 2002, 49). Copper mining at Parys Mountain goes back as far as the Bronze Age, and it is possible that material excavated at the mine could have been transported by sea from the north Anglesey coast. Direct evidence for maritime activity of this period is provided by the remains of Bronze Age sewn-plank boats, uncovered on the Severn Estuary foreshore (Murphy 2002, 50). These boats were discovered near the coast or in intertidal environments, suggesting they could have been used along the coast and were likely capable of cross-channel journeys in favourable weather (Van de Noort 2003, 406). It is also likely that log boats continued in use during this period.

7.8.5 During the Iron Age, there were further developments in boat design, with the introduction of the ‘Romano-Celtic’ boat, examples of which are known from Blackfriars in London (Marsden 1994) and Barland Farm in the Severn Estuary (Bell and Neumann 1997). Some of Iron Age coastal forts in Wales had easy approaches to the sea via sandy coves and beaches, and therefore may have been involved in maritime trade and/or fishing activities during this period (Murphy 2002, 53).

7.8.6 During the Romano-British period, there was flourishing trade and cultural contact, as evidenced by military and civilian sites along the Liverpool Bay coast (Murphy 2002, 55). The discovery of coins on beaches around Glamorgan suggests further evidence for coastal trade during this period (Murphy 2002, 56). The discovery of a Romano-Celtic boat at Barland’s Farm on the Severn Estuary provides evidence for the types of watercraft in use during this period (Bell and Neumann 1997). During the later Romano-British period, threats from Irish raiders resulted in increased coastal fortification. In response to this growing threat, a fort was constructed at Holyhead that comprised a naval base built in order to protect the island from Irish coastal raids (Hopewell 2005; Murphy 2002, 55; Wessex Archaeology 2007).

7.8.7 The Irish Sea is likely to have witnessed considerable maritime activity during the Early Medieval period. International trade continued, and material from the eastern Mediterranean, North Africa and France has been discovered on sites around Wales. Archaeological evidence for Viking interaction is scarce, although documentary sources and Anglesey place-names provide some indication of Viking influence in the area. Furthermore, excavations at Glyn, a couple of miles inland from Red Wharf Bay, Anglesey, have revealed a settlement of pre-Viking and Viking date that developed into a strong trading or mercantile settlement (Murphy 2002, 58). Fragmentary historical accounts indicate warfare involving a number of vessels linked to the rule of Gruffydd ap Llywelyn, King of Gwynedd. A war is recorded to have taken place against the English in the 11th century across the River Severn which saw the destruction of King Edward's fortress and fleet.

7.8.8 A number of important ports developed in Anglesey in the 13th century and the number of vessels which passed through the Study Area are likely to have increased. There are a greater number of archaeological examples of shipwrecks around the Welsh coast. One such example outside of the Study Area includes the Magor Pill wreck on the Severn Levels (Nayling 1998), dated to the 13th century.

7.8.9 Direct evidence for Post-Medieval maritime activity is provided by the Pwll Fanog slate wreck in the Menai Strait, dating to around the 14th to mid-16th century and the Royal Yacht *Mary*. The *Mary* is a located on The Skerries, off the north-west coast of Anglesey. This Post-Medieval vessel was built by the Dutch East India Company in 1660 and was given to King Charles II on his restoration. It sank in 1675 but is remembered as the 'first British yacht'.

7.8.10 Post-Medieval Wales witnessed rapid expansion in settlements, harbours and industries alike and the transport of goods by sea increased. In the second half of the 18th century, mining on Parys Mountain began to take place on a much larger scale, becoming one of the largest copper mines in the world by the early 19th century. Exports of coal, slate and granite fuelled the growth in industrialisation and the Irish Sea also saw a growth in the use of packet boats (designed for domestic mail, passenger and freight transportation) and ferries. Holyhead emerged as the main packet port of the area during this period.

7.8.11 The Industrial Revolution brought continued expansion to the coal industry in north-east Wales and resulted in an increase in coal carrying vessels plying the waters of the Study Area. However, production of coal declined rapidly after the early 20th century. For the modern period, the greatest potential for shipping losses and wrecking events in the study Area is associated with the two World Wars. To the present day, Holyhead continues to operate as a major port, facilitating travel by ferry to Dublin, Ireland.

7.9 Appendix 9: Aviation Archaeological Potential

7.9.1 Fixed-wing aviation first began in the early 1900s in the UK, with the first flight across the English Channel in 1909. This early period was characterised by the intense and rapid development of a new technology, from the advent of powered flight to the outbreak of WWII. At least 119 different aircraft models were used by the military in the UK during this period but examples of only 24 survive today anywhere in the world. This, alongside the fragility of the airframes and the relative scarcity of flights over water, mean that any aircraft remains dating to this period will be of special interest.

7.9.2 Early aircraft were constructed of canvas covered wooden frames and were extremely fragile, and it was not uncommon for such an aircraft to break up in flight. The regular use of aircraft over the battlefields of the Western Front by the end of WWI, however, prompted the mass-production of fixed wing aircraft in large numbers, spurring technological advances in aircraft design.

7.9.3 In 1915, the Royal Naval Air Service (RNAS) established a station for airships and aircraft in Mona, a hamlet in Anglesey. The station was active between 1915 and 1919 and was responsible for patrolling a large area of sea extending from Anglesey to Morecambe Bay in the east and to Dublin in the west. A notable amount of air activity is, therefore, likely to have occurred across the Study Area during this period. A total of 28 fixed wing aircraft and 15 airships were lost by the German Imperial Air Service and Navy during raids on the UK mainland during WWI (Wessex Archaeology 2009, 65) and a further 34 aircraft from the British Home Defence Squadrons are also recorded to have been lost during this period (Holyoak 2002, 659). It is possible that some of these losses occurred in the Irish Sea.

7.9.4 Civil aviation also increased significantly in the Inter-War period, with overseas services established to a number of European and worldwide destinations (Wessex Archaeology 2009, 16). The Department of Transport's Air Accident Investigation Branch (AAIB) records 20 civil aircraft losses at sea between 1920 and 1939, though this is not regarded as being a comprehensive record (Wessex Archaeology 2009, 65).

7.9.5 By the outbreak of WWII, low-powered wood and cloth biplanes had been replaced by high-powered monoplanes made of aluminium (Wessex Archaeology 2009, 65). During WWII airpower became increasingly important at a strategic and operational level. The loss of aircraft from both sides during the war was immense and it is estimated that an average of five aircraft crashed every day between 1939 and 1945 somewhere in the British Isles (Bédoyère 2001, 8). Many of these casualties are likely to have occurred offshore. RAF Mona was used as a training base during WWII. RAF Valley (formerly RAF Rhosneigr) opened in Anglesey in February 1941 which facilitated flying convoy patrols over the Irish Sea. Several enemy aircraft are recorded to have been claimed as a result of RAF Valley patrols and a number of Air/Sea Rescue operations are also documented (http://www.raf.mod.uk/rafvalley/aboutus/stationhistory.cfm).

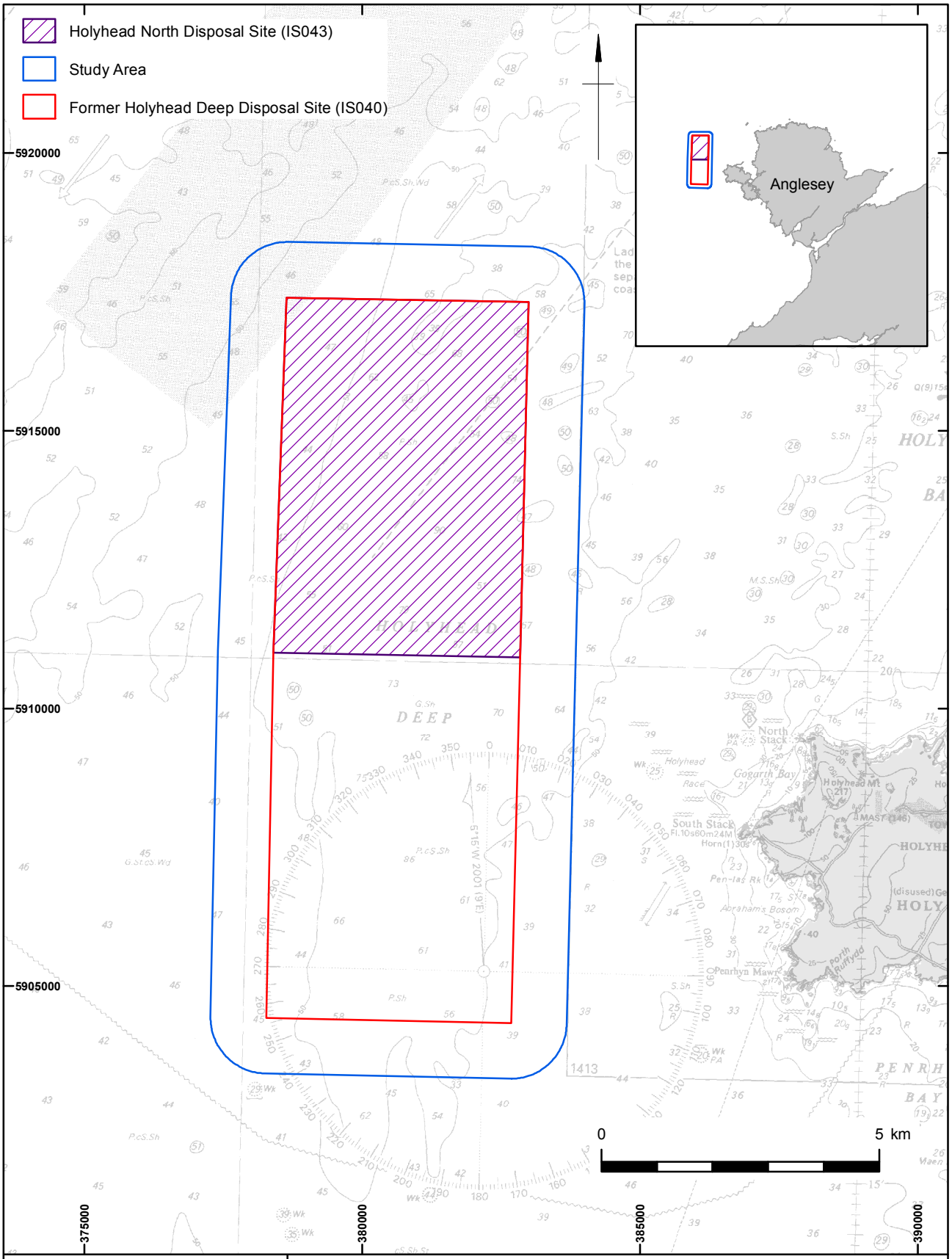
7.9.6 Enemy air activity over the Irish Sea diminished by 1943, and RAF Valley became increasingly used as a terminal point for transatlantic flights by American aircraft being delivered to the RAF.

7.9.7 From the end of WWII, aircraft research, design and development further increased to the benefit of both the military and commercial sector. Air activity across the Irish Sea in this period is likely to have comprised many United States Army Airforce which were transferred from Europe to the Far Eastern theatre in the war against Japan. In the late 1940s, RAF Valley became a permanent RAF station with official status as a Master

Diversion airfield, although it focussed on care and maintenance, providing a base for the Mountain Rescue Team which was formed in 1943 to help crashed aircraft and stranded climbers on the Welsh hills (http://www.raf.mod.uk/rafvalley/aboutus/stationhistory.cfm).

7.9.8 Developments in aerospace engineering, a term coined in 1958 to encompass aircraft and spacecraft technology, saw the refinement of the jet engine which in turn enabled the production of the jet aircraft. The jet aircraft was much faster than its propeller-powered predecessors and was able to attain a greater altitude, providing maximum efficiency over long distances (Jarrett 2000). The first jet-propelled aircraft was based at RAF Valley in 1949.

7.9.9 The growth of commercial aviation in the post-war years saw that flight soon became an available means of travel within and around the UK. However, despite the volume of aviation activity in the skies over the UK, there have been very few major losses. The Air Accidents Investigations Branch (AAIB) lists 120 civil aircraft losses at sea around the UK between 1946 and 1994, most of which comprise light aircraft or in more recent years, helicopters associated with the North Sea oil and gas industry (Wessex Archaeology 2009, 68). Unlike in preceding years, the majority of military aircraft losses are due to training accidents rather than combat operations (Wessex Archaeology 2009, 66). Aircraft training is known to have occurred from RAF Valley from the 1950s, whereby Naval pilots were trained to fly jet aircraft. The Station continued in its role as a Flying Training School and base for Search and Rescue operations until the late 1970s. As a Master Diversion Airfield, RAF Valley and its relief landing ground at Mona received many aircraft as a result of bad weather or unserviceability, placing it amongst the busiest airfields in the UK in 1980. As such, there is likely to have been a considerable amount of aircraft activity over the Irish Sea during the modern period. Modern aircraft activity over the Irish Sea also comprised passenger transport, with a service provided between Anglesey Airport and Cardiff airport, twice daily.



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Scale:	1:100,000 at A4	Illustrator:	KJF/ND
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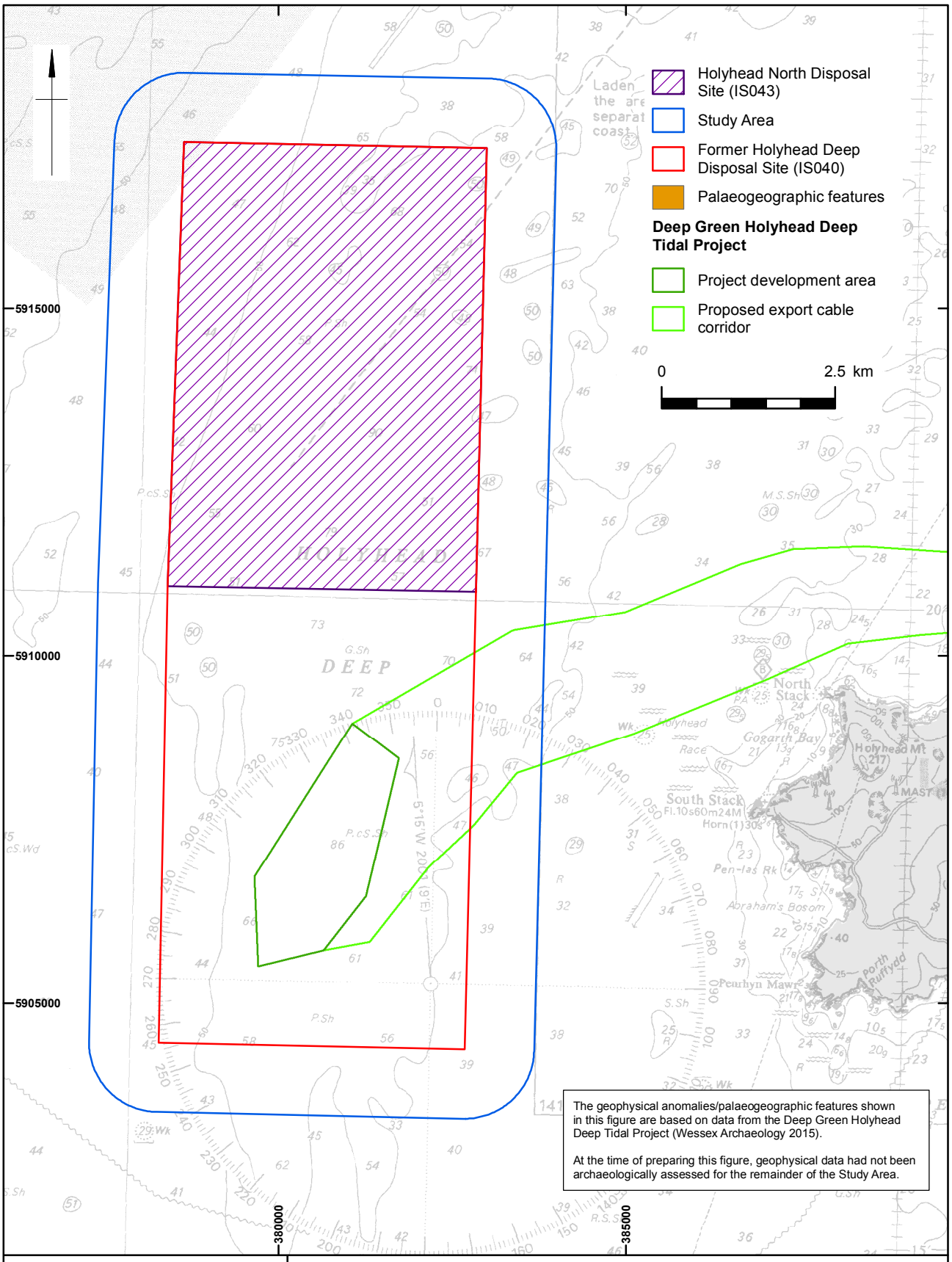
The Site and Study Area Location

Figure 1



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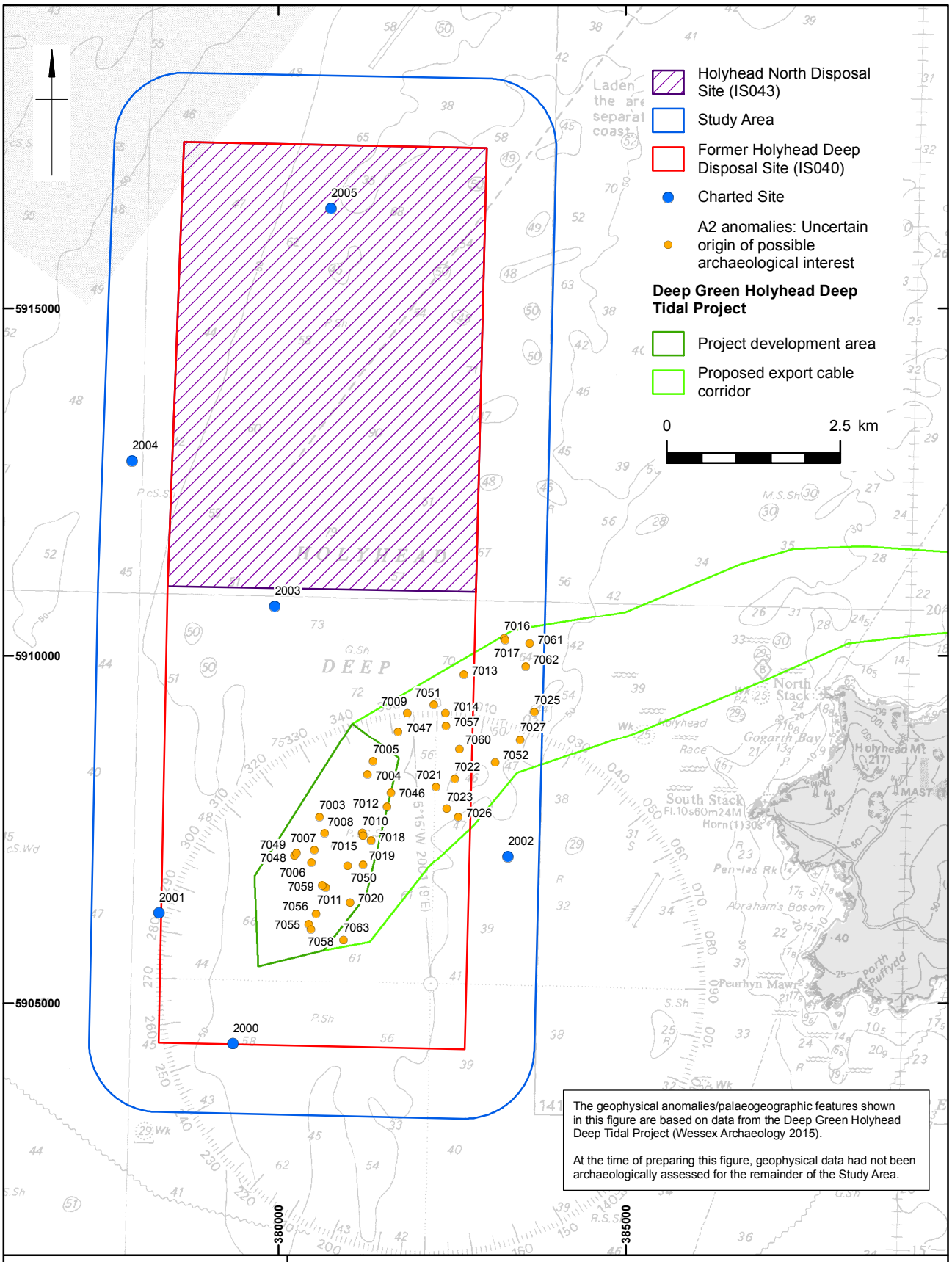
Palaeogeographic Features of archaeological potential within the Study Area

Figure 2



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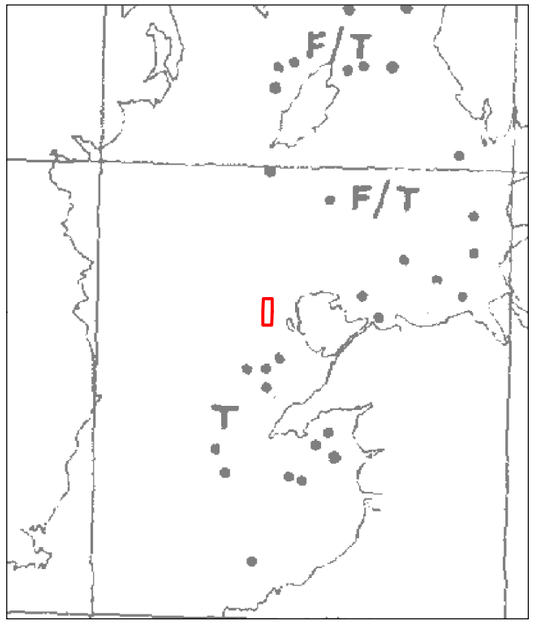
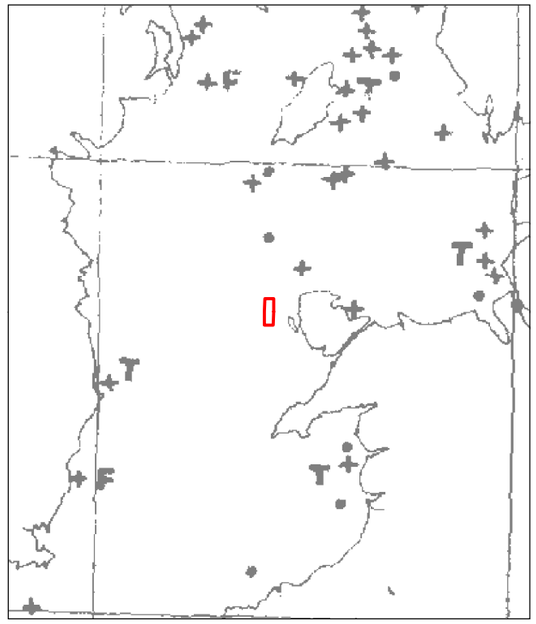
Charted Sites and Geophysical Anomalies

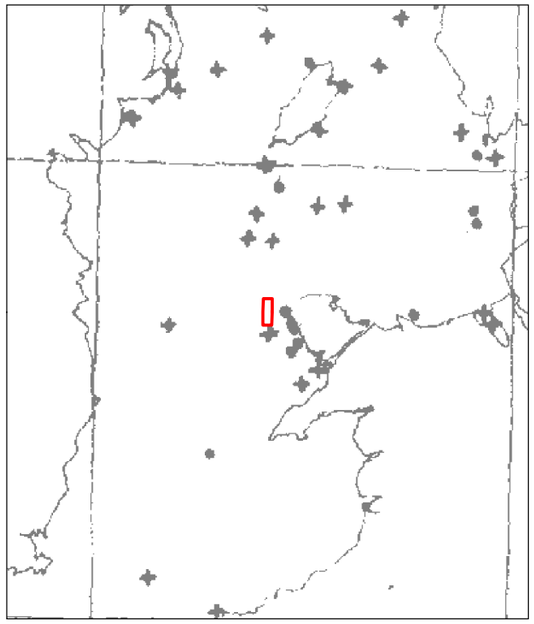
Figure 3



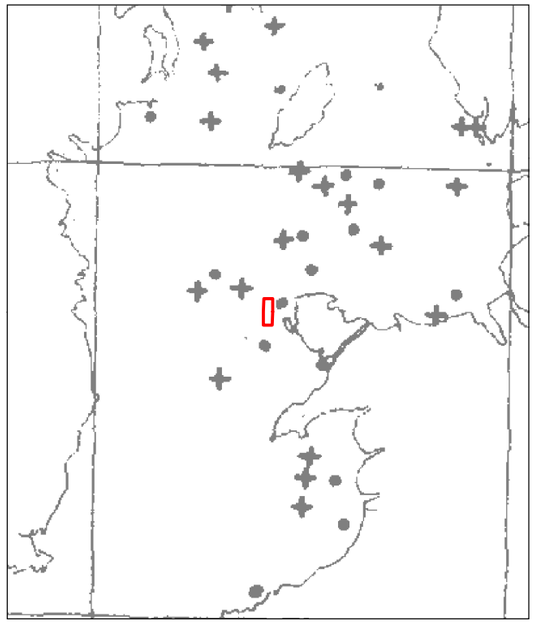
A. February to November 1941



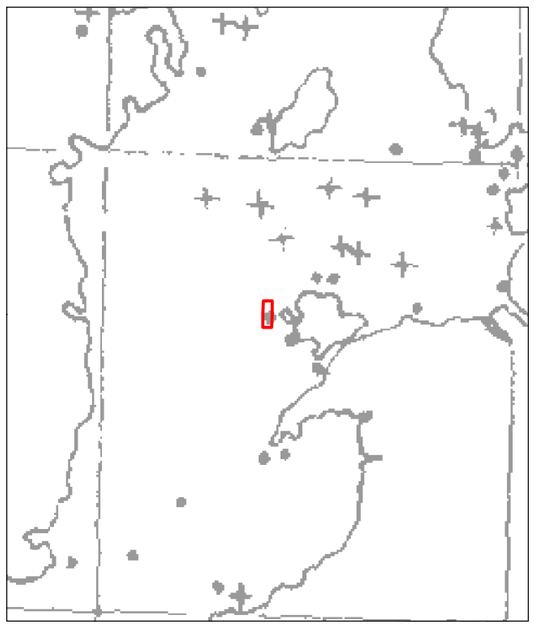
B. October 1941 to March 1942



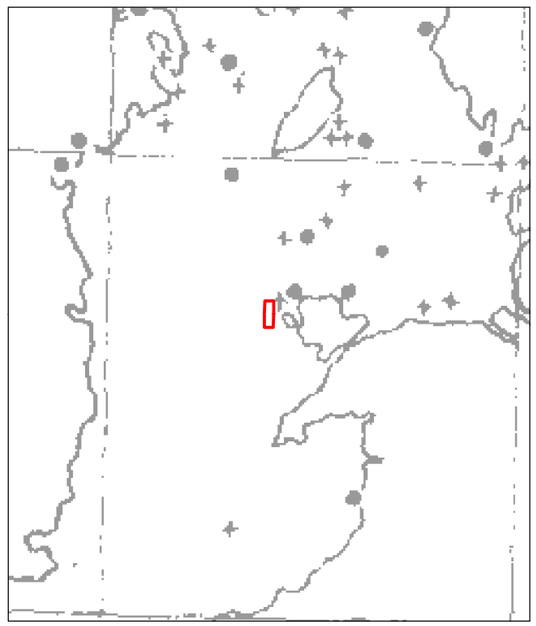
C. April to September 1942



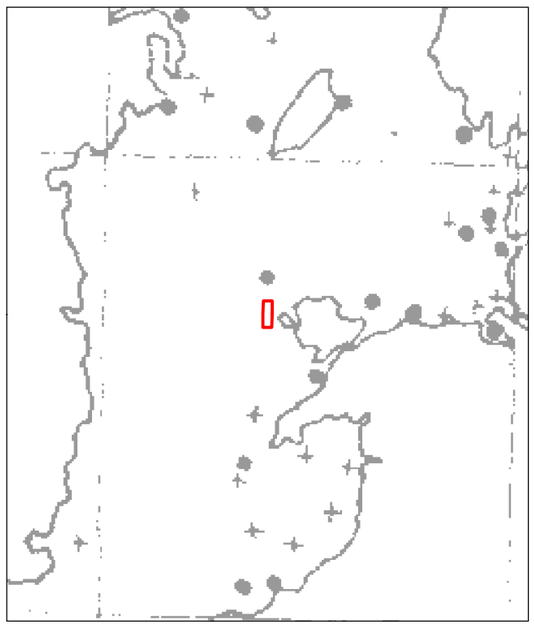
D. October 1942 to March 1943



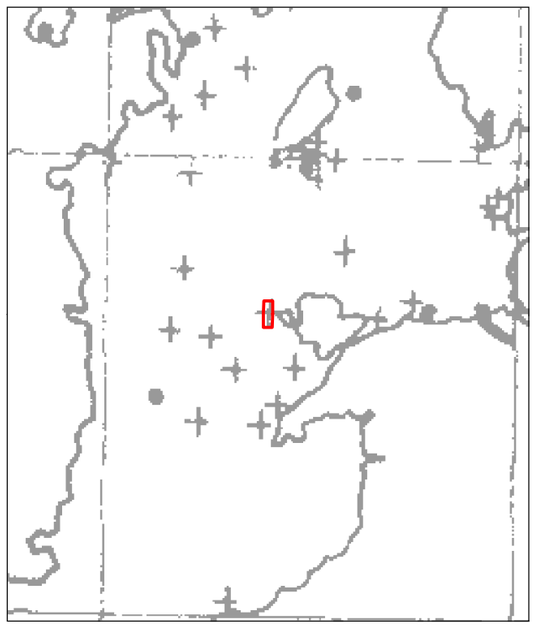
E. April to September 1943



F. October 1943 to March 1944



G. April to September 1944



H. October 1944 to March 1945

Coordinate system:
UTM WGS84 z30N

Former Holyhead Deep Disposal Site (IS040)

Dots indicate successful rescue operations; crosses indicate unsuccessful rescue operations

0 100 km

Date:	06/06/2017	Revision Number:	3
Scale:	1:3,000,000 at A3	Illustrator:	KJF/ND
Path:	W:\Projects\110101\GIS\FigsMXD\DBA\2017_06_06		

WWII Air/Sea Rescue Operations

Figure 4