

# Norfolk Boreas Offshore Wind Farm

# Appendix 17.4

## Norfolk Vanguard Marine Archaeological Technical Report *As produced for Norfolk Vanguard*

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*Photo: Ormonde Offshore Wind Farm*

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# Norfolk Vanguard Offshore Wind Farm

## Marine Archaeological Technical Report

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# Norfolk Vanguard Offshore Wind Farm

## Marine Archaeological Technical Report

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## Wreck Sheets

- Sheet 1: WA ID **70021** - Unknown
- Sheet 2: WA ID **70255** - Unknown
- Sheet 3: WA ID **70262** - Unknown
- Sheet 4: WA ID **71334** - Unknown
- Sheet 5: WA ID **70342** - *Golden Oriole* (possibly)
- Sheet 6: WA ID **70360** - HMS *Dunoon* (possibly)
- Sheet 7: WA ID **70459** - *Phillipp M*
- Sheet 8: WA ID **70565** - Unknown
- Sheet 9: WA ID **70617** - *Rye*
- Sheet 10: WA ID **70639** - *Trevethoe*
- Sheet 11: WA ID **70645** - Unknown
- Sheet 12: WA ID **70659** - Unknown
- Sheet 13: WA ID **70704** - Unknown
- Sheet 14: WA ID **70709** - *Montferland*
- Sheet 15: WA ID **70744** - Unknown
- Sheet 16: WA ID **70809** - *Seagull*
- Sheet 17: WA ID **70834** - *Xanthe*
- Sheet 18: WA ID **70934** - *Sheaf Water*
- Sheet 19: WA ID **70954** - Unknown
- Sheet 20: WA ID **70962** - *Fulgens*
- Sheet 21: WA ID **71043** - Unknown
- Sheet 22: WA ID **71117** - HMS *Francolin*
- Sheet 23: WA ID **71128** - Unknown
- Sheet 24: WA ID **71129** - HMS *Dungeness*
- Sheet 25: WA ID **71131** - Unknown
- Sheet 26: WA ID **71162** - Unknown
- Sheet 27: WA ID **71172** - Unknown
- Sheet 28: WA ID **71176** - Unknown
- Sheet 29: WA ID **71181** - Unknown
- Sheet 30: WA ID **71188** - *Ole Bull*



# Norfolk Vanguard Offshore Wind Farm

## Marine Archaeological Technical Report

### Summary

Wessex Archaeology was commissioned by Royal HaskoningDHV on behalf of Norfolk Vanguard Ltd to prepare a Marine Archaeological Technical Report, including a high level Environmental Appraisal, that will in turn inform an Environmental Impact Assessment (EIA) and subsequent Environmental Statement (ES), for the offshore elements of the proposed Norfolk Vanguard Offshore Wind Farm project and provisional offshore cable corridor.

The proposed project, Norfolk Vanguard, comprises two distinct array areas, Norfolk Vanguard East and West, along with a provisional offshore cable corridor linking the two arrays, which extends to the coast of Norfolk. The two areas are approximately 89km and 45km from the coast, respectively, and the proposed cable corridor would be 95km long.

The Technical Report comprises:

- *Relevant legislation and guidance;*
- *A methodology;*
- *An archaeological baseline study informed by an archaeological assessment of geophysical data, geotechnical samples and relevant documentary archives;*
- *An assessment of the setting, value and sensitivity of the assets identified within the assessed area; and*
- *A high level Environmental Appraisal.*

The archaeological resource within the study area are summarised as follows:

- *A total of 171 features of palaeogeographic potential (18 in Norfolk Vanguard East, 110 in Norfolk Vanguard West, and 43 in the provisional offshore cable corridor);*
- *Potential for discovery of sites and artefacts from the Palaeolithic to the Mesolithic periods across all the project areas;*
- *A total of 318 individual geophysical anomalies of possible archaeological potential within Norfolk Vanguard East, four considered to be of high archaeological potential (A1), all of which are identified as wrecks;*
- *A total of 184 individual geophysical anomalies of possible archaeological potential within Norfolk Vanguard West, eleven considered to be of high archaeological potential (A1), one of which is identified as a wreck;*
- *A total of 973 individual geophysical anomalies of possible archaeological potential within the provisional offshore cable corridor, thirty-seven considered to be of high archaeological potential (A1); twenty-six identified as wrecks;*
- *Potential for the discovery of further shipwreck material from the late Mesolithic to the present;*



- *No known aircraft crash sites; however, there is the potential for the discovery of 20th century aircraft material, particularly from World War II;*
- *A total of 65 records located within the intertidal zone of the provisional offshore cable corridor (from Bacton Green to Happisburgh South), and the potential to uncover further remains in this area, particularly dating to the prehistoric periods or much more modern World War I and II related infrastructure;*
- *Several onshore and offshore assets that have an important aspect of setting when considered within the World War I and World War II military landscape and seascape of the region; and*
- *The Historic Seascape Character of the area comprises: fishing (including fishing grounds and fishing activities), military (military defence and fortification), industry (gas supply pipeline and aggregate dredging), communications (submarine telecommunication cables), navigation (navigation routes), cultural topography (including sandbanks with sand waves) and coastal infrastructure (flood and erosion defences).*



# **Norfolk Vanguard Offshore Wind Farm**

## **Marine Archaeological Technical Report**

### **Acknowledgements**

This project was commissioned by Royal HaskoningDHV, on behalf of Norfolk Vanguard Ltd, and Wessex Archaeology is grateful to Gemma Keenan and Victoria Cooper in this respect.

Wessex Archaeology would like to thank the National Record of the Historic Environment for supplying sites and monuments data, the United Kingdom Hydrographic Office for supplying the known wreck and obstruction data, and Norfolk County Council for supplying the corresponding Historic Environment Record data. Geophysical data was provided by Vattenfall and geotechnical sample data was provided by Fugro Geoconsulting, both of which are gratefully acknowledged.

The report was compiled by Victoria Lambert and Stephanie Said, with contributions from Abby Mynett, Megan Metcalfe, Stephanie Arnott and David Howell. The figures were prepared by Kitty Foster. Dr Dan Atkinson managed the project on behalf of Wessex Archaeology. Quality assurance was provided by Dr Stephanie Arnott, Dr Louise Tizzard, and Dr Dan Atkinson.



# Norfolk Vanguard Offshore Wind Farm

## Marine Archaeological Technical Report

### 1 INTRODUCTION

#### 1.1 Project Background

- 1.1.1 Wessex Archaeology was commissioned by Royal HaskoningDHV, on behalf of Norfolk Vanguard Ltd, to prepare a marine archaeological Technical Report including a high level Environmental Appraisal for the three offshore elements of the proposed Norfolk Vanguard Offshore Wind Farm (hereafter referred to as the 'project'). The elements comprise Norfolk Vanguard West (NV West), Norfolk Vanguard East (NV East), and the provisional offshore cable corridor (OCC). This assessment will in turn inform the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).
- 1.1.2 At their closest points, NV West is located 47km from the Norfolk coastline and NV East is located 89km offshore from Bacton, Norfolk. The provisional cable corridor links the two arrays and will be connected by offshore export cables to the proposed landfall (at the time of writing, the landfall search zone is from Bacton Green to Happisburgh South). The proposed cable corridor will be approximately 95km long.
- 1.1.3 This report comprises a marine archaeological baseline study of the project area, based on an archaeological assessment of geophysical and geotechnical data, gathered as part of offshore site and cable route surveys, together with a review of records held by national and local inventories and secondary sources relating to the marine and intertidal historic environment of the region. This archeological baseline also includes an assessment of the value and sensitivity of any identified marine or intertidal archaeological assets within the project area, along with an assessment of their setting. An assessment of the seascape character will also be undertaken.
- 1.1.4 Prior to this assessment, other works have been undertaken in the area. Initially, the current project fell under the 'East Anglia Zone' which was awarded to the joint venture company East Anglia Offshore Wind (EAOW) Ltd by The Crown Estate in 2009. In 2011, Wessex Archaeology was commissioned by Environmental Resources Management (ERM) to conduct a Zonal Environmental Assessment (ZEA) on behalf of EAOW. However, in 2014 a decision was taken to split the zone, with Vattenfall Wind Power Ltd (VWPL) having development rights within the north of the former East Anglia Zone, and ScottishPower Renewables (UK) Limited (SPR) continuing to develop the southern part.
- 1.1.5 Norfolk Vanguard Ltd, an affiliate company of VWPL is now undertaking the EIA for Norfolk Vanguard. NV East includes the former East Anglia FOUR area with a slightly revised boundary. A Scoping Report for East Anglia FOUR was submitted in 2012 under the former Zone Development Agreement (ZDA; EAOW, 2012).
- 1.1.6 In 2016 Wessex Archaeology was commissioned by Royal HaskoningDHV on behalf of VWPL to provide a report summarising the archaeological assessment of geophysical data undertaken to date with reference to Norfolk Vanguard. This consisted of NV West,



NV East and the provisional OCC. A geophysical survey of NV East was undertaken in 2012 as part of the East Anglia FOUR proposal, whilst the remaining elements of Norfolk Vanguard were surveyed in 2016.

## **1.2 Development Proposal**

1.2.1 The proposed offshore wind farm would consist of between 90 and 257 wind turbines, each having a rated capacity of between 7 and 20MW, with a total installed capacity of up to 1,800MW (Royal HaskoningDHV, 2017). The location of the turbines will be finalised pre-construction, however the maximum capacity that may be located within NV West is 100%, and within NV East is estimated to be 67%. The export cable length would be approximately 110km for NV East and 100km for NV West, and at the time of writing, three potential landfall locations have been proposed – Bacton Green, Walcott Gap and Happisburgh South. The selection will depend upon the initial survey and data collected for the EIA.

1.2.2 Offshore infrastructure for the project will include:

- *Wind turbines and foundations (options for foundation include jacket, gravity base, suction caisson, monopile and floating foundations);*
- *Array cables linking the turbines;*
- *Substation platforms;*
- *Export cables connecting the substations to the landfall;*
- *Interconnector cables;*
- *Accommodation platform(s); and*
- *Up to two meteorological masts (met masts).*

## **1.3 Scope of Document**

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

## **1.4 Aims**

1.4.1 The specific aim of this marine archaeological Technical Report is to summarise the known and potential archaeological baseline within the project area to subsequently inform the EIA and production of the PEIR/ES.

1.4.2 The objectives of the assessment are as follows:

- *To provide details of relevant legislation, national and local planning policy, and best practice guidance;*
- *To assess the 2016 geophysical survey datasets provided by VWPL in order to identify any material of possible archaeological and cultural heritage significance present within the project area;*
- *To compare the results of the geophysical interpretation with the results of previous archaeological assessments of geophysical data and historic records within the project area;*
- *To update the interpretation of the results of the previous studies where necessary based on their appearance in the 2016 data. This will include updating the*



*archaeological discrimination and hence removing from the final gazetteer of anomalies in the project area those that are now interpreted as non-anthropogenic in origin;*

- *To review geotechnical logs to identify sediments of potential archaeological interest and assess alongside the sub-bottom profiler (SBP) data;*
- *To compare the geophysical and geotechnical interpretation with desk-based assessments, historical data, known archaeological sites and previous investigations in the vicinity of the project area to outline the known and potential marine archaeological resource;*
- *To assess the setting of marine heritage assets from offshore activities;*
- *To summarise the Historic Seascape Character for the area that the project truncates;*
- *To assess the significance of the known and potential marine archaeological resource through weighted consideration of their valued components; and*
- *To recommend mitigation measures for any potential archaeological or cultural heritage assets newly identified within the project area, including the addition of new Archaeological Exclusion Zones where necessary within the project area.*

## **1.5 Copyright**

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## **2 LEGISLATION, GUIDANCE AND POLICY**

### **2.1 Introduction**

- 2.1.1 The provisional OCC extends through English Territorial Waters, up to 12 nautical miles (nm) from the coast, whilst NV East and NV West are located within the UK Exclusive Economic Zone (EEZ). The archaeological curator responsible for the offshore archaeological resource, from Mean High Water Springs (MHWS) to the 12nm limit are the Historic England Marine Planning Unit, with specialist advice provided by the Historic England East of England Science Advisor with regard to activities undertaken as part of the project. Historic England also act as specialist advisors to the Marine Management Organisation (MMO), who is responsible for licencing, regulating and planning marine activities around England to ensure they are carried out in a sustainable way.
- 2.1.2 The following section provides a summary of the national, regional and local planning and legislative framework that governs the treatment of the marine historic environment in the planning process. More comprehensive details are provided in **Appendix I**.
- 2.1.3 Details regarding terrestrial legislation, in particular, the Planning Act 2008, and other relevant onshore guidance and policy are presented in the onshore archaeological desk-based assessment for the project (Royal HaskoningDHV, forthcoming).



## 2.2 Marine Legislation

2.2.1 NV East and NV West are located within the UK EEZ, and the provisional OCC extends through the English Territorial Sea (up to 12nm) from the coast into the UK EEZ. The following legislation applies to marine heritage within both the UK EEZ and English Territorial Sea:

- *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.*

2.2.2 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.

2.2.3 More information regarding the details of each piece of legislation is presented in **Appendix I**.

## 2.3 International Conventions

2.3.1 The UNESCO Convention on the Protection of Underwater Cultural Heritage was concluded in 2001, and is a comprehensive attempt to codify the law internationally, with regards to underwater cultural 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.

## 2.4 National Planning Policy Framework (NPPF)

2.4.1 The National Planning Policy Framework (NPPF) was published by the Department for Communities and Local Government (DCLG) in March 2012, replacing Planning Policy Statement 5.

2.4.2 Section 12 of the NPPF entitled 'Conserving and enhancing the historic environment' sets out the principal national guidance on the importance, management and safeguarding of heritage assets within the planning process. The aim of NPPF Section 12 is to ensure that Regional Planning Bodies and Local Planning Authorities, developers, and owners of heritage assets adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them. The government guidance provides a framework that:

- *Recognises that heritage assets are an irreplaceable resource;*
- *Requires applicants to provide proportionate information on the significance of heritage assets affected by the proposals and an impact appraisal of the proposed development on that significance;*
- *Takes into account the desirability of sustaining and enhancing the significance of heritage assets and their setting;*
- *Places weight on the conservation of designated heritage assets;*



- *Requires developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and impact, and to make this evidence (and any archive generated) publicly accessible; and*
- *Promotes the conservation of heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life for this and future generations.*

## **2.5 Marine Policy**

- 2.5.1 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) and fully reflect the requirements of the MPS at a local level. Marine plans must also be in accordance with other UK national policy, including the National Planning Policy Framework (NPPF; Department for Communities and Local Government, 2012). The MCAA will be incorporated within the requirements of the project's Development Consent Order, necessary under the provisions of the Planning Act 2008.
- 2.5.2 Under the MCAA, the UK was 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.
- 2.5.3 In England, the MMO have divided the inshore and offshore waters into 11 plan areas for which marine plans are to be produced. The Norfolk Vanguard project is within the East Inshore and East Offshore plan areas. The East Inshore and East Offshore Marine Plans were released in April 2014 (East Marine Plans page on the gov.uk website, accessed 27/04/2017).

## **2.6 Marine Guidance**

- 2.6.1 This assessment was carried out in a manner consistent with available guidance as described below in chronological order of issue:
- *Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 1998);*
  - *Managing Lithic Scatters: Archaeological Guidance for planning authorities and developers (English Heritage (now Historic England), 2000);*
  - *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);*
  - *Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE, 2007);*
  - *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);*



- *Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition) (English Heritage (now Historic England), 2011);*
- *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011);*
- *Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012);*
- *Standard and Guidance for Historic Environment Desk-based Assessment (Chartered Institute for Archaeologists, 2014).*
- *The Setting of Heritage Assets – Historic Environment Good Practice Advice in Planning: 3 (Historic England, 2015);*
- *Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Bates, R. Dix, J. K., Plets, R., 2013); and*
- *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (English Heritage (now Historic England), 2015).*

### 3 METHODOLOGY

#### 3.1 Study Area

- 3.1.1 The area assessed in this report is defined by the development extents of NV East, NV West and the provisional OCC, hereafter referred to as the ‘study area’ (**Figure 1**). The provisional OCC is delimited by the MHWS at its landward extent.

##### *Search Area*

- 3.1.2 A search area, encompassing all of the project elements, was used for obtaining records from relevant archive databases. The wider search area allows for a greater understanding of the wider archaeological baseline environment, with the dual purpose of enabling any archaeological trends within the region to be recognised and to allow any heritage assets identified to be represented in a broader archaeological context.
- 3.1.3 All data for heritage assets located within this search area are stored on the Wessex Archaeology archive network and can be made available on request.

#### 3.2 Archaeological Desk-Based Assessment

- 3.2.1 . The methodology follows the best practice professional guidance outlined by the Chartered Institute for Archaeologists’ (CIfA) *Standard and Guidance for Historic Environment Desk-Based Assessment* (2014).
- 3.2.2 The marine themes relevant to marine archaeological baseline as assessed in this report are:
- *Seabed prehistory (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes);*
  - *Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen’s fasteners) and aviation sites (aircraft crash sites and associated debris);*
  - *Intertidal heritage assets;*
  - *Setting of marine heritage assets from offshore activities; and*



- *Historic seascape character.*

#### *Data Sources*

3.2.3 A number of sources of information were consulted in order to compile this Technical Report. Data generated from marine geophysical and geotechnical surveys were also a main component of the data and are discussed further in section 3.3.

3.2.4 The following data sources were consulted in order to compile the desk-based element of the assessment:

- *The United Kingdom Hydrographic Office (UKHO) data for charted wrecks and obstructions;*
- *The National Record of the Historic Environment (NRHE) maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events;*
- *The National Heritage List for England maintained by Historic England, comprising data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973;*
- *The Norfolk Historic Environment Record (NHER), comprising a database of all recorded terrestrial and marine archaeological sites, find spots and archaeological events within the county and offshore;*
- *The Historic Seascape Characterisation (HSC) report for East Yorkshire to Norfolk (Newcastle University, 2014);*
- *Relevant mapping including Admiralty Charts, historic maps and Ordnance Survey; and*
- *Relevant documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeological Data Service and other websites (presented in the 'References'; section 11 of this document).*

#### *Data Handling*

3.2.5 This report is supported by a Geographic Information System (GIS) using ArcGIS 10.2, incorporating the positional information of the various data sources listed above, allowing the data to be spatially analysed. The data were subsequently compiled into gazetteers of the prehistoric, maritime and aviation, and intertidal resources within the study area; these were used to inform the assessment of geophysical data.

3.2.6 Within this assessment, the gazetteers for the marine and intertidal datasets are compiled and presented in Universal Transverse Mercator (UTM) Zone 31 North projected from a European Terrestrial Reference System (ETRS) 1989 datum.

3.2.7 Information relating to the marine heritage that did not include location or positional information were also used to inform the marine archaeological baseline assessment where relevant.

#### *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. By convention, 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, are presented in **Appendix II**.

#### *Seabed Prehistory*

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

- 3.2.11 The data obtained were compiled to form a gazetteer as part of the seabed prehistory baseline. These records were each given a unique identifier beginning with **75000** and continuing sequentially (**Appendix III, IV and V**), and were added to the project GIS.

#### *Maritime and Aviation Archaeology*

- 3.2.12 The sources of data for maritime and aviation history and archaeology listed in section 3.2.4 above have been collated and summarised in order to develop a baseline of marine cultural heritage for the study area, and the potential for encountering unknown shipwreck and aircraft crash sites (section 5). Sources of data relevant to maritime and aviation archaeology are the UKHO, NRHE and NHER.

- 3.2.13 The data obtained were reviewed and those located within the study area were extracted and compiled to form a gazetteer as part of the known maritime and aviation baseline. These records were each given a unique identifier beginning with **70000** and continuing sequentially (**Appendix VI, VII and VIII**), and were added to the project GIS.

- 3.2.14 For the purposes of this assessment, records with duplicate positions between datasets were amalgamated and their co-ordinates are taken from the UKHO dataset as the raw data therein is based on hydrographic survey data presented in the WGS84 datum. These co-ordinates were converted from WGS84 into UTM31N eastings and northings based on the ETRS89 datum (as described in section 3.2.6) using the Quest Geodetic Calculator version. Furthermore, the NRHE and NHER datasets are primary terrestrial datasets expressed in British National Grid, and are considered to be less accurate offshore.

- 3.2.15 The research for maritime and aviation history was then combined with the archaeological assessment of geophysical survey data.

- 3.2.16 Data relating to Recorded Losses were also extracted from the NRHE, NHER and UKHO data sources. Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped by area into Maritime Named Locations by the NRHE. For example, a Recorded Loss within this dataset may be based on the loss of a vessel 'off the coast at Happisburgh' or associated with a known navigational hazard such as a sand bank or rocks (which may give rise to a falsely precise geographic coordinate for the record). The positional data of these records is unreliable and serves only to provide an

indication of the types of vessels that passed through the area and the wrecking incidents that are known to have occurred in the general region. Whilst the remains of these vessels and aircraft are expected to exist somewhere on the seafloor, their location is unknown. As such, they signify the potential maritime and aviation resource.

- 3.2.17 Details regarding Recorded Losses, whose Named Location happens to be located within the study area, are presented in a gazetteer format (**Appendix X and XII**). These records have retained their original identification assigned by the UKHO, NRHE or NHER for ease of cross-referencing. Where records are duplicated between datasets all corresponding identification numbers have been included, but are referred to in the text by the NRHE Monument ID if one exists. The gazetteer does not include positional data due to the inaccuracies therein.
- 3.2.18 The baseline assessment of maritime and aviation archaeology was further supplemented by a review of relevant primary and secondary source material in order to provide an indication on the nature of maritime and aviation activity across the region. As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the study area (English Heritage (now Historic England), 2002; Wessex Archaeology, 2008).

#### *Intertidal Archaeology*

- 3.2.19 Since the assessment of the onshore element of the project will extend to the MHWS, there is no overlap with the intertidal and offshore study area discussed in this assessment. Data from the NRHE and NHER is provided in two spatial formats, points and polygons. All points and polygons that intersect the study area have been included within the assessment; however it should be noted that co-ordinates given for the polygon records is the centre-point generated using ArcGIS 10.2, which may lie outside the study area.

### **3.3 Geophysical and Geotechnical Methodology**

- 3.3.1 Geophysical survey and geotechnical data were collected between September and November 2016 over NV West and the provisional OCC survey areas. In addition, assessments were undertaken by Wessex Archaeology in 2014 over the former East Anglia Zone that fall within the current study areas.
- 3.3.2 The review for this assessment includes an assessment of geophysical datasets. The 2016 NV West and provisional OCC geophysical survey was undertaken by Fugro Survey B. V. (Fugro) (Fugro, 2016; Fugro, 2017a; 2017b). The NV East (formerly East Anglia Four) geophysical datasets were acquired by EMU Limited (EMU) and were obtained in 2012 (EMU Ltd, 2013). The 2012 former East Anglia Zone Offshore Transmission Owner (OFTO) survey data were acquired by Coastline Surveys Ltd.. The northern end of the OFTO area overlaps with the eastern end of the provisional OCC, as illustrated in **Figure 1**.
- 3.3.3 Wessex Archaeology has previously carried out a Zonal Environmental Assessment (ZEA) commissioned by Environmental Resources Management (ERM) on behalf of East Anglia Offshore Wind Limited (EAOW). The survey data was acquired by Gardline Geosurvey between April and August 2010 (Wessex Archaeology, 2012). The results from this assessment have not been incorporated into the current assessment as the data were collected over widely spaced corridors 6km apart and only 4% of the NV West area was covered. The 2016 data cover the whole of NV West and the provisional OCC and are also of better quality.



### *Data Sources*

- 3.3.4 Wreck and obstruction data within the development area were obtained from the UKHO. Records located within the survey areas were integrated with the geophysical results as outlined above.
- 3.3.5 Any sites found to be outside the survey areas are deemed beyond the scope of the current assessment and are subsequently not included in this report.
- 3.3.6 The 2016 NV West and provisional OCC geophysical survey data comprised sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler datasets acquired by Fugro Survey B. V. between 1 September and 15 November 2016 on-board three survey vessels, the *Fugro Pioneer*, *RV Discovery* and *Valkyrie*. The NV East geophysical datasets were acquired by EMU and were obtained between 19 June and 4 September 2012 on-board the survey vessel *MV Aurelia* (EMU Ltd, 2013). The 2012 former East Anglia Zone OFTO survey data were acquired by Coastline Surveys Ltd. and were obtained between 19 June and 8 October 2012 on-board the survey vessel *MV Flatholm*.

### *Geophysical Data – Technical Specifications*

- 3.3.7 The *Fugro Pioneer* survey over NV West and the offshore section of the provisional OCC was undertaken between 7 September and 14 November 2016. The *RV Discovery* undertook its survey across the middle section of the provisional OCC between 1 September and 15 November 2016 and *Valkyrie* undertook its survey across the inshore end of the provisional OCC between 23 September and 18 October 2016 (Fugro, 2016; Fugro, 2017a; 2017b).
- 3.3.8 Vessel *Fugro Pioneer* deployed an EdgeTech 4200-FS digital sidescan sonar towfish operated at frequencies of 100kHz and 600kHz and 125m range. Sidescan sonar data were acquired with a range of 125m across NV West, line spacings used across the site were 100m with cross lines run at approximately 1,000m. Sidescan sonar data were provided to Wessex Archaeology as .xtf files. A G-882 marine magnetometer was used to acquire magnetometer data, the files were provided to Wessex Archaeology in .csv format. Multibeam bathymetry data were acquired using a Kongsberg EM2040 multibeam echosounder operating at 400kHz. These data were provided to Wessex Archaeology as an .xyz file. The sub-bottom profiler (SBP) data were acquired using 16 element Massa TR-1075 hull mounted pinger. The data were digitally recorded and provided to Wessex Archaeology as .sgy files.
- 3.3.9 Vessel *RV Discovery* deployed an EdgeTech 4200-FS sidescan sonar towfish operated at 300kHz and 600kHz, the range varied between 50m, 75m and 100m. A Kongsberg EM2040 dual-head dual-swath system used to acquire multibeam bathymetry data was operated at 200 – 400kHz. A Geometrics G-882 magnetometer was used to acquire magnetometer data, these were provided to Wessex Archaeology in the same format as those from the *Pioneer*. Line spacing was approximately 50m. SBP data for all three vessels were acquired using hull-mounted pinger systems. The data were digitally recorded and provided to Wessex Archaeology as .sgy files.
- 3.3.10 The *Valkyrie* acquired sidescan sonar data using an EdgeTech 4125 towfish operated at 400kHz and 900kHz and a range of 25m. A Teledyne RESON 7125 dual-head dual-swath system was used to acquire multibeam bathymetry data at 400kHz. A Geometrics G-882 magnetometer towfish was used to acquire magnetometer data. The data were acquired at a 15m line spacing as a minimum. This had a 150m overlap with data collected by *RV Discovery*. The data files were provided to Wessex Archaeology in the same formats as the *Fugro Pioneer* data.



- 3.3.11 The 2012 geophysical survey data over NV East were acquired by EMU between 19 June and 4 September 2012 on-board the survey vessel MV *Aurelia*. The datasets consisted of sidescan sonar, magnetometer, multibeam echosounder and pinger and sparker sub-bottom profiler (EMU Ltd, 2013).
- 3.3.12 The sidescan sonar equipment used was an EdgeTech 4200-FS (600/300kHz) with a range of 75m. The sidescan sonar data were digitally recorded and provided to Wessex Archaeology as .*xtf* files. The magnetometer equipment used was a Geometrics G-882 magnetometer initially, which was then later replaced by a Marine Magnetics SeaSPY magnetometer. On the 29 August, the Geometrics G-882 magnetometer was found to be defective and was deemed unusable for further survey operations. This was then replaced with the on-board reserve Marine Magnetics SeaSPY magnetometer. The magnetometer data were digitally recorded and provided to Wessex Archaeology as .*txt* files.
- 3.3.13 The multibeam echosounder system deployed was a moon pool-mounted R2Sonic 2024 (300kHz head). The multibeam bathymetry data were digitally recorded and provided to Wessex Archaeology as ungridded .*xyz* files and gridded SD files. The NV East data were acquired using a Geo-Spark 200 sparker with a 24 element single channel trailing hydrophone receiver. The SBP data were digitally recorded and provided to Wessex Archaeology as .*sgy* files.
- 3.3.14 The main lines were spaced at 100m intervals and cross lines spaced at 2km intervals. Both the primary and secondary positioning used for the survey was a Fugro StarPack GNSS receiver with Starfix G2 differential corrections.
- 3.3.15 The 2012 former East Anglia Zone OFTO geophysical datasets were acquired by Coastline Surveys Ltd. and were obtained between 19 June and 8 October 2012 on-board the survey vessel MV *Flatholm*. The datasets consisted of sidescan sonar, magnetometer, single-beam and multibeam echosounder and pinger and boomer sub-bottom profilers.
- 3.3.16 The total survey area for the former East Anglia Zone OFTO totalled approximately 6700 line km. Coastline Surveys used an EdgeTech 4200-FS sidescan sonar system operated at 100kHz and 400kHz with a range of 75m. The sidescan sonar data were digitally recorded and provided to Wessex Archaeology as .*xtf* files.
- 3.3.17 Equipment specifications were not provided with the magnetometer data. The data were digitally recorded and supplied to Wessex Archaeology as cleaned and despiked .*csv* files
- 3.3.18 The multibeam echosounder system deployed was a hull-mounted Reson Seabat 7125 SV2 system. The multibeam bathymetry data were digitally recorded and provided to Wessex Archaeology as ungridded .*txt* files and processed gridded .*asc* files.
- 3.3.19 Equipment specifications were not provided with the sub-bottom profiler data, though the data were collected using a boomer probably coupled with a trailing hydrophone receiver. The data were digitally recorded and provided to Wessex Archaeology as navigation corrected .*SGY* files.

*Data Quality – Geophysical Data*

- 3.3.20 Each geophysical dataset was assessed for quality and rated using the criteria listed in **Table 1** below.

**Table 1: Criteria for assigning geophysical data quality rating**

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

- 3.3.21 The 2016 sidescan sonar data have been rated as 'Variable' using the above criteria table, with some lines exhibiting good quality data and others displaying below average quality with evidence of poor weather conditions or sea state. The horizontal range of the data varied between 25m in the inshore areas to typically 75m and 125m in the offshore areas. Overall, even with this variability the data were generally of suitable quality to support a robust archeological assessment.
- 3.3.22 The magnetometer data have been rated as 'Average' using the criteria table. A number of the data files have been affected by noise and some background variation is visible throughout the dataset. In a number of files frequent spiking is visible and some lines display noise created by alterations in tow cable length.
- 3.3.23 The multibeam bathymetry data have been rated as 'Good' using the above criteria table. The data quality and resolution of 1m were found to be of a good standard for archaeological assessment.
- 3.3.24 The quality of the SBP data acquired by Fugro on-board the *Fugro Pioneer* has been rated as 'Good' using the above criteria. Good penetration was achieved, with reflectors and structures clearly visible and little background noise identified.
- 3.3.25 The quality of the SBP data acquired by Fugro on-board the *Discovery* and *Valkyrie* have been rated as 'Variable' using the above criteria. A number of lines were affected by environmental conditions (presumably weather noise and shallow water depths) to a significant degree, and the record length of some lines was relatively short, meaning the bases of features were not imaged. Data on the *Valkyrie* was acquired with only two transducers, rather than the four transducer pinger system on the RV *Discovery*. The lower power combined with a hard and / or sandy seabed resulted in relatively poor penetration in some areas. As such, it cannot be guaranteed all palaeogeographic features of archaeological potential have been identified within the areas covered by these data sets.
- 3.3.26 The 2012 NV East geophysical data comprised sidescan sonar, magnetometer, multibeam echosounder and sub-bottom profiler data acquired by EMU between 19 June and 4 September 2012 on-board the survey vessel MV *Aurelia*. The sidescan sonar data have been rated as 'Good' using the above criteria. The data quality and positioning was found to be of a generally high standard with some lines showing signs of weather noise but on the whole suitable for archaeological assessment.



- 3.3.27 The magnetometer data were rated as 'Variable' from an archaeological perspective using the above criteria. The magnetometer data appeared to be highly affected by the geological composition of the site. There are abundant sandwaves, sand megaripples and sand banks that have affected the magnetometer data as background noise which has the potential to hide and mask smaller potential archaeological anomalies and thus made identification more difficult.
- 3.3.28 The multibeam bathymetry data have been rated as 'Good', the data quality and resolution of 1m were found to be of a good standard for archaeological assessment.
- 3.3.29 The quality of the SBP data acquired by EMU in 2012 has been rated as 'Average' using the above criteria. Good penetration was achieved with reflectors generally clearly visible, although a high degree of swell was identified on a number of lines which could not be completely removed during processing. However, this did not detrimentally affect the data to a significant degree and it is still deemed suitable for archaeological interpretation.
- 3.3.30 Wessex Archaeology processed and assessed all of the sidescan sonar and magnetometer data for the NV East area. The multibeam bathymetry data were processed and assessed over all wreck locations and seabed features of potential archaeological interest identified in the sidescan sonar and magnetometer data. The sub-bottom profiler data were assessed on every 5th main line of data, giving 20% coverage of the study area. To aid in the interpretation of features and ensure consistency of interpretation between the main lines, cross lines were also interpreted over any identified palaeolandscapes features of possible archaeological potential.
- 3.3.31 The 2012 former East Anglia Zone OFTO survey data were acquired by Coastline Surveys Ltd. and were obtained between 19 June and 8 October 2012 on-board the survey vessel MV *Flatholm*. This comprised sidescan sonar, magnetometer, single-beam and multibeam echosounder and sub-bottom profiler data.
- 3.3.32 The sidescan sonar data have been rated as generally 'Good' using the above criteria with a small number of lines that were 'Variable'. The data quality and positioning was found to be of a generally high standard with some lines showing signs of weather noise but on the whole suitable for archaeological assessment.
- 3.3.33 The magnetometer data were rated as 'Variable' from an archaeological perspective. A number of the data files have been affected by background variation in the form of geology, sandwaves and megaripples, these have the potential to hide and mask smaller possible archaeological anomalies.
- 3.3.34 The multibeam bathymetry data have been rated as 'Good' using the above criteria, with features clearly visible within the 1m resolution data.
- 3.3.35 Problems with the sub-bottom profiler data experienced before the data was handed to Wessex Archaeology resulted in a trackplot being provided with an 'interpretability index' rating, ranging from 'Good' to 'Very Poor', assigned to each survey line. According to this information, the sub-bottom profiler (sparker) data have been rated as generally 'Poor' or 'Very Poor', with very few lines rated as 'Average' or 'Good'. A number of lines were not available to be used for interpretation, mainly along the eastern edge of the former East Anglia Zone OFTO area. The data is often affected by high degrees of swell and penetration and resolution of features is generally very low.
- 3.3.36 Wessex Archaeology processed and assessed all of the sidescan sonar and magnetometer data. The multibeam bathymetry data were processed and assessed over



all wreck locations and seabed features of potential archaeological interest identified in the sidescan sonar and magnetometer data. The sub-bottom profiler data were assessed on every 5th main line of data, giving 20% coverage of the study area in the main line direction, and every available cross line. To aid in the interpretation of features, additional infill lines were also interpreted where specific features of potential archaeological interest were identified.

#### *Processing – Geophysical Data*

- 3.3.37 High frequency .xtf sidescan sonar files were processed by Wessex Archaeology using Coda Geosurvey software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were initially scanned to give an understanding of the geological nature of the site and were then interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions and acquiring an image of each anomaly for future reference.
- 3.3.38 A mosaic of the sidescan sonar data is produced during this process to assess the quality of the sonar towfish positioning. The survey lines are smoothed and the navigation corrected. This process allows the positioning of anomalies to be checked between different survey lines and for the layback values to be further refined if necessary.
- 3.3.39 The form, size and / or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of archaeological interest. A single small but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may define the edge of a buried but intact feature, or it may be all that remains as a result of past impacts from, for example, dredging or fishing.
- 3.3.40 The magnetometer data files were processed in Geometrics MagPick software. The software enables both the visualisation of individual lines of data and the gridding of data to produce a magnetic anomaly map. The data were smoothed to try to eliminate any observed noise, a trend was then fitted to the resulting data and the trend values subtracted from the smoothed values. This was carried out in an attempt to remove natural variations in the data (such as diurnal variations in magnetic field strength and changes in geology). The processed data were then gridded to produce a map of magnetic anomalies. Individual anomalies were tagged and images taken in a similar process to that undertaken for the sidescan sonar data.
- 3.3.41 The multibeam bathymetry data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded processed at the appropriate resolution and analysed using Fledermaus software, which enables a 3-D visualisation of the acquired data and geo-picking of seabed anomalies.
- 3.3.42 The SBP data were studied in order to detect and in-filled palaeochannels, ravinement surfaces, peat/fine-grained sediment horizons, or other deposits that may have archaeological potential. The data were processed by Wessex Archaeology using Coda Seismic+ software. This software allows the data to be visualised with user selected filters and gain settings in order to optimise the appearance of the data for interpretation. The software then allows an interpretation to be applied to the data by identifying and selecting sedimentary boundaries and shallow geological features that might be of archaeological interest.



- 3.3.43 The SBP data were interpreted with a two-way travel time (TWTT) along the z-axis. In order to convert from TWTT to depth, the velocity of the seismic waves was estimated to be 1,600ms<sup>-1</sup>. This is a standard estimate for shallow, unconsolidated sediments.
- 3.3.44 Any small reflectors which appear to be buried material such as a wreck site covered by sediment were also recorded, the position and dimensions of any such objects noted in a gazetteer, and an image of each anomaly acquired. It should be noted that anomalies of this type are rare, as the sensors must pass directly over such an object in order to produce an anomaly.

*Anomaly Grouping and Discrimination – Geophysical Data*

- 3.3.45 The previous section describes the initial interpretation of all available geophysical datasets which were conducted independently of one another. This inevitably leads to the possibility of any one object being the cause of numerous anomalies in different datasets and apparently overstating the number of archaeological features in the survey areas.
- 3.3.46 To address this fact, the anomalies were grouped together along with any previously identified features from past investigations and UKHO records of wrecks and obstructions that fall within the survey areas. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record, a magnetic anomaly and multiple sidescan sonar anomalies.
- 3.3.47 Once all geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to the record in order to discriminate against those which are not thought to be of archaeological concern. For anomalies located on the seabed, these flags are as follows:

**Table 2: Criteria discriminating relevance of seabed feature to proposed scheme**

<b>Non-Archaeological</b>	U1	Not of anthropogenic origin
	U2	Known non-archaeological feature
	U3	Position of a recorded loss at which no physical wreck remains have ever been identified
<b>Archaeological</b>	A1	Anthropogenic origin of archaeological interest
	A2	Uncertain origin of possible archaeological interest
	A3	Historic record of possible archaeological interest (A3) – UKHO reference to feature that shows no trace on seabed

- 3.3.48 Similarly, the discrimination flags applied to shallow geological features of possible archaeological potential are ascribed as follows (**Table 3**):

**Table 3: Criteria discriminating relevance of palaeogeographic feature to proposed scheme**

<b>Non-Archaeological</b>	U2	Feature of non-archaeological interest
<b>Archaeological</b>	P1	Feature of probable archaeological interest, either because of its palaeogeography or likelihood for producing palaeoenvironmental material
	P2	Feature of possible archaeological potential

- 3.3.49 The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of



the geophysical interpretation and desk-based assessment for further evaluation should more information become available.

#### *Co-ordinate System*

- 3.3.50 All 2016 geophysical data were acquired in ETRS89 UTM31N projected coordinates. The 2012 geophysical survey data were acquired in WGS84 UTM Zone 31N. All results are given in ETRS89 UTM31N.

#### *Geoarchaeological Framework*

- 3.3.51 Alongside the archaeological assessment of the SBP data, a geoarchaeological assessment of provided geotechnical logs was also undertaken within NV East, NV West and the provisional OCC. Wessex Archaeology has developed a five-stage approach to geoarchaeological investigations, encompassing different levels of investigation appropriate to the results obtained, accompanied by formal reporting of the results at the level achieved. The stages are summarised in **Table 4**.

**Table 4: Stages of geoarchaeological assessment**

Stage 1: Geoarchaeological review	A review of samples and logs generated by geotechnical contractors. This assessment will establish the presence and location of sediment units with likely archaeological, palaeo-environmental and / or dating potential, as a basis for deciding what Stage 2 archaeological recording is required.  The Stage 1 report will state the scale of Stage 2 work proposed. Should no further works be required a brief Stage 1 report outlining the results of the assessment will be prepared.
Stage 2: Geoarchaeological description & interpretation	Each sample containing sediment units identified as having archaeological, palaeo-environmental or dating potential will be cleaned, recorded, and the sediments described geoarchaeologically following Hodgson (1997). Preliminary interpretations will be made, those units of particular archaeological/palaeo-environmental interest will be highlighted, and an outline deposit model will be constructed/ added to if appropriate. The Stage 2 report will set out the nature and scope of any Stage 3 work which may be required to further characterise and interpret the sediment units in order to identify areas of potential archaeological or palaeoenvironmental significance.  If during Stage 2 the potential is shown to be limited to well-defined areas which could be addressed by specific targeted sampling, a programme of investigation combining limited Stage 3/4 works may be proposed. This work would output to a final client report or straight to publication, depending on the requirements of the client and curator.



<p>Stage 3: Sub-sampling and palaeoenvironmental assessment</p>	<p>Sub-sampling and assessment of any units of archaeological and / or palaeo-environmental interest. Sub-samples for the assessment of microfossil environmental indicators (including pollen, diatoms, plant macrofossils, molluscs, ostracods and / or foraminifera) will be taken. As far as possible the subsamples will be taken in such a manner that the remaining core is retained intact should further sub-sampling be required.</p> <p>The subsamples will be assessed, with the relevant ecofacts being identified to at least main Taxon, with quality of preservation and approximate quantification). This enables the value of the palaeo-environmental material surviving within the samples to be identified.</p> <p>Should radiocarbon dating have been specified at this stage by the Stage 2 report, then suitable material will be extracted from appropriate subsamples and submitted. If not, then sub-samples will also be taken and retained at this stage in case radiocarbon dating is required during Stage 4. The Stage 3 report will set out the results of each laboratory assessment, and summarise the archaeological implications of the combined results. The potential of the material will be summarised, and recommendations will be made as to whether any Stage 4 work is warranted. If Stage 4 work is recommended, then the specifics will be laid out.</p>
<p>Stage 4: Analysis and Dating</p>	<p>Full analysis of environmental indicators (including pollen, diatoms, plant macrofossils, molluscs, ostracods and / or foraminifera) from subsamples specified in the Stage 3 report.</p> <p>Typically, Stage 4 will be supported by radiocarbon dating of suitable sub-samples. Should Stage 3 assessment indicate that there is no further analytical work required on the microfossil assemblages, consideration will still be given for a programme of radiocarbon analyses to provide a chronological framework for the deposits encountered unless no suitable samples could be procured. The Stage 4 report will provide an account of the palaeo-environment(s) at each relevant sample location within a chronological framework (absolute or relative) and an outline of the archaeological implications of the analysis.</p>
<p>Stage 5: Final Reporting</p>	<p>If the archaeological results are sufficiently significant, a final report will be compiled for submission to a suitable journal, to be agreed with the client and curator. This publication report will cover all aspects of the palaeo-topography and prehistory of the area affected by the development, incorporating the results of each stage.</p> <p>If the archaeological results are not significant then the relevant Stage Report(s) will constitute the final documents for the investigation.</p>

3.3.52 The geoarchaeological assessment within this report comprises Stage 1 of the framework described in **Table 4**, and serves to support the archaeological assessment of the SBP data.

#### *Stage 1 Assessment Methodology*

3.3.53 Across the Norfolk Vanguard offshore project area, a total of 65 geotechnical sampling locations were investigated. Vibrocores were acquired at the locations by Fugro Geoconsulting during September 2016. The resulting geotechnical report, including detailed geotechnical logs, was provided to Wessex Archaeology and used as a basis for the Stage 1 assessment (Fugro, 2016). The geoarchaeological assessment was undertaken in September 2016 by geoarchaeologists at Wessex Archaeology (Wessex Archaeology, 2017).

- 3.3.54 This initial review identified sequences of bedded, laminated, fine-grained and organic sediments of probably Pleistocene and Holocene origin and of potential archaeological and palaeoenvironmental interest. As a result, the vibrocores were assigned low, medium, high and very high priority status. Those of high priority were put aside for further Stage 2 geoarchaeological work. Those identified as low priority were geotechnically logged and sampled with archaeological advice given to the geotechnical engineers on recognising and putting aside sediments of geoarchaeological significance. The geotechnical logging and sampling of the medium priority locations were monitored at Fugro House, Wallingford by a geoarchaeologist during October 2016.
- 3.3.55 The geotechnical logs were subject to a desk-based assessment by Wessex Archaeology in order to identify any samples that may contain deposits of archaeological and palaeoenvironmental potential. Of greatest interest are sediments from former terrestrial depositional environments, as well as certain features or inclusions of possible archaeological and palaeoenvironmental interest, specifically:
- *Peat layers;*
  - *Deposits containing other organic material such as wood fragments, roots, dark organic staining etc.;*
  - *Clay or silt deposits, especially those containing laminated features such as lacustrine varves or tidal rhythmites;*
  - *Inorganic fossils (such as molluscs);*
  - *Concentrations of charcoal; and*
  - *Individual artefacts such as pieces of flint or pottery (although finding these within core samples is unusual); and any other feature thought to indicate a terrestrial depositional environment.*
- 3.3.56 In addition to this individual assessment, the geotechnical logs were also assessed alongside the SBP data to aid in determining the shallow geological sequence along the marine cable corridor and identify any palaeolandscape features of archaeological potential.

### **3.4 Assumptions and Limitations**

- 3.4.1 Data used to compile this report consists of primary geophysical and geotechnical survey data and secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this assessment. The assumption is made that the secondary data, as well as that derived from other secondary sources, is reasonably accurate.
- 3.4.2 The records held by the UKHO, NRHE, NHER and the other sources used in this assessment 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 datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.

### **3.5 Assessment of Setting**

- 3.5.1 According to the NPPF (Department for Communities and Local Government, 2012), setting is defined as 'the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a

setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.’

- 3.5.2 Furthermore, the significance of an asset can be harmed or lost through development occurring within its setting. As marine heritage assets are irreplaceable, any harm or loss to the setting of an asset needs to be justified (*ibid.*).
- 3.5.3 Specific guidance regarding assessing the setting of marine heritage assets with regards to offshore development does not currently exist. However, within Historic England’s *The Setting of Heritage Assets - Historic Environment Good Practice Advice in Planning: 3* (2015) reference is made to buried heritage assets and their setting that may not be readily appreciated by a casual observer, but retain a presence in the landscape such as (in some rare cases to protected wreck sites) that are periodically, partly or wholly submerged. Furthermore, the location and setting of historic battles, otherwise with no visible traces, may include important strategic views, routes by which opposing forces approached each other and a topography that played a part in the outcome (*ibid.*: 4-5).
- 3.5.4 Following discussion between Royal HaskoningDHV and Historic England (per. comm. V. Cooper, 26/04/2017), ‘the setting assessment for offshore assets should focus more on the physical setting, historic associations and character (i.e. rather than visual, noise, dust etc), measured by reference to the capacity of that setting/character to accommodate change. The extent of change will be described within the assessment although this will not be assessed as an impact.’
- 3.5.5 The assessment of setting in this document will consider the value of the known marine heritage assets located within the study area, through intentional events (e.g. during either an isolated military event (hitting a mine within a known minefield) or battle), with regards to their collective setting in the marine landscape, association with historic events and the way they are experienced in their positions. The assessment will also indicate whether their setting (i.e. any relationships between deposits/material with their wider environment) could be altered, which could lead to an overall diminished value.
- 3.5.6 At this stage of the assessment, it is not possible to ascertain the setting of currently unidentified or derived marine heritage assets, or seabed prehistoric sediments. Subsequently, these features/anomalies have not been included in the assessment. For instance, wrecks lost other than by design (e.g. during a storm or through foundering) are not regarded as having setting as their siting is based on chance alone. If further relevant information becomes available in the future, then an assessment of the setting of these assets could be included.

### **3.6 Assessment of Historic Seascape Character**

- 3.6.1 In accordance with the European Landscape Convention, ‘landscape’ can be defined as ‘an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors’ (Council of Europe, 2000: Article 1). The term ‘seascape’ can be defined as 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.*).
- 3.6.2 Seascape assessment reflects the holistic approach to landscape of the European Landscape Convention, extending it to the sea. Seascape Character Areas include coastal land, intertidal and marine environments and cover the offshore environment to the territorial limit (12nm). HSC assessment is the identification and interpretation of the

historic dimension of the present day coastal and marine environment (Natural England, 2012: 33).

### 3.7 Determining Sensitivity and Value

3.7.1 This Technical Report will ultimately inform an EIA for the project that will be presented within the ES. In order to assess the potential impacts of a development upon the marine environment, EIAs typically adopt the conceptual approach known as the 'source-pathway-receptor' model. This approach is based on the identification of the source (i.e. the origin of a potential impact), the pathway (i.e. the means by which the effect of the activity could impact a receptor) and the receptor that may be impacted (e.g. known/potential heritage assets). For the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered. This section outlines how the sensitivity of marine heritage assets is ascertained.

3.7.2 The capability of a receptor to accommodate change and its ability to recover if affected is a function of its sensitivity. Receptor sensitivity is typically assessed via the following factors:

- *Adaptability – the degree to which a receptor can avoid or adapt to an effect;*
- *Tolerance – the ability of a receptor to accommodate temporary or permanent change without significant adverse impact;*
- *Recoverability – the temporal scale over and extent to which a receptor will recover following an effect; and*
- *Value – a measure of the receptor's importance, rarity and worth.*

3.7.3 Archaeological and cultural heritage receptors cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each asset is predominantly quantified only by its value.

#### *Assessment Criteria – Value of an Asset*

3.7.4 Based on Historic England's *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (English Heritage, 2008: 21), the significance of a historic asset 'embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it'.

3.7.5 Within this document, significance is weighed by consideration of the potential for the asset to demonstrate the following value criteria:

- *Evidential value – deriving from the potential of a place to yield evidence about past human activity;*
- *Historical value – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;*
- *Aesthetic value – deriving from the ways in which people draw sensory and intellectual stimulation from a place; and*
- *Communal value – deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values, but tend to have additional and specific aspects.*



3.7.6 With regards to assessing the value of shipwrecks, the following criteria listed in English Heritage's *Ships and Boats: Prehistory to Present – Designation Selection Guide* (English Heritage (now Historic England), 2012) can be used to assess an asset in terms of its value:

- *Period;*
- *Rarity;*
- *Documentation;*
- *Group value;*
- *Survival/condition; and*
- *Potential.*

3.7.7 These aspects help to characterise each asset whilst also comparing them to other similar assets. The criteria also enable the potential to contribute to knowledge, understanding and outreach to be assessed.

3.7.8 The value of known archaeological and cultural heritage assets were assessed on a five-point scale using professional judgement informed by criteria provided in **Table 5** below.

**Table 5: Criteria to assess the archaeological value of marine assets**

Value	Definition
<b>Very High</b>	<ul style="list-style-type: none"><li>• Best known or only example and / or significant potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable international dimension to their importance are likely to fall within this category.</li><li>• Wrecked ships and aircraft that are protected under the Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986 with an international dimension to their importance, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value.</li><li>• Known submerged prehistoric sites and landscapes with the confirmed presence of largely <i>in situ</i> artefactual material.</li></ul>
<b>High</b>	<ul style="list-style-type: none"><li>• Above average example and / or high potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable national dimension to their importance are likely to fall within this category.</li><li>• All other wrecked ships and aircraft with statutory protection under the Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value.</li><li>• Palaeogeographic features with demonstrable potential to include artefactual and / or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.</li></ul>
<b>Medium</b>	<ul style="list-style-type: none"><li>• Average example and / or moderate potential to contribute to knowledge and understanding and / or outreach.</li><li>• Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation.</li><li>• Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.</li></ul>
<b>Low</b>	<ul style="list-style-type: none"><li>• Below average example and / or low potential to contribute to knowledge and understanding and / or outreach.</li><li>• Includes wrecks of ships and aircraft that do not have statutory protection or</li></ul>



Value	Definition
	equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. <ul style="list-style-type: none"><li>• Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.</li></ul>
<b>Negligible</b>	<ul style="list-style-type: none"><li>• Poor example and / or little or no potential to contribute to knowledge and understanding and / or outreach. Assets with little or no surviving archaeological interest.</li></ul>

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

3.7.10 To further supplement this approach, the ALSF-funded *Marine Class Description and principles of selection for aggregate producing areas* project (ALSF 5383), undertaken by Wessex Archaeology (2008a), proposed a composite timeline that considers wrecks in five distinct date ranges. The timeline takes into account the broad chronology of shipbuilding, thus drawing out generalisations regarding the age and special value of sites. The timeline is summarised as follows:

- *Pre- 1508 AD: this covers the period from the earliest Prehistoric evidence for human maritime activity to the end of the medieval period, c. 1508. Little is known of watercraft or vessels from this period and archaeological evidence of them is so rare that all examples of craft are likely to be of special value;*
- *1509 to 1815: this encompasses the Tudor and Stuart periods, the English Civil War, the Anglo-Dutch Wars and later the American Independence and French Revolutionary Wars. Wrecks and vessel remains from this date are also quite rare, and can be expected to be of special value;*
- *1816 to 1913: this period witnessed great changes in the way in which vessels were built and used, corresponding with the introduction of metal to shipbuilding, and steam to propulsion technology. Examples of watercraft from this period are more numerous and as such, it is those that specifically contribute to an understanding of these changes that should be regarded as having special value;*
- *1914 to 1945: this period encompasses the World War I (WWI), the Interwar years and the World War II (WWII). This date range contains Britain's highest volume of recorded boat and ships losses. Those which might be regarded as having special interest are likely to relate to technological changes and to local and global activities during this period; and*
- *Post 1945: the final period extends from 1946 through the post-war years to the present day. Vessels from this date range would have to present a strong case if they are to be considered of special interest.*

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



## 4 ARCHAEOLOGICAL ASSESSMENT OF SEABED PREHISTORY

### 4.1 Geological Baseline

- 4.1.1 The NV West and NV East areas are situated approximately 47km and 89km east of the nearest location on the coast in north Norfolk, respectively. The associated provisional OCC extends 95km east from the landfall search area between Bacton Green and Happisburgh South (**Figure 1**).
- 4.1.2 This places the study area within the southern North Sea Basin. This shallow marine basin has existed in the approximate location of the North Sea since the Early Tertiary (although the exact location and extent has altered over time), which is reflected in the geology of the region (Cameron *et al.*, 1992).
- 4.1.3 The background geology of the study area is dominated by a series of Pleistocene deposits, ranging in age from the Lower Pleistocene (Westkapelle Ground Formation) to the Upper Devensian (Twente Formation).
- 4.1.4 The Pleistocene history of the southern North Sea is dominated by repeated glacial / interglacial cycles and the effects of the associated rises and falls in relative sea level, which has resulted in large areas of the southern North Sea being periodically exposed as a terrestrial environment. This is represented in the geological record, with distinct terrestrial landscape features being present, interspersed with deposits of marine and glacially derived sediments. This series of terrestrial and shallow marine deposits represents the Pleistocene geological record of the area.
- 4.1.5 The southern North Sea off the coast of East Anglia, is thought to have directly experienced only one episode of glaciation, during the Anglian Period (c. 480,000 to 423,000 BP), although the area will still have been affected by the changes in sea level resulting from subsequent glacial / interglacial cycles (**Figure 2**). The exact southern extent of the Anglian glaciation is currently debated, although a series of enclosed deeps previously identified within multibeam bathymetry data, most notably two large features located between the Shipwash and Inner Gabbard sand banks, have been interpreted as being glacial in origin (Emu, 2009). This suggests that at least a lobe of the Anglian ice sheet extended as far south as offshore Felixstowe (**Figure 3**).
- 4.1.6 As the area off East Anglia has only experienced at the most one glacial advance, palaeolandscapes features from periods of low relative sea level are more likely to be preserved here rather than further north (approximately north of the north Norfolk coast), where they have been removed during the subsequent Saalian and Devensian glacial advances.
- 4.1.7 The terrestrial Pleistocene sediments in this area generally comprise fluvial and associated deposits (e.g. palaeochannels, gravel terraces, floodplain deposits), and deposits associated with lagoon and lacustrine environments.
- 4.1.8 Overlying the Pleistocene sediments is a sequence of Holocene deposits. Surveys and coring in this area have identified deposits of terrestrial sediments, including peat, which are thought to have been deposited prior to and during the early to mid-Holocene marine transgression. Some of these cores appear to show a gradual upwards transition through saltmarsh peat to intertidal mud, and as such give evidence of the flooding of a terrestrial landscape by the rapidly advancing sea (Cooper *et al.*, 2008).



- 4.1.9 These terrestrial sediments are overlain by a deposit of sands, gravels and muds, which represent modern marine sediment deposited since the Holocene marine transgression. Based on regional sea-level curves this occurred c. 8,900 to 5,000 BP.
- 4.1.10 Holocene seabed features of note within the area are the sand banks known as the Great Yarmouth Banks, located off the Norfolk coast. In particular, Smiths Knoll, Hearty Knoll and Winterton Ridge, which lie just north of the provisional OCC (Cooper *et al.*, 2008). These are a system of ridges of reworked outwash sediments from the last glaciation, formed and maintained by tidal meander channels. These mostly overlie the pre-glacial Pleistocene sediments.

## 4.2 Geophysical and Geotechnical Palaeogeographic Assessment

- 4.2.1 The following section details the results of the palaeogeographic assessment of the geophysical data. To aid in the archaeological assessment of the sub-bottom profiler data, a basic stratigraphy of the whole study area was devised from both the assessed data and the geotechnical logs. This broad stratigraphy is summarised below, with detailed descriptions of individual palaeogeographic features presented after by study area. A full table detailing the individual palaeogeographic features is also provided in **Appendix III, IV and V**. There are no designated prehistoric archaeological sites located in the study area.
- 4.2.2 A total of eight broad geological units were identified (**Table 6**):

**Table 6: Shallow geological units identified within the study areas**

Unit	Unit Name	Geophysical Characteristics <sup>(1)</sup>	Sediment Type <sup>(2)</sup>	Archaeological Potential
8	<b>Holocene Seabed Sediments</b> (post-transgression) (Marine Isotope Stage (MIS) 1)	Generally observed as a veneer or thickening into large sand wave and bank features up to 10m thick. Boundary between surficial sediments and underlying units not always discernible.	Gravelly sand with shell fragments, sand waves and ripples indicate sediment is mobile.	Considered of low potential in itself, but possibly contains re-worked artefacts and can cover wreck sites and other cultural heritage.
7	<b>Holocene Sediments</b> (Pre-transgression) (MIS 2 to 1)	Small shallow infilled channels with either seismically transparent fill, or fill characterised by sub-parallel internal reflectors. Also comprises a basal high amplitude reflector peat layer.	Fluvial, estuarine and terrestrial (including peat) deposits.	Potential to contain <i>in situ</i> and derived archaeological material, and palaeoenvironmental material.
6	<b>Twente Formation</b> (Upper Devensian) (MIS 3 to 2)	Not definitively identified within the geophysical data.	Thin layer of aeolian periglacial sand.	Potential to contain <i>in situ</i> and derived archaeological and palaeoenvironmental material, and to protect underlying surfaces.



Unit	Unit Name	Geophysical Characteristics <sup>(1)</sup>	Sediment Type <sup>(2)</sup>	Archaeological Potential
5	<b>Brown Bank Formation</b> (Late Ipswichian to Lower Devensian) (MIS 5d to 3)	Observed as a blanket deposit across much of the area, either acoustically transparent or characterised by sub-horizontal layered reflectors.	Clayey silty sand infilling channels or hollows and deposited in an intertidal / lagoon environment.	<i>In situ</i> Lower Palaeolithic artefacts may be protected. Middle Palaeolithic <i>in situ</i> and derived artefacts may be associated particularly with channel edges dependent on the age of the fill. Palaeoenvironmental information. Basal contact may cover old land surfaces.
4	<b>Lower Brown Bank / Eem Formation</b> (Ipswichian or Lower Devensian) (MIS 5e to 5d)	Observed within large topographically controlled depressions. Characterised by low relief basal and either an acoustically transparent or well-layered fill.	Silty sand and sandy silt, possible intertidal or shallow marine deposits.	<i>In situ</i> Lower Palaeolithic artefacts may be protected. Middle Palaeolithic <i>in situ</i> and derived artefacts may be associated particularly with channel edges dependent on the age of the fill. Palaeoenvironmental information. Basal contact may cover old land surfaces.
3	<b>Swarte Bank Formation</b> (Anglian) (MIS 12)	Not definitively identified within the geophysical data	Sub-glacial channel fill, comprising a basal reworked till with upper glaciolacustrine / glaciomarine sediment.	Unlikely to contain archaeological material.
2	<b>Yarmouth Roads Formation</b> (Lower to Middle Pleistocene) (MIS 62 to 13)	Thick unit either seismically chaotic or containing numerous areas of well-defined cross cutting channel complexes characterised by layered sub-parallel internal reflectors. Top of unit generally a well-defined regional erosion surface.	Silty sand with occasional shell fragments with occasional layers of clay. Generally becoming silty with depth. Sediments deposited as part of delta complex.	Possibility of <i>in situ</i> finds in later part of formation if not eroded. Contemporaneous with terrestrial Cromer Forest Bed Formation (Pakefield and Happisburgh). Has been found to contain plant debris, wood and peat in some areas of possible palaeoenvironmental importance. Potential greatest where associated with river valleys.



Unit	Unit Name	Geophysical Characteristics <sup>(1)</sup>	Sediment Type <sup>(2)</sup>	Archaeological Potential
1	<b>Westkapelle Ground Formation</b> (Lower Pleistocene) (MIS 103 to 63)	Acoustically unstructured unit with a generally well-defined basal reflector.	Deltaic silty clays and sands.	Pre-Earliest occupation of the UK
<sup>(1)</sup> Based on geophysical data				
<sup>(2)</sup> Based on borehole data and Cameron <i>et al.</i> , (1992)				

4.2.3 The above stratigraphy is a combination of the identified shallow geological units from across the three study areas. The entire stratigraphy was not identified in any one single place, and the exact number of units present will differ depending on location.

#### *Norfolk Vanguard East*

4.2.4 Of the stratigraphy outlined in **Table 6**, only Unit 2, Unit 4, Unit 5 and Unit 8 were identified within NV East. This area is characterised by broad, elongate, generally NNW to SSE trending features, the locations of which are illustrated in **Figure 4**. Individual features or archaeological potential are described in **Appendix III**.

4.2.5 The basal shallow geological unit within NV East is Unit 2, the Yarmouth Roads Formation and is observed across the entirety of this area. Generally, Unit 2 is a relatively acoustically unstructured unit, with very few internal reflectors. However, in some areas, large, complex cross cutting channels are observed, characterised by well-defined sub-parallel internal reflectors. In NV East, these channel features are most obvious towards the west of the area.

4.2.6 Unit 2 is identified in the vibrocores as predominantly sand with occasional laminae of clay and thick clay beds. It is interpreted as an extensive delta top deposit covering a large section of the southern North Sea, deposited during the Cromerian prior to the Anglian Glaciation (Cameron *et al.*, 1992).

4.2.7 The upper layers of the Yarmouth Roads Formation are interpreted as being contemporaneous with the Cromer Forest Bed Formation of East Anglia, within which the Lower Palaeolithic sites at Happisburgh and Pakefield have been discovered (Parfitt *et al.*, 2010; Parfitt *et al.*, 2005). As such, there is the potential for both *in situ* and reworked archaeological and palaeoenvironmental material to be present within Unit 2. The potential for archaeological material of this age within the offshore region is considered greatest in the upper layers of Unit 2 and in areas of internal channelling. Due to the extensiveness and complexity of the upper Unit 2 channels, features have not been mapped individually. Due to this complexity, the channels within this unit are interpreted as a complex delta-top deposit rather than a single river channel.

4.2.8 One feature, anomaly number **75014**, was interpreted as being a small area of intermittent high amplitude reflectors, possibly within Unit 2. This may be indicative of preserved organic material which may suggest a buried terrestrial environment, and such material (e.g. peat and wood) has been retrieved by sampling from within the Yarmouth Roads formation in the past (Cameron *et al.*, 1992). Any well-preserved organic matter



discovered within Unit 2 may be of palaeoenvironmental importance, as preserved material from within these sediments can be used to aid in the reconstruction and dating of buried landscapes.

- 4.2.9 Directly above Unit 2 in the NV East area are a number of infilled topographically-controlled depressions (**75000**, **75003**, **75009**, **75011**, **75015**, **75016** and **75017**; **Figure 4**). These are elongate (trending approximately NNW to SSE), relatively broad and shallow features, and in NV East are characterised by either a single or two phases of acoustically unstructured fill (**Figure 5**). Borehole information from the 2010 phase of the study, (EA10-G-006, which samples feature **75015**), indicates the lower fill comprises sandy silt, and the upper fill silty fine sand, whilst CPT data from along the provisional OCC (VC116) suggests a single fill of dense sand.
- 4.2.10 These features have been classified as Unit 4, but their age is uncertain. They could belong to one of two BGS formations; either the Eem Formation, or a lower unit of the Brown Bank Formation. The Eem Formation is Ipswichian in age, and is described as a shallow marine / intertidal deposit of shelly and muddy sands, whilst the Brown Bank Formation is a lagoon deposit of Lower Devensian Age (Cameron *et al.*, 1992). The features identified here could represent a gradual transition between the Eem and Brown Bank formations, and be either Upper Ipswichian or Lower Devensian in age (MIS 5e to 5d).
- 4.2.11 The archaeological potential of these features depends on their age. As a marine deposit, the archaeological potential of the Eem Formation is considered relatively low, although the unit may cover and protect earlier land surfaces. The potential of the Brown Bank Formation is interpreted to be higher, with the possibility of derived artefacts and intact organic material of palaeoenvironmental interest. However, human absence in the area during the development of the Lower Brown Bank indicates the unit is unlikely to contain *in situ* artefacts. Further work would need to be undertaken to determine the precise age of these Lower Brown Bank Formation / Eem Formation infilled depressions.
- 4.2.12 Situated above Unit 4 is a blanket deposit of Brown Bank Formation (Unit 5), present across the whole of NV East. This unit is characterised by poorly defined sub-horizontal internal reflectors, and has been found by vibrocoring undertaken as part of the Norfolk Vanguard study to comprise silty clay and clayey silt, with an occasional upper layer of cleaner loose silt. As previously mentioned, this is interpreted as being a Lower Devensian lagoon deposit. Dating of similar upper Brown Bank Formation sediments to the east indicate that that the infill continued into the late Devensian during the period of human re-occupation (Limpenny *et al.* 2011).
- 4.2.13 The archaeological potential of the Brown Bank Formation is variable, with *in situ* and derived artefacts possible where the unit forms channel features. Complex internal features (described in both the NV West and provisional OCC sections below) have been identified within Unit 5 in other areas (mostly NV West), although no such features have been identified within NV East. This may be due to an absence of these features in this area, or due to differences in data resolution between different data sets. Due to this lack of internal features, the archaeological potential for this blanket deposit within NV East is thought to be lower than that in other areas of the site.
- 4.2.14 However, large areas of seismic blanking, interpreted as representing accumulations of shallow gas, have been identified within Unit 5. These have been included within the list of palaeolandscape features (**Figure 4**), as they suggest the presence of preserved organic material within the sediment. The source of the gas may be uncertain, however. The largest accumulations of gas (**75002** and **75004**) appears to be generally associated with

the largest of the Lower Brown Bank Formation / Eem Formation features (**75000**, **75003**, and **75009**), and are orientated along the same general NNW to SSE alignment. This possibly suggests the actual source of the gas may be within these earlier (Unit 4) features, not in the Unit 5 blanket deposit itself. However, the correlation is not entirely consistent and this interpretation remains uncertain.

- 4.2.15 Samples from within Unit 5, acquired as part of the geotechnical survey, have been recommended for further geoarchaeological work in order to refine the interpretation and archaeological potential of the Brown Bank Formation (Wessex Archaeology, 2017).
- 4.2.16 Overlying Unit 5 across the site is a deposit of post-transgression Holocene marine sediment (Unit 8), found by boreholing to comprise fine to coarse sand, which is silty and contains organic matter in some areas (probably reworked). This sediment varies in thickness from a thin veneer to sand banks up to 15m thick, and the boundary between it and the underlying Unit 5 is often unclear. These sediments are not considered to be of archaeological potential in themselves, although they could periodically bury and expose sites such as shipwrecks in areas of mobile sediment, and thicker sand deposits could protect earlier land surfaces.

#### *Norfolk Vanguard West*

- 4.2.17 The shallow geological sequence within NV West is very similar to NV East. In this area, all of units outlined in **Table 6** have been identified, with the exception of Unit 1. The locations of palaeolandscapes features of archaeological potential is illustrated in **Figure 6**, and individual features described in **Appendix IV**.
- 4.2.18 The oldest unit identified within NV West is Unit 2 (Yarmouth Roads Formation) and is observed throughout the area. The unit is generally acoustically unstructured, with some areas containing distinct, complex, cross-cutting channels. As previously described, there is the potential for both *in situ* and reworked archaeological and palaeoenvironmental material to be present within the upper layers of Unit 2, especially in the vicinity of channels features.
- 4.2.19 Unit 3 was not definitively identified by Wessex Archaeology during the geophysical assessment of the SBP data, but interpretation of deeper stratigraphy undertaken by Fugro using ultra high resolution (UHR), multi-channel data (Fugro, 2017a), has indicated it is present within NV West. Unit 3 is characterised by a number of deep, generally north – south trending palaeovalleys infilled with an acoustically unstructured fill. These are interpreted as Swarte Bank Formation channels – subglacial valleys created during the Anglian glaciation, filled with redeposited till and possible glaciolacustrine / glaciomarine sediment (Cameron *et al.*, 1992).
- 4.2.20 Due to the nature of this unit and the subglacial environment in which it was deposited, Unit 3 is not considered of archaeological interest. As such, these features are not described further.
- 4.2.21 In contrast with the relatively large, distinct features visible within NV East, Unit 4 has only been tentatively, sporadically identified within NV West. Here, the features are relatively thinner, and correlation between individual survey lines proved difficult. As such, no individual features from Unit 4 have been mapped within NV West, but it should be highlighted that scattered remnants of this unit are likely to remain at the base of the Brown Bank Formation (Unit 5).
- 4.2.22 As described previously, the archaeological potential of Unit 4 depends on its age. As a marine deposit, the archaeological potential of the Eem Formation is considered relatively



low, although the unit may cover and protect earlier land surfaces. The potential of the Brown Bank Formation is interpreted to be higher, with the possibility of derived artefacts and intact organic material of palaeoenvironmental interest.

- 4.2.23 As with NV East, Unit 5 is present as a blanket deposit across the whole of NV West, and in this area is a well-defined deposit characterised by numerous sub-parallel internal reflectors, suggesting well-layered sediments, with a distinct basal reflector (**Figure 7**). Within NV West, Unit 5 appears to be a complex unit with several different types of internal features, some of which may be of palaeogeographic interest.
- 4.2.24 Within the southern section of the NV West area, a small area of coarse sediment deposit of Ipswichian or Devensian age is identified at the base of the Brown Bank Formation (**75127**). The feature is identified as a small mound above the Unit 5 basal reflector on the SBP data and is interpreted as being a possible bank deposit or transgression feature, which could represent the remnant of a past coastline or coastal bank. As such, there is the potential for it to contain both *in situ*, depending on the time of deposition relative to periods of hominin occupation, and derived archaeological material. It could also cover and protect a section of intact land surface, and be of potential importance to palaeoenvironmental studies. However, further work, such as analysis of core samples, would be required to confirm this interpretation of this feature. This is the only such feature of this type to be identified within NV West.
- 4.2.25 A number of V-shaped features have been identified within Unit 5. These are characterised by a poorly defined to absent basal reflector and an acoustic transparent or chaotic fill, in contrast with the surrounding layered fill characteristic of most of the unit. These features often have their origin just below the base of Unit 5 in the upper layers of Unit 2, and have been interpreted as fluid escape features. As natural features created by diagenetic processes, these fluid escape structures are not considered to be of archaeological potential.
- 4.2.26 A number of internal surfaces have been identified, which range from relatively strong undulating reflectors to surfaces providing a boundary between two different sets of internal reflectors with slightly different angles of dip. These have been interpreted as possible internal erosion surfaces.
- 4.2.27 As the Brown Bank Formation is interpreted as a shallow lagoon deposit, it is possible that the lagoons dried up periodically, exposing the previously submerged sediment surface as dry land. These drying episodes could then have created the identified internal erosion surfaces. If this is the case, these surfaces could be of high archaeological potential as they would represent buried land surfaces. However, their exact potential would depend upon their age.
- 4.2.28 The identified erosion surfaces are difficult to trace between survey lines and, as such, could not be mapped with a high degree of confidence. They are therefore not included in the gazetteer of palaeogeographic features.
- 4.2.29 Of particular interest within Unit 5 are four areas of anomalous internal features – **75055**, **75081**, **75099** and **75115**. These are mostly clustered along the west of NV West, loosely aligned in a belt running NNW to SSE along the western edge of the area, although one small group (**75081**) is located towards the east (**Figure 6**).
- 4.2.30 These features are situated on top of erosion surfaces as described previously, and are characterised by a series of acoustically unstructured sediment domes with the more typical Unit 5 fill draped over the top (**Figure 8**). These have been interpreted as possible



relict dune features, developed on an erosion surface during a period of drying of the Brown Bank Formation lagoon.

- 4.2.31 Some of these features can be fairly large, up to 2 to 3m in height, suggesting the exposure of the erosion surface as a terrestrial landscape for a significant period of time. This long time period increases the archaeological potential of the erosion surfaces identified within Unit 5, especially those in the vicinity of the dune features. These could not only have provided a surface upon which human communities lived, but the mobile dunes could also preserve and protect any underlying land surface.
- 4.2.32 The elongate nature of some of the areas of dunes, combined with their alignment, suggest they may represent a buried coastline. However, more work would need to be carried out in order to test this interpretation.
- 4.2.33 Small areas of acoustic blanking, interpreted as shallow gas, have also been identified within Unit 5. These are present at two levels within the stratigraphy. A small area of acoustic blanking, **75056**, has been identified relatively deep within Unit 5. This has the 'classic' appearance of shallow gas, with a high amplitude reflector and associated blanking, and potentially indicates the presence of preserved organic material within the sediment.
- 4.2.34 The remaining areas of acoustic blanking are much shallower, and located towards the top of Unit 5. These are much less distinct, have a poorly defined reflector and the associated blanking is less pronounced. These could either be areas of shallow gas created by organic material within the sediment, or they could represent localised gravel deposits. Feature **75100** is an elongate area of blanking apparently directly associated with shallow, pre-transgression Holocene channelling.
- 4.2.35 Areas of blanking are not considered of high archaeological potential in themselves, but they could represent areas of preserved organic material of interest to palaeoenvironmental studies.
- 4.2.36 The presence of internal features such as erosion surfaces and dunes within Unit 5 suggest that the Brown Bank Formation is a more complex unit than previously thought. The SBP data suggest a multi-period, multi-phase unit rather than a single continuous deposition of lagoon clay, which may have implications for the archaeological potential of the unit as a whole.
- 4.2.37 Vibrocore samples from within Unit 5 have been recommended for further geoarchaeological work to refine the interpretation and archaeological potential (Wessex Archaeology, 2017).
- 4.2.38 Overlying the Brown Bank Formation within some areas of NV West is the Twente Formation (Unit 6). This was not definitively identified within the SBP data, but sediments tentatively associated with the Twente Formation have been identified within a number of vibrocores (VC075, VC076, and VC088). The approximate extents of Unit 6 have been taken from the BGS data (BGS 1984) and displayed in **Figure 6**.
- 4.2.39 The vibrocore data indicate the Twente Formation is a thin deposit of sand, approximately 1m thick, and is interpreted as a periglacial aeolian sand deposit of Upper Devensian age. Following the Last Glacial maximum (LGM), the northward retreat of the Devensian ice sheet would have exposed fresh land surfaces. Without extensive vegetation to hold sediment in place, winds would have carried loose sediments southwards to be deposited as aeolian sand.

- 4.2.40 Such wind-blown covers and deposits are also found in East Anglia and on continental Europe, where they have relatively high archaeological potential. In such low-lying, predominantly wetland, areas, even relatively small sand ridges such as these can produce an area of high, potentially dry ground which would be favourable for habitation. Sites such as Peacock's Farm in Cambridgeshire and the Great Coversand Ridge in northern Belgium show that Prehistoric communities were using such features (Crombé *et al.*, 2012). The surrounding (and underlying) Brown Bank Formation suggests a similar low-lying wetland landscape within the area, and as such there is the potential for *in situ* archaeological material to be present within the Twente Formation.
- 4.2.41 Vibrocore samples acquired during the Norfolk Vanguard geotechnical survey from within Unit 6 have been recommended for further geoarchaeological assessment to refine the interpretation and archaeological potential (Wessex Archaeology, 2017).
- 4.2.42 Overlying Unit 6 are a series of Holocene deposits, which have been divided into pre-transgression (Unit 7) and post transgression (Unit 8). The pre-transgression deposits comprise a number of different features. In the northern half of NV West, and very approximately correlated to the extents of Unit 6, is a distinct, intermittent but extensive high amplitude reflector (e.g. **75029**, see **Appendix IV** for full list of features; **Figure 9**). This has been found by vibrocoreing to represent a distinct peat horizon.
- 4.2.43 This peat layer overlays Unit 6 (VC075, VC076 and VC088) and Unit 5 (VC080), but in some places also seems to be within the top metre of Unit 5 itself (VC085). This suggests an extensive terrestrial landscape in this area potentially forming preferentially on top of the aeolian sand deposits. Since the layer extends onto Unit 5, it may indicate periods of drying of the Brown Bank lagoon lasted long enough for such land surfaces to form.
- 4.2.44 The layer has been interpreted as Early Holocene in age, but, due to the possible presence of the same peat layer within the upper Brown Bank Formation, development of the surface may have commenced in the Late Devensian. This layer is likely the 'basal peat' described by BGS as being present at the base of the Elbow Formation (Cameron *et al.*, 1992).
- 4.2.45 This peat layer is considered of high archaeological and palaeoenvironmental potential, as it could contain *in situ* archaeological artefacts and preserved organic material. A number of vibrocore samples from within this layer have been recommended for geoarchaeological assessment (Wessex Archaeology, 2017).
- 4.2.46 A total of 12 shallow channel features have been identified in the NV West area (**75021**, **75025**, **75035**, **75038**, **75045**, **75061**, **75077**, **75092**, **75103**, **75112**, **75122**, and **75125**) (**Figure 6**). These are thought to be pre-transgression fluvial features, and are deemed to be of high archaeological interest as they may provide evidence of a former terrestrial environment and could contain both *in situ* or derived anthropogenic artefacts and preserved palaeoenvironmental material.
- 4.2.47 Some of these Unit 7 channel features appear to correspond with the aforementioned high amplitude peat layer, and are potentially part of the same landscape. Channel feature **75112**, a meandering channel orientated approximately north – south, is followed and overlain by high amplitude feature **75113**. Vibrocore VC074 found a thick bed of clayey peat present within this feature, indicating that this may represent a former terrestrial landscapes and as such, the sediments associated with this feature are deemed to be of high archaeological potential. The feature also appears to be in line with an area of acoustic blanking (feature **75100**) which may indicate diffuse gas in the sediments or a

localised gravel deposit, possibly relating to an older segment of this relict fluvial environment.

- 4.2.48 A further 38 features interpreted to be the same age as the palaeochannels were identified within the NV West area (see **Appendix IV** for full list). These features were only identified along one or two survey lines and could not be traced any distance as coherent palaeochannels. As such, they have been classified as isolated cut and fill features. It is possible that they are the remnants of eroded palaeochannel systems, but as their nature is less certain they are considered of lower archaeological potential.
- 4.2.49 The post-transgression Holocene sediments (Unit 8) are represented by a deposit of marine sediment, found from vibrocore analysis to comprise fine to coarse silty sand, occasionally containing (probably reworked) organic matter in some areas. This sediment varies in thickness from a thin veneer to thick sand dunes, and the boundary between it and the underlying Brown Bank Formation unit is often unclear. These sediments are not considered to be of archaeological potential in themselves, although they could periodically bury and expose sites such as shipwrecks in areas of mobile sediment, and thicker sand deposits could protect earlier land surfaces.

#### *Provisional Offshore Cable Corridor*

- 4.2.50 The shallow geological sequence in the offshore part of the provisional OCC is similar to that experienced within NV East and NV West. However, the sequence changes close to shore. The locations of the features are illustrated in **Figure 10a-d**. Individual features or archaeological potential are described in **Appendix V**.
- 4.2.51 The oldest unit in the sequence interpreted along the provisional OCC is the Westkapelle Ground Formation (Unit 1). Vibrocores acquired as part of the Norfolk Vanguard geotechnical survey have shown the unit to comprise silty sand with some clay layers, and deposited in an open-marine shelf environment dating from the Upper Pliocene and the Lower Pleistocene. As such, it is considered too old to be of archaeological interest as it pre-dates the earliest known human occupation of the UK. Unit 1 outcrops at seabed at the landward end of the provisional OCC, and is gradually overlain by younger deposits further offshore.
- 4.2.52 Unit 1 is directly overlain by Unit 2 (Yarmouth Roads Formation) along most of the provisional OCC. As with NV East and NV West, this unit is generally acoustically unstructured, with some areas containing distinct, complex, cross-cutting channels. As previously described, there is the potential for both *in situ* and reworked archaeological and palaeoenvironmental material to be present within the upper layers of Unit 2, especially in the vicinity of channel features.
- 4.2.53 Unit 3 (Swarte Bank Formation) was not definitively identified by Wessex Archaeology during the geophysical assessment (or by Fugro during their deeper investigations (Fugro, 2017b)), but BGS data (BGS, 1991) indicates a relatively restricted deposit potentially exists at the landfall location. Due to the nature of this deposit and the subglacial environment it was deposited in, Unit 3 is not considered of archaeological interest.
- 4.2.54 Unit 4 has been tentatively identified in some areas of the provisional OCC. As with NV West, this unit proved difficult to trace with confidence between survey lines, and, as such, few definitive features attributed to this unit have been mapped. Of those that have, the majority (**75017**, **75128** and **75129**) are located on the border between the provisional OCC and NV East, whilst one feature (**75152**) is located south of NV West (**Figure 10b**). Features **75128** and **75129** appear to continue into NV East, although no evidence for

them was found during data interpretation of this area. This is attributed to the higher resolution of the more recent data set.

- 4.2.55 As described previously, the archaeological potential of Unit 4 depends on its age. As a marine deposit, the archaeological potential of the Eem Formation is considered relatively low, although the unit may cover and protect earlier land surfaces. The potential of the Brown Bank Formation is interpreted to be higher, with the possibility of derived artefacts and intact organic material of palaeoenvironmental interest. Vibrocore data from within feature **75152** (VC116) suggests Unit 4 along the provisional OCC comprises dense sand. Although some features attributed to Unit 4 have been mapped, it should be noted that other isolated areas of this unit are likely to be present at the base of Unit 5.
- 4.2.56 Offshore, a blanket deposit of Unit 5 (Brown Bank Formation) is present above Unit 2 (and Unit 4, where present). This unit becomes more intermittent closer to shore, where earlier units outcrop at seabed, and is completely absent by approximately 30km from landfall (**Figure 10c**).
- 4.2.57 As within NV West, Unit 5 along the provisional OCC is generally a well-defined deposit characterised by numerous sub-parallel internal reflectors, suggesting well-layered sediments, with a distinct basal reflector. Also as within NV West, Unit 5 along the provisional OCC appears to contain a number of internal features, some of which may be of palaeogeographic interest.
- 4.2.58 Some internal surfaces have been identified, that have been interpreted as possible internal erosion surfaces. As previously described for NV West, these surfaces, potentially created due to periodic drying of the Brown Bank lagoon, could be of high archaeological potential as they would represent buried land surfaces. However, their potential would depend upon their age.
- 4.2.59 The identified erosion surfaces are difficult to trace between survey lines and, as such, have not been mapped or included in the gazetteer of palaeogeographic features.
- 4.2.60 Five areas of dune features (**75156**, **75157**, **75158**, **75161** and **75162**) have also been identified within Unit 5 along the provisional OCC, all situated within the westernmost outcrop of Unit 5 (**Figure 10c**). These are similar to the dune features identified within NV West, but are generally smaller and less well developed. Also as with NV West, they are aligned approximately NNW to SSE, suggesting they may represent a past shoreline. However, more work would need to be carried out in order to test this interpretation. These features are interpreted to be of high archaeological potential, and may contain both *in situ* and derived archaeological material, and may protect the underlying land surface.
- 4.2.61 Small areas of acoustic blanking have also been identified within Unit 5. These are mostly located in the east of the provisional OCC (**75136**, **75137**, **75138** and **75139**), although one area (**75154**) is situated further west. These could either be areas of shallow gas created by organic material within the sediment, or they could represent localised gravel deposits.
- 4.2.62 Areas of acoustic blanking are not considered of high archaeological potential in themselves, but they could represent areas of preserved organic material of interest to palaeoenvironmental studies.
- 4.2.63 Unit 6 (Twente Formation) has not been definitively identified within the OCC. However, two small areas of the deposit are reported by BGS (BGS 1991) as being located within

the provisional OCC, south of NV West. These have been mapped and are illustrated in **Figure 10a**.

- 4.2.64 As described previously, this unit could have provided a land surface upon which human communities could have lived. As such, Unit 6 has a high archaeological potential and could contain *in situ* archaeological artefacts.
- 4.2.65 Overlying Unit 6 are a series of Holocene deposits, which have been divided into pre-transgression (Unit 7) and post transgression (Unit 8). The pre-transgression deposits comprise a number of different features. A few areas (mainly **75140**, **75142** and **75143**) of high amplitude reflectors have been identified overlying Unit 5 and Unit 6 to the south-west of NV West (**Figure 10a**). No vibrocore samples have been obtained from within these features, but correlation with similar high amplitude reflectors in NV West suggest they potentially represent peat deposits.
- 4.2.66 Vibrocore VC111, in the eastern end of the provisional OCC, sampled a thick lamina of black fibrous peat at 5.3m below seabed (BSB), within a unit of slightly sandy clay (interpreted as Unit 5). Although this appears to loosely correspond with a seismic horizon identified on the SBP data, the feature is not as distinct as with the areas of peat within NV West. Also, peat was not identified in any other vibrocores in the vicinity. Therefore, this feature hasn't been mapped as it has been elsewhere, and may be considered as a small, isolated patch of organic material. However, it does indicate that other, similar, isolated deposits may exist within the study areas that are not visible within the SBP data.
- 4.2.67 Peat deposits such as these indicate the presence of buried land surfaces and, as such, are considered of high archaeological and palaeoenvironmental potential.
- 4.2.68 Four channel features have also been identified along the provisional OCC, cutting into the top surface of Unit 5. These features (**75131**, **75144**, **75150** and **75153**; **Figure 10a**) are interpreted as the remnants of fluvial channels, and are considered of high archaeological potential.
- 4.2.69 Two of these channel features, **75131** and **75150**, appear to have associated blanking of lower horizons. Although the basal reflector for both these features is poorly defined, the features are mainly delineated by disruption to the underlying Brown Bank Formation structure. The apparent seismic blanking is possibly an indication of increased gas content caused by the microbial breakdown of organic matter at the base of these channels.
- 4.2.70 Feature **75131** appears to extend eastwards into the NV East. However, the feature was not identified during data interpretation of this area, probably due to differences in data quality.
- 4.2.71 A further 13 features are thought to be of the same age as the channels described above, but are interpreted as cut and fill features (**75135**, **75148** to **75149**, **75151**, **75155**, **75159** and **75163** to **75169**). These features were only identified along one or two survey lines and could not be traced any distance as coherent palaeochannels. As such, they have been classified as isolated cut and fill features. It is possible that they are the remnants of eroded palaeochannel systems, but as their nature is less certain they are considered of lower archaeological potential.
- 4.2.72 Feature **75163** is a simple cut and fill feature identified within the central section of the provisional OCC corridor (**Figure 10c**). The feature has a distinct, high amplitude basal reflector and some possible blanking of lower horizons. This may indicate the presence of

gaseous organic matter, or it may be that it represents coarse, possibly gravelly deposits at the base of the feature.

- 4.2.73 Features **75167** and **75168**, identified in the nearshore section of the provisional OCC (**Figure 10d**), are similar to the aforementioned cut and fills, however they appear to have more than one phase of fill and have therefore have been classified as a complex cut and fill features.
- 4.2.74 The post-transgression Holocene sediments (Unit 8) are represented by a deposit of marine sediment, found by vibrocoreing to comprise fine to coarse silty sand, occasionally containing (probably reworked) organic matter in some areas. This sediment varies in thickness from a thin veneer to thick sand dunes, and the boundary between it and the underlying Brown Bank Formation unit is often unclear. These sediments are not considered to be of archaeological potential in themselves, although they could periodically bury and expose sites such as shipwrecks in areas of mobile sediment, and thicker sand deposits could protect earlier land surfaces.

### 4.3 Archaeological Potential

- 4.3.1 The archaeological history of the southern North Sea is directly linked to the previously described glacial / interglacial cycles, and the associated changes of the environment across the region. 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 periods of occupation and long periods of hiatus when environmental conditions or high sea levels restricted access to Britain (Hijma *et al.*, 2012; Pettitt and White, 2012) (**Figure 2**).
- 4.3.2 The southern North Sea off the east coast of East Anglia is known to contain relatively well preserved palaeolandscape features such as fluvial channels, created during periods of sea level lowstand but while the landscape was still free of ice. The remains of this terrestrial landscape are frequently recovered by dredging and fishing in numerous areas around the southern North Sea, generally in the form of the remains of extinct megafauna (e.g. mammoths, bison, horse etc.).
- 4.3.3 The discovery of actual human artefacts, such as hand axes and worked bone, is a rarer occurrence, but such artefacts have been recovered. Reported finds from offshore activity has, to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower, Middle, and Upper Palaeolithic periods (Tizzard *et al.*, 2014; Tizzard *et al.*, 2015; Wessex Archaeology, 2011e; Wessex Archaeology, 2013a), with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Momber *et al.*, 2011; Wessex Archaeology, 2013a).

#### *Lower Palaeolithic (c. 970,000 to 300,000 BP; >MIS 9)*

- 4.3.4 The oldest prehistoric (Lower Palaeolithic) evidence north of the Iberian Peninsula in Europe has been found on the East Anglian coast, with key sites at Pakefield (c. 700,000 BP) (Parfitt *et al.*, 2005) and Happisburgh Site 3 (c. 970,000 BP) (Ashton *et al.*, 2014; Parfitt *et al.*, 2010). These sites represent activity near the northern shores of a huge North Sea basin estuarine landscape which drained many major European rivers, including the Bytham / Ingham palaeo-river (Rose, 2009; Westaway, 2009), the palaeo-Thames-Medway system which drained northwards through Essex and East Anglia (Bridgland, 1994), as well as the Rhine (Hijma *et al.*, 2012). The palaeogeography of the Middle Pleistocene enduringly saw Britain as being part of a huge peninsula of north-western Europe; the now-submerged regions were of extensive low-lying estuaries, major

river systems, plains and rolling hills. It was a rich, diverse and productive landscape like any contemporary example, and should not be considered as a temporary land-bridge or intermittent linkage to continental Europe (Coles, 1998).

- 4.3.5 Whilst the archaeology at Pakefield was created during a more Mediterranean climate, around MIS 17, the remains at Happisburgh Site 3 are indicative of colder-than-present conditions at the edge the boreal zone (Candy *et al.*, 2011), indicating that earlier hominins were capable of surviving in conditions previously thought to be too harsh (Parfitt *et al.*, 2010).
- 4.3.6 The importance of these sites is international, as they are currently unique at this latitude for this early date (Wessex Archaeology, 2013). Cohen *et al.* (2012) have highlighted the North Sea basin as a key region for understanding Pleistocene hominins within a northerly, coastal environment. The east of England, particularly East Anglia, but also the south-east of England, are important regions for Lower Palaeolithic archaeology in the last 500,000 years during MIS 13 and 11 (Hoxnian interglacial) (Wymer, 1999; Pettitt and White, 2012).
- 4.3.7 Around 400,000 BP (MIS 11, Hoxnian interglacial), within the palaeo-Thames-Medway system at Clacton, Essex, artefactual evidence suggests two phases of lithic technology; earlier 'Clactonian' pebble tools in the earlier warming phase of MIS 11, and Acheulean-type tools in the later cooling phase of the Hoxnian, suggesting that at the same site two different groups of hominins were producing tools (Pettitt and White, 2012).

*Early Middle Palaeolithic (c. 350,000 to 180,000 BP; MIS 9 to 6)*

- 4.3.8 During the Saalian glaciation (MIS 10) there was a hiatus in hominin activity in Britain (Pettitt and White, 2012). When hominins returned, *H. neanderthalensis*, they brought a new lithic technology: the Levallois prepared core technique developing from MIS 9, c. 300,000 BP (Scott and Ashton, 2011). They were hunters adapted to a 'mammoth steppe' environment (Ashton and Lewis, 2002).
- 4.3.9 The international importance of Early Middle Palaeolithic archaeology in the southern North Sea is highlighted by the numerous sites preserved within the Thames river terraces (White *et al.* 2006, Scott *et al.* 2011) and, in particular, by the submerged prehistoric Levallois lithic assemblage from marine aggregates licence Area 240 in the palaeo-Yare catchment. Over 120 artefacts have now been recovered from this locale, some of which are identifiable as Levallois, many recovered from *in situ* or near *in situ* contexts (Tizzard *et al.*, 2014, 2015; Wessex Archaeology 2013a, 2013b).
- 4.3.10 The substantial, mixed assemblage of handaxes also recovered from Area 240 may be of older Lower Palaeolithic origin (e.g. >MIS 9) or may date to the Later Middle Palaeolithic when technologically similar artefacts were made (c. MIS 3) (Boismier *et al.*, 2012). However, based on palaeoenvironmental and sedimentological evidence an Early Middle Palaeolithic date is most likely (Tizzard *et al.*, 2015).
- 4.3.11 Palaeogeographically, Area 240 is one of the most northerly Neanderthal sites in north-west Europe and of primary archaeological importance for defining Middle Palaeolithic potential and the contemporary palaeogeography across the southern North Sea basin (Tizzard *et al.*, 2014).
- 4.3.12 During MIS 6, the Weald-Artois ridge, located between south-east England and northern France, was finally breached creating the Dover Strait (Toucanne *et al.*, 2009), occurring within a trend towards increasingly restricted access to Britain (Ashton *et al.*, 2011; Scott and Ashton, 2011).

4.3.13 Currently there is no definitive evidence of a hominin presence in Britain during MIS 5 (Lewis *et al.*, 2011). Within the context of early prehistory and submerged palaeogeography however, substantial areas of the southern North Sea basin would have been dry land during the warming and cooling limbs<sup>1</sup> of the various sub-stages (MIS 5a to 5e) (**Figure 2**). Therefore potential exists for human activity to have occurred in Doggerland, the area of exposed terrestrial environment within the southern North Sea basin during and after the Devensian glaciation. Offshore locations may be the only source for testing this hypothesis (Wessex Archaeology 2013b); the western European archaeological record is rich in comparison for MIS 5 (Lewis *et al.*, 2011; Pettitt and White, 2012).

*Late Middle Palaeolithic (c. 60,000 – 34,000 BP; MIS 3)*

4.3.14 Again, East Anglia provides early evidence for Neanderthal recolonisation of Britain after the hiatus between MIS 6 to 4, around 60,000 BP. The Lynford Quarry material highlights a new lithic technology visually similar to Lower Palaeolithic Acheulean lithics, so-called Mousterian of Acheulean Tradition handaxes and tools (Boismier *et al.*, 2012). Climatically, MIS 3 was significantly colder than now but did not attain the glacial conditions of later or earlier glacial periods (e.g. MIS 6 or 2) (Pettitt and White, 2012). For the Neanderthals that may have occupied the region at this time, surviving in Doggerland during this period may have been subject to a variety of technological and cultural adaptations (White, 2006).

4.3.15 Recent analysis suggests Neanderthals died out in Britain around 42,000 years ago, with modern Humans arriving around 34,000 years ago (Jacobi and Higham, 2011).

*Upper Palaeolithic (34,000 – 10,500 BP; MIS 3 – 2)*

4.3.16 The Upper Palaeolithic straddles the Devensian glaciation with a hiatus in human activity in Britain between 24,000 and 15,000 BP (Pettitt and White, 2012; Jacobi and Higham, 2011). Recent analysis has suggested that eight relatively brief phases of human activity are represented by the existing Upper Palaeolithic archaeological record (Jacobi and Higham, 2011); with six occurring before the Devensian glacial maximum.

4.3.17 The onshore archaeological record of Upper Palaeolithic activity is relatively sparse, and offshore locations may provide unique and important context for coastal and lowland human activity during this period (Wessex Archaeology, 2013b). For example, a Maglemosian harpoon artefact from trawled peat in the early 20th century was subsequently radiocarbon dated to around 12,000 years ago (Houseley, 1991), and archaeological and palaeoenvironmental material has been reported from North Sea contexts for over a century (Reid, 1913; Godwin and Godwin, 1933).

*Mesolithic (10,500 – 6,000 BP)*

4.3.18 Considerable attention has been paid to Mesolithic Doggerland in the last decade (Gaffney *et al.*, 2007; Tappin *et al.*, 2011) and the geoarchaeology (Boomer *et al.*, 2007), submerged forests (Hazell, 2008) and palaeo-river systems around the current North Sea coast (Wessex Archaeology, 2013a; Limpenny *et al.*, 2011; EMU, 2009). Increasingly, a maritime perspective has developed for understanding the early prehistoric archaeological record, where coasts, estuaries and wetlands are key landscape elements (Ransley *et al.*, 2013).

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<sup>1</sup> 'Limbs' refers to the edges of the peaks and troughs of the relative sea level curve.

- 4.3.19 It is clear from numerous research and development-led investigations that postglacial marine transgression has not destroyed Pleistocene and Holocene palaeogeography by default (Wessex Archaeology, 2013b). Areas of preserved palaeogeographic features do remain, and detailed reconstructions of palaeoenvironments and palaeogeography can be achieved for large parts of the North Sea basin (Tappin *et al.*, 2011; Limpenny, 2011; Dix and Sturt, 2011). By the early Holocene, Mesolithic hunter-fisher-gatherers in Doggerland were active in a familiar ecosystem of mixed deciduous woodland with oak, elm, alder and lime populated by deer and a wide variety of other mammals (Tappin *et al.*, 2011).
- 4.3.20 Post the Holocene marine transgression, the archaeological potential of the southern North Sea, including the study area, shifts to the maritime history of the UK which is presented in **Appendix IX** and summarised in **Section 5.3**.

## 5 ARCHAEOLOGICAL ASSESSMENT OF MARITIME AND AVIATION SITES

### 5.1 Introduction

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

### 5.2 Geophysical Seabed Features Assessment

#### *Introduction*

- 5.2.1 An archaeological assessment of 2016 and 2012 geophysical survey datasets was undertaken by Wessex Archaeology (**Figures 11, 12 and 13a-h**). Within the study area, a total of 1,475 geophysical anomalies were identified within the geophysical data after the grouping and discrimination phase. A full gazetteer of anomalies is presented in **Appendix VI, VII and VIII**.

- 5.2.2 These anomalies are discussed below, separately for each project element; NV East, NV West and the provisional OCC. Any sites from the 2014 former East Anglia Zone OFTO assessment that fall within the study areas (**Figure 1**) have been included in the results.

#### *Norfolk Vanguard East*

- 5.2.3 An archaeological assessment of 2012 geophysical survey datasets was undertaken by Wessex Archaeology in 2014 and the results are described below. A full gazetteer of all anomalies is supplied in **Appendix VI** and examples of anomalies are illustrated in **Figure 11**. Wrecks are illustrated in detail in **Sheets 1 to 3**.
- 5.2.4 There are currently no sites within NV East 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.
- 5.2.5 In total 318 features of archaeological potential have been identified within NV East by Wessex Archaeology. These are discriminated as shown in **Table 7**.



**Table 7: Features of archaeological potential within NV East**

Archaeological Discrimination	Quantity	Interpretation
A1	4	Anthropogenic origin of archaeological interest
A2	313	Uncertain origin of possible archaeological interest
A3	1	Historic record of possible archaeological interest with no corresponding geophysical anomaly
<b>Total</b>	<b>318</b>	

- 5.2.6 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance.

**Table 8: Types of feature identified**

Feature Classification	Quantity
Wreck	4
Debris	16
Debris Field	6
Seafloor Disturbance	17
Bright Reflector	4
Dark Reflector	116
Rope/Chain	11
Magnetic	143
Recorded obstruction	1
<b>Total</b>	<b>318</b>

- 5.2.7 There are three charted wrecks (**70021**, **70255**, and **70262**) and one charted obstruction (**70079**) located within NV East. In addition, there is one charted wreck (**71480**) that lies just outside NV East. The recommended Archaeological Exclusion Zone (see **Section 10.2**) around this feature does encroach into NV East and hence this wreck is included in the assessment.
- 5.2.8 There are no known aircraft crash sites located within NV East.
- 5.2.9 Anomaly **70021 (Sheet 1)** is a partially buried wreck located in the northern half of NV East approximately 700m from the development boundary. An elongated, discrete, oval shaped area measuring 21.5 x 9.7 x 0.6m contains several linear and rectilinear dark reflectors showing degrading structure of a wreck partially buried in sediment. Two further pieces of debris lie within 10m of the main wreck site and they are approximately 5.5 x 0.5m and 2 x 0.5m in size. As the wreck is partially buried, not enough of the superstructure is visible to ascertain which orientation the wreck is lying in but it is possible that the remaining wreck survives buried and intact.
- 5.2.10 Two magnetic anomalies, a very distinct medium sized asymmetric dipole anomaly of 62nT and approximately 50m to the south and possibly associated a second magnetic small and wide dipole of 19nT, suggests the presence of ferrous material. The wreck is visible in the multibeam bathymetry data as an elongated mound and located at the edge of a sandwave in an area of sand ripples.



- 5.2.11 The wreck is uncharted and not recorded in the UKHO database. The dimensions of the vessel should be taken as a minimum as the remainder of the wreck is potentially buried and surviving intact.
- 5.2.12 Anomaly **70255 (Sheet 2)** is a badly damaged and partially buried wreck in the southern half of NV East. The main wreck anomaly is of a discrete irregular shaped area in soft sediment containing one prominent L-shaped dark reflector which looks structural and numerous linear and curvilinear dark reflectors scattered around. The wreck measures 60 x 22 x 1.5m and is orientated north-west to south-east. In the multibeam bathymetry data is a rounded mound in area of sand ripples measuring 7.5 x 6 x 1.3m and possibly represents a larger upstanding piece of the wreck. A significant amount of ferrous material is suggested by a very strong magnetic anomaly of 2879nT.
- 5.2.13 To the north-east, south-east and west are five pieces of debris visible but there is the possibility of further debris buried in the surrounding built up sediment. Associated wreck debris ranges from 1.5 x 1m in size to 23.5 x 4m for a discrete area containing more than one piece of debris.
- 5.2.14 There is potentially debris up to 125m away from main wreck site. Anomalies **70248** and **70253** are single pieces of debris potentially associated with this wreck and together all three cluster in this area to the north-east of the main wreck site. Anomaly **70250** is a discrete area containing at least five small approximately circular dark reflectors ranging from 0.5 to 2.5m in size.
- 5.2.15 Approximately 35m to the south-east of the wreck anomaly is the charted location of a wreck whose description and dimensions correspond to anomaly **70255**. This charted wreck is included in the UKHO database (ID 11213). It is described as an unknown wreck, first detected in 1994 with the surveyed position of this wreck regarded as having an accuracy of 15m. The survey data indicates the presence of an entire wreck, largely buried, lying just below the crest of an adjacent sandwave. Only a small portion of the wreck was observed standing above the seabed level. The wreck is thought to be orientated south-east to north-west measuring 35 x 5 x 2.9m, the orientation and description of only one portion of the wreck upstanding corresponds to the results from the 2012 data. Magnetometer data indicates that the wreck extends to the south-east for approximately 40m.
- 5.2.16 The difference in positioning between the UKHO wreck and the wreck anomaly seen in the 2012 data is approximately 35m but it is located at the south-east end of the wreck which is a small irregular shaped area 7.5 x 4 x 0.5m containing diffuse dark reflectors, potentially structural. Potentially this is one end of the wreck site with the rest significantly buried; this would increase the length of the wreck to 60m. Another possible explanation is that from the UKHO description from 1994 the wreck is described as lying just below the crest of an adjacent sandwave, the surrounding environment visible in the sidescan sonar and multibeam bathymetry data shows the wreck lying in an area of sand ripples with sandwaves approximately 100m north and south of the wreck. It is possible that more of the wreck has been uncovered with the movement of the sediments in the area therefore a new position for this charted wreck is given at the location where the bulk of the wreck material is now visible. There is also the possibility that it is partly to do with differences in the positional accuracy, stated above in the UKHO description as having an accuracy of 15m.
- 5.2.17 Anomaly **70262 (Sheet 3)** is an intact wreck, lying on its side and partially buried and located in the southern half of NV East. The wreck is visible in the sidescan sonar data as a discrete area 33 x 8 x 1.7m containing several interconnecting curvilinear and rectilinear



dark reflectors and showing structure of a wreck lying on its side, partially buried in sediment that graduates from finer grained sand ripples to coarser sediment. The wreck is nearly wholly buried but appears to be upright as complex detail looks like deck structure; it is orientated north-west to south-east. The multibeam bathymetry data shows an elongated oval shaped area with scour extending to the north for approximately 100m, possibly showing the more extant section of the wreck site.

- 5.2.18 There are two further anomalies to the east and south-east of wreck **70262** that are possibly associated debris. Anomaly **70263** has dimensions of 1.1 x 0.6 x 0.2m and anomaly **70265** is larger at 2.6 x 1.2 x 0.0m. Both are oval shaped dark reflectors. The strongest associated magnetic contact at the location of wreck **70262** is a large negative monopole anomaly of 153nT suggesting the presence of ferrous material.
- 5.2.19 This wreck is charted and included in the UKHO database (ID 11214), it is an unknown wreck first detected in 1994. Survey data from 1994 indicates that the wreck is small and present in its entirety lying NW/SE, although it is broken up, it measures 30 x 5 x 0.6m. A magnetic anomaly associated with the wreck was also observed. The surveyed position of this wreck is regarded as having an accuracy of 13m. The 2012 geophysical data shows the wreck at the same location as the charted wreck, with similar dimensions.
- 5.2.20 Wreck **71480** lies outside NV East but is included in this assessment as the recommended Archaeological Exclusion Zone (AEZ) extends into the NV East area by up to 30m (**Figure 11**). This feature is the wreck of a submarine and the UKHO (ID 79542) records that it was last observed in September 2014 with dimensions of 58 x 6.5 x 5m and lying 020/200 with the bow to the south. A strong magnetic anomaly was also recorded. In the 2012 geophysical data the wreck was observed with dimensions of 63.2 x 5.8 x 4.4m and with a magnetic anomaly of 600nT. Surrounding debris increases the dimensions of the site to 64 x 20 x 4.4m.
- 5.2.21 Anomaly **70058** is an extremely strong magnetic anomaly of 6587nT, it is a very large dipole, possibly suggestive of a wreck anomaly with a significant amount of ferrous material in its construction and / or cargo but there is no sidescan sonar or bathymetry anomaly visible at this location and there are no recorded wrecks or obstructions. There is the possibility that if it is a wreck site then it is completely buried, the sidescan sonar and multibeam bathymetry data both show an environment of sand ripples.
- 5.2.22 There are no recorded wrecks and one recorded obstruction that have not been identified in the geophysical data. Anomaly **70079** is an unidentified obstruction which has been identified by previous geophysical survey and was first detected in 1994. Survey data indicated the presence of a very small contact with dimensions of 2 x 1 x 0.8m with no associated magnetic anomaly. The surveyed position of this obstruction is regarded as having an accuracy of 13m. No geophysical anomaly was identified at this location and it is possible that the object has since become buried.
- 5.2.23 A total of 313 anomalies have been interpreted as A2 – uncertain origin of possible archaeological interest.
- 5.2.24 There are 16 pieces of debris identified in NV East which have been assigned an archaeological potential of A2 due to their anthropogenic appearance and characteristics. The anomalies vary in size and character and are characterised as debris, as opposed to debris fields, as they are single anomalies interpreted as one or possibly two objects at the most and are more complex in appearance. A selected range of these debris remains are described below.



- 5.2.25 Anomalies **70253**, **70263** and **70265** are all pieces of debris that have been associated with wrecks. They range from being linear to circular in shape and from 1.1 x 0.6 x 0.2m to 9.4 x 2.9 x 0.1m in size. Their locations in the immediate vicinity of a wreck site potentially indicate their origin as wreck debris or cargo. None of them have a magnetic contact to indicate the presence of ferrous material.
- 5.2.26 The remaining debris anomalies range in size from 1.1m in length for anomaly **70263** to 16.3m in length for anomaly **70273**. Further anomalies such as **70305** are typically characterised as items of debris being rectangular in shape where some detail can be discerned suggesting an anthropogenic origin.
- 5.2.27 Anomaly **70312** is an irregular shaped discrete area 15.5 x 12.5 x 0.4m containing a complex anomaly of numerous dark reflectors that suggest structure but of weak contrast. It appears to be broken up and damaged but partially buried so difficult to see its full condition, true extent is unknown. It is an amorphous shaped anomaly measuring 12.3 x 7.3 x 1m and is visible in the multibeam bathymetry data possibly suggesting area where height is surviving to greatest extent. Although no direct magnetic contact has been identified at this location it is situated in trend of high magnetic anomalies and therefore the presence of magnetic material cannot be ruled out.
- 5.2.28 Four of the debris anomalies are dark reflectors that have an associated magnetic contact suggesting that they contain ferrous material. Anomaly **70230** is a pair of dark reflectors, one linear and the other curvilinear with a weak magnetic dipole of 6nT. Anomaly **70187** is a pair of two thick curvilinear dark reflectors approximately 13m apart and 4.4m in length with a significant magnetic dipole of 65nT. Finally, **70188** is a discrete area containing three curvilinear dark reflectors which are possibly all part of the same object as they appear partially buried in sediment. A magnetic contact of 20nT suggests ferrous material in their construction.
- 5.2.29 Six anomalies have been characterised as debris fields on the basis that they are discrete areas containing more than two pieces of debris; they are typically larger areas in size than of single pieces of debris. The six debris fields have been assigned an archaeological potential of A2 due to their anthropogenic appearance and characteristics.
- 5.2.30 The debris fields range in size from 4.7 x 2.9 x 0.1m for anomaly **70282** which is an area containing four small curvilinear dark reflectors possibly individual pieces of debris to anomaly **70202**. Anomaly **70202** is an irregular shaped discrete area 25 x 12 x 0.8m, partially visible in the bathy as an elongated mound overlying sand ripples and measuring 12 x 3.8 x 0.9m. The area contains one major curvilinear and several narrow curvilinear dark reflectors with no obvious structure but from size and appearance it is possibly partially buried debris.
- 5.2.31 There are four anomalies characterised as bright reflectors indicating their possible construction of a material such as plastic, rubber, wood or potentially fibreglass. They have all been assigned an archaeological discrimination of A2 and none have an associated magnetic contact to indicate the presence of ferrous material.
- 5.2.32 Anomaly **70068** is a single bright reflector measuring 4.7 x 3.4 x 0.5m and is visible in the multibeam bathymetry data highlighting the scour associated with the object.
- 5.2.33 There are 116 anomalies identified and characterised as dark reflectors. These anomalies are typically single reflectors, simple in shape such as linear, circular or oval with no complex detail or structure visible. The dark reflectors range in size from anomaly **70001**, an approximately oval-shaped anomaly measuring 0.8 x 0.5 x 0.1m to anomaly **70268** a



discreet elongated area with dimensions of 40 x 3.5 x 0.2m containing four anomalies forming a roughly linear orientation from north to south. The individual anomalies range in size from 4.5 x 3.5 x 0.2m to 1.8 x 0.8 x 0.1m.

- 5.2.34 Eleven anomalies are identified and characterised as possible lengths of rope or chain. They have been assigned an archaeological discrimination of A2. Two of the anomalies have associated magnetic contacts suggesting that they are partly or wholly of ferrous construction, these are **70071** and **70111**. The anomalies range from 6.3 to 130m in length with the majority of the anomalies over 40m in length and typically intermittent lengths of short, linear dark reflectors suggesting that they are becoming progressively buried. It is possible that these may be the remains of decommissioned cables in the region.
- 5.2.35 There are 17 seafloor disturbances recorded in NV East. A seafloor disturbance is an area of seabed that appears disturbed, potentially by a buried or partially buried wreck or debris of archaeological interest. These types of features may be groups of what is apparently debris or may be more ephemeral and consist solely of a patch of bright and dark reflectors distinct from the surrounding seabed.
- 5.2.36 The features vary in size from 3 x 2.9 x 0.5m (**70038**) up to 65 x 11.5 x 1.1m (**70303**). They generally are made up of multiple dark and bright reflectors, hard edged and also diffuse anomalies that look anomalous and are spread across the seabed. Two of the recorded seafloor disturbances have associated magnetic anomalies, these are **70210** (13nT) and **70024** (19nT), and this suggests the presence of ferrous material.
- 5.2.37 The following four anomalies are particularly distinct. Anomaly **70040** is a mounded area with a scour measuring 8.7 x 4.9 x 0.6m observed in the sidescan sonar data. The multibeam bathymetry data shows a small depression in an area of sand ripples, which corresponds to the location of the scour but the mounded area is not visible within it.
- 5.2.38 Anomaly **70042** is a strong curvilinear dark reflector with no complex detail visible suggesting structure but it is a large object partially buried in sediment, possibly the outline structure of a large object or wreck. The area of seafloor disturbance measures approximately 17.9 x 5.7 x 0.7m and there is no magnetic contact at this location to indicate the presence of ferrous material.
- 5.2.39 Anomaly **70168** is a discrete area containing numerous small circular and short linear dark reflectors that are randomly ordered and not of uniform size and orientation. This is possibly debris but is badly degraded and broken up with no obvious structure visible to identify it as a wreck and no associated magnetic contact to indicate the presence of ferrous material.
- 5.2.40 Anomaly **70203** is a discrete area containing at least three curvilinear regular spaced dark reflectors with scour observed associated with each reflector. The regularly spaced dark reflectors could be interpreted as possibly structural but not enough complex detail can be seen. In bathymetry data it is visible as an elongated depression cutting through area of slightly raised seabed. The anomaly measures 16 x 5.8 x 0.5m.
- 5.2.41 There are 143 magnetic anomalies across NV East which have no sidescan sonar or bathymetry anomalies visible at their locations. Anomaly **70058** (6587nT) which is potentially indicative of a wreck or large amount of debris has been assigned an archaeological discrimination of A1 and is described above. Therefore there are 142 magnetic anomalies with an archaeological discrimination of A2. They are difficult to characterise further other than that they are the locations of potential debris or wrecks that



are wholly buried in the highly mobile sediment visible across the development area. As they are not able to be characterised further they could also potentially be natural in origin and the response of features such as boulders.

- 5.2.42 Magnetic anomalies which formed larger linear or curvilinear features such as those in response to sandwaves or sandbanks have been removed as they are natural in origin. A large number of anomalies were identified which were then also removed as they followed the location of charted cables or their linear alignment across hundreds of metres inferred that they were man-made features such as a cable or pipeline.
- 5.2.43 The magnetic anomalies vary greatly in strength from the weak asymmetric dipolar anomaly **70015** with magnetic amplitude of 5nT (the minimum size recorded) to the extremely distinct dipolar anomaly **70035** with a magnetic strength of 674nT.

#### *Norfolk Vanguard West*

- 5.2.44 An archaeological assessment of 2016 geophysical survey datasets was undertaken by Wessex Archaeology across NV West and the results are described below. A full gazetteer of all anomalies is supplied in **Appendix VII** and examples of anomalies are illustrated in **Figure 12**. The wreck is illustrated in detail in **Sheet 4**.
- 5.2.45 There are currently no sites within NV West 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.
- 5.2.46 In total 184 features of archaeological potential have been identified within NV West by Wessex Archaeology. These are discriminated as shown in **Table 9**.

**Table 9: Features of archaeological potential within NV West**

Archaeological Discrimination	Quantity	Interpretation
A1	11	Anthropogenic origin of archaeological interest
A2	172	Uncertain origin of possible archaeological interest
A3	1	Historic record of possible archaeological interest with no corresponding geophysical anomaly
<b>Total</b>	<b>184</b>	

- 5.2.47 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance.

**Table 10: Types of feature identified**

Feature Classification	Quantity
Wreck	1
Debris	21
Debris Field	14
Seafloor Disturbance	13
Bright Reflector	15
Dark reflector	79
Rope/chain	2



Mound	1
Magnetic	37
Obstruction	1
<b>Total</b>	<b>184</b>

- 5.2.48 There is one charted wreck (**71334**) and one recorded obstruction (**71377**) located within NV West.
- 5.2.49 There are no known aircraft crash sites located within NV West.
- 5.2.50 From the geophysical assessment there are 11 features discriminated as A1 within NV West, one of these is a wreck (**71334**), three pieces of associated wreck debris, a debris field and six magnetic anomalies (**Appendix VII**).
- 5.2.51 One recorded wreck (**71334**) has been identified within NV West (**Sheet 4**). The wreck is visible in the sidescan sonar data as a large spread of debris features comprising mainly linear and curvilinear thin dark reflectors with height in an area of sandwaves. The overall dimensions of the debris spread are 54 x 41.2 x 0.6m, with the longest individual feature measuring 12m. The wreck appears to be very broken up and degraded with no identifiable structure visible and the full extent of the wreck may be buried by sands. In the bathymetry data this wreck is observed as an irregular mound measuring 28 x 18m within an area of sandwaves and aligned north-east to south-west. There is a very large magnetic anomaly measuring 5974nT associated with this wreck, indicating a substantial quantity of ferrous material. The magnetic anomaly is noisy and widely spaced in the data, with a possible slight positioning error between lines of data, or a possible indication of buried material extending beyond the boundaries identified on the sonar data. In the UKHO data (record 11190) this wreck is listed as an unidentified non-dangerous wreck, well buried and almost flush with the seabed with only the upper structure visible and dimensions of 38 x 15m.
- 5.2.52 Three pieces of debris possibly associated with this wreck have been discriminated as A1. Debris **71332** is located 45m north-west of the wreck and is visible in the sidescan sonar data as a long and thick curvilinear dark reflector with a bright shadow and dimensions of 4.6 x 1.8 x 0.3m. Debris **71333** is located 36m to the east of wreck **71334**. This is a long and thin linear dark reflector with a dull shadow and dimensions of 5.3 x 0.4 x 0.1m. The third piece of possible wreck debris is **71336**, located 35m to the south of the wreck. This is a long and very thin indistinct dark reflector with a slight shadow in the sidescan sonar data and dimensions of 3.6 x 0.2 x 0.2m. None of these debris features have magnetic anomalies associated with them, however any magnetic anomaly here is likely to have been masked by the very large anomaly associated with the main area of wreckage. All of these pieces of debris possibly associated with wreck **71334** have been identified in an area of sandwaves and there is a possibility that there may be further buried debris in the vicinity of the wreck.
- 5.2.53 Debris field **71301** is located in the north-east area of NV West and has been given an archaeological discrimination of A1. In the sidescan sonar data this feature is discernible as several distinct linear dark reflectors with height situated in an area of megaripples and with dimensions of 23 x 0.9 x 0.2m (**Figure 14**). The largest individual dark reflector measures 7.6m length. The objects appear to be in a line therefore possibly represent one, partially buried feature such as a possible wreck and, as such, have been grouped together as one debris field. The debris field has a very large associated magnetic anomaly measuring 7022nT, indicating substantial ferrous material is present.



- 5.2.54 There are six magnetic anomalies with no associated surface expression discriminated as A1 within NV West. Magnetic anomaly **71297** is visible as a very large asymmetric dipole and measures 953nT. This is located in the north-east corner of the survey area and identified on more than one survey line. Magnetic anomaly **71299** is visible as a very large asymmetric dipole in a single line of data and measures 1450nT. This anomaly is located in the north-east of NV West and lies approximately 180m west of a charted pipeline, but is not part of the linear anomaly associated with it. Magnetic anomaly **71314** measures 896nT and is visible as a large asymmetric dipole only identified on one survey line. Anomaly **71479** is located in the south-west corner of NV West and measures 4455nT. This is visible in the magnetic profile as a very large dipole. Two very large magnetic anomalies are possibly associated with wreck **71334** in the north-east corner of the survey area. Anomaly **71323** measures 1320nT and is located 450m to the north-east of the wreck while magnetic anomaly **71325** measures 1127nT and is located 215m to the north-east of the wreck. All of these magnetic anomalies with no associated seabed feature have the potential to be substantial buried ferrous debris.
- 5.2.55 A total of 172 anomalies have been interpreted as A2 – uncertain origin of possible archaeological interest.
- 5.2.56 There are 21 pieces of debris recorded across NV West that have been discriminated as A2 (**Appendix VII**). The largest of these is a linear piece of debris (**71362**) situated in the northern extent of NV West with dimensions of 20.1 x 0.9 x 0.2m. This is visible in the sidescan sonar data as a very long and thin slightly curvilinear shaped dark reflector with a bright and short shadow. This debris is located in an area of sandwaves and may be partially buried.
- 5.2.57 The smallest piece of debris recorded is ferrous debris **71455** identified in the southern extent of NV West. The debris has dimensions of 1.7 x 0.5 x 1.1m and is visible in the sidescan data as a very thin, linear dark reflector with a bright and distinct shadow. This feature is also observed as a small, rounded mound in the bathymetry data measuring 3 x 3 x 0.2m. The debris has a large magnetic anomaly measuring 239nT associated indicating it is ferrous. It is located 27m south-west from debris field **71453** and may be related.
- 5.2.58 Two further pieces of debris have been interpreted to contain ferrous material. Debris **71456** is located in the southern extent of NV West and is visible in the sidescan sonar data as a rectangular shaped dark reflector with a bright and tapered shadow. The debris has dimensions of 2.9 x 1.3 x 0.4m, it is isolated and distinct on a sandwave rich area of the seabed. This has a small magnetic anomaly measuring 38nT associated indicating some ferrous material is present.
- 5.2.59 Ferrous debris **71352** is located in the northern extent of NV West and is visible in the sidescan sonar data as an indistinct dark reflector with dimensions of 4.3 x 3m and no discernible height. This is an irregularly shaped feature that may be partially buried by sands. It has been identified approximately 10m east south-east of a medium magnetic anomaly measuring 84nT and may be associated. Debris field **71353**, located 25m to the west of **71352**, also shares this magnetic anomaly as it is not possible to discern which feature, if any, it is associated with given the magnetometer line spacing. A dark reflector (**71351**) has also been identified 6m to the east of this ferrous debris. All of these features in this area may be related.
- 5.2.60 A total of 13 debris fields discriminated as A2 have been identified across NV West (**Appendix VII**). Debris field **71361** is located in the centre of the northern half of the survey area. The feature comprises a large area of partially buried debris features that

have an anthropogenic appearance. In the sidescan sonar data the feature comprises an almost structural looking right angled linear dark reflector with bright shadows and smaller possible associated debris in the surrounding sands. The debris field has dimensions of 40.8 x 15.3 x 0.6m and is not visible in the bathymetry data.

- 5.2.61 Ferrous debris field **71453** is situated in the southern extent of NV West. This has been identified in the sidescan data as a large scatter of potential debris comprising approximately 10 dark reflector anomalies, some with shadows and some without (**Figure 14**). The exposed dimensions of the debris field are 33.5 x 17.1 x 0.3m. The features are variable in their appearance with some rounded, linear and square objects visible within an area of sandwaves. The largest feature measures 4.1 x 2.5m and further anomalies may be buried by sands. This debris field has a large magnetic anomaly measuring 239nT associated indicating ferrous debris is present. In the bathymetry data this is visible as an irregular mound with dimensions of 26 x 10 x 0.5m.
- 5.2.62 Ferrous debris field **71412** is situated in the centre of NV West. This has dimensions of 22.2 x 9.8 x 0.5m and is visible in the sidescan sonar data as a large spread of approximately nine dark reflectors of various shapes and sizes, the largest measures 3.8 x 2m. The full extent of this debris may be buried by sands. There is a small magnetic anomaly measuring 26nT associated with this debris field indicating some ferrous material is present.
- 5.2.63 In total, 13 areas of seafloor disturbance have been identified within NV West. All of these have an archaeological discrimination rating of A2 and none have an associated magnetic contact to indicate the presence of ferrous material. The largest area of seafloor disturbance is **71444** located in the south-west area of NV West. This feature is visible in the sidescan sonar data as a large oval shaped area of irregular seabed comprising many small bright reflectors and some dark reflectors with overall dimensions of 28.5 x 18.2m. The feature is situated in a rough and sandwave rich area of the seabed.
- 5.2.64 Seafloor disturbance **71395** is located in the north-west corner of NV West. In the sidescan data the anomaly is visible as a distinct and large area of disturbed seabed, with dimensions of 17.6 x 4.1 x 0.9m. There is a main, slightly bulbous bright reflector with two curvilinear features exposed directly next to this, one a bright reflector and one a thin, dark reflector with a shadow. This feature is located in an uneven and sandwave rich area of the seabed and appears to be highly anomalous (**Figure 15**).
- 5.2.65 Feature **71324** is a distinct, medium sized patch of seafloor disturbance cutting through large sandwaves, with dimensions of 14.6 x 10.3 x 0.5m. The anomaly comprises a group of irregularly shaped dark reflectors, some with slight height, and some indistinct bright reflectors. There is one particularly distinct feature exposed in the centre which measures 4.9 x 0.9m, with a height of 0.5m. The seafloor disturbance is visible in the bathymetry data as an indistinct, rounded mound with a slight surrounding sediment build-up and dimensions of 16 x 14 x 0.7m.
- 5.2.66 A total of 15 bright reflector anomalies have been identified across NV West. These have all been assigned an archaeological discrimination of A2 and none have an associated magnetic contact to indicate the presence of ferrous material. The largest bright reflector (**71363**) has been identified in the north-east of the area. This has dimensions of 12.3 x 6m and is visible in the sidescan sonar data as an indistinct, elongated bright reflector in an 'x' shape. The smallest bright reflector (**71450**) is located in the south-west area of NV West, this is visible in the sidescan data as a slightly oval shaped feature with no obvious object in front and dimensions of 3.7 x 1m. Another example is **71329**, which is a small

and irregular bright reflector with dimensions of 4.2 x 1.9m (**Figure 15**). It was identified in an area of megaripples in the north of NV West.

- 5.2.67 Two possible rope or chain features have been identified within NV West. Both of these have been discriminated as A2 and neither have magnetic anomalies associated. Feature **71398** is located in the eastern extent of NV West. This is a very long and thin curvilinear dark reflector, with a bright reflector at the front in the central section and dimensions of 44.4 x 0.7m. The feature is indistinct in parts across its extent.
- 5.2.68 Anomaly **71367** is located in the northern section of NV West. This appears in the sidescan data as a partially buried or broken up thin linear dark reflector with a shadow, located within sandwaves. It has dimensions of 12.7 x 0.6 x 0.1m and is quite distinct.
- 5.2.69 There are 79 dark reflector features recorded across the NV West (**Appendix VII**). All of these are discriminated as A2 and have no associated magnetic anomaly. These anomalies are typically single reflectors, simple in shape such as linear, circular or oval with no complex detail or structure visible. The features identified vary greatly in size. The smallest is **71389**, a linear dark reflector with no shadow with dimensions of 2.3 x 0.5m. It is an isolated and distinct feature located within sandwaves. Dark reflector **71414** is the largest feature identified with dimensions of 31.2 x 0.8m. This is visible in the sidescan sonar data as a long, thin and slightly curvilinear dark reflector with no shadow.
- 5.2.70 One mound, **71458**, has been identified within NV West and discriminated as A2. This is located in the southern extent of the survey area (**Figure 15**). The mound is visible as a large, slightly curvilinear dark reflector that is wider but more indistinct at one end than the other with a large dull shadow in the sidescan sonar data. In the bathymetry data the feature is discernible as a long, tapering mound of sloping height, aligned north-west to south-east. The mound is located within sandwaves but on a different alignment and has dimensions of 21.3 x 7 x 0.5m.
- 5.2.71 There are 30 magnetic anomalies with no sidescan sonar feature associated across NV West. All of these have been given an archaeological discrimination of A2 (see **Appendix X.3**). These have been categorised as small magnetic anomalies of less than 50nT; medium sized magnetic anomalies of 50nT to 200nT, large magnetic anomalies of 201nT to 900nT and very large of over 900nT. Background magnetic variation caused by geology is approximately  $\pm 5$ nT and as such smaller anomalies recorded across the survey areas may prove to be geological in origin and likewise small anomalies may also be masked by this geological variation. All of the magnetic anomalies classified as A2 have the possibility to be buried objects with ferrous content that are of archaeological potential.
- 5.2.72 There are four small magnetic anomalies ranging from 33nT to 44nT, 18 medium sized magnetic anomalies ranging from 51nT to 177nT and nine large anomalies ranging from 218nT to 620nT (**Appendix VII**). These features, especially the large anomalies, have the potential to be substantial buried ferrous debris.
- 5.2.73 One historic record of an obstruction, **71377** is located within NV West and is discriminated as A3. UKHO record 11236 describes an area of foul ground at this location, however nothing anthropogenic was identified here in the geophysical data.

#### *Provisional Offshore Cable Corridor*

- 5.2.74 An archaeological assessment of 2016 geophysical survey datasets and anomalies identified in the former East Anglia Zone OFTO survey that fall within the current survey areas was undertaken by Wessex Archaeology across the provisional OCC and the results are described below. A full gazetteer of all anomalies is supplied in **Appendix VIII**



and examples of anomalies are illustrated in (**Figure 13a-h**). Wrecks are illustrated in detail in **Sheets 5 to 30**.

- 5.2.75 There are currently no sites within the provisional OCC 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.
- 5.2.76 In total 973 features of archaeological potential have been identified within the provisional OCC by Wessex Archaeology. These are discriminated as shown in **Table 11**.

**Table 11: Features of archaeological potential within the provisional OCC**

Archaeological Discrimination	Quantity	Interpretation
A1	37	Anthropogenic origin of archaeological interest
A2	936	Uncertain origin of possible archaeological interest
<b>Total</b>	<b>973</b>	

- 5.2.77 These anomalies have been classified by probable type, as shown in **Table 12**.

**Table 12: Types of features identified**

Feature Classification	Quantity
Wreck	26
Debris	79
Debris Field	39
Seafloor Disturbance	7
Bright Reflector	29
Dark Reflector	157
Rope/chain	36
Mound	10
Magnetic	590
<b>Total</b>	<b>973</b>

- 5.2.78 There are 26 charted wrecks situated within the provisional OCC, these are discriminated as A1 and detailed below.
- 5.2.79 There are no known aircraft crash sites located within Norfolk Vanguard East.
- 5.2.80 Anomaly **70342 (Sheet 5)** is associated with UKHO record 11091 for the *Golden Oriole* (possibly). The wreck is visible in the sidescan sonar data as a very indistinct expanse of wreckage. It consists of an oval shaped area of bright and dark reflectors, some with shadows and some without, lying perpendicular to the large sandwaves. The dimensions of the wreck are 33 x 14 x 1m. There is very little detail discernible in the data to identify this as a wreck and the full extent may be buried by sands. In the bathymetry data the wreck is observed as lying slightly perpendicular to the large sandwaves and may be partially masked by sediment. It is aligned north-east to south-west and visible as a long and thick linear mound with faint scouring to the north measuring 50m in length. There is a medium sized magnetic anomaly measuring 50nT associated with this wreck, though the

closest line of data is located 27m away. It is anticipated if the magnetometer had crossed directly over the wreck the anomaly amplitude would be much larger. This wreck is associated with the UKHO record 11091 for the *Golden Oriole* (possibly). This is a British trawler sunk on 22 January 1915. The wreck was previously observed in 2014 and was documented as being very broken up, with dimensions of 26 x 8.3 x 1.4m and having a large magnetic anomaly associated.

- 5.2.81 Anomaly **70360 (Wreck Sheet 6)** has been identified to be the HMS *Dunoon* (possibly) in the UKHO data (11093). In the sidescan sonar data the wreck is visible as a large area of debris features, including linear, curvilinear and smaller dark reflectors with shadows. It is located within sandwaves and the full extent of the wreck debris may be buried. The wreck has dimensions of 54 x 11 x 4m and the largest piece of discernible debris measures 5.8 x 1.4m. The wreck appears relatively intact but in poor condition, with little structural detail visible beyond the hull. There is some possible debris or broken off structure situated 40m north of one end of the vessel (**70361**). In the bathymetry data the wreck is seen to be aligned north-east to south-west and possibly has some debris or broken structure situated directly to the north-east end of the vessel. The wreck stands prominently upright on the seabed within large sandwaves and has a large amount of scouring orientated north to south and measuring over 300m in length. There is a very large magnetic anomaly associated measuring 15867nT indicating a ferrous structure. This wreck is associated with UKHO record (11093) of the HMS *Dunoon* (possibly), a 700-ton British minesweeper with original dimensions of 70.4 x 8.5 x 2.1m. The vessel was sunk by a mine on 30 May 1940. The wreck was last observed in 1986 as being relatively intact but damaged at the bow, with a length of 62m and a recorded height of 5.2m.
- 5.2.82 Anomaly **70459 (Sheet 7)** is the recorded wreck *Phillipp M* (UKHO 11092). In the sidescan sonar data the wreck is clearly broken in two and visible as a large spread of highly dispersed wreck debris. There is some structure and possible deck planking discernible as parallel dark reflectors with shadows. It is not clear which is the stern or bow end of the vessel, however the two hull sections appear to be largely intact. The full extent of the wreck is likely to be buried by the large sandwaves in the area. In the bathymetry data the wreck is also clearly lying in two parts, with a 17m gap between them and both sections orientated north-west to south-east. The wreck is situated in a large depression with clear scouring visible orientated north-west to south-east and measuring over 100m in length. The individual dimensions of the northern section are 41 x 23 x 10m and the southern section measures 44 x 19 x 8m. The combined dimensions are similar to the recorded construction dimensions of 80.5 x 11.9 x 7m. The wreck has a large magnetic anomaly associated measuring 775nT and indicating a ferrous composition. In the UKHO database this is recorded as *Phillipp M*, a steamship, which was torpedoed and sunk in 1944. The wreck is described as lying in two parts on the seabed, probably inverted, with measurements of 55 x 30 x 7.7m. It was last observed in 1999.
- 5.2.83 Anomaly **70565 (Sheet 8)** is a highly dispersed wreck. In the sidescan data the vessel is visible as several distinct dark reflectors, with broad shadows. The wreck appears to have a main central body with large bits broken off from the hull. The wreck is situated within the crest of a sandwave and the full extent is likely to be buried by sediments. In the bathymetry data the wreck appears to be broken up with large sections displaced from the main structure of the wreck, possible boilers can be seen as distinct peaks in the data. It is clearly within large sandwaves and partially buried by sediments. The vessel has dimensions of 70 x 31 x 6.3m. There is some scouring coming from the wreck extending to the south-east and measuring approximately 50m in length. A large magnetic anomaly measuring 200nT is associated indicating some ferrous content. In the UKHO record (10722) this is stated to be an unknown wreck with dimensions of 35 x 20 x 4.2m. It is described as being broken up and almost buried by sandwaves with the hull lying north-

west to south-east. Pieces of debris in the vicinity of the wreck are thought likely to be boilers and engines. The wreck has a large magnetic anomaly associated with it and it is reported to have last been observed in 2014.

- 5.2.84 Wreck **70617 (Sheet 9)** is a large wreck broken in two parts which lie perpendicular to one another on the seabed. In the sidescan sonar data the two parts of the hull appear to be intact and visible as thick and distinct linear dark reflectors. Within these some possible deck structure survives as straight, slatted dark reflector features with bright shadows. The area covered by the wrecks two parts measures 56.7 x 47 x 6.4m and it has a very large magnetic anomaly measuring 6367nT indicating a ferrous construction. In the bathymetry data the wreck is clearly broken in two parts with some standing structure visible. What appears to be the bow is orientated south-east to north-west and the stern lies west to east. The two parts measure 77m in length when added together in the multibeam data, close to the original build dimensions of 73.2m. The two pieces of the wreck are situated in a slight depression with some sediment build up. In the UKHO record (10544) this vessel is identified to be the *Rye*, a steamship with original dimensions of 73.2 x 10.4 x 4.6m. The vessel was built in 1924 by W Beardmoe & Co. It was owned at the time of loss by London, Midland and Scottish Railway and was sunk in 1941 by a torpedo. The wreck was last identified in 2014, when scouring was observed 2m deep and extending for 10m.
- 5.2.85 Wreck **70639 (Sheet 10)** is recorded wreck *Trevethoe* (UKHO 10546). In the sidescan sonar data the wreck appears to be highly dispersed across the seafloor with dimensions of 146.4 x 46.6 x 11.7m. The length is comparable to the build length (131.8m) but the width is more than double, which may suggest some of the structure has collapsed. A thick slightly curvilinear dark reflector, possibly the hull edge, is discernible but no structural elements or decking are clear. The wreck is comprised of numerous straight dark reflectors with shadows of varying lengths and widths. The vessel is orientated north-west to south-east and lies perpendicular to the large sandwaves. The full extent of the vessel is possibly covered by sands. The wreck has a possible associated piece of debris at its northern end (**70640**) which is a long, thin and indistinct linear dark reflector with a broad shadow, it has dimensions of 20.5 x 1.1 x 3.3m. It is possible that there may be more buried debris in the vicinity of the wreck and within the large sandwaves. The wreck has a large magnetic anomaly measuring 818nT associated, indicating a ferrous composition. In the bathymetry data the wreck appears upright with some superstructure visible, again there is evidence that parts of the hull have collapsed and the vessel is not intact. The UKHO records this wreck as the *Trevethoe*, a motor vessel built in Glasgow in 1940 with build dimensions of 131.8 x 17.1 x 7.5m. The vessel was sunk in 1941 after being attacked by E-boats. The wreck was last observed in 2014 as upright but collapsed in two parts with scour 2m deep and extending for 15m.
- 5.2.86 **70645 (Sheet 11)** is a medium sized wreck with dimensions of 24 x 8.5 x 5.4m. It is visible in the sidescan sonar data as a distinct, thick curvilinear dark reflector outline that is likely to be the hull, with some indistinct dark reflectors in its centre. There is no discernible deck structure visible in the data but the wreck has a broad, irregular and distinct shadow. The wreck is located in an area of megaripples and there is the possibility of associated debris being buried by sediments. The wreck is orientated north-east to south-west. In the bathymetry data this is visible as a large and distinct wreck lying in between large sandwaves. The wreck is intact and upright with some slight scouring orientated in the same direction and measuring 16m to either side. There is a medium magnetic anomaly measuring 52nT associated with this wreck indicating some ferrous debris, though the nearest line of data is 25m from the wrecks location and the amplitude would be expected to be higher if the magnetometer passed directly over the vessel. In the UKHO record



(82114) this is stated to be an unknown wreck that is largely intact and partially buried with dimensions of 24 x 10 x 4m.

- 5.2.87 **70659 (Sheet 12)** is a large wreck with dimensions of 56 x 22 x 6.7m. In the sidescan sonar data the wreck appears intact, situated on a rough and sandwave rich area of the seabed. The hull is clearly visible as long and thick slightly curvilinear dark reflectors. Within these there are long and thin linear slatted dark reflectors which are possibly deck structure. The vessel is possibly listing slightly to the starboard side and has a broad shadow. The full extent of the wreck may be buried by sandwaves. The wreck is orientated east to west with a large amount of scouring visible orientated north-west to south-east and measuring 70m in length. There is a very large magnetic anomaly measuring 9466nT associated, indicating the wreck has a ferrous composition. In the bathymetry data the wreck appears to cut through a megaripple. There is deck structure discernible in these data and possibly associated debris in the vicinity. The UKHO record (10849) associated with this wreck states it is unknown. It is described as lying in two parts with damage to the bow. The vessel was last observed in 2014 with dimensions of 31 x 10 x 5.1m and scour 1.5m deep and extending 60m.
- 5.2.88 Anomaly **70704 (Sheet 13)** is a medium sized wreck of a sailing vessel. In the sidescan sonar data the wreck appears to be relatively intact and upright though partially buried. Numerous short, straight slatted dark reflectors with height are visible in the data, that are likely deck structure and there are other reasonably distinct and detailed structural features visible. In the bathymetry data an indistinct mound is visible located within large sandwaves although it is difficult to distinguish as a wreck. The vessel appears to be aligned north-east to south-west and very little detail is visible. The wreck is mostly buried by sediments and the edge of the hull is hard to see. The wreck has dimensions of 26 x 7 x 2m and has a medium magnetic anomaly measuring 117nT associated indicating some ferrous content. In the UKHO record (10545) the wreck is described as a sailing vessel, intact and mainly covered by a sandwave. It was last observed in 2014 with dimensions of 46 x 8 x 2m.
- 5.2.89 Anomaly **70709 (Sheet 14)** is the wreckage of steamship *Montferland* (UKHO 10549). In the sidescan sonar data the wreck appears to be partially disintegrated and possibly broken up into sections, though still with height. The wreck has dimensions of 153 x 38 x 10.2m and the hull is clearly visible as a thick and distinct linear dark reflector. Numerous straight, sometimes slatted, sometimes square, dark reflectors can be distinguished across the deck, indicating some superstructure may still be standing. The wreck is visible in the bathymetry data as a distinct mound orientated north-west to south-east and lying perpendicular to large sandwaves. There is scour visible to the south-west of the wreck. The wreck appears upright with some possible associated debris located at the north-western end of the vessel. The wreck has a very large magnetic anomaly measuring 10244nT associated, suggesting a ferrous construction. In the UKHO database (10549) this is the steamship *Montferland*, built in 1921 in Newcastle-Upon-Tyne, with an original length of 128m. The vessel was attacked and wrecked by a German aircraft in 1941. It was carrying sugar, meat, steel, wool and milk powder at the time. The wreck was last observed in 2014 with dimensions of 160 x 34 x 7.7m and debris lying close to the north-east side of the vessel.
- 5.2.90 Anomaly **70744 (Sheet 15)** is a large wreck with dimensions of 68 x 11.3 x 6m. The wreck appears in the sidescan sonar data to be largely intact but with a possible break near one end. Numerous straight, dark reflectors and some slatted items are visible on the deck indicating surviving structure. The wreck is located in an area with large and frequent sandwaves and associated debris may be buried in the vicinity. The wreck has a very large magnetic anomaly measuring 10181nT associated, indicating a ferrous construction.

In the bathymetry data the wreck is visible as intact and lying upright on the edge of a large sandwave with sediment build up around the hull. The wreck is orientated north-east to south-west with scouring measuring 30m long and orientated to the south-east. The UKHO (10548) records this as an unknown wreck with dimensions of 31 x 10 x 4.1m lying straight but broken on the seabed. There is a scour up to 1.5m deep extending 65m from the wreck in both directions, north-west and south-east. The wreck has a large magnetic contact associated with it and was last observed in 2014.

- 5.2.91 Anomaly **70809 (Sheet 16)** is the wreck of the steam paddle schooner *Seagull* (UKHO 10550). The wreck appears to be partially disintegrated in the sidescan sonar data, but upright and mostly intact. Numerous straight dark reflectors with bright shadows that are likely surviving deck structure are visible. The wreck has a broad, irregular shadow displaying significant height above the seafloor. The wreck is orientated in a north-west to south-east direction and has dimensions of 47 x 18 x 7.6m. The width of the vessel suggests some of its structure and / or hull has collapsed. The vessel has a large magnetic anomaly measuring 1779nT associated, indicating a ferrous construction. In the bathymetry data the wreck appears intact and upright on a sandwave rich area of the seabed, again some superstructure is discernible in the data. The UKHO record (10550) states that the original dimensions of the schooner were 52.1 x 7m. It was built in 1848 in Belfast and sunk in 1868 after being struck by another vessel. The wreck is described as being very broken up and collapsed on the seabed. The vessel was last observed in 1994 by divers who recovered the ship's bell and identified its provenance. They recorded dimensions for the wreck of 40m in length with a height of 8.6m.
- 5.2.92 Anomaly **70834 (Sheet 17)** is the wreck of the steam screw barque *Xanthe* (10660 UKHO). In the sidescan sonar data the wreck appears to be relatively intact and upright, with a very distinct hull edge visible on both sides as a thick, curvilinear dark reflector. One end of the wreck appears to be more degraded than the other and partially buried. There are also some linear slatted deck features and possible structural elements discernible in the data, with associated items of debris visible close to the wreck. The wreck has dimensions of 66 x 12.8 x 6.4m and is orientated east to west on an area of the seabed covered with megaripples. The vessel has a medium magnetic anomaly measuring 147nT associated, indicating ferrous material is present, though the closest survey line is 18m away and the anomaly amplitude would be expected to be higher if a line crossed directly over the wreck. In the bathymetry data the wreck appears intact with possible superstructure visible and is distinct in between areas of megaripples. The vessel has scouring orientated to the south-east measuring over 100m in length and is lying in a water depth of 29m below Lowest Astronomical Tide (LAT). The UKHO (10660) records this as a 689 ton steamship, with original dimensions of 62.2 x 8.5 x 4.9m. The vessel was built in Hull in 1862 and was sunk after a collision in 1869 while carrying a cargo of coal. The wreck was last observed in 2002 with recorded dimensions of 55 x 10 x 7m.
- 5.2.93 Anomaly **70934 (Sheet 18)** is identified as recorded wreck *Sheaf Water* (10554 UKHO). In the sidescan sonar data a very large area of small, dark reflector objects with shadows is visible spread across the seabed, some of these are linear. The hull does not look intact and the vessel appears to be very broken up and degraded in the images. No structure or recognisable features are discernible and it is likely that much of the vessel has collapsed. The wreck has dimensions of 105 x 46.4 x 1.9m and is orientated north to south on a fairly flat and even area of the seabed. There is a large magnetic anomaly measuring 1056nT associated, indicating a ferrous composition. In the bathymetry data this wreck is visible as mostly buried and broken up and situated in a depression. The UKHO records this wreck as the *Sheaf Water*, a steamship torpedoed by a German E-Boat in 1942. The vessel's original dimensions are recorded as 97.5 x 13.1m. The length is comparable to



the dimensions from the geophysical data. The wreck is recorded as last observed in 1983.

- 5.2.94 Anomaly **70954 (Sheet 19)** is recorded in the UKHO database (10680) as an unknown wreck. In the sidescan sonar data this is a large wreck with dimensions of 73.2 x 29.6 x 5.1m. It appears to be mostly intact though possibly partially disintegrated. There are numerous dark reflectors, some of which are linear and have long, distinct shadows, which look to be surviving deck structure. The vessel has a large height measurement and is orientated north-east to south-west on a relatively flat and even area of the seabed. The vessel appears to have some sediment cover in places across the deck. There is a rope or chain feature (**70960**) situated 13m to the north-east of the wreck orientated north-west to south-east on the seabed. This may be associated debris or is perhaps more likely to be modern fishing gear, rope or chain that has caught on the wreck and been lost. In the bathymetry data the wreck appears upright and intact with a distinct area of scour orientated south-east with a depth of 1m below the seabed. A possible boiler can also be seen in the data. There is a large magnetic anomaly measuring 12104nT associated, indicating the wreck has a ferrous composition. The UKHO record (10680) associated with this wreck is for an unknown vessel last observed in 1983 with dimensions of 80 x 20 x 4m. The wreck is recorded as being intact.
- 5.2.95 Anomaly **70962 (Sheet 20)** is the recorded wreck *Fulgens* (UKHO 10556). In the sidescan sonar data this is visible as a very large, dispersed area of wreckage with dimensions of 107 x 43.5 x 4m. Hundreds of various sized dark reflector anomalies with shadows are visible in the data, some are linear shaped and likely deck structure features. Some parts of the outer hull edge appear to be intact, though some areas appear to have collapsed. The wreck has an associated debris field (**70958**) located on the eastern edge of the vessel which consists of a small patch of dispersed dark reflectors with height. It comprises approximately four anomalies, one thin linear dark reflector and smaller anomalies, the debris field dimensions are 44.4 x 19.2 x 0.2m. There are also four likely associated rope or chain features within the wreck's vicinity (**70952**, **70955**, **70956** and **70959**), the longest of which, **70952**, measures 98.2m in length and is orientated north-west to south-east. There is a large magnetic anomaly measuring 30656nT associated with this vessel indicating a ferrous construction. In the bathymetry data the wreck is orientated north to south and situated on a relatively flat and even area of the seabed. The hull appears to be broken up and more disintegrated at the southern (possibly stern) end of the vessel. In the UKHO database (10556) this is recorded as *Fulgens*, a steamship built in 1912 with original dimensions of 93.1 x 12.9 x 5.8m. It was sunk in 1915 by torpedo and is described as being very broken up with no scour and sonar dimensions of 100 x 30 x 3m.
- 5.2.96 Anomaly **71043 (Sheet 21)** is a large wreck broken into two sections, that appear to be in a poorly preserved condition, lying perpendicular to one another. The larger section is to the north and orientated east to west with dimensions of 52 x 17 x 0.5m. This section has straight edges along its length and the deck appears to be intact showing some superstructure. The boundaries of this section are not always discernible in the data and there is some slight scouring orientated north-west to south-east. The second section of the wreck has dimensions of 37 x 14 x 1.9m and is orientated north-east to south-west. This section of the wreck appears more degraded in the sidescan sonar data with little detail other than the hull edge discernible. The complete dimensions of the wreck site are 60 x 56 x 1.9m. This wreck has a large magnetic anomaly measuring 322nT associated, indicating a ferrous construction or cargo. In the bathymetry data this is visible as a large wreck split in two parts that appears to be very degraded and poorly preserved with little height above the seabed. Overall, the wreck appears to be poorly preserved and as it is located within large sandwaves there is potential for associated debris to be buried in the

vicinity. UKHO record 86378 is associated with this wreck. It records it as unknown and describes the wreck as being split into two pieces, one measuring 50m and the other 35m long.

- 5.2.97 Anomaly **71117 (Sheet 22)** is the recorded wreck of the HMS *Francolin*, UKHO number 10568. In the sidescan sonar data a large area of dispersed wreckage is visible on a fairly flat and even area of the seabed. The vessel appears to be very broken up with tens of linear dark reflectors with shadows discernible. The area the wreck covers measures 50.2 x 26.4 x 1.7m and it is orientated north-west to south-east. There is a very large magnetic anomaly associated measuring 13265nT, indicating a ferrous construction. In the bathymetry data the wreck is visible as an oval shaped uneven mound and appears very degraded with little height within a slight depression on a featureless area of the seabed. The UKHO record is situated 20m from the observed wreck location and states it to be the HMS *Francolin*, a trawler that was bombed and sunk by a German aircraft in 1941. It was last observed in 2015 with dimensions of 40 x 16 x 1.6m.
- 5.2.98 Anomaly **71128 (Sheet 23)** is an unknown wreck recorded in the UKHO database (82483). In the sidescan sonar data a small spread of several dark reflectors is visible. There are approximately 10 anomalies, some of which appear to be relatively straight, with height. The vessel has dimensions of 16.3 x 8 x 0.9m. It is extremely broken up and degraded and there is little indication in the sidescan sonar data images to suggest that this was once a wreck from its current condition on the seabed. The wreck is visible in the bathymetry data as an elongated mound orientated north to south on a relatively flat and even area of the seabed. Again, no structure or detail is visible in the data. The vessel has a very large magnetic anomaly measuring 954nT associated, indicating a ferrous construction or cargo. This wreck is recorded in the UKHO database as an unknown wreck, which was last observed in a 2015 survey with dimensions of 15 x 6 x 1m and orientated 050°.
- 5.2.99 Anomaly **71129 (Sheet 24)** are the remains of a medium sized wreck located within the inshore area of the provisional OCC. The wreck has dimensions of 30 x 16 x 2.6m; however, these should be considered a minimum as the vessel extends beyond the limits of the geophysical survey data. Sections of the hull of the vessel are discernible in the sidescan sonar data with some internal structure visible within this. The vessel comprises indistinct dark and bright reflectors, some linear and some irregular, across its extent. There are numerous slatted dark reflectors with shadows and associated debris scattered across the seafloor around the wreck. There is a large magnetic anomaly measuring 555nT associated, indicating a ferrous construction or cargo. There is also a magnetic anomaly (**71127**) of 64nT, discriminated as A2, located 84m south-west of the wreck that may be associated buried debris. In the bathymetry data the wreck extends beyond the data coverage, but a large mound is partially visible although there is little detail or structure discernible. A UKHO record (10560) for the HMS *Dungeness* is located 52m south of the location of this wreck and may be the same vessel. The vessel was a trawler that was bombed by a German aircraft in 1940 and ran aground. Nothing was observed at the position of this record in 1983 which might suggest that the position of the wreck is incorrect in the UKHO database.
- 5.2.100 Anomaly **71131 (Sheet 25)** is a recorded, but unknown wreck (UKHO 82484) visible in the sidescan sonar data as a large group of compact dark reflectors with a very distinct and broad shadow. The wreck has dimensions of 13 x 7 x 3m and is located in the inshore area of the provisional OCC. There are no distinguishable structural elements of the vessel visible which suggests that it is badly damaged or degraded, though it still stands tall above the seafloor although it appears to be partially buried by sediments. The wreck has a large magnetic anomaly measuring 368nT associated indicating ferrous material is

present. In the bathymetry data the wreck is visible as an upright distinct oval shaped mound orientated north-west to south-east in a featureless area of the seabed. Again, there is little detail visible though the highest point of the wreck is at the centre of the feature. The UKHO records this as an unknown wreck, last observed in 2015 with dimensions of 9 x 4.5 x 2.3m and orientated 130° on the seabed.

- 5.2.101 Wreck **71162 (Sheet 26)** is visible in the sidescan sonar data as a large area of indistinct wreck debris that appears to be very broken up. It covers an area of 54.5 x 18.2 x 2.6m on a sandwave rich part of the seabed. The feature comprises an elliptical area of dark and bright reflectors with some bright shadows. A thick curvilinear dark reflector can be seen and is likely one edge of the hull with some slatted dark reflectors and likely standing deck structure discernible within this. A large area of seabed is disturbed around the wreck suggesting that there may be further buried debris under the sediments. It is difficult to distinguish the full extents in the sidescan data as the wreck goes beyond the data limits. A large magnetic anomaly is associated with this wreck measuring 370nT and suggesting a ferrous construction or cargo. There is one piece of possible associated debris located 33m south-west of this wreck, **71158**. This is a small dark reflector object with dimensions of 1.5 x 0.5 x 0.2m located within a depression and an angular shadow. It has an associated magnetic anomaly measuring 146nT indicating it is ferrous debris. In the bathymetry data the wreck is visible as a broken up and poorly preserved wreck orientated north-west to south-east, with the southern section larger and more defined. The northern section of the wreck has some height whilst the centre is broken up and appears to be partially buried by sediments. There is a large amount of scouring orientated to the south-east and measuring over 100m in length. This vessel is associated with UKHO record 86203 of an unknown wreck, first observed in 2016 with a recorded sonar length of 30m.
- 5.2.102 Anomaly **71172 (Sheet 27)** is a very large area of dispersed wreck measuring 93.5 x 29 x 5.5m. In the sidescan sonar data there are numerous dark reflector objects of various sizes with bright shadows visible. Some of these appear to be quite straight and are possibly structural. A long and thin curvilinear dark reflector that may be part of the hull can also be seen, though the entire vessel is very broken up and indistinct. There are two possible associated pieces of debris in the vicinity of this wreck. **71163** is located 75m to the south-east and **71167** is located 62m to the south-east from the centre of the wreck. There is a large magnetic anomaly measuring 4056nT associated with this wreck indicating a ferrous construction. In the bathymetry data the wreck is visible as an upright and intact wreck orientated north-west to south-east. Two distinct possible structural elements can be seen in the centre of the wreck, possibly boilers, which are the highest point of the wreckage. The northern end of the vessel appears to be mostly buried or broken up. In the UKHO record (10571) this is an unknown wreck that was discovered in 1961 when it was fouled by a boats sweep. It was last observed in 2015 with dimensions of 86 x 14 x 3.8m.
- 5.2.103 Anomaly **71176 (Sheet 28)** is a medium sized wreck with no associated UKHO record. In the sidescan sonar data the wreck is visible as a distinct and irregular outline of parallel dark reflectors with some irregular bright shadows. These are likely to be structural remains, possibly parts of the deck. The wreck has dimensions of 19.8 x 8 x 1m and appears to be intact with the anomaly having a slatted texture. The wreck is orientated north-east to south-west on a rocky area of the seabed. There is no associated magnetic anomaly present at this location and it is likely that this is a non-ferrous wreck of wooden construction. In the bathymetry data this wreck is visible as a linear mound orientated north-east to south-west situated on a rough and uneven area of the seabed. A possible piece of associated debris (**71173**) is situated 24m to the south-east of the wreck. This is a long and relatively straight, narrow dark reflector with a broad, rounded shadow and has

dimensions of 3.9 x 0.5 x 0.5m. There is the potential for further buried debris to be present in the wreck's vicinity. This wreck is located 60m to the south-east of wreck **71181**.

- 5.2.104 Anomaly **71181 (Sheet 29)** is a very large and dispersed wreck spread over an area measuring 73 x 48.7 x 3.1m. The wreck is visible in the sidescan sonar data as a large number of mainly linear dark and bright reflectors. Possible slatted deck areas are discernible as well as very distinctive and clear structural debris in the data. The hull appears to be mostly intact, though large sections of structure may have collapsed over the sides of the vessel. The wreck is orientated north to south and is lying within large sandwaves. Several debris features lie close to the wreck (**71183**, **71174**, and **71175**) and there is a possibility that more debris may be buried by sediments in the vicinity of the wreck. In the bathymetry data **71181** appears as a partially buried wreck, lying upright and possibly broken up on an uneven area of the seabed with sandwaves situated to the south and east. There is significant scouring present orientated to the south-west and measuring approximately 60m in length. The wreck has a very large magnetic anomaly associated, measuring 25165nT, indicating a ferrous construction. UKHO record 58447 is associated with this wreck and describes it as an unknown vessel which was last observed in 2015 with dimensions of 77 x 16 x 2.5m.
- 5.2.105 Wreck **71188 (Sheet 30)** is recorded wreck *Ole Bull* (UKHO 10574). In the sidescan sonar data there is one particularly large, thick curvilinear object with height that may be part of the hull structure. Further linear and smaller dark reflector objects can also be distinguished in the data, though there is little detail visible and the full extent may be covered by sediment. The wreck has dimensions of 26 x 8 x 4.1m, which are significantly less than the original build dimensions of 82.3 x 11.6 x 5.5m, so it may be that the majority of the wreck has collapsed or is buried by sediments. The vessel has a very large magnetic anomaly associated measuring 1479nT, indicating a ferrous composition. In the bathymetry data the wreck is situated at a right angle to a large sandwave. It is orientated east to west and appears very distinct on the seabed. The UKHO records this wreck as the *Ole Bull*, a steamship built in 1901 that was sunk when it struck a mine laid by UC-19 in 1917. The vessel was last observed in 2015 with recorded dimensions of 22 x 4 x 4.5m. This wreck is located outside of the survey area but its recommended Archaeological Exclusion Zone brings it within.
- 5.2.106 In addition to the wrecks above there are a further 11 features discriminated as A1 within the provisional OCC: six pieces of debris, three debris fields and two very large magnetic anomalies (**Appendix VIII**).
- 5.2.107 Ferrous debris **70618 (Figure 13e)** is visible in the sidescan sonar data as a distinct dark reflector with a broad shadow. It has dimensions of 3.1 x 2.5 x 2m and has been identified on a rough and uneven area of the seafloor. The debris has a very large magnetic anomaly associated with it, measuring 1182nT and has been discriminated as A1 for this reason.
- 5.2.108 Ferrous debris **70784** has again been discriminated as A1 due to its very large associated magnetic anomaly, measuring 1113nT. In the sidescan sonar data this is discernible as a very small but distinct dark reflector with an irregular shadow and dimensions of 0.8 x 0.6 x 0.8m. The object is situated 6m south-east of debris field **70785 (Figure 13g)**, also discriminated as A1 due to its archaeological potential. In the sidescan sonar data **70785** is visible as a small patch of disturbed seabed comprising numerous dark reflectors with height. This ferrous debris field has dimensions of 10.8 x 2.4 x 1.3m. It shares the same magnetic anomaly as **70784** and the two features may well be related.

- 5.2.109 Anomaly **70460** is small piece of debris possibly associated with wreck **70459**, situated 27m to the south-west of the vessel (**Figure 13d**). The debris has dimensions of 1.6 x 0.2 x 0.2 and is visible as a thin curvilinear dark reflector with a shadow in the sidescan sonar data, located within sandwaves.
- 5.2.110 Anomaly **70832** and **70833** are both pieces of debris possibly associated with wreck **70834**. The former is a small and indistinct dark reflector with dimensions of 1.6 x 0.3 x 0.5m. This is located 5m from the eastern end of the vessel (**Figure 13g**). Debris **70833** is situated 2m from the eastern end of the vessel and slightly north-west of **70832**. The object has dimensions of 0.9 x 0.6 x 0.6m. This is discernible as a small dark reflector that is partially obscured by the wrecks shadow in the sidescan sonar data.
- 5.2.111 Debris **70640** is a long, thin and indistinct linear dark reflector with a long and broad shadow. The object has dimensions of 20.5 x 1.1 x 3.3m. This debris is possibly associated with wreck **70639**, as it is situated 9m to the north-west of the wreck's location (**Figure 13e**).
- 5.2.112 Debris field **70810** has dimensions of 8 x 3.3 x 0.4m. In the sidescan data this is discernible as a small patch of disturbed seafloor with some possible straight dark reflector features with height within. It is fairly indistinct. This debris field is located 7m from the north-western end of wreck **70809** (**Figure 13g**) and is possibly related debris.
- 5.2.113 Debris field **70958** is possibly associated with wreck **70962**, the wreck is orientated north to south and the debris field is situated on the eastern side of the hull (**Figure 13g**). In the sidescan data this is visible as a large area of dispersed dark reflectors with height. There are approximately four features consisting of a distinct, thin linear dark reflector and additional smaller, slightly rounded anomalies. The debris covers an area of 44.4 x 19.2 x 0.2m.
- 5.2.114 There are two magnetic anomalies with no associated surface expression discriminated as A1 within the provisional OCC. Magnetic anomaly **71073** (**Figure 13h**) is a very large dipole identified on more than one survey line measuring 949nT and **70615** (**Figure 13e**) is a large negative monopole only identified on one survey line measuring 1697nT. Both of these features have the potential to be substantial buried ferrous debris.
- 5.2.115 A total of 936 anomalies have been interpreted as A2 – uncertain origin of possible archaeological interest.
- 5.2.116 There are 73 pieces of debris discriminated as A2 recorded across the provisional OCC. Thirty-six of these have a magnetic anomaly associated, indicating they contain ferrous material (**Appendix VIII**). **71104** is a long, faint, linear dark reflector with a very slight shadow that is not particularly distinct in the sidescan sonar data. The feature has dimensions of 40.2 x 0.3 x 0.1m and it has a dark reflector with a narrow shadow visible at one end measuring 2.2 x 0.5 x 0.8m. This has been interpreted to be a possible length of rope or chain with an object such as an anchor attached. The feature has a large magnetic anomaly measuring 368nT associated indicating it is ferrous debris.
- 5.2.117 **70881** is a small, circular dark reflector with a bright reflector in the centre and a broad distinct shadow. The feature has dimensions of 2.5 x 1.9 x 0.5m and is associated with a large magnetic anomaly measuring 241nT indicating ferrous debris (**Figure 14**).
- 5.2.118 Ferrous debris **70474** is a distinct horseshoe shaped curvilinear dark reflector with no shadow, located within sandwaves. The feature looks slightly broken up or buried in parts and has dimensions of 5.7 x 0.6m. It has a medium magnetic anomaly measuring 126nT



associated. Debris feature **70380** is a large, curved dark reflector with a corresponding curvilinear shadow. It has dimensions of 8.8 x 1.6 x 0.1m and scouring associated, measuring 32.5m and orientated to the north-west.

- 5.2.119 Three pieces of debris identified in the 2012 former East Anglia Zone OFTO survey (**70317**, **70323** and **70320**) are situated within the provisional OCC. Debris **70320** was originally identified in the 2012 data as an indistinct, large curvilinear feature. It appeared to be partially buried and had scour and a distinct depression in the bathymetry data. In the 2016 bathymetry data this is visible as a large object within a depression, with a slightly rounded shape. The debris has dimensions of 6 x 4 x 0.3m and has scouring orientated to the north measuring 25m. The depression the object is situated in measures 8 x 6m.
- 5.2.120 There are 36 debris fields identified within the provisional OCC with an archaeological discrimination of A2 (**Appendix VIII**). Fifteen of these have magnetic anomalies associated indicating some ferrous content. The smallest debris field is **70344** which has dimensions of 5.4 x 0.8 x 0.2m and is located on the edge of a sandwave. This has been identified in the sidescan sonar data as three small and distinct dark reflectors with shadows. The largest feature in the debris field measures 1.9 x 0.7m.
- 5.2.121 The largest debris field identified is **71122**. This has dimensions of 83.4 x 19.1 x 0.3m. The debris field is comprised of several dispersed linear items of debris with height. This feature has a large magnetic anomaly measuring 362nT associated indicating ferrous debris is present. **70399** is a medium sized indistinct spread of possible debris. A thick curvilinear shaped dark reflector with a very large and bright shadow is discernible with some smaller exposed dark reflectors surrounding it. The debris field has dimensions of 9.5 x 8 x 2.5m and is situated within sandwaves, it may be partially buried. In the bathymetry data this is visible as a medium sized, distinct rounded mound situated in a depression. There is scouring 2m deep associated, this is orientated north and measures over 100m in length.
- 5.2.122 Seven seafloor disturbances have been identified within the provisional OCC (**Appendix VIII**). Anomaly **71001** is the largest area recorded with dimensions of 22 x 5 x 1.1m. In the sidescan data this is visible as an elongated area of disturbed seabed with irregular shadows or numerous objects with height close together in a line. In the bathymetry data this is visible as a linear arrangement of small mounds aligned east to west.
- 5.2.123 Seafloor disturbance **70318** was originally identified in the 2012 former East Anglia Zone OFTO survey as a weak, large diffuse irregular shaped anomaly with height in the sidescan sonar data. In the bathymetry data this was visible as a distinct depression with a mound to the south. The feature had dimensions of 9.2 x 4 x 0.7m. This seafloor disturbance was not observed in the most recent 2016 dataset and may have since been buried. This is situated approximately 25m north of a mound, **70319**, which is described below.
- 5.2.124 There are 29 bright reflector objects identified within the provisional OCC, all of which have been discriminated as A2 archaeological potential (**Appendix VIII**). The smallest feature (**71156**) has dimensions of 1.7 x 1.1m. This is a circular, bright reflector with a possible small dark reflector object in its centre. Bright reflector **70356** is a large feature with dimensions of 8.7 x 1.8m. It is visible in the sidescan data as a distinctive bright reflector that appears to be two semi circles aligned on the seabed, it looks highly anthropogenic. The largest bright reflector identified is **70385**, which has dimensions of 17.7 x 2.1m. This feature appears as a disjointed linear object, with a right-angled bend in its centre.

- 5.2.125 A total of 157 dark reflector features have been identified within the provisional OCC (**Appendix VIII**). The majority of these features, 101 of them, are less than 5m in length. Dark reflector **70937** is a typical example with dimensions of 4.7 x 0.5 x 0.3m. It is a short and straight distinct anomaly with a broad shadow (**Figure 15**).
- 5.2.126 Dark reflector **71121** is a large and irregular object with an irregular bright shadow. The feature has dimensions of 16 x 3 x 0.3m and is visible in the bathymetry data as a long and thin linear mound. It may be outcropping geology but this is not possible to determine from the data and it may be anthropogenic in nature. Dark reflector **70327** was originally identified in the 2012 former East Anglia Zone OFTO survey and falls within the provisional OCC. In the 2012 data this was identified as a weak, partially buried oval shaped dark reflector in the sidescan sonar data. It has not been observed in the most recent 2016 dataset and may have since been buried by sediments.
- 5.2.127 The smallest dark reflector identified is **71002** which has dimensions of 0.4 x 0.3 x 0.4m. It is a small but distinct, isolated dark reflector with a broad shadow. This has been identified on a flat and featureless area of the seabed. The largest dark reflector (**71042**) has dimensions of 19.2 x 0.3 x 0.3m. This is visible in the sidescan data as a long and thin slightly curvilinear dark reflector with height, it appears to be partially buried or broken up along its extent. This may be related to ferrous debris object (**71041**) situated 10m to the north-east.
- 5.2.128 A total of 36 possible rope or chain features have been identified across the provisional OCC. These vary in length from 7.2m (**70503**) to an extremely long 259m (**71264**). Ten possibly ferrous rope or chains have been recorded (**Appendix VIII**). Rope or chain **71264** has the largest magnetic anomaly associated measuring 591nT indicating a ferrous composition. The feature has dimensions of 259 x 0.8 x 0.4m. It is visible in the sidescan data as a long and thin curvilinear dark reflector with slight height. This is orientated north-west to south-east on the seabed and has a bright reflector (**71263**) situated 4m from it at its centre, which may be related.
- 5.2.129 Rope or chain **70913** is a long and thin curvilinear dark reflector with slight height and dimensions of 92.7 x 0.8 x 0.4m. The feature is possibly split apart or partially buried across its extent. It is orientated north-west to south-east on a relatively flat and even area of the seabed and has a large magnetic anomaly measuring 305nT associated indicating ferrous debris. Large ferrous linear anomaly **70823** is discernible in the sidescan sonar data as a long, thin and straight dark reflector with a shadow visible in parts. The feature has dimensions of 82.7 x 0.9 x 0.4m and an associated magnetic anomaly measuring 110nT. This may be a chain. It is located across an area of sandwaves and appears to be partially buried.
- 5.2.130 The shortest rope or chain identified is **70503**, which has dimensions of 7.2 x 0.5 and no measurable height. The feature is visible as a bright curvilinear feature lying in a 'C' shape on a rough and uneven area of the seabed. There is possible disturbance to surrounding sediment around the feature. Possible rope or chain **70989** has dimensions of 38.0 x 0.3 x 0.2m. It is a dark, linear feature with a slight shadow lying on a sandy seabed (**Figure 15**). There is no magnetic anomaly so it is unlikely to be ferrous in nature.
- 5.2.131 Ten mounds have been identified across the provisional OCC (**Appendix VIII**). One of these (**70319**) was originally identified in the 2012 former East Anglia Zone OFTO survey. This was described in the sidescan data as a weak, large diffuse irregular shaped anomaly with height that was possibly natural but larger in size than other natural features in the area. In the bathymetry data this was seen as a distinct mound on flat seafloor with two adjacent depressions separated by central barrier orientated north to south. A larger



depression was located to the west of the mound. In the 2016 bathymetry data this is visible as a small mound within natural features or possible scars and has dimensions of 9 x 7 x 0.6m.

- 5.2.132 Mound **70915** has a medium sized magnetic anomaly measuring 128nT associated indicating some ferrous debris may be present within the feature. It is a large mound with dimensions of 16 x 15 x 1.9m. In the sidescan data this is visible as a large, rounded and poorly defined dark reflector with a broad and long shadow. In the bathymetry data this is discernible as a large circular mound, very distinct on a featureless area of the seabed.
- 5.2.133 The largest mound identified within the provisional OCC is **71023**. This has dimensions of 36.7 x 22 x 3m. In the sidescan data this feature is discernible as a large mound with a distinct, broad shadow. The feature is comprised of tens of small dark reflectors with height. It is isolated and very distinct on a sandy and even area of the seabed. In the bathymetry data this is visible as a distinct and large circular mound, anomalous to the surrounding seabed.
- 5.2.134 There are 590 magnetic anomalies with no sidescan sonar feature associated across the provisional OCC. Two of these have been discriminated as A1, as discussed above, 588 have been given an archaeological discrimination of A2 (see **Appendix VIII**). These have been categorised as small magnetic anomalies of less than 50nT; medium sized magnetic anomalies of 50nT to 200nT, large magnetic anomalies of 201nT to 900nT and very large of over 900nT. Background magnetic variation caused by geology is approximately  $\pm 5$ nT and as such smaller anomalies recorded across the provisional OCC may prove to be geological in origin. Likewise, small anomalies may also be masked by this geological variation. All of the magnetic anomalies classified as A2 have the possibility to be buried objects with ferrous content that are of archaeological potential.
- 5.2.135 There are 275 small magnetic anomalies ranging from 6nT to 49nT, 245 medium sized magnetic anomalies ranging from 50nT to 200nT and 68 large anomalies ranging from 204nT to 841nT (**Appendix VIII**). These features, especially the large anomalies, have the potential to be substantial buried ferrous debris.

### 5.3 Maritime Archaeological Potential

- 5.3.1 The assessment of potential for the discovery of shipwreck and shipwreck-derived material within the study area draws on the results of the geophysical survey and desk-based research combined with further research of the wider area. Further information is presented in **Appendix IX**.

#### *Navigational Hazards*

- 5.3.2 A project entitled *Enhancing our Understanding: Mapping Navigational Hazards as areas of Maritime Archaeological Potential*, undertaken by Bournemouth University (Merritt *et al.*, 2007) assessed historical records of navigational hazards to interpret and characterise the marine historic environment. Areas assessed to be hazardous were considered alongside a model of the preservation potential of marine sediments with the purpose of identifying areas where there was not only a high potential for ship losses, but where there was also a high potential for the preservation of archaeological remains. These areas were coined as Areas of Maritime Archaeological Potential (AMAPs).
- 5.3.3 The provisional OCC truncates two AMAPs that are defined as having a high percentage of fine grained sediments and therefore a high potential of preservation (**Figure 16**).



- 5.3.4 The coastal section of the study area is within an area of medium potential for navigational hazard, with an exposed shallow coastal area, sheltered by offshore banks. Further offshore, the area is of low to medium potential for navigational hazard, with offshore banks, namely that of Happisburgh Sand which is located south of the provisional OCC, and exposure to all wind directions.
- 5.3.5 The study area falls within an area of significant shipping and navigation activity. These include the passage of merchant vessels, ferries, fishing vessels, recreational craft, military vessels, and vessels engaged on specialist operations such as aggregate dredgers.

#### *Recorded Losses*

- 5.3.6 As discussed in section 3.2, Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped together by their general area of loss into Maritime Named Locations (displayed spatially as polygons or centrepoints of polygons, often associated with NRHE data), however many records (particularly from the NHER dataset) are given co-ordinates (displayed spatially as points), although these are similarly unsubstantiated.
- 5.3.7 Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost or for which no physical wreck remains have ever been identified. **Table 13** shows the distribution of these documented losses according to the date of loss for those records whose positions fall within the study area (in this case only the provisional OCC). Details regarding these losses are presented in **Appendix X**.

**Table 13: Recorded Losses based on NRHE and UKHO data**

Period	Number of Losses
Medieval	2
Post-medieval	14
19th century	36
Modern	10
Unknown	5
<b>Total</b>	<b>67</b>

- 5.3.8 Recorded Losses are predominantly reported to have stranded in coastal areas, around Happisburgh and Bacton Beach. Other areas mentioned include Bromholme, Walcott, Eccles-on-Sea, Sea Palling, and Waxham, roughly covering 16km of coastline and although they are documented as being lost beyond the study area, their recorded loss position within the arbitrary Named Location places them within the study area. The majority of losses wrecked at or near Happisburgh, with Bacton beach being the second most popular location to have received wrecks. Both locations are Maritime Named Locations. A total of 22 vessels are recorded within the Bacton Beach Named Location, whilst 34 vessels are recorded within the Happisburgh Named Location.
- 5.3.9 In general, Recorded Losses paint a vibrant picture of the types of voyages being undertaken around the coast of Happisburgh. The losses across the area generally

represent 18th and 19th century vessels, including those involved in international trade. The sailing ships of the 19th century lost at Happisburgh predominantly feature cargo sailing vessel, crafts, schooners, brigs and ketches.

- 5.3.10 Further maritime Recorded Losses are recorded within the wider area, information for which is held by Wessex Archaeology and can be provided on request.

*Overview of Potential*

- 5.3.11 There is potential for the presence of archaeological material of maritime nature spanning from the Mesolithic period to the present day within the study area. The key areas of potential are summarised in **Table 14** below. The potential for further wrecks to be discovered within the study area is discussed in greater detail in **Appendix IX**.

**Table 14: Summary of key areas of maritime potential**

Period	Summary
Pre-1508 AD	Low potential for material associated with prehistoric maritime activities. Prehistoric maritime activities include coastal travel, fishing and the exploitation of other marine and coastal resources. Vessels of this period include rafts, hide covered watercraft and log boats.
	Low potential for material associated with later prehistoric maritime activities, including seaworthy watercraft suitable for overseas voyages to facilitate trade and the exploitation of deep water resources. Such remains are likely to comprise larger boat types, including those representing new technologies such as the Bronze Age sewn plank boats which are associated with a growing scale of seafaring activities.
	Low potential for material of Romano-British date, associated with the expansion and diversification of trade with the Continent. Watercraft of this period, where present, may be representative of a distinct shipbuilding tradition known as 'Romano-Celtic' shipbuilding, often considered to represent a fusion of Roman and northern European methods.
	Low potential for material associated with coastal and seafaring activity in the 'Dark Ages', associated with the renewed expansion of trade routes and Germanic and Norse invasion and migration. Vessels of this period may be representative of new shipbuilding traditions such as the technique.
	Low potential for material associated with medieval maritime activity, including that associated with increasing trade between the UK and Europe, the development of established ports around the southern North Sea and the expansion of fishing fleets and the herring industry. Vessels of this period are representative of a shipbuilding industry which encompassed a wide range of vessel types (comprising both larger ships and vernacular boats). Such wrecks may also be representative of new technologies (e.g. the use of flush-laid strakes in construction), developments in propulsion, the development of reliable navigation techniques and the use of ordnance.
1509 to 1815	Medium 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.
	Medium potential for post-medieval shipwrecks associated with the expansion of transoceanic communications and the opening up of the New World.



Period	Summary
	Medium 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.
	Medium potential for post-medieval shipwrecks associated with continuing local trade and marine exploitation including the transport of goods associated with the agricultural revolution.
1816 to 1913	Higher 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.
	Higher potential for the discovery of shipwrecks demonstrating a diverse array of vernacular boat types evolved for use in specific environments.
	Higher potential for wrecks associated with large scale worldwide trade, the fishing industry or coastal maritime activity including marine exploitation.
1914 to 1945	Higher potential for the discovery of shipwrecks associated with the two world wars including both naval vessels and merchant ships. Wrecks of this period may also be associated with the increased shipping responding to the demand to fulfil military requirements. A large number of vessels dating to this period were lost as a result of enemy action.
Post- 1946	Potential for wrecks associated with a wide range of maritime activities, including military, commerce, fishing and leisure. Although ships and boats of this period are more numerous, losses decline due to increased safety coupled with the absence of any major hostilities. Vessels dating to this period are predominantly lost as a result of any number of isolated or interrelated factors including human error, adverse weather conditions, collision with other vessels or navigational hazards or mechanical faults.

## 5.4 Aviation Archaeological Potential

- 5.4.1 The assessment of potential for the discovery of aircraft crash sites and aircraft derived material within the study area draws on the results of the geophysical survey and desk-based research combined with further research of the wider area. Further information is presented in **Appendix XI**.
- 5.4.2 There are no known aircraft crash sites recorded within the study area, however there is potential for the discovery of previously unknown aircraft material.

### *Recorded Losses*

- 5.4.3 There are three Recorded Losses for aircraft casualties listed by the NRHE and NHER within the study area, although it is not confirmed if material relating to the crash sites has been discovered within the area, hence their inclusion as Recorded Losses.
- 5.4.4 The aircraft date to WWII and comprise two British bombers; a Wellington MK 1, and a Hampden Mk 1; and one German bomber. These aircraft are recorded as having been lost off the Happisburgh coast and their records signify the potential for hitherto unknown aircraft remains to exist on the seafloor within the study area. Remains relating to the German bomber were discovered by divers, however the position given has not been confirmed. Two geophysical anomalies are located close to the given position (**71080** and **71088**), however since they indicate isolated pieces of debris rather than coherent



remains or a debris field, as implied in the record for the aircraft, it is possible that either the position is wrong or the remains have been dispersed since their discovery in 1981.

- 5.4.5 Details regarding these aircraft are provided in **Appendix XII**. Records for other aircraft casualties are present within the wider area, information for which is held by Wessex Archaeology and can be provided on request.

#### *Overview of Potential*

- 5.4.6 There is potential for the presence of aviation material dating from the early 20th century until more recent times, with a concentration dating to the World Wars and in particular WWII. Discoveries may occur anywhere within the study area, but potential may increase nearer the coastlines.
- 5.4.7 The key areas of aviation potential that may be uncovered within the study area are summarised in **Table 15** and further discussion regarding the potential for discovering aviation remains is presented in Appendix XI.

**Table 15: Summary of key areas of aviation potential**

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

## **6 ARCHAEOLOGICAL ASSESSMENT OF INTERTIDAL HERITAGE ASSETS**

### **6.1 Data Assessment**

- 6.1.1 There is a total of 65 records relating to archaeological sites, artefacts, material and standing remains within the intertidal zone (to MHWS) of the provisional OCC at the landfall search zones of Bacton Green, Walcott Gap and Happisburgh South (**1001 to 1065**). These records have been derived from the NRHE and NHER archives and are illustrated in **Figure 17**.
- 6.1.2 More detailed information regarding these assets is presented in **Appendix XIII** and are discussed in context in the onshore assessment (Royal HaskoningDHV, forthcoming), but a summary is provided in **Table 16**: Recorded assets based on NRHE and NHER data and below:

**Table 16: Recorded assets based on NRHE and NHER data**

Period	No. of Assets
Prehistoric	11
Palaeolithic	17
Neolithic	5
Bronze Age	2
Medieval	8
Post-medieval	7
Post-medieval to Modern	4
19th Century	1
Modern (WWII)	10
<b>Total</b>	<b>65</b>

- 6.1.3 A majority of the records refer to prehistoric findspots that no longer exist at the locations provided, and furthermore there appears to be a concentration of 24 records around Happisburgh. Some artefacts were discovered during the Norfolk Rapid Coastal Survey in Happisburgh, North Norfolk, whilst others were found by chance along Happisburgh beach. Features **1001** to **1008** consist of prehistoric flint flakes, scrapers and cores. Other finds relate to Palaeolithic flint artefacts including handaxes and flakes, often including environmental evidence (**1009** to **1016**, and **1018** to **1025**).
- 6.1.4 One record (**1017**) describes hominin footprints dating to early Pleistocene and early Middle Pleistocene located at Happisburgh after severe wave erosion exposed an area of laminated sediments on the foreshore. The footprints ranged from juvenile to adult hominin foot sizes and are considered the oldest known hominin footprints found outside Africa. Other significant early hominin sites have been located in Happisburgh comprising flint objects and cut-marked bones together with associated environmental remains.
- 6.1.5 Isolated Neolithic artefacts located in the intertidal area include polished flint axeheads (**1026** to **1028**) and a flaked flint axe (**1029**). These finds were discovered along Happisburgh Beach, Bacton and Walcott. Furthermore, discoveries dating to the Bronze Age include a blade fragment of a leaf shaped sword (**1034**) and a copper alloy flanged axehead found on Happisburgh beach (**1035**).
- 6.1.6 Records relating to **1030** to **1033** consist of multi-period finds ranging from the Neolithic to the post-medieval and include flint artefacts, coins, and pottery. These were all located within the area of Happisburgh.
- 6.1.7 Medieval findspots include an early Saxon silver pyramid mount with garnet (**1037**), a medieval gold ring dating to the late 12th or 13th century (**1038**), various coins (**1039**, **1041** to **1043**) and a harness pendant and coin of Charles I (**1040**). These finds were retrieved from Happisburgh, the area around Bacton and Walcott.
- 6.1.8 A Primitive Methodist chapel built in 1883 is wrongly recorded within the intertidal area (**1036**), as the record describes its position in Acle, a town located 20km to the south of Happisburgh.
- 6.1.9 Record **1044** refers to a medieval well to the south of Walcott. The site consisted of a square timber framed well, exposed by erosion in 1947. Its base was excavated in August 1948 and contained 13th century pottery. The finds are now located in Norwich Museum.



- 6.1.10 Record **1045** is the site of Happisburgh Low Lighthouse. This was one of two lighthouses erected in Happisburgh in 1791. By 1886 the lighthouse had fallen into the sea, probably as a result of coastal erosion. In 1980, when recorded by the Royal Commission on the Historical Monuments of England (RCHME), remains of part of the foundations still survived *in situ* but the majority of the remains lay on the beach or had been covered over by sand.
- 6.1.11 Post-medieval records include a coin showing George I (**1046**), and a flint and brick-lined well, now demolished (**1047**).
- 6.1.12 Modern records in the area refer to lines of posts visible on aerial photographs (**1048**, **1049** and **1053**) thought to be groynes or sea defences, the site of a brickyard that has since been eroded away (**1050**), an undated road from a map dating to 1797 that has since been destroyed by coastal erosion (**1051**), and a drain eroding from Happisburgh cliffs that was subsequently destroyed (**1052**).
- 6.1.13 Features **1054** and **1055** are both intertidal structures visible on aerial photographs taken in 1940. These possibly relate to WWII training or are evidence of coastal defences. It is possible that the remains may also relate to a wreck site that is no longer visible.
- 6.1.14 Military features are prevalent along this stretch of coastline. Within the study area several WWII features are recorded in the form of anti-tank blocks situated in the vicinity of Cart Gap to the north of Eccles-on-Sea and constructed between 1940 and 1941 (**1056**), and along Walcott Beach (**1057**). Two records relate specifically to WWII pillboxes - a polygonal pillbox (**1060**) situated in the vicinity of Cart Gap to the north of Eccles-on-Sea and now in poor condition, and the site of a former pillbox (**1061**) situated in the vicinity of Walcott Gap at Walcott that has been destroyed due to sea erosion and sea defence works.
- 6.1.15 Furthermore, **1062** describes barbed wire obstructions and possible weapons pits which are clearly visible on modern aerial photographs, **1063** is a site of barbed wire obstructions and two pillboxes, **1064** refers to coastal defences visible on aerial photographs, comprising of barbed wire obstructions, anti-tank cubes and a pillbox, and **1065** also includes anti-tank ditches, anti-tank cubes, barbed wire and pillboxes.
- 6.1.16 Record **1058** is for a Coast Artillery Battery situated on Happisburgh beach and about 38m north-east of Beach Road. The battery was built of concrete and was constructed between 1940 and 1941. The battery is equipped with mounting for two six-inch guns. The coastal battery was abandoned in the late 1940s as the Happisburgh Emergency Coast Battery became operational. At the time of a field visit on 30th October 1994 it was noted that the remains of the battery were in very bad condition and threatened by coastal erosion.
- 6.1.17 Record **1059** is for a machine gun post situated in the vicinity of Cart Gap to the north of Eccles-on-Sea. The gun post was built of brick and was constructed between 1940 and 1941. The polygonal structure was built into the cliff and is presumed to be a purpose-built machine gun post. At the time of a field visit between 1986 and 1988 it was noted that the structure was in fair condition.
- 6.1.18 The concentration of military defence features clearly indicates the vulnerability of this stretch of coastline during WWII.



## 6.2 Discussion and potential for heritage assets within the intertidal zone

- 6.2.1 As already discussed in section 4.3, there is the potential for prehistoric material, including palaeoenvironmental material such as peat and wood and also artefact evidence such as flint remains, to be discovered during the proposed work elements at the landfall sites.
- 6.2.2 The earliest direct evidence for Hominin activity in the UK was identified at the Lower Palaeolithic sites of Happisburgh, on the Norfolk coast, and Pakefield, on the Suffolk coast, dating from c. 800,000 and 700,000 BP respectively. These sites are both located within sediments of Cromerian age, and pre-date the earliest known glaciation of the UK. Due to the location of landfall in vicinity to these discoveries, the potential for uncovering material of equal international importance is considered to be high. Furthermore, the quantity of prehistoric material discovered from within the intertidal area indicates this area to be an area of high archaeological potential for such discoveries. The exposed footprints (**1017**) form one element of a group of internationally significant early hominin sites in Happisburgh investigated between 2005 and 2013 by the Ancient Human Occupation of Britain project (AHOB). These sites have pushed back the known record of human occupation of northern Europe by at least 350,000 years and continuing erosion of the coastline is likely to reveal further evidence of our distant past, transforming our understanding of the earliest human occupation of northern latitudes.
- 6.2.3 As sea levels rose, communities migrated further inland and as a result the types of archaeological assets discovered within the intertidal zone are of a maritime nature. Many of the recorded sites have been destroyed or are threatened by severe coastal erosion. This natural eroding factor can expose features of an archaeological nature, but can also bury existing features and therefore is very dynamic.
- 6.2.4 The concentration of military defence features present clearly indicates the vulnerability of this stretch of coastline during the WWII and the lengths taken to protect it. There may be potential for further material dating to WWII to be uncovered from intertidal contexts.

## 7 ASSESSMENT OF SETTING OF MARINE HERITAGE ASSETS

### 7.1 Introduction

- 7.1.1 The assessment of the setting of marine heritage assets within the study area draws on the results from the archaeological assessment of maritime and aviation sites (section 5 above). The heritage assets being referred to in this section consist of partially or fully buried features, and are located within a dynamic environment, reflecting past seascapes, palaeolandscapes, sea use, historic events and a general degree of change over time.
- 7.1.2 The assessment of setting for known marine heritage assets that appear to be isolated events without association with broader themes, together with assets that have limited information available has not been undertaken at this time. This also includes un-named wreck sites, unidentified foul ground/obstructions, or A2 geophysical anomalies. The setting associated with these assets cannot be experienced from land or within a wider marine landscape, and due to the generally limited visibility within UK waters, the experience of setting at their locations is likely to be limited to the immediate vicinity. With regards to wreck sites, vessels lost other than by design are not regarded as having a setting as their siting is based on chance alone.
- 7.1.3 Additional future discoveries made by the project during evaluation measures may provide further detail regarding the military setting containing these assets. However, ascertaining the true value of such relationships, between individual heritage assets and their wider



seabed context or setting, can only be inferred within this assessment until further information becomes available.

## 7.2 Norfolk Vanguard East

- 7.2.1 Within NV East there are five recorded wreck sites located across the area, three of which are associated with UKHO records and therefore have further information available (**70079**, **70255** and **70262**). Since these wrecks are all unidentified, their historic character and wrecking event is unknown and therefore their setting cannot be ascertained.
- 7.2.2 The remaining seabed features in NV East also contain limited information or are unidentified A2 geophysical anomalies, and as such it is impossible to infer their setting at this time.

## 7.3 Norfolk Vanguard West

- 7.3.1 Within NV West there are 12 recorded wrecks or obstructions, two of which are associated with UKHO records and therefore have further information available (**71334** and **71377**). Record **71377** is for an area of foul ground and therefore its setting will not be considered until further information is available.
- 7.3.2 The record for **71334** refers to an unidentified buried wreck containing substantial ferrous material. Since this wreck is unidentified, its historic character and wrecking event is unknown and therefore its setting cannot be ascertained at this time. However, it is considered to be associated with other A1 anomalies in close proximity, and if further survey/ground truthing is undertaken in the future this could provide more information regarding the overall setting of this wreck site.
- 7.3.3 The remaining seabed features in NV West are unidentified wreck sites, which contain limited information or are unidentified A2 geophysical anomalies, and as such it is impossible to infer their setting at this time.

## 7.4 Provisional Offshore Cable Corridor

- 7.4.1 Within the provisional OCC there are 37 recorded wrecks, 25 of which are associated with UKHO/NRHE records and therefore have further information available. Two of these records date to the 19th century (**70809** and **70834**), three relate to WWI losses (**70342**, **70962** and **71188**), and eight relate to WWII losses (**70360**, **70459**, **70617**, **70639**, **70709**, **70934**, **71117** and **71129**). The remaining 12 are unidentified wreck sites (**70565**, **70645**, **70659**, **70704**, **70744**, **70954**, **71043**, **71128**, **71131**, **71162**, **71172** and **71181**).
- 7.4.2 These 37 records are distributed across the provisional OCC but appear to be concentrated closer to the coastline. This may be due to the hazardous nature of the coastal topography, or possibly due to an increase in recordings by onshore witnesses of wrecking events. However, it could also be due to targeted military actions causing a proportion of vessels to wreck in this area.
- 7.4.3 Two records relate to 19th century wreck sites (**70809** and **70834**). Although these sites are located less than 1.5km apart, their records indicate they are isolated collision and wrecking events; *Seagull* (**70809**) was lost following a collision with the *Swan*, whilst the vessel *Xanthe* (**70834**) was lost following a collision with an unknown vessel in 1869. Since these vessels were lost other than by design, and their siting is based on chance alone, they are regarded as not having a setting beyond that experienced at their locations, and considering the generally limited visibility within UK waters this experience would be limited to the immediate vicinity.



- 7.4.4 With regards to maritime casualties during WWI and WWII, the recent study, *East Coast War Channels in the First and Second World War* (Firth, 2014), researched the spatial extent of navigation channels and minefields between the Thames and the Scottish border during both wars, and evaluated the heritage assets that are associated with these channels. The East Coast War Channels (ECWC) could be considered heritage assets with associated value in their own right, as they can be spatially represented. The significance of the value of their setting, specifically within the area of proposed development, may also become apparent through the assessment of the collective military landscape and seascape, encompassing recorded onshore defence infrastructure and known losses or documented losses of maritime vessels or aircraft during WWI and WWII.
- 7.4.5 Three records refer to WWI maritime casualties (**70342**, **70962** and **71188**), two of which are located in the inshore area. Although it is difficult at this time to infer more regarding their setting within the wider WWI military seascape of the ECWC, the histories of these vessels each indicate the location of a military strike and their cause of loss, the type of action undertaken by the German Imperial Navy and also the vessel responsible. This provides a broader understanding of how these incidents fitted into one element of WWI maritime activity - the targeting of civilian shipping and in particular merchant vessels. For instance, the wrecks of the two steamship colliers, *Fulgens* (**70962**) and *Ole Bull* (**71188**), were both lost less than 3km from the coast; caused by a torpedo attack and hitting a mine respectively. The submarines responsible for these actions were UB-10 and UC-19.
- 7.4.6 At present, these heritage assets are the only recorded elements of WWI military activity existing in the offshore study area, and although they are not intrinsically linked having been lost at different times, their setting is still considered part of the wider WWI military landscape and seascape present in the ECWC.
- 7.4.7 A total of eight of the known wrecks date to WWII, and although these are isolated military occurrences (similar to the WWI equivalents) the setting of each asset is apparent when considered within the wider collective WWII landscape and seascape of the region. These casualties were caused by Luftwaffe aircraft, torpedoes, and mines, and the vessels themselves were often merchant ships, part of the high concentration of essential civilian shipping present during this period.
- 7.4.8 The Norfolk Rapid Coastal Zone Archaeological Survey (Robertson *et al.*, 2005) and associated National Mapping Programme assessment (Albone *et al.*, 2007) clearly indicate the prevalence of WWII defence structures that were erected along the Norfolk coastline, remains of which are still present in the intertidal area (discussed in section 6). These features, along with the less visible, and therefore often less considered/experienced, offshore WWII sites (both known losses and documented losses of aircraft and vessels) all form part of the broader military landscape and must be jointly considered when evaluating the setting of individual and collective assets from this period. The extent of this military landscape/seascape will ideally become clearer as the Norfolk Vanguard development proposal becomes refined and evaluation works are undertaken utilising further survey and ground-truthing methods.
- 7.4.9 The remaining recorded sites with corresponding UKHO records are for unknown wreck sites. It is possible that these are associated with WWI or WWII military activity, and therefore become part of the broader military landscape that exists in the region, however without further information to identify these wrecks it is impossible to confirm at this time. If additional information is obtained from future evaluations, a more accurate assessment of the setting of these assets may be possible.



- 7.4.10 Due to the proximity of the study area with the supposed battle locations of the First, Second and Third Anglo-Dutch wars (1652 to 1654; 1665 to 1667; and 1672 to 1674 respectively), it is also possible that currently unidentified remains together with the discovery of new material within the area may relate to these events. A total of 20 Dutch ships and two English vessels were lost during the Battle of Lowestoft (1665) with three Dutch ships and four ships from the combined English and French fleet lost at the Battle of Sole Bay (1672); both of which are to the south of the study area. If evidence of these warships is confirmed in the study area, then their setting with regards to these events should be considered further as part of the EIA.
- 7.4.11 Finally, the remaining seabed features in the provisional OCC are unidentified A2 geophysical anomalies, and as such it is impossible to infer their setting at this time.

## 8 ASSESSMENT OF HISTORIC SEASCAPE CHARACTER

- 8.1.1 As part of the National Heritage Protection Plan (NHPP), English Heritage (now Historic England) commissioned a Historic Seascape Characterisation (HSC) for East Yorkshire to Norfolk, and the work was undertaken by the projects team of the School of History, Classics and Archaeology at Newcastle University (2014).
- 8.1.2 The East Yorkshire to Norfolk HSC project aimed to complete strategic-level HSC in accord with the national HSC Method that extends and applies the principles already in use for Historic Landscape Characterisation (HLC) to the coast and seas. The method assesses and defines areas with Historic Seascape Character types that promote an understanding of historic trends and processes in order to inform the sustainable management of change over time. This is achieved by addressing the multi-level character of the sea by splitting the marine zone into four tiered levels; the sea surface, the water column, the sea floor and the sub-sea floor. The characterisation is GIS-based, enabling key characteristics within the study area to be identified, and are summarised below.
- 8.1.3 The known and potential prehistoric, maritime and aviation heritage assets that form part of the HSC have been discussed in the relevant baseline characterisations above. The character descriptions below refer only to the cultural processes which have shaped the historic seascape of the study area.
- 8.1.4 The East Yorkshire to Norfolk HSC project identified several areas that are within or intersect with the study area, shown in **Table 17: HSC - primary cultural processes in the study area**.

**Table 17: HSC - primary cultural processes in the study area**

Present Broad Character Types	Present Character Sub-Types
Cultural Topography	Landward mobile cliffs
	Marine sand banks with sand waves
	Palaeolandscapes
Coastal Infrastructure	Flood and erosion defences
Communications	Submarine telecommunication cables
Fishing	Aquaculture – cultivated shellfish
	Inshore fisheries
	Offshore fishing grounds – trawling, netting, longline, potting
Industry	Energy industry – gas supply pipeline



Present Broad Character Types	Present Character Sub-Types
	Extractive industry – marine aggregates dredging
Military	Military defence and fortification
Navigation	Maritime safety – lighthouse
	Navigation route

## 9 VALUE AND SENSITIVITY

### 9.1 Value

9.1.1 The Marine Policy Statement (Department for Environment, Food and Rural Affairs, 2011) states ‘the more significant the [designated] asset, the greater should be the presumption in favour of its conservation’ (section 2.6.6.8 and 2.6.6.5). However, ‘many heritage assets are not currently designated as scheduled monuments or protected wreck sites but are demonstrably of equivalent significance. The absence of designation for such assets does not necessarily indicate lower significance and the marine plan authority should consider them subject to the same policy principles as designated heritage assets’ (East Inshore and East Offshore Marine Plans, 2014: no.148 p.52).

9.1.2 Based on information available to date, the marine archaeological baseline environment for the study area can be considered to comprise:

#### *Norfolk Vanguard East:*

- 18 palaeogeographic features of potential;
- Five recorded wrecks (A1 and A3); and
- 312 geophysical anomalies of anthropogenic potential (A2).

#### *Norfolk Vanguard West:*

- 110 palaeogeographic features of potential;
- 12 recorded wreck and obstructions (A1 and A3); and
- 172 geophysical anomalies of anthropogenic potential (A2).

#### *Provisional Offshore Cable Corridor:*

- 43 palaeogeographic features of potential;
- 37 recorded wrecks (A1);
- 936 geophysical anomalies of anthropogenic potential (A2);
- Known maritime assets with setting when considered within the WWI and WWII military landscape; and
- 65 records within the intertidal area; remains of 21 of these may still be present in the area (i.e. not findspots or erroneous positions).

#### *Study Area:*

- Potential for discovery of prehistoric sites and artefacts from the Palaeolithic to the Mesolithic;
- Potential for the discovery of shipwreck material from the late Mesolithic to the present;
- Potential for the discovery of 20th century aircraft material, particularly from World War II;



- Potential for the discovery of remains within the intertidal area from the Palaeolithic to the modern periods (especially WWII related infrastructure);
- The HSC of the area that comprises a broad range of cultural processes including fishing, military, industry, communications, navigation and coastal infrastructure.

9.1.3 This section identifies the value and sensitivity of the known marine heritage assets and their setting (if applicable), the potential for unknown marine heritage assets, and the historic seascape character, as summarised in the baseline assessments above (sections 4 to 9).

9.1.4 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. As a precautionary measure, unknown potential cultural heritage assets are therefore considered to be of **high** sensitivity and **high** value, until more information is available.

#### *Seabed Prehistory*

9.1.5 There are no records of any known prehistoric sites from offshore contexts within the study area. A total of 171 palaeogeographic features were identified in the SBP data and geotechnical samples assessed for the study area that may contain archaeological remains. There is also significant potential for the presence of as yet undiscovered *in situ* prehistoric sites and finds, and a high potential for isolated derived finds in a secondary context. The values assigned to these potential heritage assets are outlined in **Table 18**.

**Table 18: Value of seabed prehistory heritage assets**

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

9.1.6 On the basis of their age and rarity in a marine context, all *in situ* Palaeolithic and Mesolithic material will be of high archaeological value. The guidance for planning authorities and developers on *Identifying and Protecting Palaeolithic Remains* (English Heritage (now Historic England), 1998) notes that sites containing certain forms of Palaeolithic material are so rare in Britain that they should, whenever possible, remain undisturbed.

9.1.7 In the event that prehistoric archaeological material discovered offshore is found *in situ* it should be considered of particularly high archaeological importance. As such, the features and deposits which have the potential to contain within them *in situ* material should be considered as **high** value assets.



- 9.1.8 Prehistoric archaeological material discovered within secondary contexts also has the potential to provide valuable information on patterns of human land use and demography in a field of study which is still little understood and rapidly evolving (Hosfield and Chambers, 2004). They are, however, by their very nature derived and, as such, isolated prehistoric finds should be regarded as **medium** value assets.
- 9.1.9 Palaeoenvironmental evidence in the context of an *in situ* prehistoric site (if found) will be of **high** value. However, as there are no known prehistoric sites within the study area, isolated discoveries of palaeoenvironmental material should be considered of low value for the purpose of this assessment.
- 9.1.10 More widely, palaeolandsurfaces and palaeolandscape features will be considered of **high** value for the purpose of this assessment owing to the Quaternary scientific potential of such sedimentary sequences, to contextualise the wider early prehistoric palaeogeography and the potential of palaeolandscape features to preserve *in situ* artefacts and sites (Bicket and Tizzard, 2015).

*Seabed Features: Maritime*

- 9.1.11 The perceived value assigned to an individual wreck site is, to a large degree, site specific. A vessel may be considered of special interest on the basis of any number of interrelating integral and relative factors, as discussed in section 3.7. Those regarded as being of special interest may further be designated under the Protection of Wrecks Act 1973 or the Protection of Military Remains Act 1986. Only features located within the study area are discussed in this section.
- 9.1.12 There are no wrecks with statutory designations located within the study area.
- 9.1.13 There are 54 known and charted sites or obstructions, and the potential for further wrecks or maritime-related debris to exist within the study area. The values assigned to these heritage assets are outlined in **Table 19**: Value of maritime heritage assets .



**Table 19: Value of maritime heritage assets**

Asset Type	Definition		Value
Known assets	Named wrecks (A1)	<i>Golden Oriole</i> (possibly) (70342); <i>HMS Dunoon</i> (possibly) (70360); <i>Phillipp M</i> (70459); <i>Rye</i> (70617); <i>Trevethoe</i> (70639); <i>Montferland</i> (70709); <i>Seagull</i> (70809); <i>Xanthe</i> (70834); <i>Sheaf Water</i> (70934); <i>Fulgens</i> (70962); <i>HMS Francolin</i> (71117); <i>HMS Dungeness</i> (71129); <i>Ole Bull</i> (71188)	High
	Un-named wrecks (A1)	70021; 70255; 70262; 71334; 70565; 70645; 70659; 70704; 70744; 70954; 71043; 71128; 71131; 71162; 71172; 71176; 71181	High
	Magnetic anomalies (A1)	70058; 70615; 71073; 71297; 71299; 71314; 71323; 71325; 71479	High
	Debris fields (A1)	70460; 70618; 70640; 70784; 70785; 70810; 70832; 70833; 70958; 71301; 71332; 71333; 71336	High
Additional anomalies	Anomalies identified by geophysical assessment that could be of anthropogenic origin totalling 1,421 (A2), with 313 in NV East, 172 in NV West and 936 in provisional OCC.		High
Potential wrecks	Wrecks within the study area that are yet to be discovered.		High
Potential derived maritime finds	Isolated artefacts lost from a boat or ship or moved from a wreck site.		Medium

- 9.1.14 Eight of the 13 known wrecks comprise WWII losses, either torpedoed, bombed or struck by mines. Three comprise WWI losses, two of which were struck by mines and one torpedoed. Two comprise vessels that sank as a result of collision dating to the 1860s. A majority of the WWI and WWII wrecks consist of dispersed wreck debris. However, some are broken in two with hulls clearly still intact. These examples are considered to be of **high** archaeological value due to the importance of their military involvement during the wars.
- 9.1.15 For all unknown wrecks, there is insufficient data to assess the value of each individual wreck. As such, all wreck sites must be considered to have archaeological value, to a greater or lesser degree and, in accordance with the precautionary approach, must be considered as high value assets. Similarly, as the value of potential wrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of **high** value.
- 9.1.16 Twenty-five reported assets have been recorded as magnetic or areas of debris or debris fields under A1 discrimination. These are considered to be of **high** archaeological value until more information becomes available. A majority of these assets are located within the provisional OCC.
- 9.1.17 As there is insufficient information to assess the value of each individual unidentified anomaly identified in the geophysical assessment (A2), all of these additional anomalies must be considered to have **high** archaeological value until more information becomes available.
- 9.1.18 Derived artefacts are likely to be of limited archaeological value as individual discoveries. However, the occurrence of a number of seemingly isolated objects within a particular area has the potential to indicate shipping routes or maritime battlegrounds, or possibly even indicate the presence of a hitherto unknown wreck site. Isolated maritime finds are, therefore, regarded as being of **medium** archaeological value.



### *Seabed Features: Aviation*

- 9.1.19 There are no known aircraft crash sites in the study area, however it is possible that any of the 1,474 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.
- 9.1.20 The values assigned to these heritage assets are outlined in **Table 20: Value of aviation heritage assets** and refer to aviation remains located across the entire study area.

**Table 20: Value of aviation heritage assets**

<b>Asset Type</b>	<b>Definition</b>	<b>Value</b>
Additional anomalies	Anomalies identified by geophysical assessment that could be of anthropogenic origin totalling 1,421 (A2).	High
Potential aircraft	Aircraft within the study area that are yet to be discovered.	High
Potential derived aviation finds	Isolated artefacts lost from an aircraft or moved from a crash site.	Medium

- 9.1.21 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.
- 9.1.22 Aircraft lost as a result of military action during WWII 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.
- 9.1.23 Any aircraft lost after WWII 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.
- 9.1.24 Aircraft are considered to have significance for remembrance and commemoration, but also have an implicit heritage value as historic artefacts, providing information on the aircraft itself and also the circumstances of its use and loss (Historic England (now English Heritage), 2002: 2). On this basis, all potential aircraft sites are considered to be of **high** value.
- 9.1.25 It is also conceivable that any of the unidentified geophysical anomalies could be identified as aircraft crash sites, and subsequently are presently considered of **high** archaeological value.
- 9.1.26 Isolated aircraft finds are considered as being of **medium** archaeological value as they may provide insight into patterns of historical aviation across the study area or indicate the presence of uncharted aircraft crash sites.

### *Intertidal Heritage Assets*

- 9.1.27 There are a total of 65 assets located within the intertidal area of the study area. The values assigned to these heritage assets are outlined in **Table 21** and refer to intertidal remains located within the landfall area.



**Table 21: Value of intertidal heritage assets**

<b>Asset Type</b>	<b>Definition</b>		<b>Value</b>
Known assets	Findspots	Findspots consisting of single or multiple finds located within the intertidal zone.	Negligible
	Structures	Structures of a vernacular nature including: sea defences; wells; brickyard; lighthouse; road; and drain	Low
	Military Structures	Structures related to military activities including: military defences; pillboxes; machine gun posts; artillery batteries; anti-tank blocks	Low
Potential derived intertidal finds	Isolated artefacts and findspots dating to all periods which are located within the intertidal zone.		Medium

- 9.1.28 A total of 35 findspots have been recorded, **1001** to **1035**, dating from the Palaeolithic to the Bronze Age. These artefacts have been removed from the area and therefore will not be affected by the development, and as such, these records have no archaeological value, with the exception of **1017**.
- 9.1.29 Record **1017** consists of hominin footprints dating to Early Pleistocene and early Middle Pleistocene. Sites such as this have pushed back the known record of human occupation of northern Europe by at least 350,000 years and continuing erosion of the coastline is likely to reveal further evidence of our distant past, transforming our understanding of the earliest human occupation of northern latitudes. Therefore, although these particular footprints do not exist anymore and therefore do not have corresponding archaeological value, there is still potential for further similar remains to be uncovered and these would be considered to be **high**.
- 9.1.30 Seven findspots (**1037** to **1044**) have been recorded dating to the medieval period, consisting of coins and artefacts, along with a medieval well that was excavated in 1948. All these finds have been taken from site, therefore they will not be affected by the development, and have no archaeological value.
- 9.1.31 Although no remains of the post-medieval lighthouse (**1045**) are visible on modern aerial imagery, elements of its foundations might still be *in situ* and therefore could be impacted upon. Due to the nature and date of this structure, the corresponding archaeological value is considered to be **low**.
- 9.1.32 Another ten records (**1046** to **1055**) have been dated to the post-medieval period consisting of a findspot, structures, sea defences and other features. Most have been destroyed by coastal erosion and therefore no longer exist. Due to the nature and date of these structures, and that potential still exists for associated remains to be uncovered, the corresponding archaeological values is considered to be **low**.
- 9.1.33 The 19th century Primitive Methodist chapel (**1036**) is located within the town of Acle, unlike the co-ordinates provided by the NRHE that erroneously locate it within the intertidal area. As a result, the chapel has no archaeological value with regards to the project.
- 9.1.34 Ten assets date to WWII (**1056** to **1065**) and consist of two anti-tank blocks, an artillery battery, a machine gun post, two pillboxes and four military defences. These assets have either been removed after the war, destroyed due to sea erosion or at the time of



inspection were already in a bad condition. Due to the nature and date of these structures, the corresponding archaeological value is considered to be **low**.

#### *Setting of Heritage Assets*

- 9.1.35 Section 7 above mainly focussed on the possible setting of WWI and WWII heritage assets. Collectively they may represent important features within a wider military seascape that may or may not be directly related. And as such the value of their setting can be considered **high**, in accordance with the precautionary approach.
- 9.1.36 Alongside the known A1 wrecks mentioned in section 7.4, further evaluation works undertaken as part of the project may also identify further unknown wreck sites, ordnance or even mine sinkers, all of which will add to the value of the military setting of these heritage assets.
- 9.1.37 Although the use of micro-siting and Archaeological Exclusion Zones will be used as a form of mitigation to protect assets and their setting, other cases whereby remains are impacted through relocation, recovery or damage may have a detrimental effect on their setting when considered within the wider collective landscape. Seascapes/landscapes may be able to sustain the removal or disassociation through project activity of a limited number of relevant heritage assets, but its wider value may be diminished.

#### *Historic Seascape Character*

- 9.1.38 The local seascape characters located around and within the study area are considered to be of **medium** archaeological value due to the area's important and prolonged maritime history and its continued use today.
- 9.1.39 The HSC of the study area will remain predominantly the same whilst the project is in operation, with the inclusion of a new element into this character; offshore wind farm and associated offshore HVDC or HVAC cables. Once the project is decommissioned, this character will no longer be part of the seascape of the area.

## **9.2 Sensitivity of Heritage Assets and Seascape Character**

- 9.2.1 The archaeological resource is finite and non-renewable, and represents a unique aspect of cultural heritage (UK Marine Policy Statement, 2011: 21). All archaeological receptors have the potential to be damaged or destroyed if they are exposed to direct, indirect or secondary impacts during construction, operation or decommissioning activities. As such, all archaeological sites and material should be regarded as vulnerable. In addition, archaeological features have no adaptability, tolerance or recoverability, and subsequently any direct damage will be permanent and irreversible.
- 9.2.2 With regards to the sensitivity of the setting of heritage assets and seascape character in terms of its setting, the impacts are temporary to the lifetime of the project, and the effects are entirely non-physical. Therefore, any change to the setting of assets is entirely reversible with the decommissioning of the project and the recovery would be instantaneous.

## **10 ENVIRONMENTAL APPRAISAL AND RECOMMENDATIONS**

### **10.1 High Level Environmental Appraisal**

- 10.1.1 This section presents a high level appraisal used to determine the significance of the effects of the preparation, installation, operation, maintenance and decommissioning elements of the project, and refers to guidance developed for the Offshore Renewable



Energy sector (COWRIE 2007, 2008, 2011). The assessment has also been based on professional archaeological judgement and best practice that has been applied to other consented marine development projects.

10.1.2 Offshore developments can affect heritage assets in two ways:

- *from the direct effect of the physical siting of the project; and*
- *from indirect changes to the physical marine environment.*

10.1.3 Impacts to heritage assets and their historic environment occur as a result of changes to their physical environment in terms of loss and / or degradation, which can subsequently reduce the significance of a heritage asset and its wider historic environment. The management and mitigation of such change is based on the principle that archaeological assets are finite, non-renewable and cannot adapt, tolerate or recover from direct impacts.

10.1.4 Heritage assets may be buried within seabed sediments or may rest upon the seafloor, either with or without height. As such, direct impacts to such assets can occur during any development or related activity that makes contact with the seafloor or cuts through seabed deposits. Heritage assets with height, such as wrecks, may also be impacted by development or activities that occur within the water column.

10.1.5 The implementation of the marine element of the project is anticipated to entail the following sources of ground disturbance:

- *Seabed preparation prior to foundation installation and cable laying;*
- *Survey and clearance of unexploded ordnance (UXO);*
- *Installation of turbine foundations (options include jacket, gravity base, suction caisson, monopile and floating foundations);*
- *Placing of scour protection around turbine locations;*
- *Installation of substations, accommodation platform and converter stations;*
- *Laying of inter-array, inter-connector and export cables (methods include ploughing, jet trenching, dredging, mass flow excavation and / or mechanical trenching);*
- *Backfilling of cable trenches and protection/stabilisation of surface laid marine cables (options include rock placement, concrete/frond mattresses, or uraduct);*
- *Scour associated with the disturbances listed above; and*
- *Seabed contact by legs of jack-up vessels and / or anchors on vessels associated with the installation, maintenance and decommissioning phases of the project.*

10.1.6 The activities listed above may result in impacts that have potential direct and / or indirect effects on marine archaeological heritage assets. The activities and anticipated effects are summarised in **Table 22**.

**Table 22: Impact types and potential effects on marine archaeological heritage assets**

Activity	Anticipated effects on archaeological asset	Impact type
Seabed preparation	Direct damage/destruction to assets lying on the seafloor and buried within the shallower seabed sediments.	Direct



Activity	Anticipated effects on archaeological asset	Impact type
UXO survey and clearance	Direct damage to assets located within close proximity to UXO	Direct
Installation of turbine foundations and placing of scour protection	Direct damage/destruction to assets lying on the seafloor and buried within the shallower seabed sediments.	Direct
Installation of ancillary infrastructure	Direct damage/destruction to assets lying on the seafloor and buried within the shallower seabed sediments.	Direct
Cable burial whereby seabed is truncated	Direct damage/destruction to assets, and / or their physical setting, lying on the seafloor and buried within the seabed sediments.	Direct
Cable laying on the seabed	Direct damage/destruction to assets lying on the seafloor.	Direct
Installation of cable protection (where burial is not possible)	Direct damage/destruction to assets, and / or their physical setting, lying on the seafloor and buried within the seabed sediments.	Direct
	Potential scour and plume effects resulting in increased protection to, or deterioration of, assets in the vicinity.	Indirect
Seabed contact by legs of jack-up vessels and / or anchors on vessels during installation, scheduled and unplanned maintenance works and decommissioning works.	Localised damage/destruction to assets, and / or their physical setting, lying on the seafloor and buried within the seabed sediments.	Direct
Changes to the hydrodynamic and sedimentary regimes due to spoil removal and distribution caused by installation of foundations and trenching operations.	Increased protection to, or deterioration of, assets resulting in a beneficial or adverse effect on assets in the vicinity.	Indirect
Changes to hydrodynamic and sedimentary regimes resulting from the removal of turbines and cables and associated scour protection as part of decommissioning works.	Increased protection to, or deterioration of, assets resulting in a beneficial or adverse effect on marine archaeological assets in the vicinity.	Indirect

## 10.2 Recommendations

- 10.2.1 There is the potential for the proposed project to impact as yet unknown heritage assets, including sites relating to seabed prehistory, wreck sites and aircraft remains situated within the study area.
- 10.2.2 Mitigation is necessary to reduce, remove or offset the impacts on heritage assets and fall under three main categories: avoidance; reduction of impact; and remedying and offsetting. Prior to the project starting, any further planned archaeological work should be detailed within a Written Scheme of Investigation (WSI). Any changes to the project design may require additional assessment of geophysical data in the future.

### *Avoidance*

- 10.2.3 Avoidance is considered to represent the primary option with regards to mitigating impacts upon the marine archaeological resource. This is typically achieved through the implementation of Archaeological Exclusion Zones (AEZs), around known sites prohibiting any development activities to take place within its remit, or through the micro-siting of the project design to avoid vulnerable heritage assets.



- 10.2.4 A total of 318 anomalies have been identified as being of possible archaeological interest within NV East. Four of these have been assigned an A1 archaeological potential rating, 313 features have been assigned an A2 rating and one A3 historic record of possible archaeological interest with no corresponding geophysical anomaly has been identified.
- 10.2.5 In NV West 184 anomalies have been identified in total. Of these, 11 have been assigned an A1 archaeological potential rating, 172 features have been assigned an A2 rating and one A3 historic record of possible archaeological interest with no corresponding geophysical anomaly has been identified.
- 10.2.6 In total 973 anomalies have been identified as being of possible archaeological interest within the provisional OCC. Thirty-seven of these have been assigned an A1 rating and 936 features have been assigned an A2 rating. No A3 records were present in this area.
- 10.2.7 It is recommended that AEZs are implemented around all 30 wrecks and two debris fields with large magnetic anomalies (A1s) within the study area following the assessment of geophysical survey data (**Table 23**). In addition, an AEZ should be implemented around wreck **74180**, even though it lies outside the study area, as the AEZ encroaches on the NV East area (**Figure 11**). All AEZs are recommended to be 50m buffers around the extents of the wreck or debris field, as recorded in the sidescan sonar and bathymetry data. These are illustrated in **Figures 11, 12, 13a, 13b and 13d-h**.



**Table 23: Archaeological Exclusion Zones recommended in this assessment**

WA ID	Type	Position		Status Exclusion Zone		Area
		Easting	Northing			
70021	Wreck	496438	5859769	New	50m around extents	NV East
70255	Wreck	496393	5847836	New	50m around extents	
70262	Wreck	498353	5847680	New	50m around extents	
71480	Wreck	503572	5848770	New	50m around extents	
71301	Debris field	470711	5873567	New	50m around extents	NV West
71334	Wreck	470730	5870846	New	50m around extents	
70342	Wreck	477521	5849048	New	50m around extents	Provisional OCC
70360	Wreck	466386	5846784	New	50m around extents	
70459	Wreck	446041	5844450	New	50m around extents	
70565	Wreck	431217	5841986	New	50m around extents	
70617	Wreck	429617	5846348	New	50m around extents	
70639	Wreck	428802	5847632	New	50m around extents	
70645	Wreck	428283	5848091	New	50m around extents	
70659	Wreck	426967	5850445	New	50m around extents	
70704	Wreck	422267	5849082	New	50m around extents	
70709	Wreck	421671	5849182	New	50m around extents	
70744	Wreck	419288	5849507	New	50m around extents	
70785	Debris field	415354	5849572	New	50m around extents	
70809	Wreck	413550	5850143	New	50m around extents	
70834	Wreck	412105	5850354	New	50m around extents	
70934	Wreck	406929	5852021	New	50m around extents	
70954	Wreck	406125	5853694	New	50m around extents	
70962	Wreck	406058	5852977	New	50m around extents	
71043	Wreck	403723	5852349	New	50m around extents	
71117	Wreck	402077	5855893	New	50m around extents	
71128	Wreck	401921	5856180	New	50m around extents	
71129	Wreck	401875	5853654	New	50m around extents	
71131	Wreck	401775	5856176	New	50m around extents	
71162	Wreck	401376	5854164	New	50m around extents	
71172	Wreck	401255	5855809	New	50m around extents	
71176	Wreck	401228	5854614	New	50m around extents	
71181	Wreck	401163	5854662	New	50m around extents	
71188	Wreck	400957	5857290	New	50m around extents	

- 10.2.8 Of the 19 A1 anomalies without AEZs, two debris fields and seven objects of debris likely to be related to the wrecks are covered within the AEZs listed above. In addition, there are two small objects of debris with very high magnetic anomalies associated and eight magnetic only A1 anomalies. These have not been assigned AEZs as it is not possible to say with certainty that they are of archaeological interest. However, there does appear to be a substantial amount of ferrous material at these locations and these anomalies should be considered during planning of the development and impacts to them avoided where possible.
- 10.2.9 For features assigned A2 archaeological potential rating, no AEZs are recommended at this time. Similarly, based on the nature of the records associated with the A3 archaeological potential rating, no AEZs are currently recommended. However, an avoidance strategy with respect to these A2 and A3 anomalies is advised where possible. Further work may be necessary to ascertain the precise nature and archaeological potential of individual features should avoidance prove unfeasible.

### *Reduction*

- 10.2.10 Reduction of impact can be achieved by means of receiving prompt archaeological advice in the event of a discovery and by recording and conserving any objects that have been disturbed. In a marine environment, this is often achieved by means of implementing a protocol for reporting finds of archaeological interest. It is recommended that if any objects of possible archaeological interest are recovered during any groundwork operations, that they should be reported using the established *Protocol for Archaeological Discoveries: Offshore Renewables Projects* (The Crown Estate, 2014). This will establish whether the recovered objects are of archaeological interest and recommend appropriate mitigation measures where necessary.
- 10.2.11 Furthermore, a number of palaeogeographic features of archaeological potential have been identified within the study area, and sediments of archaeological and palaeoenvironmental interest have been recovered within the geotechnical samples. Of these samples, it was recommended a programme of Stage 2 geoarchaeological recording be carried out on sediments from 22 vibrocores, to further ascertain their nature and determine their archaeological potential. This work is currently being undertaken by Wessex Archaeology, and the data will be integrated into the deposit model. The overall aim of this work will be to understand which deposits are of archaeological significance and if warranted to identify those deposits which have potential for Stage 3 work. Further details regarding this recommendation is presented in *Norfolk Vanguard Offshore Wind Farm, Stage 1 Geoarchaeological Review* (Wessex Archaeology, 2017).
- 10.2.12 It is also recommended that should further geophysical survey or geotechnical sampling be undertaken in the area archaeological input into the survey locations, data obtained, and sampling strategy should be considered.

### *Remedying and Offsetting*

- 10.2.13 Remedying and offsetting could include re-stabilising sites after they have been disturbed or archaeologically recording sites that cannot be preserved.

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## 12 APPENDICES

### 12.1 Appendix I: Legislative, Policy and Guidance

#### Global Policy and Legislation

Legislation/Policy	Summary
<b>The World Heritage Convention 1972</b>	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 29 World Heritage Sites.
<b>The United Nations Convention on the Law of the Sea 1982</b>	UNCLOS 1982 was ratified by the UK in 1997. Article 149 applies only to those archaeological and historical objects that lie outside national jurisdiction and stipulates that 'all objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin'. Article 303 stipulates that 'states have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose'. Article 303 also provides for coastal states to exert a degree of control over the archaeological heritage to 24 nm, though the UK has not introduced any measures to implement this right.
<b>International Council of Monuments and Sites Charter on the Protection and Management of Underwater Cultural Heritage 1996 (the Sofia Charter)</b>	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.
<b>UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001)</b>	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
<b>The European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (The Valletta Convention)</b>	<p>The Articles of the Valletta Convention tackle various aspects. Article 1 deals with the inventorying and protection of sites and areas; Article 2 deals with the mandatory reporting of chance finds and providing for 'archaeological reserves' on land or underwater; Article 3 promotes high standards for all archaeological work undertaken by suitably qualified people; Article 4 requires the conservation of excavated sites and the safe-keeping of finds; and Article 5 is concerned with consultation that should take place between planning authorities and developers to avoid damage to archaeological remains.</p> <p>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.</p>
<b>The European Landscape Convention 2000</b>	<p>The European Landscape Convention 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.</p>
<b>European Directives for Environmental Impact Assessments (2014/52/EU)</b>	<p>The EIA Directive entered into force on 15 May 2014 to simplify the rules for assessing the potential effects of projects on the environment. The newly amended directive replaces former directives (85/337/EEC; 97/11/EC; 2003/35/EC; 2009/31/EC; 2011/92/EU) and Member States must apply these from 16 May 2017 at the latest.</p>



## United Kingdom Policy and Legislation

Legislation/Policy	Summary
<b>Ancient Monuments and Archaeological Areas Act 1979 (as amended)</b>	Scheduled Monuments and Archaeological Areas of Importance (AAIs or their equivalent) are afforded statutory protection and the consent of Secretary of State (DCMS), as advised by Historic England, is required for any works. This Act is primarily used to protect terrestrial site, but has also been used to protect underwater sites.
<b>NPPF: Conserving and enhancing the historic environment. Para. 128</b>	In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.
<b>NPPF: Conserving and enhancing the historic environment. Para. 129</b>	Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.
<b>NPPF: Conserving and enhancing the historic environment. Para. 132</b>	When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be.
<b>NPPF: Conserving and enhancing the historic environment. Para. 135</b>	The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.
<b>NPPF: Conserving and enhancing the historic environment. Para. 137</b>	Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites and within the setting of heritage assets to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably.
<b>NPPF: Conserving and enhancing the historic environment. Para. 139</b>	Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.



Legislation/Policy	Summary
<b>NPPF: Conserving and enhancing the historic environment. Para. 141</b>	Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible.
<b>Protection of Wrecks Act 1973: Section One</b>	Wrecks and wreckage assessed to be of historical, archaeological or artistic value can be protected by way of site specific designation. It is an offence to carry out certain activities within a defined area surrounding a designated wreck, unless a licence for those activities has been obtained through Historic England.
<b>Protection of Wrecks Act 1973: Section Two</b>	This provides protection for wrecks that have been designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency through the Receiver of Wreck.
<b>Protection of Military Remains Act 1986</b>	Under the Protection of Military Remains Act 1986, all aircraft that have crashed whilst in military service are automatically protected. Maritime vessels (e.g. ships and boats) lost during military service are not automatically protected, although the Ministry of Defence (MoD) has powers to protect any vessel that was in military service when lost. The MoD can designate wrecks whose position is known as 'controlled sites' and can designate named vessels whose location is unknown 'protected places'. It is not necessary to demonstrate the presence of human remains for wrecks to be designated as either 'controlled sites' or 'protected places'.
<b>Merchant Shipping Act 1995</b>	This Act sets out the procedures for determining the ownership of underwater finds classified as 'wreck'; defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any such finds are brought ashore, the salvor is required to give notice to the Receiver of Wreck that he/she has found or taken possession of them and, as directed by the Receiver, either hold them pending the Receiver's order or deliver them to the Receiver. The Act is administered by the Maritime and Coastguard Agency. Beyond the 12 nm limit, the Merchant Shipping Act 1995 covers wreck found or taken into possession outside UK waters, and stipulates that if brought into UK waters, finds must be reported to the Receiver of Wreck. The provisions of the Protection of Military Remains Act 1986 regarding Controlled Sites are applicable in international waters, though they are only enforceable with respect to British-controlled ships, British citizens and British companies.
<b>Marine and Coastal Access Act 2009</b>	Under this Act the UK was divided into marine planning regions with an associated plan authority responsible for preparing a marine plan for that area.
<b>Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change 2011a)</b>	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
<b>National Policy Statement for Renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change 2011b)</b>	This NPS, taken together with the overarching NPS (EN-1), provides the primary basis for decisions by the Planning Inspectorate on renewable energy infrastructure development applications. It sets out the importance of the historic environment and the ways it can be impacted by development, outlines guidance for application assessments, Planning Inspectorate decision making and mitigation measures.
<b>National Policy Statement for Electricity Networks Infrastructure (EN-5) (Department of Energy and Climate Change 2011c)</b>	This NPS, taken together with the overarching NPS (EN-1) provides for decision making on above ground electricity lines of 132kV and over and other electricity networks associated with a Nationally Significant Infrastructure Project e.g. substations and converted stations.
<b>Marine Policy Statement 2011</b>	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.
<b>Marine Planning 2012 – East Marine Plans</b>	This was a development of the Marine Plan which apply the MPS framework at a national, regional and area specific level. It includes the East Inshore and Offshore Areas in a process of Marine Plan development expected to be completed in 2021.
<b>Enterprise and Regulatory Reform Act 2013</b>	This Act was given Royal Assent, and has implications for Listed Buildings and Conservation Areas. A provision for the reduction of legislative burdens, it 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.

## Guidance

<b>Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee (Joint Nautical Archaeology Policy Committee 2006)</b>	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.
<b>Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists 2014)</b>	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.



## 12.2 Appendix II: Terminology

### Glossary

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

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



## Chronology

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

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

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

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



### 12.3 Appendix III: Palaeogeographic Features of Archaeological Potential in NV East

WA ID	Classification	Archaeological Discrimination	Description	Age
75000	Infilled Depression	P2	Broad, approximately NNW-SSE trending, unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by sub-parallel internal reflectors. Feature acoustically blanked (probably by shallow gas) along its western edge so exact extent unknown, although it is likely to be part of feature 75003. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 4.1m - 31.9m BSB.	Ipswichian or Devensian
75001	Acoustic Blanking	P2	Small area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Only identified on one survey line. Depth Range: 11.6m - 11.7m BSB.	Devensian
75002	Acoustic Blanking	P2	Extensive, approximately NNW-SSE trending area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 3.5m - 26.3m BSB.	Devensian
75003	Infilled Depression	P2	Broad, approximately NNW-SSE trending, unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by sub-parallel internal reflectors. Feature acoustically blanked (probably by shallow gas) along its eastern edge so exact extent unknown, although it is likely to be part of feature 75000. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 7.5m - 26.8m BSB.	Ipswichian or Devensian
75004	Acoustic Blanking	P2	Extensive, approximately NNW-SSE trending area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 3.5m - 26.3m BSB.	Devensian
75005	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 6.7m - 7.9m BSB.	Devensian
75006	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 7.8m - 12.3m BSB.	Devensian
75007	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 7.1m - 10.1m BSB.	Devensian



WA ID	Classification	Archaeological Discrimination	Description	Age
75008	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Only identified on one survey line. Depth Range: 8.9m - 9.7m BSB.	Devensian
75009	Infilled Depression	P2	Broad unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by poorly defined sub-parallel internal reflectors. Possible second phase of acoustically unstructured fill in some areas, though this is unclear. Unit is acoustically blanked (probably by gas) along its eastern edge, and so extent is unknown. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 8.6m - 25.5m BSB.	Ipswichian or Devensian
75010	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Depth Range: 7.6m - 11.7m BSB.	Devensian
75011	Infilled Depression	P2	Broad, approximately NNW-SSE trending, unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by poorly defined sub-parallel internal reflectors. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 6.8m - 18.0m BSB.	Ipswichian or Devensian
75012	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Only identified on a single survey line. Depth Range: 10.3m - 11.1m BSB.	Devensian
75013	Acoustic Blanking	P2	Area of acoustic blanking within BNB Formation (Unit 5), probably caused by shallow gas and indicative of organic material within the sediment. Only identified on a single survey line. Depth Range: 9.8m - 11.0m BSB.	Devensian
75014	High Amplitude Reflector	P1	Area of intermittent high amplitude reflectors, possibly within YM Formation (Unit 2) although this is unclear. Possibly indicative of preserved organic material. Depth Range: 13.7m - 19.0m BSB.	Pre-Anglian
75015	Infilled Depression	P2	Broad unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by poorly defined sub-parallel internal reflectors. Possible second phase of acoustically unstructured fill in some areas, though this is unclear. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 6.2m - 38.9m BSB.	Ipswichian or Devensian



WA ID	Classification	Archaeological Discrimination	Description	Age
75016	Infilled Depression	P2	Unit below the base of BNB Formation (Unit 5), appears to be the fill of a topographically controlled depression. Characterised by a single phase of fill characterised by numerous sub-parallel internal reflectors. Unit not definitely known, but could be EE or an early deposit of BNB (Unit 4). Depth Range: 5.7m - 10.7m BSB.	Ipswichian or Devensian
75017	Infilled Depression	P2	Unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by poorly defined sub-parallel internal reflectors. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Present within both NV East and the ECR. Depth Range: 6.1m - 13.6m BSB.	Ipswichian or Devensian



## 12.4 Appendix IV: Palaeogeographic Features of Archaeological Potential in NV West

WA ID	Classification	Archaeological Discrimination	Description	Age
75018	High Amplitude Reflector	P1	Extensive, relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is occasionally cut/disrupted by cut and fill features, particularly channel 75021. Peat recovered from vibrocore VC088 suggest this represents a buried land surface (Unit 7). Depth Range: 0.8 - 5.8m BSB.	Holocene (Pre-Transgression)
75019	Simple Cut and Fill	P2	Small, relatively poorly defined possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of fill, with relative strong basal reflector. Possible remains of a fluvial feature associated with the same surface as high amplitude reflector 75018 (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth Range: 2.0 - 3.1m BSB.	Holocene (Pre-Transgression)
75020	Simple Cut and Fill	P2	Small, relatively poorly defined possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of fill, with poorly defined basal reflector. Possible remains of a fluvial feature associated with the same surface as high amplitude reflector 75018 (Unit 7), although could be an internal reflector. Depth range: 4.0 - 7.0m BSB.	Holocene (Pre-Transgression)
75021	Channel	P1	Relatively small but distinct channel feature cut into the BNB Formation (Unit 5), identified on a number of survey lines. Relatively poorly defined basal reflector, with a single phase of acoustically chaotic fill. Possible fluvial feature, possibly associated with channel 75025 and the same surface as high amplitude reflectors 75018, 75023 and 75022 (Unit 7). Depth Range: 1.5 - 6.5m BSB.	Holocene (Pre-Transgression)
75022	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is cut/disrupted by channel 75021. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 2.1 - 4.2m BSB.	Holocene (Pre-Transgression)
75023	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is cut/disrupted by channel 75021. Peat recovered from vibrocore VC085 suggest this represents a buried land surface (Unit 7). Depth Range: 1.6 - 3.8m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75024	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is cut/disrupted by channel 75025. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 0.8 - 3.0m BSB.	Holocene (Pre-Transgression)
75025	Channel	P1	Relatively small but distinct channel feature cut into the BNB Formation (Unit 5), identified on a number of survey lines. Relatively poorly defined basal reflector, with a single phase of acoustically chaotic fill. Possible fluvial feature, possibly associated with channel 75021 and the same surface as high amplitude reflector 75024 (Unit 7). Depth Range: 1.6 - 6.7m BSB.	Holocene (Pre-Transgression)
75026	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line, but probably related to similar feature 75028. Feature is cut/disrupted by cut and fill feature 75027. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 2.4 - 3.8m BSB.	Holocene (Pre-Transgression)
75027	Simple Cut and Fill	P2	Small, relatively poorly defined possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of fill, with relative strong basal reflector. Possible remains of a fluvial feature associated with the same surface as high amplitude reflectors 75028 and 75026 (Unit 7), although could be an internal reflector. Identified on two survey lines. Depth Range: 1.6 - 5.4m BSB.	Holocene (Pre-Transgression)
75028	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is cut/disrupted by cut and fill feature 75027. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.6 - 5.4m BSB.	Holocene (Pre-Transgression)
75029	High Amplitude Reflector	P1	Extensive, relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on numerous survey lines. Feature is intermittent in places, but closely spaced anomalies have been grouped together. Feature is occasionally cut/disrupted by cut and fills, particularly channels 75035 and 75038. Peat recovered from vibrocores VC075, VC076, and VC080, plus roots recovered from vibrocore VC081, suggest this represents a buried land surface (Unit 7). Depth Range: 0.6 - 10.5m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75030	Simple Cut and Fill	P2	Small, possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of layered fill, with a well defined basal reflector. Possible remains of a fluvial feature associated with the same surface as high amplitude reflector 75029 (Unit 7), although could be an internal reflector. Depth range: 2.5 - 3.8m BSB.	Holocene (Pre-Transgression)
75031	Simple Cut and Fill	P2	Small, possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of layered fill, with a well defined basal reflector. Possible remains of a fluvial feature, possibly associated with the same surface as high amplitude reflector 75029 (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth range: 3.6 - 4.8m BSB.	Holocene (Pre-Transgression)
75032	Simple Cut and Fill	P2	Possible cut and fill feature cut into BNB Formation (Unit 5). Relatively poorly defined basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial feature, possibly associated with the same surface as high amplitude reflector 75029 (Unit 7), although could be an internal feature. Depth Range: 3.2 - 7.9m BSB.	Holocene (Pre-Transgression)
75033	Simple Cut and Fill	P2	Distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with a single phase of acoustically structured fill. Possible remnants of a fluvial channel, possibly relating to the same surface as high amplitude reflector 75029 (Unit 7). Depth Range: 1.6 - 5.2m BSB.	Holocene (Pre-Transgression)
75034	Simple Cut and Fill	P2	Distinct cut and fill feature cut into BNB Formation (Unit 5). Distinct basal reflector with a single phase of acoustically structured fill. Possible remnants of a fluvial channel, possibly relating to the same surface as high amplitude reflector 75029 (Unit 7). Depth Range: 1.5 - 8.4m BSB.	Holocene (Pre-Transgression)
75035	Channel	P1	Distinct channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Poorly defined basal reflector with a single phases of acoustically layered fill. Possible fluvial feature, possibly associated with the same surface as high amplitude reflector 75029 (Unit 7). Depth Range: 2.4 - 13.0m BSB.	Holocene (Pre-Transgression)
75036	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Feature is cut/disrupted by channel 75035. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.3 - 6.4m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75037	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.3 - 4.5m BSB.	Holocene (Pre-Transgression)
75038	Channel	P1	Distinct channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Poorly defined basal reflector with a single phases of acoustically layered fill. Possible fluvial feature, possibly associated with the same surface as high amplitude reflectors 75029 and 75039 (Unit 7). Depth Range: 1.3 - 7.7m BSB.	Holocene (Pre-Transgression)
75039	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Feature is cut/disrupted by channel 75038. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 4.2m BSB.	Holocene (Pre-Transgression)
75040	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 2.7m BSB.	Holocene (Pre-Transgression)
75041	Simple Cut and Fill	P2	Distinct cut and fill feature cut into BNB Formation (Unit 5). Distinct basal reflector with a single phase of acoustically structured fill. Possible remnants of a fluvial channel, possibly relating to the same surface as high amplitude reflector 75029 (Unit 7). Depth Range: 4.7 - 8.7m BSB.	Holocene (Pre-Transgression)
75042	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Feature is cut/disrupted by cut and fill 75043. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 3.3 - 4.2m BSB.	Holocene (Pre-Transgression)
75043	Simple Cut and Fill	P2	Possible cut and fill feature cut into BNB Formation (Unit 5). Relatively poorly defined basal reflector with single phase of unstructured fill. Possible remnants of a fluvial feature, possibly associated with the same surface as high amplitude reflector 75029 (Unit 7), although could be an internal reflector. Depth Range: 4.2 - 6.6m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75044	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.8 - 4.2m BSB.	Holocene (Pre-Transgression)
75045	Channel	P1	Possible channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Relatively poorly defined basal reflector, with a single phase of acoustically layered fill. Possible buried fluvial feature (Unit 7). Depth Range: 1.6 - 9.0m BSB.	Holocene (Pre-Transgression)
75046	Simple Cut and Fill	P2	Small, possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of layered fill, with a well defined basal reflector. Possible remains of a fluvial feature (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth range: 1.4 - 3.4m BSB.	Holocene (Pre-Transgression)
75047	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.0 - 3.8m BSB.	Holocene (Pre-Transgression)
75048	Simple Cut and Fill	P2	Small, possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of layered fill, with a well defined basal reflector. Possible remains of a fluvial feature (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth range: 2.4 - 4.6m BSB.	Holocene (Pre-Transgression)
75049	Simple Cut and Fill	P2	Small, possible cut and fill feature cut into BNB Formation (Unit 5). Single phase of layered fill, with a well defined basal reflector. Possible remains of a fluvial feature (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth range: 1.4 - 2.8m BSB.	Holocene (Pre-Transgression)
75050	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.4 - 2.3m BSB.	Holocene (Pre-Transgression)
75051	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.1 - 3.9m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75052	Acoustic Blanking	P2	Irregular area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth Range: 2.3 - 4.8m BSB.	Holocene (Pre-Transgression)
75053	Simple Cut and Fill	P2	Possible poorly defined cut and fill feature cut into BNB Formation (Unit 5). Poorly defined basal reflector with single phase of acoustically transparent fill. Possible remnant fluvial feature, possibly associated with the same surface as high amplitude reflector 75054 (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth Range: 2.9 - 4.6m BSB.	Holocene (Pre-Transgression)
75054	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Feature is cut/disrupted by cut and fill 75053. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.5 - 4.2m BSB.	Holocene (Pre-Transgression)
75055	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by possible poorly developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 3.3 - 9.3m BSB.	Devensian
75056	Acoustic Blanking	P2	Area of acoustic blanking within the lower layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material. Identified on more than one survey line. Depth Range: 9.9 - 12.4m BSB.	Devensian
75057	Acoustic Blanking	P2	Small area of acoustic blanking within the lower layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material. Only identified on one survey line. Depth Range: 11.2 - 11.9m BSB.	Devensian
75058	Simple Cut and Fill	P2	Relatively poorly defined cut and fill feature cut into BNB Formation (Unit 5), identified on more than one survey line. Intermittent basal reflector with a single phase of acoustically unstructured fill. Possible remnants of a fluvial system, possibly related to the same surface as high amplitude reflector 75029 (Unit 7). Depth Range: 2.4 - 6.3m BSB.	Holocene (Pre-Transgression)
75059	Simple Cut and Fill	P2	Possible poorly defined cut and fill feature cut into BNB Formation (Unit 5). Poorly defined basal reflector with single phase of acoustically transparent fill. Possible remnant fluvial feature, possibly associated with the same surface as high amplitude reflector 75029 (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth Range: 3.6 - 6.8m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75060	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Feature is cut/disrupted by channel 75061. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.2 - 5.6m BSB.	Holocene (Pre-Transgression)
75061	Channel	P1	Small but distinct channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Generally well defined basal reflector with a single phases of acoustically transparent fill. Possible buried fluvial feature, possibly associated with the same surface as high amplitude reflector 75060 (Unit 7). Depth Range: 1.3 - 4.4m BSB.	Holocene (Pre-Transgression)
75062	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth Range: 2.2 - 2.8m BSB.	Devensian
75063	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 2.6m BSB.	Holocene (Pre-Transgression)
75064	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth Range: 2.0 - 2.9m BSB.	Devensian
75065	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on a number of survey lines. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth Range: 1.6 - 3.2m BSB.	Devensian
75066	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth Range: 2.0 - 2.5m BSB.	Devensian
75067	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.4 - 2.5m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75068	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.2 - 1.9m BSB.	Holocene (Pre-Transgression)
75069	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth Range: 1.2 - 1.4m BSB.	Devensian
75070	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 1.7m BSB.	Holocene (Pre-Transgression)
75071	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 0.9m BSB.	Holocene (Pre-Transgression)
75072	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.9m BSB.	Holocene (Pre-Transgression)
75073	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.3 - 2.8m BSB.	Holocene (Pre-Transgression)
75074	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth Range: 3.6 - 4.1m BSB.	Devensian
75075	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.0 - 3.6m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75076	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on more than one survey line. Feature is cut/disrupted by cut and fill feature 75077. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.6 - 5.4m BSB.	Holocene (Pre-Transgression)
75077	Channel	P1	Distinct channel feature cut into BNB Formation (Unit 5), identified on more than one survey line. Poorly defined basal reflector with a single phase of acoustically layered fill. Possible fluvial feature, possibly associated with the same surface as high amplitude reflectors 75076 and 75078 (Unit 7). Depth Range: 2.0 - 8.8m BSB.	Holocene (Pre-Transgression)
75078	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on more than one survey line. Feature is cut/disrupted by cut and fill feature 75077. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.3 - 3.8m BSB.	Holocene (Pre-Transgression)
75079	Simple Cut and Fill	P2	Distinct cut and fill feature cut into BNB Formation (Unit 5). Distinct basal reflector with a single phase of acoustically structured fill. Possible remnants of a fluvial channel (Unit 7), although only identified on one survey line. Depth Range: 2.0 - 6.5m BSB.	Holocene (Pre-Transgression)
75080	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.2 - 4.6m BSB.	Holocene (Pre-Transgression)
75081	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by possible poorly developed dune features, suggesting a significant time of exposure. Possible buried land surface (Unit 7). Depth Range: 2.7 - 5.0m BSB.	Devensian
75082	High Amplitude Reflector	P1	Relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)), identified on a number of survey lines. Peat recovered from within similar features suggest this represents a buried land surface (Unit 7). Depth Range: 1.5 - 3.3m BSB.	Holocene (Pre-Transgression)
75083	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 2.5m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75084	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line, and located at the edge of the area. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.3 - 2.0m BSB.	Holocene (Pre-Transgression)
75085	Simple Cut and Fill	P2	Small but distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial system (Unit 7). Depth Range: 2.6 - 3.8m BSB.	Holocene (Pre-Transgression)
75086	Simple Cut and Fill	P2	Small but distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial system (Unit 7). Depth Range: 2.0 - 4.8m BSB.	Holocene (Pre-Transgression)
75087	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line, and reflector extends over the top of cut and fill features 75085 and 75087. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.0 - 3.3m BSB.	Holocene (Pre-Transgression)
75088	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.6 - 3.2m BSB.	Holocene (Pre-Transgression)
75089	High Amplitude Reflector	P1	Area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line, and reflector is situated partially on top of channel feature 75092. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 2.8m BSB.	Holocene (Pre-Transgression)
75090	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.6 - 2.5m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75091	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 0.8 - 1.7m BSB.	Holocene (Pre-Transgression)
75092	Channel	P1	Small but distinct channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Generally well defined basal reflector with a single phase of acoustically transparent fill. Possible buried fluvial feature (Unit 7). Depth Range: 1.3 - 4.8m BSB.	Holocene (Pre-Transgression)
75093	High Amplitude Reflector	P1	Area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line, and reflector is situated partially on top of channel feature 75092. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.7 - 3.2m BSB.	Holocene (Pre-Transgression)
75094	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line, but is close to the edge of channel 75092. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.0 - 1.2m BSB.	Holocene (Pre-Transgression)
75095	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.2 - 2.3m BSB.	Holocene (Pre-Transgression)
75096	Simple Cut and Fill	P2	Small but distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial system (Unit 7). Depth Range: 1.7 - 4.4m BSB.	Holocene (Pre-Transgression)
75097	Simple Cut and Fill	P2	Possible poorly defined cut and fill feature cut into BNB Formation (Unit 5). Poorly defined basal reflector with single phase of acoustically transparent fill. Possible remnant fluvial feature (Unit 7), although could be an internal reflector. Only identified on one survey line. Depth Range: 1.8 - 4.8m BSB.	Holocene (Pre-Transgression)
75098	Simple Cut and Fill	P2	Small but distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial system (Unit 7), although could be an internal BNB feature. Depth Range: 1.4 - 7.2m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75099	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by large, well-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 3.0 - 7.9m BSB.	Devensian
75100	Acoustic Blanking	P2	Long, but relatively narrow, area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on a number of survey lines. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer or erosion surface. Appears to be associated with channels 75103 and 66046. Depth Range: 1.5 - 4.9m BSB.	Devensian
75101	Simple Cut and Fill	P2	Possible poorly defined cut and fill feature cut into BNB Formation (Unit 5). Poorly defined basal reflector with single phase of acoustically transparent fill. Possible remnant fluvial feature (Unit 7), although could be an internal reflector. Depth Range: 1.7 -4.2m BSB.	Holocene (Pre-Transgression)
75102	Simple Cut and Fill	P2	Poorly defined cut and fill feature, cut through the BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Only identified on one survey line. Possible remnants of a fluvial system (Unit 7). Depth Range: 1.4 - 7.3m BSB.	Holocene (Pre-Transgression)
75103	Channel	P1	Poorly defined channel feature (Unit 7) identified on a number of survey lines, cut through BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Depth Range: 1.3 - 6.1m BSB.	Holocene (Pre-Transgression)
75104	Simple Cut and Fill	P2	Shallow, possible cut and fill feature cut into BNB Formation (Unit 5), although only identified on one survey line. Strong, well defined basal reflector with single phase of unstructured fill. Possible remnants of an eroded fluvial system (Unit 7), although is located in an area of shallow gas and so may be associated. Depth Range: 0.8 - 3.7m BSB.	Holocene (Pre-Transgression)
75105	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.2 - 1.7m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75106	High Amplitude Reflector	P1	Area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on more than one survey line. Feature is cut/disrupted by cut and fills 75107 and 75108, and partially overlaps possible shallow gas 75100. Peat recovered from within similar features suggest it could be an area of buried land surface (Unit 7). Depth Range: 0.5 - 3.4m BSB.	Holocene (Pre-Transgression)
75107	Simple Cut and Fill	P2	Shallow, possible cut and fill feature cut into BNB Formation (Unit 5), identified on more than one survey line. Strong, well defined basal reflector with single phase of unstructured fill. Possible remnants of an eroded fluvial system (Unit 7), although is located in an area of shallow gas and so may be associated. Depth Range: 0.8 - 2.6m BSB.	Holocene (Pre-Transgression)
75108	Simple Cut and Fill	P2	Shallow, possible cut and fill feature cut into BNB Formation (Unit 5), although only identified on one survey line. Strong, well defined basal reflector with single phase of unstructured fill. Possible remnants of an eroded fluvial system (Unit 7), although is located in an area of shallow gas and so may be associated. Depth Range: 1.2 - 2.7m BSB.	Holocene (Pre-Transgression)
75109	Simple Cut and Fill	P2	Small but distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with single phase of acoustically layered fill. Possible remnants of a fluvial system (Unit 7). Depth Range: 1.7 - 4.4m BSB.	Holocene (Pre-Transgression)
75110	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer or erosion surface. Appears to be associated with channel 75112. Only identified on one survey line. Depth Range: 2.7 - 3.2m BSB.	Devensian
75111	Simple Cut and Fill	P2	Possible poorly defined cut and fill feature cut into BNB Formation (Unit 5), only identified on one survey lines. Very poorly defined basal reflector with single phase of acoustically transparent fill. Possible remnants of an eroded fluvial system (Unit 7). Depth Range: 2.7 - 5.2m BSB.	Holocene (Pre-Transgression)
75112	Channel	P1	Distinct shallow channel feature cut into BNB Formation (Unit 5), identified on a number of survey lines. Well defined basal reflector with a single phase of acoustic unstructured fill, often associated with areas of possible shallow gas within BNB. Possible buried fluvial feature, possibly associated with the same surface as high amplitude reflector 75113 (Unit 7). Depth Range: 1.4 - 5.4m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75113	High Amplitude Reflector	P1	Extensive area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5) (possibly above a thin layer of TN Formation (Unit 6)). Identified on a number of survey lines, the feature follows the course of, overlies, and extends slightly beyond, channel 75112. Peat recovered from within similar features suggest it could be the remnants of a buried land surface (Unit 7). Depth Range: 1.0 - 3.6m BSB.	Holocene (Pre-Transgression)
75114	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer or erosion surface. Appears to be associated with channel 75112 (Unit 7). Depth Range: 2.4 - 3.8m BSB.	Devensian
75115	Erosion Surface	P1	Extensive internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by large, well-developed dune features, suggesting a significant time of exposure. Possible buried land surface (Unit 7). Depth Range: 1.3 - 9.2m BSB.	Devensian
75116	Simple Cut and Fill	P2	Poorly defined cut and fill feature cut into the BNB Formation (Unit 5), identified on more than one survey line. Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial system (Unit 7). Depth Range: 2.1 - 8.8m BSB.	Holocene (Pre-Transgression)
75117	Simple Cut and Fill	P2	Poorly defined cut and fill feature cut into the BNB Formation (Unit 5), but only identified on one survey line. Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial system (Unit 7). Depth Range: 1.6 - 6.0m BSB.	Holocene (Pre-Transgression)
75118	Simple Cut and Fill	P2	Poorly defined cut and fill feature cut into the BNB Formation (Unit 5), identified on more than one survey line. Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial system (Unit 7). Depth Range: 2.2 - 4.7m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75119	Simple Cut and Fill	P2	Poorly defined cut and fill feature cut into the BNB Formation (Unit 5), but only identified on one survey line. Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial system (Unit 7). Depth Range: 1.9 - 5.4m BSB.	Holocene (Pre-Transgression)
75120	Simple Cut and Fill	P2	Poorly defined cut and fill feature identified on a number of survey lines, cut through BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial feature (Unit 7). Depth Range: 1.4 - 9.5m BSB.	Holocene (Pre-Transgression)
75121	simple Cut and Fill	P2	Poorly defined cut and fill feature only identified on one survey line, cut through BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possible remnants of an eroded fluvial feature (Unit 7). Depth Range: 2.5 - 6.9m BSB.	Holocene (Pre-Transgression)
75122	Channel	P1	Poorly defined channel feature identified on a number of survey lines, cut through BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possibly related to nearby cut and fill 75123 (Unit 7). Depth Range: 1.6 - 7.3m BSB.	Holocene (Pre-Transgression)
75123	Simple Cut and Fill	P2	Poorly defined cut and fill feature identified on more than one survey line, cut through BNB Formation (Unit 5) and into the underlying YM Formation (Unit 2). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the internal BNB structure and YM/BNB boundary reflector. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined. Possibly related to nearby channel 75122 (Unit 7). Depth Range: 1.4 - 7.3m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75124	Simple Cut and Fill	P2	Distinct cut and fill feature cut into BNB Formation (Unit 5), but only identified on one survey line. Distinct basal reflector with a single phase of acoustically layered fill. Possible remnants of a fluvial channel (Unit 7), possibly relating to features 75122 and 75123, although appears slightly higher in the stratigraphy and is different in character, so may be a later phase feature. Depth Range: 0.6 - 3.9m BSB.	Holocene (Pre-Transgression)
75125	Channel	P1	Relatively poorly defined channel feature identified on a number of survey lines, cut into BNB Formation (Unit 5). Very poorly defined basal reflector, but with a relatively strong internal structure characterised by layered reflectors. Possible remains of a fluvial system (Unit 7). Depth Range: 1.6 - 5.8m BSB.	Holocene (Pre-Transgression)
75126	Simple Cut and Fill	P2	Poorly defined cut and fill feature only identified on one survey line, cut into BNB Formation (Unit 5). Poorly defined basal reflector, with a single phase of acoustically transparent fill. Possible remnants of an eroded fluvial feature (Unit 7). Depth Range: 2.0 - 4.3m BSB.	Holocene (Pre-Transgression)
75127	Coarse Sediment Deposit	P2	Isolated, possible small coarse sediment deposit at the base of BNB Formation (Unit 5), identified on one survey line only. Possible bank deposit or transgression feature. Depth Range: 5.0 - 6.2m BSB.	Ipswichian or Devensian



## 12.5 Appendix V: Palaeogeographic Features of Archaeological Potential in the provisional Offshore Cable Corridor

WA ID	Classification	Archaeological Discrimination	Description	Age
75128	Infilled Depression	P2	Broad, approximately NNW-SSE trending, unit below the base of BNB Formation (Unit 5), appears to be the fill of a large topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by sub-parallel internal reflectors. Feature appears to extend eastwards into NV East but feature not identified during data interpretation of this area, probably due to differences in data quality. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 7.6m - 12.6m BSB.	Ipswichian or Devensian
75129	Infilled Depression	P2	Approximately WNW-ESE trending unit below the base of BNB Formation (Unit 5), appears to be the fill of a topographically controlled depression. Relatively low relief basal reflector with single phase of fill characterised by sub-parallel internal reflectors. Feature appears to extend eastwards into NV East but feature not identified during data interpretation of this area, probably due to differences in data quality. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Depth Range: 7.5m - 26.8m BSB.	Ipswichian or Devensian
75130	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth range: 2.3 - 2.8m BSB.	Devensian
75131	Channel	P1	Poorly defined channel feature identified on a number of survey lines cutting into BNB Formation (Unit 5). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined, and apparent blanking of underlying data may indicate the presence of diffuse shallow gas. Feature appears to extend eastwards into NV East but feature not identified during data interpretation of this area, probably due to differences in data quality. Depth Range: 1.1 - 3.9m BSB.	Holocene (Pre-Transgression)
75132	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth range: 1.7 - 2.4m BSB.	Devensian
75133	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth range: 2.0 - 2.3m BSB.	Devensian



WA ID	Classification	Archaeological Discrimination	Description	Age
75134	Acoustic Blanking	P2	Small area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Only identified on one survey line. Depth range: 2.1 - 2.9m BSB.	Devensian
75135	Simple Cut and Fill	P2	Small, simple cut and fill identified beneath a veneer of Holocene sediment, cut into the top of the BNB Formation (Unit 5). Single phase of fill characterised by closely spaced, subparallel horizons, indicating well layered sediment. Some slight blanking of lower horizons. Feature only identified on one line. Depth range: 1.2 - 6.4m BSB.	Holocene (Pre-Transgression)
75136	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on more than one survey line. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth range: 1.6 - 3.9m BSB.	Devensian
75137	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on more than one survey line. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth range: 2.1 - 3.6m BSB.	Devensian
75138	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on more than one survey line. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth range: 2.1 - 3.5m BSB.	Devensian
75139	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5), identified on more than one survey line. Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth range: 1.1 - 6.6m BSB.	Devensian
75140	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5), identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.1 - 3.4m BSB.	Holocene (Pre-Transgression)
75141	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.1 - 3.1m BSB.	Holocene (Pre-Transgression)
75142	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5), identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.9 - 4.5m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75143	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5), identified on more than one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 3.1 - 5.0m BSB.	Holocene (Pre-Transgression)
75144	Channel	P1	Poorly defined channel feature identified on a number of survey lines cutting into BNB Formation (Unit 5). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined, and apparent blanking of underlying data may indicate the presence of diffuse shallow gas. Depth Range: 0.3 - 7.0m BSB.	Holocene (Pre-Transgression)
75145	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.5 - 3.8m BSB.	Holocene (Pre-Transgression)
75146	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 2.0 - 3.4m BSB.	Holocene (Pre-Transgression)
75147	High Amplitude Reflector	P1	Small area of a relatively flat, high amplitude reflector at the top of the BNB Formation (Unit 5). Only identified on one survey line. Peat recovered from within similar features suggest it could be an isolated area of buried land surface (Unit 7). Depth Range: 1.3 - 5.2m BSB.	Holocene (Pre-Transgression)
75148	Simple Cut and Fill	P2	Possible simple cut and fill feature identified cutting into the BNB Formation (Unit 5), beneath possible Holocene sediment. Only identified on one survey line. Single phase of acoustically chaotic fill, suggesting well mixed channel fill. Basal reflector very poorly defined. Depth range: 1.0 - 2.6m BSB.	Holocene (Pre-Transgression)
75149	Simple Cut and Fill	P2	Possible simple cut and fill feature identified cutting into the BNB Formation (Unit 5), beneath possible Holocene sediment. Only identified on one survey line. Single phase of acoustically chaotic fill, suggesting well mixed channel fill. Basal reflector very poorly defined. Depth range: 1.2 - 3.8m BSB.	Holocene (Pre-Transgression)



WA ID	Classification	Archaeological Discrimination	Description	Age
75150	Channel	P1	Poorly defined channel feature identified on a number of survey lines cutting into BNB Formation (Unit 5). Very poorly defined basal reflector, and feature is mainly delineated by disruption to the BNB structure. Possible single phase of fill comprising very faint internal reflectors, although the structure cannot be definitively determined, and apparent blanking of underlying data may indicate the presence of diffuse shallow gas. Depth Range: 1.8 - 5.1m BSB.	Holocene (Pre-Transgression)
75151	Simple Cut and Fill	P2	Possible simple cut and fill feature identified cutting into the BNB Formation (Unit 5), beneath possible Holocene sediment. Only identified on one survey line. Single phase of acoustically chaotic fill, suggesting well mixed channel fill. Basal reflector very poorly defined. Depth range: 1.2 - 3.8m BSB.	Holocene (Pre-Transgression)
75152	Infilled Depression	P2	Localised unit below the base of BNB Formation (Unit 5), appears to be the fill of a topographically controlled depression. Relatively low relief basal reflector with single phase of acoustically chaotic fill. Unit not definitely known, but possibly EE or an earlier BNB unit (Unit 4). Data from vibrocore VC116 suggests the unit comprises dense sand. Depth Range: 5.1m - 10.3m BSB.	Ipswichian or Devensian
75153	Channel	P1	Possible channel feature identified cutting into the top of BNB (or possible EE) and YM Formation (Unit 2). Feature has a poorly defined basal reflector and closely spaced, subparallel internal reflectors indicated well layered sediment. Possible remnant fluvial feature. Identified on a number of survey lines. Depth range 1.4 - 10.6m BSB.	Holocene (Pre-Transgression)
75154	Acoustic Blanking	P2	Area of acoustic blanking within the upper layers of BNB Formation (Unit 5). Possible accumulation of shallow gas, indicating preserved organic material, although could be a localised gravelly layer. Depth Range: 1.1 - 1.9m BSB.	Devensian
75155	Simple Cut and Fill	P2	Possible, poorly defined cut and fill feature identified cutting into BNB Formation (Unit 5), possibly with more than one phase of fill. Fill is characterised by parallel internal reflectors, with some possible blanking of lower horizon. Basal reflector not particularly distinct. Depth range: 1.3 - 7.7 m BSB.	Holocene (Pre-Transgression)
75156	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by relatively poorly-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 4.3 - 11.0m BSB.	Devensian



WA ID	Classification	Archaeological Discrimination	Description	Age
75157	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by relatively poorly-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 4.6 - 9.9m BSB.	Devensian
75158	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by relatively poorly-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 7.4 - 12.8m BSB.	Devensian
75159	Simple Cut and Fill	P2	Possible simple cut and fill feature cut into BNB Formation (Unit 5), identified on more than one survey line. Base of feature not particularly distinct, possibly an internal reflector within the possible BNB or EE Formation (Unit 4) or could be the remnants of an eroded fluvial feature. Depth range: 0.5 - 6.9 m BSB.	Holocene (Pre-Transgression)
75160	High Amplitude Reflector	P1	High amplitude reflector identified within well layered sediments of interpreted BNB. Some possible blanking of lower horizons. Feature identified on one line. Could indicate shallow gas or a layer of organic material. Depth range: 4.9 - 6.1 m BSB.	Devensian
75161	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by relatively well-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 5.3 - 17.6m BSB.	Devensian
75162	Erosion Surface	P1	Internal erosion surface within the BNB Formation (Unit 5), identified on more than one survey line. Overlain by relatively well-developed dune features, suggesting a significant time of exposure. Possible buried land surface. Depth Range: 9.4 - 16.1m BSB.	Devensian
75163	Simple Cut and Fill	P2	Cut and fill feature identified cutting into top of the BNB Formation (Unit 5). Feature has a distinct, high amplitude base and possible blanking of lower horizons. Feature identified on one line. Possible remnants of an eroded fluvial feature. Depth range: 0.6 - 2.9 m BSB.	Holocene (Pre-Transgression)
75164	Simple Cut and Fill	P2	Possible cut and fill feature identified cutting into possible EE formation (Unit 4). Poorly defined basal reflector with indistinct fill, and only identified on one line, possible continuation of <b>75165</b> however this isn't clear. Depth range: 1.0 - 4.2m BSB.	Post-Ipswichian
75165	Simple Cut and Fill	P2	Possible cut and fill feature identified cutting into possible EE formation (Unit 4). Poorly defined basal reflector with indistinct fill, and only identified on one line, possible continuation of <b>75164</b> however this isn't clear. Depth range: 1.0 - 9.4m BSB.	Post-Ipswichian
75166	Simple Cut and Fill	P2	Possible small simple cut and fill feature cut into possible WK Formation (Unit 1). Poorly defined basal reflector with indistinct fill, and only identified on one line. Could be an internal reflector. Depth range: 1.0 - 5.8 m BSB.	Unknown



WA ID	Classification	Archaeological Discrimination	Description	Age
75167	Complex Cut and Fill	P2	Possible indistinct complex cut and fill feature cutting into the top of the possible WK Formation (Unit 1). Only identified on one line, possible continuation of 75168 however this isn't clear. Depth range: 0.7 - 4.7 m BSB.	Unknown
75168	Complex Cut and Fill	P2	Possible indistinct complex cut and fill feature cutting into the top of the possible WK Formation (Unit 1). Only identified on one line, possible continuation of 75167 however this isn't clear. Depth range: 0.3 - 3.2 m BSB.	Unknown
75169	Simple Cut and Fill	P2	Possible small simple cut and fill feature cutting into possible WK Formation (Unit 1). Feature is poorly defined and only identified on one line. Depth range: 0.6 - 2.0 m BSB.	Unknown
75170	Acoustic Blanking	P2	Indistinct reflector identified in upper unit beneath seabed, possibly WK Formation (Unit 1). Feature not particularly distinct, but some possible blanking/disturbance to lower horizons indicating possible shallow gas accumulation or a localised gravel deposit. Feature only identified on one line. Depth range 1.8 - 3.3 m BSB.	Unknown



## 12.6 Appendix VI: Seabed Anomalies of Archaeological Potential in NV East

Co-ordinates are in ETRS89 UTM Zone 31N.

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70000	Magnetic	503394	5861745	A2	-	-	-	547	Large asymmetrical dipolar anomaly, no recorded wrecks or obstructions and possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70001	Dark reflector	504907	5861509	A2	0.8	0.5	0.1	-	Approximately oval shaped anomaly with a slight L-shape to it, appears partially buried.	
70002	Magnetic	504689	5861472	A2	-	-	-	20	Distinct dipolar anomaly on ridge of sandwave, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70003	Dark reflector	504173	5861185	A2	3.4	1.3	0	-	Four oval shaped intermittent anomalies, possibly partially buried object.	
70004	Magnetic	503394	5861153	A2	-	-	-	11	Small but distinct dipolar anomaly in an area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70005	Magnetic	502797	5861124	A2	-	-	-	11	Negative monopolar anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70006	Magnetic	502673	5861066	A2	-	-	-	8	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70007	Magnetic	499082	5861061	A2	-	-	-	8	Dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70008	Magnetic	502893	5860998	A2	-	-	-	123	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70009	Dark reflector	500616	5860788	A2	7.9	5.4	0.3	-	Bathymetric anomaly of a possible mound located in an area of sand ripples with a diamond shaped anomaly measuring 3.1m x 2.7m x 0.7m with scour, possibly piece of debris.	
70010	Dark reflector	500160	5860738	A2	2.5	1.7	0.2	-	Almost triangular shaped anomaly with weak tiny circular anomaly nearby, possibly debris.	
70011	Magnetic	499005	5860571	A2	-	-	-	17	Asymmetrical dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70012	Magnetic	498786	5860491	A2	-	-	-	23	Two anomalies approximate 25m apart and possibly associated. Stronger is a dipole of 23nT with the weaker a small dipole anomaly of 8nT, in an area of noise. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70013	Magnetic	503479	5860359	A2	-	-	-	10	Narrow peaked monopolar positive anomaly but in an area of larger broad anomalies possibly natural in origin.	
70014	Dark reflector	496046	5860324	A2	5.6	0.4	0	-	Thick linear anomaly, possibly partially buried, faint scour trailing off one end.	
70015	Magnetic	503289	5860278	A2	-	-	-	5	Distinct small dipolar anomaly in area of broad dipolar anomalies, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70016	Magnetic	499999	5860245	A2	-	-	-	14	Narrow peaked positive monopolar anomaly, stronger than other anomalies in area that are possibly natural, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70017	Debris	501768	5860169	A2	10.4	3.9	0.7	-	Possible rounded mound located in an area of sand ripples with associated scour on its north-west side visible in the bathymetry data. Complex irregular looking anomaly and weakly contrasting but with a prominent pointed oval shaped shadow with scour. Possibly piece of debris lying on seabed.	
70018	Magnetic	503474	5860142	A2	-	-	-	5	Distinct but weak asymmetrical dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70019	Magnetic	496390	5859947	A2	-	-	-	111	Distinct asymmetric medium dipole anomaly on single line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70020	Rope/chain	498804	5859831	A2	18	0.7	0.1	-	Narrow curvilinear anomaly possibly rope or chain.	
70021	Wreck	496438	5859769	A1	21.5	9.7	0.6	62	Elongated oval shaped area containing several linear crossing dark reflectors showing degrading structure of a wreck partially buried in sediment with two further pieces of debris lying nearby approximately 5.5m x 0.5m and 2m x 0.5m in size. The pieces of debris are both within 10m of the main wreck site. Associated is a very distinct medium sized asymmetric dipole anomaly of 62nT and just to south and possibly associated is a second magnetic small and wide dipole of 19nT suggesting the presence of ferrous material. The wreck is located at the edge of a sandwave in an area of sand ripples.	
70022	Magnetic	497097	5859655	A2	-	-	-	7	Small negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70023	Magnetic	505096	5859429	A2	-	-	-	40	Distinct asymmetrical dipolar anomaly, possible piece of ferrous, but located on crest of a sandwave, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70024	Seafloor disturbance	498418	5859302	A2	26	3.7	0.1	19	Elongated oval shaped area in sand ripples containing at least four short crescent-shaped dark reflectors, possibly partially buried objects. Associated are two magnetic anomalies possibly indicating ferrous material within the seafloor disturbance.	
70025	Dark reflector	498638	5859111	A2	3.3	2.3	0	-	Three parallel short linear anomalies, possibly buried debris.	
70026	Magnetic	492881	5859097	A2	-	-	-	26	Small sized dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70027	Magnetic	502666	5858973	A2	-	-	-	20	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location. Slightly to the south of cable visible in magnetic and sidescan sonar data.	
70028	Dark reflector	492537	5858942	A2	10.1	0.8	0.1	-	Two anomalies adjacent to each other which appear partially buried and possibly part of the same feature, a short narrow linear with a sub-rectangular anomaly.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70029	Magnetic	494668	5858805	A2	-	-	-	36	Small sized negative dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70030	Dark reflector	497304	5858631	A2	2.7	1.8	0.6	-	Triangular shaped anomaly in scour mark and appears partially buried.	
70031	Dark reflector	492935	5858549	A2	3.1	1.6	0.1	-	Sub-rectangular anomaly with shadow only at one end, possibly a piece of debris.	
70032	Magnetic	497868	5858486	A2	-	-	-	32	Distinct small sized dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70033	Seafloor disturbance	497923	5858432	A2	6.9	5.3	0	-	Irregular shaped and complex looking anomaly, possibly debris.	
70034	Magnetic	493082	5858410	A2	-	-	-	49	Small asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70035	Magnetic	492203	5858215	A2	-	-	-	674	Large asymmetric distinct dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70036	Dark reflector	497815	5858202	A2	4.2	1	0.1	-	Wedge shaped anomaly, possibly partially buried.	
70037	Dark reflector	499425	5858175	A2	5.1	0.3	0.1	-	Narrow linear anomaly, possibly piece of debris.	
70038	Seafloor disturbance	494116	5858120	A2	3	2.9	0.5	-	Approximately circular anomaly, possibly second immediately adjacent but difficult to distinguish, appears partially buried.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70039	Magnetic	495993	5858052	A2	-	-	-	31	Small sized positive monopole with weaker asymmetric dipole adjacent, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70040	Seafloor disturbance	491024	5857988	A2	8.7	4.9	0.6	-	Irregular shaped anomaly, mounded area with scour mark, unable to discern any further detail, possibly piece of buried debris. Bathymetry data shows a small depression in an area of sand ripples which corresponds to location of scour, object not visible within it.	
70041	Dark reflector	505466	5857809	A2	4	3.2	0.3	-	Weak approximately rectangular anomaly partially buried in sediment.	
70042	Seafloor disturbance	487240	5857789	A2	17.9	5.7	0.7	-	Strong curvilinear dark reflector, no complex detail suggesting structure seen but large object partially buried in sand ripples. Possibly outline structure of a large object or wreck. In area of mobile sediment and not much more visible.	
70043	Dark reflector	490963	5857598	A2	2	0.5	0.3	-	Short bar shaped anomaly with scour, possibly piece of debris.	
70044	Dark reflector	495647	5857503	A2	15	0.5	0	-	Two anomalies, approximately 15m apart east-west orientation. Smaller is a short narrow linear 5m x 0.5m at edge of range. The larger is an intermittent curvilinear anomaly 11m x 0.5m and possibly length of rope/chain.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70045	Dark reflector	495783	5857497	A2	35.2	0.5	0	-	Three small rectangular anomalies in a linear orientation, possibly all associated and pieces of debris.	
70046	Magnetic	487263	5857491	A2	-	-	-	24	Thin and small asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70047	Debris	489828	5857487	A2	6.9	4.9	0	-	Complex looking curvilinear anomaly.	
70048	Magnetic	489977	5857473	A2	-	-	-	15	Small but distinct dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70049	Magnetic	502862	5857341	A2	-	-	-	11	Distinct small dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70050	Magnetic	487263	5857272	A2	-	-	-	39	Narrow and distinct dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70051	Dark reflector	498125	5857264	A2	15.4	0.4	0.1	-	Two small oval shaped anomalies which are possibly opposite ends of single object but buried by sediment in between.	
70052	Magnetic	487575	5857230	A2	-	-	-	19	Distinct asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70053	Dark reflector	491197	5857213	A2	4.1	0.7	0.2	-	Short thick linear anomaly with slight curvilinear at one end. Possibly piece of debris.	
70054	Magnetic	501273	5857103	A2	-	-	-	13	Narrow positive monopolar anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70055	Seafloor disturbance	497740	5856926	A2	32.5	7	0	-	Irregular shaped area containing a semi-circular dark reflector and several further weak diffuse irregular-shaped dark reflectors. Possibly partially buried or possibly natural.	
70056	Dark reflector	505309	5856926	A2	9.1	0.5	0	-	Short thick linear with weaker curvilinear attached, possibly piece of debris lying on seabed.	
70057	Magnetic	495866	5856773	A2	-	-	-	62	Medium distinct asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70058	Magnetic	494268	5856763	A1	-	-	-	6587	Very large dipole, possibly wreck anomaly but there is no sidescan sonar or bathymetry anomaly visible at this location and there is not recorded wreck or obstructions at this location.	
70059	Dark reflector	492814	5856660	A2	7.8	2	0.1	-	Irregular shaped anomaly in area of sand ripples, possibly piece of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70060	Magnetic	504055	5856657	A2	-	-	-	11	Positive monopolar anomaly, in an area of broader negative anomalies, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70061	Dark reflector	485178	5856649	A2	5.4	3.1	0.8	-	Oval shaped anomaly with tiny circular dark reflectors scattered around it, straight edged shadow, possibly piece of debris.	
70062	Magnetic	488589	5856545	A2	-	-	-	34	Small sized asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70063	Magnetic	491867	5856487	A2	-	-	-	21	Irregular shaped dipole anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70064	Seafloor disturbance	504729	5856405	A2	12.4	8.8	0	-	Depression orientated approximately north-south and containing numerous small circular dark reflectors, possibly natural in origin but multibeam bathymetry data indicates it is on top of big sandbank, which means more likely to be anthropogenic.	
70065	Magnetic	488672	5856342	A2	-	-	-	67	Narrow and distinctive medium dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70066	Dark reflector	485119	5856280	A2	5.5	0.3	0.2	-	Narrow linear anomaly possibly in two pieces and broken up.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70067	Magnetic	502260	5856204	A2	-	-	-	28	Asymmetrical dipolar anomaly, stronger anomaly than other on survey line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70068	Bright reflector	487554	5856136	A2	4.7	3.4	0.5	-	Triangular anomaly, difficult to distinguish dark reflector to identify object causing shadow/bright reflector. Scour marks off either side and possibly a piece of debris. Bathymetry anomaly is a possible rounded mound located in an area of sand ripples with associated scour to the north.	
70069	Magnetic	505763	5856107	A2	-	-	-	13	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70070	Magnetic	505161	5856080	A2	-	-	-	23	Irregular looking dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70071	Rope/chain	499023	5856038	A2	6.3	2.8	0	10	L-shaped anomaly, slight scour visible off one end. Negative monopolar anomaly at location suggesting presence of ferrous material.	
70072	Dark reflector	496642	5855951	A2	8	0.4	0	-	Curvilinear anomaly with further small circular anomaly nearby, possibly associated.	
70073	Dark reflector	500429	5855944	A2	6	0.4	0	-	Narrow curvilinear anomaly disappearing into the sediment.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70074	Magnetic	485967	5855913	A2	-	-	-	13	Distinct and narrow dipolar anomaly possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70075	Dark reflector	499246	5855881	A2	3.5	1.1	0.3	-	Circular shaped anomaly with attached narrow linear in a small hollow in the sediment, scour off one side too. Possibly boulders in depressions.	
70076	Dark reflector	484924	5855802	A2	13.4	3.6	0.1	-	Thick diffuse crescent shaped anomaly and two further, smaller, yet more distinct crescent shaped anomalies in discrete area at edge of range, possibly all associated.	
70077	Magnetic	487047	5855798	A2	-	-	-	30	Distinct small sized negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70078	Magnetic	489268	5855761	A2	-	-	-	24	Medium sized distinct asymmetric isolated dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70079	Recorded Obstruction	485478	5855681	A3	2	1	0.8	-	An unidentified obstruction, first detected in 1994. Survey data indicates the presence of a very small contact with no associated magnetometric anomaly. The surveyed position of this obstruction is regarded as having an accuracy of 13m. No geophysical anomaly observed in previous zoning assessment or in 2013 data.	11216 (UKHO)
70080	Dark reflector	499103	5855643	A2	2.5	0.5	0.1	-	Small rectangular anomaly, appears partially buried.	
70081	Dark reflector	489787	5855640	A2	5.1	2.7	0.1	-	Two linear anomalies lying side by side, one slightly larger at 5.1m in length with the second linear 4.1m and appears more intermittent possibly broken up or buried along parts of its length.	
70082	Magnetic	489962	5855407	A2	-	-	-	18	Small dipole in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70083	Dark reflector	491397	5855393	A2	1.1	0.2	0.2	-	Short narrow linear.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70084	Dark reflector	491241	5855392	A2	6.8	1.4	0	-	Two oval shaped anomalies lying side by side, at edge of range and when viewed on adjacent line there is an approximately oval shaped bright reflector which was interpreted as part of a sand ripple. Possible oval shaped area of darker reflection but very weak contrast if it is an object here and it does not resemble anomaly on adjacent survey line.	
70085	Dark reflector	488532	5855336	A2	12.1	5.9	0	-	Weak linear dark reflector at different orientation to direction of sand ripples in area. Further small approximate circular anomalies next to it. Possibly piece of debris partially buried.	
70086	Rope/chain	490106	5855226	A2	67.3	0.5	0.2	-	Intermittent short linear dark reflectors in a linear orientation, possibly exposed length or cable.	
70087	Magnetic	493570	5855185	A2	-	-	-	21	Small sized asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70088	Magnetic	492176	5855153	A2	-	-	-	43	Asymmetric dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70089	Magnetic	496642	5855051	A2	-	-	-	37	Distinct narrow dipolar anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70090	Magnetic	490850	5855047	A2	-	-	-	35	Small sized negative monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70091	Bright reflector	490130	5854931	A2	8.5	0.5	0	-	Linear anomaly lying across area of sand ripples.	
70092	Magnetic	486060	5854895	A2	-	-	-	15	Asymmetric dipole anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70093	Magnetic	484178	5854884	A2	-	-	-	20	Small sized, distinct asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70094	Dark reflector	493207	5854854	A2	25	1	0.3	-	Two dark reflectors space approximately 25m apart and possibly associated through their proximity. The larger is a diffuse sub-rectangular shaped anomaly 5.1m x 1m with the second a much smaller triangular anomaly 0.7m x 0.6m x 0.3m.	
70095	Magnetic	505371	5854790	A2	-	-	-	5	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70096	Magnetic	500251	5854775	A2	-	-	-	13	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70097	Rope/chain	501824	5854746	A2	22	0.4	0	-	Intermittent curvilinear dark reflector, possibly length of buried rope or chain.	
70098	Dark reflector	492205	5854602	A2	4.5	1.1	0	-	Narrow rectangular anomaly possibly piece of debris. Quite strong return.	
70099	Magnetic	488661	5854581	A2	-	-	-	9	Thin and small positive monopole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70100	Magnetic	483855	5854536	A2	-	-	-	29	Asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70101	Dark reflector	488771	5854515	A2	2.1	0.7	0.4	-	Short rectangular anomaly with straight edged shadow and slight scour.	
70102	Magnetic	503166	5854425	A2	-	-	-	11	Dipolar but possibly similar anomalies along survey line, in an area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70103	Dark reflector	484120	5854366	A2	3.7	0.7	0	-	Curvilinear anomaly at edge of range, in area of sand ripples.	
70104	Magnetic	493765	5854362	A2	-	-	-	15	Irregular shaped dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70105	Dark reflector	501126	5854334	A2	7	1.9	0.1	-	Curvilinear anomaly which splits into two linears at one end, possibly piece of debris lying on seabed.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70106	Magnetic	489563	5854198	A2	-	-	-	33	Narrow and distinct asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70107	Magnetic	493640	5854141	A2	-	-	-	9	Asymmetric dipole in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70108	Dark reflector	487600	5854137	A2	2	0.3	0.1	-	Discrete cluster of three small oval shaped anomalies.	
70109	Magnetic	495444	5854110	A2	-	-	-	60	Medium asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70110	Dark reflector	487598	5854067	A2	11.3	3	1	-	Weak semi-circular shaped anomaly with second short curvilinear adjacent and appearing partially buried with weak contrast.	
70111	Rope/chain	505646	5854054	A2	81.7	0.4	0	15	Short narrow intermittent linears in a linear orientation, possibly buried cable or seabed scarring. Magnetic anomaly 50m to south-east of a dipolar anomaly, distinct from the larger broader anomalies in the vicinity possibly suggesting presence of ferrous material.	
70112	Magnetic	505252	5854031	A2	-	-	-	12	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70113	Magnetic	501451	5853953	A2	-	-	-	12	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70114	Magnetic	485244	5853882	A2	-	-	-	16	Small but distinct dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70115	Debris field	501902	5853766	A2	18.1	16.9	0.3	-	One main area containing numerous circular anomalies with two separate larger curvilinear dark reflectors nearby, possible further debris in between. No obvious structure and appears partially buried. Previously recorded as a seafloor disturbance measuring 46m x 32m x 0.3m so the smaller dimensions recorded here possibly show that it has been further buried in sediment since the area was last surveyed.	
70116	Debris	495933	5853642	A2	6.8	0.5	0.1	-	Linear anomaly partially buried in soft sediment, possibly further curvilinear attached could be piece of isolated debris.	
70117	Magnetic	495862	5853578	A2	-	-	-	36	Asymmetric dipole in area of noise, possibly natural or possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70118	Magnetic	492245	5853570	A2	-	-	-	133	Distinct dipole anomaly, anomaly across two lines, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70119	Magnetic	495758	5853504	A2	-	-	-	70	Medium dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70120	Rope/chain	492280	5853486	A2	119.1	0.3	0		Small intermittent linear dark reflectors in a linear orientation, possibly buried cable.	
70121	Dark reflector	487381	5853436	A2	4.7	4.5	0.1	-	Triangular shaped anomaly with parallel linear dark reflector along one side, partially buried but there is a possibility that the feature is natural.	
70122	Magnetic	505966	5853429	A2	-	-	-	67	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70123	Dark reflector	501789	5853412	A2	5.6	2.6	0	-	Two oval shaped anomalies side by side.	
70124	Dark reflector	494017	5853383	A2	4.2	3.8	0	-	Irregular shaped anomaly, breaks up the crest of a sand ripple.	
70125	Dark reflector	491980	5853369	A2	2.3	0.7	0.1	-	Sub-oval shaped anomaly with triangular shadow.	
70126	Magnetic	501042	5853297	A2	-	-	-	12	Narrow peaked monopolar anomaly, stronger than similar anomalies along survey line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70127	Magnetic	486576	5853273	A2	-	-	-	33	Distinct asymmetric small sized dipole, possibly part of a trend but kept due to its strength or possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70128	Magnetic	501448	5853207	A2	-	-	-	35	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70129	Dark reflector	499800	5853197	A2	1.8	1.7	0.4	-	Oval shaped anomaly, diffuse in appearance with thin narrow linear protruding.	
70130	Debris	489326	5853090	A2	5.5	0.3	0.1	-	Narrow linear anomaly with second separate short linear at one end.	
70131	Dark reflector	488985	5852970	A2	4	0.4	0	-	Narrow, short, slightly curved linear.	
70132	Dark reflector	502833	5852920	A2	5.1	4.1	0.8	-	Partially buried so difficult to see but a linear possibly with second anomaly adjacent whose scour is more prominent.	
70133	Magnetic	503572	5852838	A2	-	-	-	16	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70134	Magnetic	486645	5852832	A2	-	-	-	37	Narrow and distinct dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70135	Dark reflector	495005	5852802	A2	7	3.3	0	-	Curvilinear anomaly, weak and intermittent and appears partially buried, possibly piece of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70136	Magnetic	487560	5852795	A2	-	-	-	34	Narrow and distinct asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70137	Dark reflector	493518	5852779	A2	10.4	2.3	0.1	-	Two anomalies adjacent to each other, possibly associated, possibly debris. Circular anomaly and linear narrow anomaly next to it disappearing into the sediment.	
70138	Dark reflector	489316	5852761	A2	4.9	1	0	-	Thick curvilinear anomaly.	
70139	Dark reflector	504704	5852697	A2	4	2.9	0.2	-	Two parallel irregular shaped linears, possibly partially buried debris.	
70140	Magnetic	484365	5852618	A2	-	-	-	62	Medium distinct asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70141	Magnetic	483846	5852465	A2	-	-	-	29	Small sized possible dipole anomaly, looks more uniform than surrounding data, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70142	Dark reflector	503940	5852441	A2	1.7	0.4	0.3	-	Oval shaped anomaly with rectangular shadow and slight scour.	
70143	Seafloor disturbance	487598	5852370	A2	12.2	7	0.3	-	Semi-circular shaped area of dark reflectors comprising two adjacent curvilinear anomalies. Diffuse with no obvious structure but could be partially buried object, buried at base of sandwave.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70144	Dark reflector	487793	5852307	A2	3.8	0.5	0.2	-	Rectangular anomaly lying on sand ripples.	
70145	Magnetic	484434	5852277	A2	-	-	-	46	Distinct asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70146	Magnetic	488043	5852258	A2	-	-	-	44	Small sized distinctive asymmetric dipole	
70147	Magnetic	491954	5852251	A2	-	-	-	218	Large asymmetric dipole anomaly across adjacent lines, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70148	Dark reflector	505075	5851991	A2	0.9	0.7	0.4	-	Approximately V-shaped anomaly with slight scour, possibly partially buried. Possible extending scour visible as a depression measuring 17.8m x 7.5m x 0.5m in the multibeam bathymetry data.	
70149	Dark reflector	489096	5851966	A2	2	1	0.1	-	Two semi-circular anomalies lying side-by-side.	
70150	Seafloor disturbance	492070	5851830	A2	13.5	12.3	0.2	-	Discrete oval shaped area containing at least three sub-circular dark reflectors, one with height which is measured here. Possibly piece of debris and could indicate further buried debris. Area has harder sediments also compared to surrounding area.	



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70151	Magnetic	503852	5851811	A2	-	-	-	8	Distinct dipolar anomaly in broader area of positive anomalies, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70152	Magnetic	492847	5851804	A2	-	-	-	28	Asymmetric dipole, also present on adjacent line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70153	Dark reflector	500184	5851664	A2	2	0.6	0.2	-	Short thick linear, possibly piece of debris.	
70154	Magnetic	497146	5851631	A2	-	-	-	127	Medium positive monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70155	Dark reflector	500003	5851455	A2	4	0.4	0.1	-	Strong linear anomaly.	
70156	Magnetic	503436	5851329	A2	-	-	-	14	Distinct dipolar anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70157	Magnetic	493040	5851206	A2	-	-	-	12	Asymmetric dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70158	Dark reflector	490770	5851202	A2	2.2	0.2	0.1	-	Small, oblong anomaly, isolated.	
70159	Magnetic	492545	5851167	A2	-	-	-	48	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70160	Rope/chain	502675	5851160	A2	41.2	0.4	0	-	Intermittent linear dark reflector, possibly buried cable or seabed scarring.	
70161	Dark reflector	495776	5851121	A2	2.5	0.3	0	-	Short, narrow linear anomaly.	
70162	Magnetic	502739	5851034	A2	-	-	-	16	Negative monopolar anomaly, stonger than other similar anomalies along survey line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70163	Dark reflector	493434	5851023	A2	3.3	0.6	0	-	Curvilinear anomaly, appears partially buried, at edge of range.	
70164	Magnetic	485548	5850999	A2	-	-	-	34	Two anomalies approximately 35m apart, asymmetric dipolar anomaly and small sized dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70165	Rope/chain	502997	5850944	A2	94.2	0.6	0	-	Intermittent curvilinear dark reflectors in a curvilinear orientation, possibly buried cable or rope/chain or possibly seabed scarring.	
70166	Seafloor disturbance	499790	5850889	A2	6.4	2.4	0.5	-	Irregular shaped anomaly, possibly piece of debris lying at crest of a sand ripple.	
70167	Dark reflector	499228	5850858	A2	3.7	1.2	0.3	-	Pear drop shaped anomaly with shadow only in the curved part of the anomaly, possibly piece of debris.	



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70168	Seafloor disturbance	501684	5850769	A2	13.7	13.3	0.2	-	Discrete area containing numerous small circular and short linear dark reflectors, possibly debris but badly degraded and broken up, no structure visible to identify definitely as wreck but possible.	
70169	Magnetic	487356	5850767	A2	-	-	-	40	Narrow and distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70170	Dark reflector	492800	5850749	A2	6.2	0.3	0	-	Linear anomaly at different orientation to direction of sand ripples in the area.	
70171	Dark reflector	488448	5850728	A2	1.9	0.5	0	-	Two small circular anomalies lying adjacent to each other.	
70172	Seafloor disturbance	492382	5850684	A2	33.3	20.8	0.2	-	Discrete area in sand ripples containing several circular and curvilinear dark reflectors some with height. Three are possibly in linear orientation. Could indicate buried debris.	
70173	Dark reflector	486313	5850680	A2	3.8	0.3	0.3	-	Narrow, short curvilinear anomaly with uneven height.	
70174	Dark reflector	492696	5850661	A2	3.2	0.6	0	-	Short linear anomaly, possibly partially buried and located approximately 35m to the north-east of debris field anomaly <b>70176</b> and possibly further associated debris.	
70175	Seafloor disturbance	497297	5850658	A2	27.8	7.3	0	-	Irregular shaped anomaly that has numerous dark reflectors mostly circular in shape. Possibly object partially or nearly wholly buried.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70176	Debris field	492663	5850640	A2	16.6	12.4	0	-	Irregular shaped discrete area containing several small circular and curvilinear dark reflectors which could be debris on the seabed.	
70177	Dark reflector	492580	5850624	A2	2.2	0.7	0.2	-	Sub-oval shaped anomaly with one part of it exhibiting height.	
70178	Magnetic	504025	5850596	A2	-	-	-	25	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70179	Magnetic	492356	5850591	A2	-	-	-	20	Irregular shaped anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70180	Dark reflector	485248	5850585	A2	1.1	0.6	0.2	-	Small approximately circular anomaly, isolated.	
70181	Bright reflector	487994	5850520	A2	5.3	2.9	0	-	Rectangular anomaly, possibly piece of debris of material such as plastic or rubber or wood.	
70182	Dark reflector	497488	5850430	A2	2.2	0.7	0.1	-	Approximately triangular shaped anomaly partially buried in sediment possibly piece of debris.	
70183	Magnetic	500734	5850366	A2	-	-	-	46	Distinct dipolar anomaly, in an area of sand ripples but anomalies responding to those are weaker and follow curvilinear pattern. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70184	Rope/chain	492374	5850291	A2	40.6	0.4	0	-	Intermittent linear dark reflector possibly buried rope/chain or larger object such as cable.	
70185	Dark reflector	487927	5850289	A2	3.5	0.7	0.4	-	Approximately square-shaped anomaly, possibly piece of debris.	
70186	Magnetic	502340	5850183	A2	-	-	-	20	Dipolar anomaly, stronger than other dipolar anomalies along survey line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70187	Debris	492357	5850168	A2	13	0.4	0	65	Two thick curvilinear anomalies approximately 13m apart. The slightly larger one is 4.4m and the smaller one is 3.7m. A medium magnetic anomaly is associated, indicating ferrous content.	
70188	Debris	492166	5850155	A2	12.8	8.5	0	20	Three curvilinear anomalies in a discrete area possibly all part of same object as it looks like the curvilinears disappear into and out of the sediment and therefore partially buried. Approximately 30m to the east is a weak almost triangular dark reflector 3m x 0.7m possibly associated. Magnetic contact therefore possibly debris is ferrous.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70189	Seafloor disturbance	484208	5850135	A2	22.8	8.6	0.8	-	Boomerang shaped dark reflector perpendicular to direction of sand ripples, possibly buried object with height. Second associated narrow linear off one area, full extent unknown as partially buried in sediment, no obvious structure to indicate a wreck but large object nonetheless with scour measuring 7.3m x 5.4m x 1.5m.	
70190	Dark reflector	491059	5850095	A2	3.3	0.4	0	-	Short, weak linear anomaly.	
70191	Debris field	502303	5850080	A2	14.6	2.8	0	-	Discrete area containing at least two objects, weak curvilinear dark reflector 4m x 2.5m and ring shaped dark reflector nearby 1.7m wide, possible further tiny circular dark reflectors are also debris.	
70192	Dark reflector	502705	5850057	A2	0.9	0.7	0.2	-	Approximately circular anomaly in area of sand ripples.	
70193	Magnetic	503738	5849999	A2	-	-	-	7	Asymmetrical dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70194	Dark reflector	487788	5849932	A2	5.1	3.1	0.4	-	Approximately rectangular anomaly, possibly with narrow linear coming off one side, appears nearly wholly buried with slight scour.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70195	Magnetic	483957	5849862	A2	-	-	-	39	Irregular dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location. Two other anomalies are aligned with <b>70195</b> in a linear orientation - <b>70196</b> and <b>70198</b> - they are possibly associated with each other.	
70196	Magnetic	483954	5849778	A2	-	-	-	37	Irregular dipole, at the same location as previously identified zoning anomaly. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location. Two other anomalies are aligned with <b>70196</b> in a linear orientation - <b>70195</b> and <b>70198</b> - they are possibly associated with each other.	
70197	Magnetic	498232	5849755	A2	-	-	-	24	Two adjacent anomalies, a small dipole of 12nT in noisy data and a larger irregular shaped dipole of 24nT. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70198	Magnetic	483954	5849715	A2	-	-	-	34	Irregular dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location. Two other anomalies are aligned with <b>70198</b> in a linear orientation - <b>70195</b> and <b>70196</b> - they are possibly associated with each other.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70199	Dark reflector	490320	5849691	A2	18.5	1.8	0	-	Diffuse linear anomaly measuring 18.5m x 1.8m and is located approximately 60m to the north-east of debris field anomaly <b>70202</b> , possibly associated with it.	
70200	Magnetic	502043	5849688	A2	-	-	-	10	Dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70201	Magnetic	486621	5849687	A2	-	-	-	28	Small sized asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70202	Debris field	490377	5849670	A2	25	12	0.8	-	Irregular shaped discrete area partially visible in the bathy as an elongated mound overlying sand ripples. Area contains one major curvilinear and several narrow curvilinear dark reflectors but with no obvious structure. Possibly associated is anomaly <b>70199</b> approximately 60m to the north-west.	
70203	Seafloor disturbance	487053	5849457	A2	16	5.8	0.5	-	Discrete area containing at least three curvilinear regular spaced dark reflectors with scour coming off each one. No obvious structure therefore not classified as debris or wreck.	
70204	Dark reflector	495916	5849456	A2	4.1	2.2	0	-	Rectilinear anomaly, weak and intermittent, partially buried, possibly piece of debris.	
70205	Dark reflector	491997	5849437	A2	2.8	1.6	0.2	-	Triangular anomaly in area of sand ripples, possibly piece of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70206	Magnetic	484545	5849367	A2	-	-	-	31	Distinct wide dipole anomaly in noisy area, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70207	Magnetic	490544	5849349	A2	-	-	-	37	Narrow small sized positive monopole in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70208	Magnetic	493932	5849341	A2	-	-	-	46	Irregular and wide dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70209	Magnetic	484632	5849196	A2	-	-	-	41	Distinct small sized dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70210	Seafloor disturbance	487018	5849159	A2	24.7	4.3	0.2	13	Curvilinear diffuse dark reflector, height is a minimum as object at edge of range and data is of average quality, weather noise visible and it appears partially buried. Anomaly has scour and is in an area of slightly raised seabed. Thin and distinctive small negative monopole anomaly indicates possibility of ferrous material.	
70211	Dark reflector	493073	5849147	A2	3.4	0.2	0.1	-	Short thick linear anomaly, possibly piece of debris lying on seabed.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70212	Dark reflector	486171	5849025	A2	10.3	4.9	0	-	Curvilinear dark reflector with further rectangular 'frame' shaped dark reflector attached, possibly piece of debris.	
70213	Dark reflector	492690	5849012	A2	3.3	0.3	0.1	-	Narrow weak linear.	
70214	Dark reflector	496592	5849011	A2	1.5	0.4	0	-	Narrow strong linear, possibly piece of debris lying on seabed.	
70215	Dark reflector	491266	5848989	A2	5.3	0.4	0	-	Short intermittent linear anomaly.	
70216	Magnetic	503341	5848973	A2	-	-	-	45	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70217	Magnetic	496019	5848907	A2	-	-	-	10	Asymmetric distinct dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70218	Dark reflector	503180	5848758	A2	2.5	0.4	0.1	-	Thick short linear with height only at one end.	
70219	Magnetic	501631	5848736	A2	-	-	-	25	Positive narrow peaked monopolar anomaly, possibly associated with anomalies <b>70220</b> and <b>70221</b> making up part of a larger feature. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70220	Magnetic	501532	5848734	A2	-	-	-	23	Negative monopolar anomaly, possibly associated with anomalies <b>70219</b> and <b>70221</b> making up part of a larger feature. Possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70221	Dark reflector	501464	5848700	A2	6.8	0.4	0	-	S-shaped anomaly, possibly length of rope or chain, possibly associated with anomalies 70219 and 70220 making up part of a larger feature.	
70222	Magnetic	502144	5848683	A2	-	-	-	15	Dipolar anomaly, stronger than other similar anomalies on survey line. possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70223	Dark reflector	491994	5848582	A2	25.3	0.4	0	-	Three narrow, short intermittent linears measuring between 1.6 to 2.5m in length and 0.3 to 0.4m in width. Only one has height. Possibly linear feature such as a cable but not magnetic contacts associated	
70224	Dark reflector	500986	5848577	A2	4.2	0.3	0	-	Short curvilinear anomaly in area of sand ripples, possibly partially buried.	
70225	Dark reflector	500956	5848554	A2	4.6	0.5	0	-	Narrow linear anomaly, slightly fatter at one end, possibly second tiny linear nearby.	
70226	Magnetic	500832	5848536	A2	-	-	-	19	Positive monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70227	Dark reflector	486970	5848523	A2	3.6	0.5	0.3	-	Sub-rectangular anomaly in area of sand ripples, possibly partially buried piece of debris.	
70228	Magnetic	500734	5848497	A2	-	-	-	34	Negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70229	Magnetic	484020	5848428	A2	-	-	-	29	Small sized positive monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70230	Debris	502521	5848325	A2	4.3	3.6	0	6	One linear and one curvilinear anomaly side by side with weak magnetic contact suggesting presence of ferrous material.	
70231	Magnetic	498816	5848245	A2	-	-	-	42	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70232	Magnetic	488544	5848226	A2	-	-	-	58	Asymmetric dipole, very distinctive, could be part of linear alignment, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70233	Magnetic	498628	5848225	A2	-	-	-	28	Small sized negative monopole, possibly sandwave but distinct against other anomalies in the area, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70234	Magnetic	501630	5848215	A2	-	-	-	10	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70235	Dark reflector	502685	5848184	A2	6.4	0.4	0	-	Curvilinear anomaly with one end disappearing into sediment and very weak, possibly piece of partially buried debris.	
70236	Dark reflector	494187	5848166	A2	3.3	0.3	0.1	-	Narrow linear with uneven height.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70237	Magnetic	496948	5848156	A2	-	-	-	17	Very distinct, thin symmetric dipole, isolated on one line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70238	Magnetic	498933	5848154	A2	-	-	-	15	Negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70239	Dark reflector	484465	5848117	A2	3.3	0.7	0	-	Small rectangular anomaly, in area of sand ripples, is located on the route of a cable but has been kept as it is in a different orientation from the cable anomalies.	
70240	Dark reflector	495887	5848117	A2	3.9	0.3	0.3	-	Narrow linear with large rounded shadow.	
70241	Magnetic	488544	5848052	A2	-	-	-	71	Asymmetric dipole, very distinctive, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70242	Magnetic	484614	5848037	A2	-	-	-	38	Distinct small sized negative monopole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70243	Magnetic	497745	5848014	A2	-	-	-	49	Irregular shaped dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70244	Dark reflector	490292	5848011	A2	6.3	0.5	0	-	Narrow linear lying across sediment.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70245	Magnetic	490739	5847970	A2	-	-	-	11	Small asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70246	Dark reflector	489010	5847966	A2	1.5	0.6	0.3	-	Sub-oval shaped small anomaly.	
70247	Dark reflector	492329	5847948	A2	2.2	1.4	0.4	-	Diffuse curvilinear anomaly with several tiny circular anomalies around it.	
70248	Dark reflector	496496	5847899	A2	1.6	1.1	0.3	-	Sub-oval shaped anomaly with slight scour which is possibly a boulder in a depression but due to its locations approximately 60m north-east of wreck <b>70255</b> it is potentially inferred as debris.	
70249	Dark reflector	487436	5847874	A2	9.5	3.2	0.1	-	Irregular complex looking anomaly with slight height, possibly piece of debris but there is a possibility that the feature is natural.	
70250	Debris field	496455	5847872	A2	23.3	4.2	0.2	-	At least 5 smaller approximately circular dark reflectors in a discrete area ranging from 0.5m to 2.5m in size and lying approximately 120m from the main wreck area of <b>70255</b> .	
70251	Dark reflector	484970	5847866	A2	8.8	6.1	1.2	-	Oval shaped anomaly with weaker, more diffuse irregular shaped area coming off one side. In area of sand ripples. Rectangular 'frame' shaped anomaly with scour obscuring part of the object, in area of sand ripples and appears partially buried, true extent therefore unknown.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70252	Magnetic	494540	5847865	A2	-	-	-	11	Small negative monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70253	Debris	496470	5847849	A2	1.5	0.4	0.1	-	Small thick linear dark reflector, possibly associated debris from wreck anomaly <b>70255</b> .	
70254	Dark reflector	489981	5847837	A2	12	0.2	0.1	-	Two short, narrow linears one 3m x 0.2m x 0.1m and the second 2.2m x 0.2m x 0.1m.	





WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70256	Magnetic	487809	5847825	A2	-	-	-	39	Small sized negative monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70257	Magnetic	500622	5847810	A2	-	-	-	18	Distinct dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70258	Dark reflector	495584	5847766	A2	3.8	1.5	0	-	Possibly anthropogenic origin, small oval shaped anomaly at intersection of two orientations of sand ripples. Diffuse and difficult to distinguish shape.	
70259	Rope/chain	490067	5847758	A2	57.2	2.8	0	-	Series of several curvilinear or linear small dark reflectors in a linear orientation. Possibly buried cable causing seafloor disturbance.	
70260	Magnetic	486351	5847758	A2	-	-	-	18	Small asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70261	Debris	489869	5847738	A2	3.8	0.5	0.1	14	Pointed, sub-oval shaped anomaly with small negative monopole anomaly, possibly piece of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70262	Wreck	498353	5847680	A1	33.0	8.0	1.7	153	<p>Discrete area containing several curvilinear and rectilinear dark reflectors 33m x 8m x 1.7m and showing structure of a wreck lying on its side, partially buried in sediment going from sand ripples to coarser sediment. Further small anomalies nearby are debris. Several parallel linear dark reflectors and areas of numerous tiny circular dark reflectors showing nearly wholly buried structure of a wreck, upright, looks like deck structure. Three pieces of potential wreck debris to east and south-east of wreck. Debris ranges in size from 1m x 0.5m x 0.2m to 2.6m x 1.2m and are either oval shaped or square-shaped dark reflectors. Strongest associated magnetic contact at location of wreck is a large negative monopole anomaly. An unknown wreck, first detected in 1994. Survey data indicates that the wreck is small and present in its entirety lying NW/SE, although it is broken up, it measures 30m x 5m x 0.6m. A magnetic anomaly associated with the wreck was also observed. The surveyed position of this wreck is regarded as having an accuracy of 13m.</p>	11214 (UKHO)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70263	Debris	498368	5847678	A2	1.1	0.6	0.2	-	Small approximately oval shaped dark reflector near wreck <b>70262</b> and possibly associated debris.	
70264	Dark reflector	486628	5847669	A2	6.3	1.1	0.3	-	Weak intermittent linear with four separate triangular shadows with overall scour.	
70265	Debris	498385	5847642	A2	2.6	1.2	0	-	Approximately oval shaped dark reflector in vicinity of wreck <b>70262</b> and possibly associated. Looks partially buried.	
70266	Debris	498770	5847617	A2	13.8	1.1	0.2	-	Diffuse approximately oval shape with second short narrow linear adjacent and a narrow curvilinear attached, possibly partially buried debris as several anomalies visible in a discrete area.	
70267	Dark reflector	491777	5847612	A2	2.9	0.5	0.2	-	Short bar-shaped anomaly with only a narrow linear shadow at one point, not along full length.	
70268	Dark reflector	498171	5847533	A2	40	3.5	0.2	-	Discrete elongated area containing four anomalies either rectangular in shape or approximately triangular ranging in size from 4.5m x 3.5m x 0.2m to 1.8m x 0.8m x 0.1m. They are all possible associated forming a roughly linear orientation from north to south.	
70269	Magnetic	498416	5847500	A2	-	-	-	9	Thin negative small monopole anomaly in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70270	Magnetic	501416	5847500	A2	-	-	-	22	Negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70271	Dark reflector	501684	5847486	A2	7.2	0.9	0.1	-	Rectilinear, intermittent anomaly, appears partially buried, possibly piece of debris.	
70272	Magnetic	498218	5847447	A2	-	-	-	25	Asymmetric irregular shaped dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70273	Debris	485872	5847427	A2	16.3	5.2	0.2	-	Discrete area on crest of sand ripple containing two curvilinear dark reflectors adjacent to each other with possibly further circular dark reflectors nearby. Possibly further anomalies buried.	
70274	Magnetic	489530	5847358	A2	-	-	-	39	Asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70275	Magnetic	493723	5847351	A2	-	-	-	47	Asymmetric dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70276	Magnetic	501005	5847336	A2	-	-	-	16	Dipolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70277	Dark reflector	497835	5847280	A2	1.7	0.7	0.1	-	Small sub-oval shaped anomaly, appears partially buried.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70278	Magnetic	485925	5847252	A2	-	-	-	45	Irregular shaped dipole of 23nT and irregular shaped negative monopole of 45nT, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70279	Magnetic	496524	5847248	A2	-	-	-	25	Small sized distinct dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70280	Magnetic	501124	5847245	A2	-	-	-	33	Negative monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70281	Magnetic	489740	5847210	A2	-	-	-	24	Distinct small sized dipole in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70282	Debris field	484776	5847154	A2	4.7	2.9	0.1	-	Narrow curvilinear, further three very small similar anomalies in immediate vicinity, possibly associated and making up a group of debris.	
70283	Magnetic	483815	5847110	A2	-	-	-	38	Small sized possible monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70284	Dark reflector	491558	5847076	A2	1.3	0.7	0.1	-	Two small circular anomalies grouped together, only one has height.	
70285	Bright reflector	486522	5847068	A2	2.8	0.9	0	-	Sub-rectangular anomaly with scour, possibly piece of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70286	Dark reflector	495677	5847039	A2	3.4	1.3	0	-	Adjacent small triangular anomalies, partially buried and possibly a piece of debris.	
70287	Magnetic	500212	5846982	A2	-	-	-	29	Negative narrow monopolar anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70288	Dark reflector	489235	5846982	A2	4.2	0.8	0	-	Pointed oval shaped anomaly.	
70289	Dark reflector	495462	5846968	A2	2.5	0.2	0	-	Short narrow linear, in area of sand ribbons.	
70290	Rope/chain	496587	5846868	A2	130	0.9	0.1	-	Intermittent linear bright reflector, possibly seabed scar or buried cable.	
70291	Magnetic	489929	5846868	A2	-	-	-	67	Medium negative monopole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70292	Debris	489362	5846856	A2	1.3	0.6	0.5	-	Circular anomaly but with narrow thin, linear, shadow.	
70293	Dark reflector	487569	5846833	A2	1.5	0.4	0.3	-	Circular anomaly with straight edged shadow it is possible debris but could be a boulder	
70294	Dark reflector	493264	5846790	A2	1.6	0.6	0	-	Small pointed oval shaped anomaly, appears partially buried in sediment.	
70295	Magnetic	495940	5846725	A2	-	-	-	12	Small but distinct dipole, could be natural or possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70296	Dark reflector	491990	5846614	A2	2.8	0.4	0	-	Narrow rectangular, nearly T-shaped anomaly at edge of range.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70297	Dark reflector	492952	5846516	A2	5.8	3.8	0.6	-	Small sub-oval area of dark reflection and which appears to be partially buried. Possible small shallow areas of scour off either side of object, possibly piece of debris.	
70298	Dark reflector	492651	5846464	A2	2.7	1	0.2	-	Irregular looking oval shaped anomaly, area contains at least three connecting curvilinear dark reflectors, possibly buried object.	
70299	Dark reflector	484679	5846411	A2	2.4	2.2	0.3	-	Square shaped anomaly in area of sand ripples, possibly piece of debris.	
70300	Dark reflector	488859	5846389	A2	6.3	0.6	0.1	-	Strong narrow linear anomaly possibly with weak curvilinear anomaly attached, lying on sediment, possibly piece of debris.	
70301	Dark reflector	486924	5846351	A2	6.8	0.2	0.7	-	Weak narrow linear anomaly in a depression.	
70302	Magnetic	495213	5846302	A2	-	-	-	37	Small sized negative monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70303	Seafloor disturbance	486469	5846205	A2	65	11.5	1.1	-	Discrete area measuring 40m x 11.5m x 1m consisting of one larger pointed oval shaped dark reflector with irregular shadow. Main anomaly is surrounded by intermittent curvilinears in no regular order and showing no obvious structure. Appears partially buried with at least one further piece of associated debris 45m to the south-east of the main area in the form of a linear anomaly measuring 6m x 1m x 0.1m. Scour extending immediately north for a distance of up to 50m. Classified as seafloor disturbance as there is no structure visible to confirm it is a wreck.	
70304	Magnetic	488007	5846204	A2	-	-	-	38	Small sized negative monopole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70305	Debris	488363	5846158	A2	5.3	4.3	0.7	-	Approximately rectangular frame-shaped anomaly with further linear and circular dark reflector adjacent.	
70306	Magnetic	488523	5846103	A2	-	-	-	22	Small and distinct asymmetric dipole, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70307	Dark reflector	487339	5846089	A2	4.4	2.9	0	-	Sub-rectangular, diffuse anomaly, appears partially buried in area of sand ripples.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70308	Magnetic	493406	5846085	A2	-	-	-	11	Distinct small dipole in area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70309	Magnetic	491314	5846074	A2	-	-	-	16	Thin asymmetric dipole in a area of noise, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70310	Dark reflector	484577	5846055	A2	19.6	4.3	0.9	-	Elongated depression cutting across sand ripples measuring 10.5m x 7.4m x 0.7m which is a thick bar shaped structure, with narrow linear protruding off shorter end which increases the dimensions of the overall anomaly. Appears partially buried in sediment therefore dimensions are a minimum.	
70311	Magnetic	484815	5845871	A2	-	-	-	100	Medium and distinct thin dipole anomaly on one line, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70312	Debris	485572	5845620	A2	15.5	12.5	0.4	-	Irregular shaped discrete area containing a complex anomaly of numerous dark reflectors that suggest structure but weak contrast. Looks broken up and damaged but partially buried so difficult to see full condition. Partially buried therefore true extent unknown. It is situated in trend of high magnetic anomalies and therefore the presence of magnetic material cannot be ruled out.	
70313	Dark reflector	488229	5845487	A2	3.5	2.2	0.2	-	Irregular shaped complex looking anomaly.	
70314	Magnetic	484316	5845272	A2	-	-	-	90	Irregular shaped dipole anomaly in noisy area but large magnetic value compared to other anomalies in the area, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70315	Magnetic	486921	5845260	A2	-	-	-	68	Distinct dipole anomaly, possibly buried ferrous object as there is no sidescan sonar or bathymetry anomaly visible at this location.	
70316	Dark reflector	486968	5845181	A2	6.5	4.8	0.4	-	Oval shaped anomaly with second but weaker oval anomaly and a narrow curvilinear anomaly adjacent. Appears partially buried in area of sand ripples.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71480	Wreck	503572	5848770	A1	64	20	4.4	600	<p>Wreck of a submarine. Narrow elongated bathymetry anomaly oriented north-east to south-west and measuring 63.2 x 5.8 x 4.m and with an isolated scour to the north-east end.</p> <p>Prominent thick long dark reflector with numerous small linear, curvilinear and circular dark reflectors showing structure of wreck, intact, upright, heavily buried in sediment, disrupts sediment pattern in area with scour of approximately 160m extending to the north-east. Solid large linear dark reflectors showing bulk structure of wreck, possibly on side but looking intact, partially buried in sediment and debris seen scattered in vicinity, potentially more buried. Width of main wreck site is 6m but debris extending from wreck measures up to 20m. Possibly further debris to the south at a distance of approximately 40m from end of wreck shown by two magnetic anomalies</p>	79542 (UKHO)



## 12.7 Appendix VII: Seabed Anomalies of Archaeological Potential in NV West

Co-ordinates are in ETRS89 UTM Zone 31N.

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71296	Bright reflector	470936	5876930	A2	5.4	4.5	0	-	A large and slightly bulbous bright reflector object located within sandwaves, looks anomalous to the surrounding seabed.	
71297	Magnetic	470549	5875951	A1	-	-	-	953	Very large asymmetric dipole identified on more than one survey line. Indicative of possible substantial buried ferrous debris.	
71298	Debris	467660	5874419	A2	9.6	3.6	0.5	-	Large piece of debris, a distinct dark reflector with an irregular shape, has two short and thin curvilinear dark reflectors attached and a bright shadow, isolated on a sandy and even area of the seabed.	
71299	Magnetic	471001	5874207	A1	-	-	-	1450	Very large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris. Lies approximately 180m west of charted pipeline and not part of linear anomaly associated with it.	
71300	Dark reflector	467655	5873863	A2	4.4	0.7	0.2	-	Small straight object with a bright shadow on a different alignment to sandripples.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71301	Debris field	470711	5873567	A1	23.0	0.9	0.2	7022	Several distinct linear dark reflectors with height identified in an area of megaripples. Features appear to be in a line therefore possibly represent one, partially buried feature such as a possible wreck and, as such, have been grouped together as one. Length measurement represents length of entire feature. Largest individual dark reflector measures 7.6m. Feature has a very large associated magnetic anomaly, indicating ferrous material.	
71302	Magnetic	470559	5873521	A2	-	-	-	343	Large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71303	Dark reflector	467627	5873298	A2	8.1	0.9	0	-	A thick linear dark reflector with no shadow, may be geological.	
71304	Bright reflector	469341	5873168	A2	5.3	2.6	0	-	A linear and slightly right angled bright reflector, isolated and distinct feature, in a noisy area.	
71305	Debris	467374	5872945	A2	4.2	2.6	0.3	-	A medium sized piece of possible debris, very distinct square shaped dark reflector with a dull shadow and in a depression, located near sandwaves.	
71306	Magnetic	469173	5872781	A2	-	-	-	244	Large negative monopole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71307	Dark reflector	464983	5872669	A2	7.4	1.2	0.3	-	Poorly defined, irregular dark reflector with a shadow at either end. Image possibly distorted by movement of the sonar fish.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71308	Debris	471006	5872655	A2	3.2	1.7	0.1	-	A medium sized oval possible debris feature, distinct dark reflector with a very slight shadow located within sandwaves.	
71309	Dark reflector	471069	5872611	A2	6.5	0.5	0	-	A thick and distinct right angled linear dark reflector with no shadow but in a depression.	
71310	Magnetic	470829	5872335	A2	-	-	-	33	Small monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71311	Bright reflector	464688	5872253	A2	9.3	2.3	0	-	Slightly elongated, irregularly shaped, bright reflector. Other, smaller and less distinct bright reflectors possible nearby.	
71312	Bright reflector	464545	5872107	A2	3.8	3.3	0	-	Irregular bright reflector, possibly a shadow but with no discernible contact, close to dark reflector <b>71313</b> .	
71313	Dark reflector	464549	5872098	A2	7.9	1.3	0.6	-	Elongated dark reflector with a broad shadow. Identified in an area of megaripples, 8m from bright reflector <b>71312</b> .	
71314	Magnetic	471077	5871919	A1	-	-	-	896	Large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71315	Magnetic	470861	5871493	A2	-	-	-	135	Medium anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
71316	Magnetic	470505	5871285	A2	-	-	-	269	Large dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71317	Dark reflector	466117	5871188	A2	6.1	4.8	0.6	-	Poorly defined dark reflector with a slight shadow identified in an area of megaripples.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71318	Dark reflector	466214	5871180	A2	11.1	6.0	0	-	Distinct dark reflector, with a bright reflector at the front section, identified on the crest of a sandwave. Possibly a natural feature however looks quite distinct.	
71319	Dark reflector	466065	5871119	A2	4.7	0.8	0.2	-	Straight dark reflector identified in an area of megaripples. Feature has a slight shadow.	
71320	Dark reflector	464647	5871067	A2	5.5	2.0	0	-	Small, elongated dark reflector identified in an area of megaripples. Feature possibly has a slight shadow. May be a natural feature.	
71321	Dark reflector	464666	5871039	A2	6.9	1.8	0.2	-	Small, elongated dark reflector identified in an area of megaripples. Feature possibly has a slight shadow. May be a natural feature.	
71322	Magnetic	470425	5871023	A2	-	-	-	230	Large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris. Located 327 north-west of wreck <b>71334</b> .	
71323	Magnetic	471157	5871003	A1	-	-	-	1320	Very large positive monopole only identified on one survey line. Indicative of possible substantial buried ferrous debris. Located 450m north-east of wreck <b>71334</b> .	
71324	Seafloor disturbance	466673	5870988	A2	14.6	10.3	0.5	-	Patch of seafloor disturbance. Comprised of irregularly shaped dark reflectors, some with slight height. One particularly distinct feature in its centre, measuring 4.9 x 0.9m, with a height of 0.5m. Some bright reflectors identified. Possible linear extending across the sandwaves. Observed in the MBES data as an indistinct rounded mound with a slight surrounding build-up (16 x 14 x 0.7m).	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71325	Magnetic	470932	5870985	A1	-	-	-	1127	Very large dipolar anomaly only identified on one survey line. Indicative of possible substantial buried ferrous debris. Located 245m north-east of wreck 71334.	
71326	Magnetic	470807	5870969	A2	-	-	-	92	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris. Located 105m north-east of wreck 71334.	
71327	Dark reflector	463349	5870964	A2	6.4	0.6	0.5	-	Thin rounded edge of an object with corresponding bright shadow.	
71328	Magnetic	470473	5870947	A2	-	-	-	113	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris. Located 255m north-west of wreck 71334.	
71329	Bright reflector	464869	5870908	A2	4.2	1.9	0	-	Small, irregular bright reflector identified in an area of megaripples. Possibly a natural feature however looks quite distinct.	
71330	Magnetic	465967	5870899	A2	-	-	-	67	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71331	Dark reflector	463715	5870879	A2	2.9	0.6	0.2	-	A linear dark reflector, slightly tapered in the centre and with a bright shadow, located on an uneven sandwave rich area of the seabed.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71332	Debris	470686	5870865	A1	4.6	1.8	0.3	-	A long and thick curvilinear dark reflector with a bright shadow, likely debris and possibly related to nearby wreckage. Feature may be ferrous but any magnetic anomaly here is likely to be masked by the very large anomaly associated with the main area of wreckage <b>71334</b> .	
71333	Debris	470763	5870863	A1	5.3	0.4	0.1	-	A long, thin and distinct dark reflector with a dull shadow, located at the edge of the range and may be slightly stretched. Possibly part of the wreckage <b>71334</b> however, due to the quality of the data it is difficult to discern whether this is the case.	
71334	Wreck	470730	5870846	A1	54.0	41.2	0.6	5974	Large spread of debris comprising mainly linear and curvilinear thin dark reflectors with height, longest is 12m, could be highly broken up or partially buried wreckage. Identified as a very large magnetic anomaly on the magnetometer data, indicating a substantial quantity of ferrous material. Magnetic anomaly is noisy and widely spaced, possible slight positioning error between lines of data, or possible indication of buried material extending beyond the boundaries identified on the sonar data. Identified by UKHO as a non-dangerous wreck, well buried, almost flush with the seabed. Observed in MBES data as irregular mound within an area of sandwaves aligned north-east to south-west, measuring 28 x 18m.	11190 (UKHO)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71335	Magnetic	470880	5870838	A2	-	-	-	175	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris. Located 135m east from wreck <b>71334</b> .	
71336	Debris	470736	5870812	A1	3.6	0.2	0.2	-	A long and very thin discreet dark reflector. Feature has a slight shadow and is located in sandwaves, possibly debris related to wreck <b>71334</b> (35m to the north).	
71337	Dark reflector	465168	5870750	A2	7.0	0.8	0	-	Slightly curved dark reflector identified in an area of megaripples. No discernible height. Possibly natural however looks a little more distinct.	
71338	Magnetic	470732	5870708	A2	-	-	-	92	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris. Located 120m east of wreck <b>71334</b> .	
71339	Bright reflector	466335	5870354	A2	8.2	2.2	0	-	Series of three, slightly oval bright reflectors in a row. Image possibly distorted by movement of the sonar fish.	
71340	Magnetic	471050	5869966	A2	-	-	-	57	Medium dipole anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
71341	Dark reflector	464209	5869963	A2	3.0	1.2	0.1	-	A distinct rectangular shaped dark reflector with a bright but short shadow.	
71342	Dark reflector	469214	5869852	A2	4.0	2.3	0	-	A medium sized very distinctive rounded dark reflector with no shadow located within sandwaves.	
71343	Dark reflector	464015	5869754	A2	8.1	0.9	0.6	-	A long, thin and curvilinear dark reflector with a large and bright shadow, located in sandwaves and possibly related to nearby dark reflector feature <b>71344</b> .	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71344	Dark reflector	464025	5869733	A2	5.1	1.4	0.4	-	A slightly jagged dark reflector with a shadow, located within sandwaves. The full extent may be covered. Possibly related to nearby dark reflector feature 71343.	
71345	Dark reflector	461224	5869547	A2	6.6	1.0	0.2	-	Small thin object with bright shadow, distorted at one end.	
71346	Dark reflector	462783	5869346	A2	2.7	0.5	0.1	-	A long and thin linear dark reflector with a short shadow, indistinct anomaly.	
71347	Bright reflector	463783	5869207	A2	9.6	4.0	0	-	A large bright reflector anomaly, looks anthropogenic with a fanned profile shape, located within sandwaves.	
71348	Magnetic	463241	5868689	A2	-	-	-	51	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71349	Bright reflector	467825	5868655	A2	9.2	1.7	0	-	Slightly rectangular bright reflector identified in an area of megaripples. Possibly part of a natural formation however looks relatively distinct.	
71350	Magnetic	460521	5868531	A2	-	-	-	620	Large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71351	Dark reflector	459422	5868511	A2	2.7	0.3	0.3	-	An indistinct but long and thin dark reflector with a short but bright shadow, may be associated with nearby dark reflector 71352 and debris field 71353.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71352	Debris	459417	5868507	A2	4.3	3.0	0	84	An indistinct dark reflector that may be associated or part of debris field on opposite channel <b>71353</b> . An irregular shaped feature that may be buried and with no obvious shadow. Identified approximately 10m east south-east of a magnetic anomaly measuring 8nT, however difficult to discern which feature, if any, it is associated to.	
71353	Debris field	459393	5868497	A2	25.2	12.3	0.3	84	Possible debris field, with several small dark reflectors with height, identified on two lines. One large piece of debris, a rounded dark reflector with indistinct curvilinear dark reflectors surrounding it, or possibly partially buried pieces, object has some shadow visible, possibly some associated debris on other channel ( <b>71352</b> ). Identified approximately 10m south-west of a magnetic anomaly measuring 8nT, however difficult to discern which feature, if any, it is associated with.	
71354	Dark reflector	469281	5868494	A2	7.8	2.5	0.6	-	Poorly defined dark reflector, not particularly distinct, with a broad shadow. Identified in an area of megaripples. Possibly a natural feature.	
71355	Dark reflector	464179	5868285	A2	10.3	6.3	0.2	-	Large dark reflector that appears broken up or partially buried by sands. The feature has a thick and distinct curvilinear edge and smaller dark reflectors within and bright shadows, has some possible scouring orientated east and measuring 6m.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71356	Magnetic	470801	5868241	A2	-	-	-	586	Large negative monopole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71357	Dark reflector	466335	5868205	A2	8.9	5.5	0	-	Slightly oval dark reflector with a brighter reflector in the centre. Identified in an area of megaripples, possibly a natural feature.	
71358	Bright reflector	464400	5868104	A2	5.3	4.4	0	-	A distinct bulbous bright reflector with a slight dark reflector outline and a possible bright reflector linear object attached, located within sandwaves.	
71359	Magnetic	466645	5867823	A2	-	-	-	122	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71360	Dark reflector	469581	5867798	A2	4.3	3.1	0.3	-	Poorly defined dark reflector, possibly with a slight shadow. Some possible disturbance to surrounding sediment. Possibly a natural feature however looks a little anomalous.	
71361	Debris field	465600	5867662	A2	40.8	15.3	0.6	-	A large area of partially buried debris features, a structural looking crossed linear dark reflector is visible in parts with bright shadows and smaller possible associated debris in the sands surrounding the feature. Not visible in the bathymetry data.	
71362	Debris	465576	5867598	A2	20.1	0.9	0.2	-	A very long and thin slightly curvilinear shaped dark reflector with a bright, short shadow, located in sandwaves and may be partially buried debris.	
71363	Bright reflector	468278	5867476	A2	12.3	6.0	0	-	Elongated bright reflector, appears to be an 'x' shape. Not particularly distinct.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71364	Dark reflector	467225	5867314	A2	5.8	0.8	0.4	-	Elongated dark reflector with slight height. Not particularly distinct. Identified in an area of megaripples, possibly a natural feature.	
71365	Dark reflector	459025	5867120	A2	3.0	0.7	0.4	-	A distinct crescent shaped dark reflector with a bright shadow, located within sandwaves, isolated feature.	
71366	Dark reflector	468502	5867011	A2	5.0	2.8	0.6	-	Poorly defined dark reflector with an irregular shadow. Feature identified towards the limit of the data therefore hard to discern.	
71367	Rope/chain	465416	5867008	A2	12.7	0.6	0.1	-	A partially buried or broken up thin linear dark reflector with a shadow located within sandwaves. Quite distinct possible rope or chain.	
71368	Dark reflector	469839	5866908	A2	7.7	1.6	0.6	-	Poorly defined, elongated dark reflector with a very slight shadow. Identified in an area of megaripples.	
71369	Dark reflector	464095	5866854	A2	4.5	0.7	0.1	-	A long and thick linear dark reflector with a short and bright shadow, distinct anomaly within large sandwaves.	
71370	Dark reflector	466587	5866795	A2	2.7	0.5	0.2	-	A distinct and slightly curvilinear dark reflector with a bright shadow, located within sandwaves.	
71371	Magnetic	469685	5866793	A2	-	-	-	218	Large positive monopole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71372	Dark reflector	470665	5866788	A2	5.8	1.2	0	-	A large and slightly oval shaped distinct dark reflector with no shadow, distinct anomaly within sandwaves.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71373	Seafloor disturbance	462025	5866580	A2	20.5	11.1	0	-	Small patch of disturbed seafloor comprised several dark reflectors. Not particularly distinct however looks a little anomalous. Observed in the MBES data as a small irregular mound within area of sandwaves (18 x 17 x 1.1m).	
71374	Debris	463190	5866253	A2	16.2	0.8	0	-	Straight, linear dark reflector identified in an area of megaripples. Not particularly distinct, possibly a natural feature however appears to be perpendicular to the natural orientation of the ripples.	
71375	Debris	457509	5866051	A2	7.4	1.6	0.2	-	An indistinct possible large piece of debris, a cross shaped dark reflector with shadows in parts, located on the edge of sandwaves.	
71376	Dark reflector	466574	5865877	A2	2.8	0.2	0.2	-	An indistinct linear dark reflector with a bright shadow, situated on a sandwave and may be partially buried.	
71377	Recorded Obstruction	467513	5865872	A3	-	-	-	-	UKHO have a record of an area of foul ground however nothing anthropogenic was identified on the geophysical data.	11236 (UKHO)
71378	Seafloor Disturbance	454526	5865807	A2	10.9	10.6	0	-	An anomalous area of small bright and dark reflectors. Has a rather speckled appearance. In area of rippled seabed.	
71379	Dark reflector	469084	5865720	A2	6.9	0.2	0.1	-	Straight, narrow dark reflector with a slight shadow. Not particularly distinct.	
71380	Dark reflector	462262	5865503	A2	6.9	2.6	0.6	-	Elongated, irregularly shaped dark reflector with a slight shadow. Possibly a natural feature or item of debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71381	Magnetic	456149	5865143	A2	-	-	-	62	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71382	Dark reflector	464999	5865023	A2	7.9	0.8	0.5	-	A long and thick linear dark reflector with a large and bright shadow, looks anthropogenic within large sandwaves.	
71383	Debris	462861	5864962	A2	4.1	3.2	2.2	-	Small oval patch of disturbed seafloor around a distinct, angular dark reflector with height in its centre (disturbed seabed measures 20.4 x 7.4m). UKHO describes feature as a low mound, possibly a wellhead however with no associated magnetic anomaly. Observed in the MBES data as a small sub-rounded object (7 x 6 x 1.7m) within a slight depression with some scour to the north-west. No charted wellheads or pipelines here.	11235 (UKHO)
71384	Dark reflector	467186	5864794	A2	5.2	0.2	0.1	-	A long and thin distinct linear dark reflector with a bright shadow located within sandwaves.	
71385	Dark reflector	458836	5864552	A2	4.7	2.8	0	-	A large, distinct and isolated rectangular shaped dark reflector with no shadow, looks anomalous to the surrounding seabed.	
71386	Dark reflector	456581	5864541	A2	7.7	1.7	0.6	-	Indistinct feature with a clear and bright shadow. Located on a rippled seabed.	
71387	Dark reflector	467740	5864536	A2	4.8	2.2	0	-	A large and distinct oval shaped dark reflector with no shadow, located on the edge of a sandwave. Isolated feature.	
71388	Magnetic	459359	5864415	A2	-	-	-	34	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71389	Dark reflector	459434	5864415	A2	2.3	0.5	0	-	A linear dark reflector with no shadow, located within sandwaves, isolated and distinct feature.	
71390	Dark reflector	462250	5863977	A2	11.3	0.7	0.2	-	A very long and thin linear dark reflector with a slight shadow visible, lying within sandwaves this looks anthropogenic rather than part of them.	
71391	Bright reflector	463556	5863945	A2	8.8	1.5	0	-	Elongated bright reflector identified in an area of megaripples. Possibly part of a natural feature however looks quite distinct.	
71392	Bright reflector	470190	5863857	A2	4.6	3.2	0	-	'L' shaped bright reflector, close to other, similar bright reflectors. Possibly part of a natural feature.	
71393	Dark reflector	463009	5863847	A2	13.9	0.8	0	-	Short, slightly bent linear dark reflector. No discernible height. Possibly natural however looks slightly more distinct.	
71394	Dark reflector	460449	5863844	A2	7.8	2.1	0.3	-	Three rounded small dark reflectors aligned with a shadow with a thick linear (5.2m length) dark reflector with no shadow attached to this.	
71395	Seafloor disturbance	458042	5863627	A2	17.6	4.1	0.9	-	A large feature with a very distinct and large area of shadows. The dark reflectors are vaguely visible as thin curvilinear features, there is a main piece with two linears coming off, one bright reflector and one thin dark reflector with a shadow.	
71396	Dark reflector	455890	5863588	A2	10.5	1.5	0.4	-	Elliptical object which appears across sand ripples. Some slight varying bright shadow.	
71397	Dark reflector	469886	5863181	A2	3.1	1.5	0.5	-	Small rounded dark reflector with a broad, irregular shadow. Feature is not particularly distinct.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71398	Rope/chain	470616	5862905	A2	44.4	0.7	0	-	Curvilinear dark reflector, with a bright reflector at the front in the central section. Feature not always particularly distinct. Possible rope or chain.	
71399	Magnetic	461333	5862863	A2	-	-	-	87	Distinct medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71400	Debris	466420	5862227	A2	10.1	2.4	0.4	-	A large possible piece of debris, a rounded and hollow dark reflector with a linear piece attached to this, has a bright reflector shadow and possibly in a depression. Located within sandwaves.	
71401	Magnetic	463131	5862213	A2	-	-	-	480	Large asymmetric dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
71402	Dark reflector	465775	5862092	A2	7.1	0.4	0.1	-	Small, slightly curved elongated dark reflector with a slight shadow.	
71403	Magnetic	463049	5862063	A2	-	-	-	44	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71404	Dark reflector	465137	5862030	A2	15.0	1.5	0.6	-	Slightly wavy linear dark reflector with a broad shadow. Identified in an area of megaripples.	
71405	Debris field	465303	5861937	A2	23.7	16.9	0.5	-	Small patch of possible debris features comprising several dark reflectors of different shapes with height. Identified in an area of megaripples.	
71406	Magnetic	462347	5861921	A2	-	-	-	58	Medium distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71407	Dark reflector	470782	5861681	A2	3.8	2.3	0.5	-	Poorly defined dark reflector with a relatively distinct, irregular shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71408	Dark reflector	469247	5861598	A2	5.8	2.8	0.5	-	An indistinct large dark reflector with a shadow in parts, appears broken up or partially buried by sands, appears to have a rounded dark reflector with smaller anomalies joined to this.	
71409	Seafloor disturbance	459980	5861546	A2	22.0	10.2	0.6	-	Discrete area of small dark reflectors of varying shapes with varying height shadows.	
71410	Dark reflector	456808	5861509	A2	4.2	0.3	0.1	-	Distinct linear object with height in area of irregular seabed.	
71411	Dark reflector	458062	5861390	A2	2.6	0.9	0.3	-	Rather indistinct feature with height and scour.	
71412	Debris field	462554	5861336	A2	22.2	9.8	0.5	26	Large spread of possible debris located within sandwaves, approximately 9 dark reflectors of various shapes and sizes, the largest measures 3.8 x 2m. The full extent of this debris may be buried by sands. Identified on the magnetic data as a small dipole indicating some ferrous material.	
71413	Dark reflector	470441	5861228	A2	4.7	1.0	0.2	-	Poorly defined straight, elongated dark reflector with a very faint shadow. Identified in an area of megaipples.	
71414	Dark reflector	459229	5860911	A2	31.2	0.8	0	-	A long, thin and slightly curvilinear dark reflector with no shadow. At far extent of data.	
71415	Magnetic	457611	5860895	A2	-	-	-	107	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71416	Seafloor disturbance	458624	5860621	A2	11.6	10.5	0.4	-	Sub-rounded area of dark and bright reflectors. Appears indistinct with corresponding rounded bright shadow.	
71417	Dark reflector	465118	5860542	A2	4.8	1.6	0	-	Elongated dark reflector, poorly defined.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71418	Debris field	463437	5860495	A2	40.1	8.2	0.3	-	A group of parallel curvilinear dark reflectors with bright shadows in a triangular alignment, approximately six at the widest point though very indistinct, possibly buried by sandwaves.	
71419	Dark reflector	456525	5860463	A2	4.9	0.8	0.4	-	Small linear item with height near 71420. In an area of sandwaves.	
71420	Dark reflector	456530	5860457	A2	4.8	0.5	0.6	-	Rather indistinct small linear feature with height in area of small sandwaves, close to dark reflector <b>71419</b>	
71421	Debris field	463311	5859642	A2	17.5	6.2	0.3	-	Large spread of possible debris, including an irregular oval shaped dark reflector hollow anomaly. Features don't look joined up so may be partially buried by sands, some have shadows and some not. Looks to be situated in an area of disturbed seabed.	
71422	Dark reflector	463323	5859580	A2	3.5	1.8	0.2	-	A medium sized dark reflector with a small shadow that does not appear to be solid, may be slightly buried by sands or broken up.	
71423	Dark reflector	457700	5859220	A2	6.6	0.6	0	-	A thin curvilinear dark reflector feature, isolated object.	
71424	Dark reflector	467511	5859031	A2	10.2	3.1	0.6	-	Slightly rectangular dark reflector with a bright reflector in the centre and a broad shadow. Identified in an area of megaripples.	
71425	Debris	463547	5859014	A2	5.7	0.7	0.3	-	A distinct long and thin linear dark reflector with a dull shadow, distinct feature lying perpendicular to the sandwaves.	
71426	Debris	458485	5858743	A2	5.4	0.7	0.2	-	Distinct linear dark reflector with height. Possibly slightly stretched data here.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71427	Seafloor disturbance	459917	5858607	A2	21.1	8.0	0	-	Oval shaped area of disturbed seabed. Possibly contains some debris.	
71428	Debris field	459669	5858243	A2	41.7	9.6	0.7	-	A large debris field. Contains mostly linear debris. In area of rippled seabed. Some bright reflectors.	
71429	Dark reflector	467349	5858041	A2	6.4	1.0	0.4	-	Elongated dark reflector, bent round in a slight 'v' shape, with a distinct shadow. Identified in an area of megaripples.	
71430	Dark reflector	463366	5857745	A2	4.9	0.6	0.4	-	A long thin and slightly curvilinear dark reflector with a bright shadow, located at the edge of a sandwave.	
71431	Dark reflector	459404	5857717	A2	5.1	0.8	0	-	Two small dark reflectors situated next to each other.	
71432	Dark reflector	468081	5857433	A2	3.8	1.5	0.5	-	Small round dark reflector with a bright reflector in its centre. Feature appears to extend out. Contact has a distinct, relatively broad shadow, identified in an area of megaripples.	
71433	Debris field	463740	5857305	A2	12.6	3.1	0.3	-	A large spread of small dark reflectors, some with shadows, close together within sandwaves, possible debris field.	
71434	Seafloor Disturbance	460065	5857241	A2	7.1	2.8	0	-	Depression or scour containing possible debris. Bright reflector on the near side, backed by a dark reflector.	
71435	Magnetic	469435	5857207	A2	-	-	-	120	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71436	Dark reflector	458818	5857042	A2	5.4	1.2	0	-	Rather indistinct elongate feature. Possible scouring around one end. In area of rippled seabed.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71437	Seafloor disturbance	459385	5856973	A2	20.5	10.2	0	-	Irregularly shaped area of bright and dark reflectors. Appears situated at one end of a patch of coarser sediment. Possibly contains debris.	
71438	Dark reflector	462846	5856794	A2	3.8	0.5	0.2	-	A very distinct thick linear dark reflector with a bright shadow lying perpendicular to the sandwaves.	
71439	Bright reflector	464942	5856502	A2	4.3	0.2	0	-	Small straight thin object with no obvious dark reflector or shadow.	
71440	Dark reflector	459416	5856382	A2	4.2	0.3	0.2	-	Small and thin linear feature with height. Possible debris. Isolated object on rippled seabed.	
71441	Bright reflector	460814	5856368	A2	6.5	1.0	0	-	Linear bright reflector feature with no apparent object in front. Seabed is irregular with ripples and shadows nearby but this one looks anomalous.	
71442	Dark reflector	470099	5856157	A2	5.5	0.7	0.3	-	An indistinct linear dark reflector with a large pointed shadow, located within sandwaves.	
71443	Magnetic	469821	5856125	A2	-	-	-	51	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71444	Seafloor Disturbance	461437	5855625	A2	28.5	18.2	0	-	Possible area of seafloor disturbance, may just be a localised area of irregular seabed but it is anomalous here. Consists of many small bright reflectors and some dark reflectors.	
71445	Magnetic	462945	5855147	A2	-	-	-	177	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71446	Dark reflector	463880	5855077	A2	4.4	0.4	0.2	-	A long, thin and distinct linear dark reflector with a bright shadow, lying perpendicular to sandwaves.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71447	Seafloor disturbance	467803	5854603	A2	20.2	5.9	0.3	-	Elliptical area of dark and small reflectors. Seems off the angle of sandwaves.	
71448	Dark reflector	460687	5854541	A2	3.4	0.6	0.2	-	Linear feature with possible height located on an uneven area of the seabed and 6m from 71449.	
71449	Dark reflector	460690	5854535	A2	4.5	0.8	0.3	-	An elongate object with height, located 6m from 71448.	
71450	Bright reflector	460711	5854518	A2	3.7	1.0	0	-	An elongate bright reflector feature with no obvious object in front.	
71451	Dark reflector	469491	5854489	A2	3.6	2.0	0.6	-	Dark reflector with a relatively broad shadow.	
71452	Debris	464769	5854398	A2	11.9	4.5	0.9	-	A large piece of possible debris, an irregular triangle shaped dark reflector with a bright, pointed shadow, isolated object within sandwaves, has some slight scouring orientated north and measuring 9m. Observed in the MBES data as a small sub-rounded object within a slight depression to the south-west of a possible cable.	
71453	Debris field	463732	5854346	A2	33.5	17.1	0.3	239	A large scatter of potential debris, approximately 10 dark reflector anomalies, some with shadows, rounded, linear and square objects visible within an area of sandwaves and further anomalies may be buried. The largest is 4.1 x 2.5m. Has a large magnetic anomaly associated indicating ferrous debris. Observed as an irregular mound (26 x 10 x 0.5m) in the MBES data.	
71454	Dark reflector	460370	5854342	A2	3.4	1.0	0.5	-	An elongate dark reflector with variable height indicated by shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71455	Debris	463706	5854335	A2	1.7	0.5	1.1	239	Possible piece of debris, very thin and long dark reflector with a bright distinct shadow, located 27m south-west from possible debris field 71453 and may be related. Has a large magnetic anomaly associated indicating ferrous debris. Observed as a small round mound in the MBES data measuring 3 x 3 x 0.2m.	
71456	Debris	463481	5853862	A2	2.9	1.3	0.4	38	A rectangular shaped dark reflector with a bright and tapered shadow, isolated and distinct feature on a sandwave rich area of the seabed. Has a small magnetic anomaly associated indicating ferrous debris.	
71457	Magnetic	463503	5853825	A2	-	-	-	43	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71458	Mound	465194	5853745	A2	21.3	7.0	0.5	-	A large object visible as a slightly curvilinear dark reflector that is wider but more indistinct at one end than the other with a large dull shadow. Observed in the MBES data as a long tapering mound of sloping height, aligned north-west to south-east, within sandwaves but on a different alignment.	
71459	Dark reflector	465987	5853739	A2	3.0	0.7	0.2	-	A distinct dark reflector, appears as a rounded dark reflector with a shadow and a very thin linear dark reflector attached to this, located in sandwaves and isolated.	
71460	Magnetic	465955	5853643	A2	-	-	-	220	Large dipole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71461	Magnetic	462057	5853581	A2	-	-	-	91	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71462	Debris	461860	5853426	A2	6.7	0.7	0.2	-	Curvilinear object with height in area of rippled seabed.	
71463	Seafloor disturbance	470959	5853148	A2	14.4	8.3	0	-	Medium sized, mottled patch of disturbed seafloor identified in an area of megaripples. Possibly a natural feature however looks a little anomalous.	
71464	Seafloor disturbance	470963	5853127	A2	20.5	7.3	1.1	-	Large and slightly oval shaped area of disturbed seafloor identified in an area of megaripples. Possibly a natural feature however looks anomalous to the surrounding seabed.	
71465	Debris	464915	5852959	A2	5.2	0.8	0.3	-	A linear alignment of four possible objects close together, only has a shadow at one end of the feature and possibly in a slight depression within an area of sandwaves, possible debris.	
71466	Dark reflector	470286	5852755	A2	5.5	5.2	0.4	-	Angular bent object with slight shadow. Follows sand ripples so could be part of natural feature but looks anomalous.	
71467	Dark reflector	470245	5852729	A2	9.4	6.1	0.4	-	Sub rounded object which looks dappled and some rounded bright reflector.	
71468	Dark reflector	470244	5852718	A2	3.4	2.5	0.3	-	Small angular object with corresponding bright shadow.	
71469	Debris	462289	5852648	A2	12.5	2.8	0	-	A curvilinear feature with no height and possible scouring around it. Located within sandwaves.	
71470	Dark reflector	462472	5852549	A2	4.4	0.4	0.3	-	Long and thin linear object with height, possibly associated with nearby debris field <b>71471</b> .	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71471	Debris field	462479	5852515	A2	15.7	9.0	2.4	-	Area containing several objects with height. Some linear and some more blocky. Identified by UKHO as a possible cable with anchor attached. Observed in the MBES data as a small sub-rounded mound within a possible larger seafloor disturbance. The nearest magnetic survey line is located 47m away and this may explain why, if it is an anchor, there is no magnetic anomaly associated this this feature.	11246 (UKHO)
71472	Debris field	461988	5852355	A2	11.8	7.8	0	-	Medium sized area containing dark reflectors, some of which are linear. Bright reflectors indicate height or scouring.	
71473	Dark reflector	470419	5852141	A2	2.5	1.7	0.9	-	Irregular dark reflector with a distinct shadow and some possible associated scour.	
71474	Dark reflector	470335	5852008	A2	7.5	2.4	0.6	-	Irregular object, possibly in stretched data, with some bright angular shadow.	
71475	Debris field	466763	5851999	A2	6.8	4.3	0.3	-	An irregular shaped dark reflector with shadows in parts, large object that appears to be broken up or partially buried by sediment, appears to be two crossed linear features and some small, rounded dark reflectors.	
71476	Magnetic	470359	5851917	A2	-	-	-	52	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71477	Debris	469565	5851813	A2	5.5	2.0	0.5	-	Dark reflector identified within sandwaves, a very distinct curvilinear thick dark reflector with a bright shadow and possibly in a slight depression. Possible non-ferrous item of debris.	
71478	Debris field	467849	5851714	A2	11.5	10.7	1.2	-	Large spread of possible debris located within large sandwaves and possibly partially buried. Small but distinct dark reflectors with shadows, largest is 1.5 x 0.7m. Observed in the MBES data as an indistinct mound with an apex (50 x 20 x 1m) aligned north-east to south-west.	
71479	Magnetic	464147	5851155	A1	-	-	-	4455	Very large dipole identified on more than one survey line. Indicative of possible substantial buried ferrous debris.	



## 12.8 Appendix VIII: Seabed Anomalies of Archaeological Potential in the provisional Offshore Cable Corridor

Co-ordinates are in ETRS89 UTM Zone 31N.

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70317	Debris	483654	5850867	A2	6.0	1.3	0.6	-	Observed in 2012 OFTO data. Weakly contrasting and diffuse narrow rectangular anomaly in depression, possibly piece of debris. Associated multibeam bathymetry beam showing slight mound amongst sandwaves but no associated magnetic contact. Not observed in the most recent 2016 dataset and may have since been buried	
70318	Seafloor disturbance	483569	5847632	A2	9.2	4.0	0.7	-	Observed in 2012 OFTO data. Weak, larger diffuse irregular shaped anomaly with height, possibly natural but larger in size than other natural features in area. Distinct depression with mound to the south visible on the multibeam bathymetry. Located approximately 25m north of <b>70319</b> . No associated magnetic contact. Not observed in the most recent 2016 dataset and may have since been buried.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70319	Mound	483557	5847594	A2	9.0	7.0	0.6	-	Observed originally in 2012 OFTO data. Weak, larger diffuse irregular shaped anomaly with height, possibly natural but larger in size than other natural features in area. Distinct mound on quiet seafloor with two adjacent depressions separated by central barrier orientated north - south. Larger depression is located to the west of the mound. Located approx. 25m south of <b>70318</b> . No associated magnetic contact. In the 2016 bathymetry data this is visible as a small mound within natural features/possible dredging scars.	
70320	Debris	483355	5847396	A2	8.0	6.0	0.3	-	Observed originally in 2012 OFTO data. Diffuse, large curvilinear anomaly, appears partially buried and with scour, possibly piece of debris. A distinct depression is visible on the multibeam bathymetry. No associated magnetic contact. In the 2016 bathymetry data this is visible as a large object within a depression, slightly rounded shaped feature, has scouring orientated north measuring 25 m. The depression measures 8 m x 6 m	
70321	Dark reflector	483255	5848355	A2	8.2	1.7	0	-	A large dark reflector with no shadow, distinct and irregular shaped anomaly	
70322	Debris field	483134	5848791	A2	38.3	6.0	0.2	-	A very large oval shaped area of possible debris. Indistinct group of bright and dark reflectors that appear to be partially buried by sands. It has a long rope or chain coming off the feature orientated to the north. Not visible in bathymetry data.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70323	Debris	483073	5848816	A2	6.5	2.1	0.2	-	Observed in 2012 OFTO data. Approximately oval shaped anomaly with three short linear dark reflectors on the outer edge with an inner area of curvilinear bright reflector, possibly non-ferrous piece of debris as there is no associated magnetic contact. Not observed in the most recent 2016 dataset and may have since been buried	
70324	Magnetic	483028	5855129	A2	-	-	-	27	Observed in 2012 OFTO data. Small distinct anomaly located amongst sandwaves. No associated multibeam bathymetry or side scan sonar contact. Not observed in the most recent 2016 dataset however retained given magnetometer line spacing.	
70325	Magnetic	482987	5849995	A2	-	-	-	39	Small anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70326	Magnetic	482932	5851879	A2	-	-	-	157	Observed in 2012 OFTO data. Medium sized distinct negative anomaly located amongst sandwaves. No associated multibeam bathymetry or side scan sonar contact. Not observed in the most recent 2016 dataset however retained given magnetometer line spacing.	
70327	Dark Reflector	482777	5846618	A2	7.2	2.3	0	-	Observed in 2012 OFTO data. Weak, partially buried oval shaped anomaly. No associated magnetic contact. Not observed in the most recent 2016 dataset and may have since been buried	
70328	Dark reflector	482605	5852302	A2	4.2	0.4	0.2	-	A long and thin distinct dark reflector with a dull tapered shadow, located on an area of sandwaves	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70329	Debris	482491	5849286	A2	2.5	1.4	0	-	A triangular shaped bright reflector, located in an area of sandwaves small and very distinct anomaly, possibly debris	
70330	Magnetic	482393	5851869	A2	-	-	-	33	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70331	Bright reflector	482374	5848830	A2	7.2	1.9	0	-	Large oval shaped bright reflector, distinct anomaly.	
70332	Bright reflector	482368	5849369	A2	5.6	1.1	0	-	Slightly tapered linear shaped bright reflector, possibly part of sandwaves though looks to be quite isolated from them.	
70333	Magnetic	482302	5849420	A2	-	-	-	62	Observed in 2012 OFTO data. Distinct dipole anomaly located amongst sandwaves. No associated multibeam bathymetry or side scan sonar contact. Not observed in the most recent 2016 dataset however retained given magnetometer line spacing.	
70334	Dark reflector	482146	5850322	A2	7.8	2.0	0.7	-	One or possibly two dark reflectors directly next to one another with very bright shadows. Very distinctive anomaly located within sandwaves.	
70335	Debris field	482142	5850334	A2	8.6	5.5	0.3	-	A medium sized possible debris field located within sandwaves. The anomaly comprises indistinct dark reflectors with bright shadows, located on the crest of a sandwave. Possible area of gravel	
70336	Debris field	482107	5848737	A2	9.1	4.1	0.2	-	A possible area of debris or perhaps partially buried debris. A half butterfly shaped dark reflector with bright shadows situated in a depression. The full extent is possibly buried, may just be natural	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70337	Magnetic	481997	5848895	A2	-	-	-	41	Observed in 2012 OFTO data. Distinct dipole anomaly located amongst sandwaves. No associated multibeam bathymetry or side scan sonar contact. Not observed in the most recent 2016 dataset however retained given magnetometer line spacing.	
70338	Magnetic	481631	5849897	A2	-	-	-	29	Observed in 2012 OFTO data. A broad irregular magnetic anomaly. No associated multibeam bathymetry or side scan sonar contact. Not observed in the most recent 2016 dataset however retained given magnetometer line spacing.	
70339	Magnetic	480753	5849174	A2	-	-	-	52	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70340	Mound	480053	5849399	A2	4.2	3.8	0.7	-	A large oval shaped hollow dark reflector with a large but dull shadow, located in sandwaves and the full extent may be hidden, there is some scouring visible. Identified in the bathymetry data as a small but distinct mound	
70341	Dark reflector	477907	5849684	A2	7.3	0.8	0	-	A long, thin and curvilinear dark reflector with no shadow. Looks slightly more anthropogenic than part of a sandwave	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70342	Wreck	477521	5849048	A1	33.0	14.0	1.0	50	Very indistinct area of wreckage. An oval shaped area of bright and dark reflectors, some with shadows and some without, lying perpendicular to sandwaves. There is very little detail visible to identify this as a wreck. In the bathymetry data a long and thick linear mound is visible, lying slightly perpendicular to the large sandwaves and may be masked by sediment, it is aligned north-east to south-west and has faint scouring orientated north and measuring 50m. Has a medium magnetic anomaly associated, though nearest mag line is 27m away. Associated with UKHO record (11091) of Golden Oriole (possibly), a British trawler Sunk 22/01/1915. Previously observed in 2014 as well broken-up with dimensions of 26m x 8.3m x 1.4m.	11091 (UKHO)
70343	Magnetic	477288	5849286	A2	-	-	-	28	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70344	Debris field	477130	5848283	A2	5.4	0.8	0.2	-	Three small dark reflectors with shadow located on the edge of a sandwave, largest measures 1.9 m x 0.7 m. Possibly rocks though not many seen in this area of the seabed.	
70345	Dark reflector	474764	5848339	A2	8.6	0.5	0.2	-	A very long and thin linear dark reflector with a bright shadow, feature looks slightly disjointed. Located within sandwaves and full extent may be partially buried	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70346	Debris field	473868	5847907	A2	11.7	0.8	0.4	-	A spread of possible debris comprising three very thin linear dark reflectors with shadows, possibly broken up single piece of debris, full extent may be buried by fine sediments	
70347	Debris	473461	5847936	A2	4.3	0.9	0	-	Medium sized rectangular shaped bright reflector located in between sandwaves, distinctive possible debris feature.	
70348	Debris field	472271	5848199	A2	11.0	3.7	0.5	-	Possible debris field comprising 5+ medium sized dark reflectors with shadows. Curvilinear and linear features, the largest measures 0.4 m x 3.3 m. Located in sandwaves and full extent may be buried. Not visible in bathymetry data.	
70349	Magnetic	472004	5849266	A2	-	-	-	42	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70350	Bright reflector	471930	5848358	A2	7.3	3.1	0	-	A large half circular shaped bright reflector, located on the edge of a sandwave and may be part of it, though looks larger and more distinctive than surrounding seabed.	
70351	Magnetic	471821	5849407	A2	-	-	-	22	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70352	Magnetic	471771	5848989	A2	-	-	-	36	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70353	Dark reflector	471589	5847886	A2	2.1	0.7	2.1	-	A small/medium sized rectangular shaped dark reflector with a large, bright and bulbous shadow, very similar to 70354 which is 5 m away	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70354	Dark reflector	471584	5847884	A2	1.4	0.7	2.1	-	A small rectangular shaped dark reflector with a very long, thin and bright shadow, located within sandwaves, very similar to 70353 which is 5 m away	
70355	Debris	471567	5847880	A2	7.1	1.5	1.9	-	A long and thick linear dark reflector with a large shadow, very distinctive feature in an area of sandwaves, possible debris	
70356	Bright reflector	471561	5850060	A2	8.7	1.8	0	-	A large and distinctive bright reflector, appears as two semi-circles aligned, looks highly anthropogenic.	
70357	Debris	470982	5848241	A2	8.9	0.5	0	-	A long and thick linear bright reflector anomaly, looks too straight to be a sandwave, possible debris.	
70358	Dark reflector	469971	5847765	A2	3.0	0.4	0	-	A thin and distinct dark reflector with no shadow, located on the edge of a sandwave.	
70359	Magnetic	467009	5847525	A2	-	-	-	15	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70360	Wreck	466386	5846784	A1	54.0	11.0	4.0	15867	An area of wreck debris consisting of a large spread of linear, curvilinear and smaller dark reflectors with shadows located within sandwaves. The full extent of the wreck may be buried. The largest piece measures 5.8m x 1.4m. The wreck is relatively broken up and in poor condition. Large amount of scour visible. Not seen in full in sidescan data as towfish went over the top and not good quality data. In the bathymetry data the wreck is aligned north-east to south-west, it possibly has some debris or broken structure situated directly to the north-east end of the vessel (70361). The wreck stands upright prominently within large sandwaves and has a large amount of scouring orientated north to south and measuring over 300m visible. Very high magnetic anomaly associated. Some possible debris associated. Associated with UKHO record (11093) of HMS <i>Dunoon</i> (possibly), a British minesweeper with original dimensions 70.4m x 8.5m x 2.1m. Sunk by a mine on 30/05/1940. Last observed as relatively intact but damaged in the bows with a length of 62m and a recorded height of 5.2m.	11093 (UKHO)
70361	Debris	466368	5846827	A2	6.4	1.9	0.2	-	A thick linear dark reflector with a shadow on a rough and uneven area of the seabed. Large piece of possible debris associated with wreck 70360 situated 47 m to the south-east.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70362	Magnetic	465809	5847281	A2	-	-	-	52	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70363	Magnetic	465267	5847174	A2	-	-	-	14	Small anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
70364	Magnetic	464769	5846759	A2	-	-	-	6	Small but distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70365	Debris	464150	5846800	A2	8.7	3.6	1.2	-	A large piece of possible debris, very solid and distinct dark reflector with a short but bright shadow, has some scour associated orientated north and measuring 24 m	
70366	Magnetic	464076	5846817	A2	-	-	-	31	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70367	Magnetic	463601	5846121	A2	-	-	-	29	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70368	Dark reflector	463238	5845318	A2	3.6	0.6	0.4	-	A long and thin distinct dark reflector with a large but dull shadow, very distinct anomaly on a rough and uneven area of the seabed, possibly in a slight depression	
70369	Dark reflector	463126	5845352	A2	3.2	2.2	0.3	-	A very distinctive rectangular shaped dark reflector with a dull shadow, feature possibly has some scouring orientated north and measuring 40 m	
70370	Magnetic	462912	5845478	A2	-	-	-	18	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70371	Magnetic	462780	5845538	A2	-	-	-	11	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70372	Dark reflector	462763	5846108	A2	3.8	0.7	0.5	-	A medium sized rectangular shaped dark reflector with a bright and tapered shadow, possibly broken in two and located on a sandwave rich are of the seabed	
70373	Magnetic	462342	5844954	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70374	Debris field	462243	5846617	A2	8.4	3.8	0.7	-	A medium sized possible area of debris. Three very distinct and aligned circular dark reflectors with bright, bulbous shadows, with some scouring. The full extent of the features may be buried by sandwaves	
70375	Dark reflector	461996	5850153	A2	4.2	1.3	0.6	-	A distinct medium sized curvilinear shaped dark reflector with a bright, tapered shadow, isolated anomaly with scouring orientated north-west and measuring 50 m	
70376	Debris	461852	5846402	A2	3.6	0.6	0.3	-	A very distinct long and curvilinear shaped dark reflector with a bright shadow, has some slight scour or sediment build up to the north measuring 4.5 m	
70377	Debris	461821	5845391	A2	8.5	0.5	0.2	-	A long and thin linear dark reflector with a bright shadow and situated in a slight depression, located on the edge of a sandwave, possibly debris	
70378	Magnetic	461635	5851612	A2	-	-	-	9	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70379	Debris field	461596	5850052	A2	29.0	11.0	0.5	-	A large spread of debris comprising six dark reflectors, five of which have shadows. The largest is a long and thin curvilinear feature with dimensions of 22.6 m x 1 m, located in an area of sandwaves and the full extent may be buried. In the bathymetry data this is visible as a large and distinct mound with little height in an area of small sandwaves. Oval shaped and anomalous to the surrounding seabed, there is a slight depression within the mound's centre	
70380	Debris	461555	5851073	A2	8.8	1.6	0.1	-	A curved dark reflector with corresponding curvilinear shadow. Has scouring associated orientated north-west and measuring 32.5 m, possible debris	
70381	Dark reflector	461439	5851955	A2	12.3	1.2	0.6	-	A medium sized curvilinear shaped dark reflector with a bright triangular shaped shadow. Some faint possible scouring orientated north-west and measuring 5.4 m is associated.	
70382	Magnetic	461374	5850385	A2	-	-	-	23	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70383	Debris	461351	5850856	A2	5.8	0.4	0.2	-	A very distinct, long curvilinear dark reflector with a short but bright shadow and situated in a depression, possible item of debris	
70384	Dark reflector	461287	5846389	A2	9.0	0.5	0	-	A very long and thick linear dark reflector with no shadow. Distinct feature located within sandwaves, looks more anthropogenic than natural.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70385	Bright reflector	461270	5850984	A2	17.7	2.1	0	-	Possible wide curvilinear shaped bright reflector in poor quality data, does not look like a sandwave. Not visible in bathymetry data.	
70386	Dark reflector	461051	5847518	A2	2.6	0.5	0.2	-	An indistinct thin linear dark reflector with a bright shadow. Isolated anomaly in noisy data	
70387	Dark reflector	460834	5844988	A2	12.8	0.5	0	-	Long and thin linear dark reflector with no shadow, possibly in a slight depression. Not visible in bathymetry data.	
70388	Magnetic	460694	5847360	A2	-	-	-	37	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70389	Debris	460582	5851838	A2	5.8	0.8	0.3	-	Very distinct dark reflector with a bright shadow, a curvilinear feature distinct and isolated on a sandy and even area of the seabed. Possibly debris	
70390	Magnetic	460421	5847701	A2	-	-	-	43	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70391	Dark reflector	460364	5846227	A2	2.4	1.2	0.3	-	A small dark reflector with a very bright shadow and sediment build up around its extent. Possibly natural though distinct on a sandy area of the seabed	
70392	Dark reflector	460345	5851503	A2	6.1	1.5	0.7	-	A right angled dark reflector with bright triangular shadow, possibly natural though distinctive and isolated on a sandy area of the seabed	
70393	Dark reflector	460314	5848410	A2	3.7	1.1	0.5	-	A distinct long and curvilinear shaped dark reflector with a bright shadow and situated in a depression, located within sandwaves	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70394	Dark reflector	460279	5851418	A2	2.4	1.5	0.3	-	A distinct rounded dark reflector with a bright shadow. Possibly large rock though quite infrequent on this area of the seabed. Located within sandwaves.	
70395	Magnetic	460265	5846817	A2	-	-	-	41	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70396	Debris field	460236	5854038	A2	28.8	11.9	1.1	-	Large spread of possible debris. It appears to be a hollow oval shaped indistinct dark reflector with two long and thin curvilinear ropes/chain coming off it, located on a gravelly area of the seabed.	
70397	Dark reflector	459916	5844318	A2	3.9	0.3	0.3	-	A very distinct curvilinear dark reflector with a bright shadow, possibly slightly stretched in data, isolated feature	
70398	Magnetic	459845	5848062	A2	-	-	-	189	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70399	Debris field	459385	5845426	A2	9.5	8.0	2.5	-	A large, but indistinct spread of possible debris. Thick curvilinear shaped dark reflector with a very large and bright shadow. The feature is situated within sandwaves and may be partially buried. There is some scouring to the south and possible scour or a smaller scatter of debris to the north measuring 14 m. In the bathymetry data this is visible as a medium sized distinct rounded mound with height situated in a depression and with associated scouring 2 m deep, orientated north and measuring 100 m	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70400	Debris	459354	5845416	A2	3.8	2.1	0.6	-	A medium sized angular shaped dark reflector with a thin bright shadow, situated in a depression with scouring orientated to the north and measuring 7.7 m.	
70401	Magnetic	457715	5844963	A2	-	-	-	57	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70402	Magnetic	457658	5844953	A2	-	-	-	266	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70403	Magnetic	457049	5844090	A2	-	-	-	13	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70404	Magnetic	456701	5844519	A2	-	-	-	64	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70405	Magnetic	456350	5843541	A2	-	-	-	90	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70406	Magnetic	455205	5843522	A2	-	-	-	38	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70407	Bright reflector	455075	5844256	A2	4.0	2.7	0	-	A medium sized circular bright reflector feature located on the edge of a sandwave, anomalous to the surrounding seabed.	
70408	Dark reflector	454424	5844932	A2	2.8	0.7	0	-	A long and thick linear dark reflector with no shadow, very distinct feature located within sandwaves	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70409	Debris field	454152	5844749	A2	23.0	12.0	1.0	-	A large area of possible debris, appears as a scattering of tiny dark reflectors. Possibly partially covered by sands, feature is distinct and anomalous to the surrounding seabed, located within sandwaves which may be disguising the full extent. In the bathymetry this is visible as a large and distinct oval shaped mound situated within small sandwaves. Very distinct and isolated feature.	
70410	Debris	454044	5844958	A2	3.8	1.1	0.3	-	A long and thick curvilinear dark reflector with a shadow. Very distinct feature in an area of sandwaves, possible debris	
70411	Magnetic	453482	5843765	A2	-	-	-	6	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70412	Magnetic	453207	5843922	A2	-	-	-	18	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70413	Debris	452921	5843296	A2	17.8	0.8	0.0	-	Broken up or disjointed linear shaped bright reflector feature, large and indistinct anomaly on a sandy area of the seabed, isolated possible debris feature. Not visible in bathymetry data.	
70414	Magnetic	452700	5844836	A2	-	-	-	44	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70415	Magnetic	452631	5844717	A2	-	-	-	10	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70416	Magnetic	452252	5843213	A2	-	-	-	6	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70417	Debris	452221	5842953	A2	4.6	0.4	0.1	-	A long and thin distinct linear dark reflector with a bright shadow, isolated possible debris	
70418	Magnetic	451919	5843240	A2	-	-	-	7	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70419	Debris field	450816	5843285	A2	19.9	17.2	0.3	-	Possible group of debris made up of distinct dark reflectors with shadows, some small circular (1 m x 0.4 m) and larger linear (5 m x 0.4 m) anomalies, approximately 15 in total over a large area. Nothing visible in bathymetry data.	
70420	Dark reflector	450806	5842974	A2	5.3	1.7	0.2	-	An oval shaped dark reflector/circular group of small dark reflectors with shadows, may be a gravel patch or rocks	
70421	Debris	450787	5842981	A2	4.4	0.3	0.2	-	A long and thin linear dark reflector with a bright shadow, located in between sandwaves, possibly linear debris	
70422	Dark reflector	450781	5842606	A2	3.3	1.4	0.1	-	Very distinctive dark reflector with a bright shadow located in between sandwaves, possibly broken in two parts or partially buried in its centre. Rectangular shaped feature	
70423	Dark reflector	450781	5842981	A2	1.8	1.3	0.3	-	A disjointed or partially broken up distinct dark reflector with a bright shadow. Located in between sandwaves, may be natural	
70424	Magnetic	450644	5842687	A2	-	-	-	79	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70425	Magnetic	450469	5843104	A2	-	-	-	30	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70426	Magnetic	450459	5842806	A2	-	-	-	19	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70427	Magnetic	450457	5843861	A2	-	-	-	365	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70428	Magnetic	450450	5843838	A2	-	-	-	11	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70429	Magnetic	450445	5844334	A2	-	-	-	9	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70430	Dark reflector	450175	5844259	A2	2.8	0.3	0.2	-	A long and thin linear dark reflector with a dull shadow, situated at the edge of a sandwave but does not look part of them	
70431	Magnetic	450129	5843224	A2	-	-	-	108	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70432	Magnetic	450096	5843177	A2	-	-	-	45	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70433	Magnetic	450066	5843086	A2	-	-	-	58	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70434	Dark reflector	450064	5842559	A2	3.0	0.9	0.2	-	A long and thick rectangular dark reflector with a bright shadow, located in between sandwaves, very distinct feature	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70435	Dark reflector	450060	5843704	A2	3.5	0.8	0.3	-	A long and thin linear dark reflector with a bright shadow, distinct feature located in between sandwaves, tagged mainly due to length, lots of similar but smaller features on this area of the seabed	
70436	Magnetic	449995	5843028	A2	-	-	-	37	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70437	Dark reflector	449882	5844269	A2	4.5	1.0	0.4	-	A very thin slightly curvilinear dark reflector with a right angled end. Feature has a very bright shadow and is distinct within an area of sandwaves	
70438	Dark reflector	449840	5844210	A2	3.8	0.5	1.3	-	A large curvilinear shaped dark reflector with a bright shadow. Distinct anomaly located within sandwaves - does not look to be part of them	
70439	Dark reflector	449615	5843736	A2	8.2	1.9	0.1	-	An indistinct curvilinear dark reflector with a shadow in parts. Feature looks disjointed or partially buried between sandwaves	
70440	Magnetic	449571	5842924	A2	-	-	-	79	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70441	Magnetic	449427	5842568	A2	-	-	-	28	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70442	Magnetic	449401	5842568	A2	-	-	-	35	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70443	Magnetic	449391	5843836	A2	-	-	-	16	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70444	Magnetic	449156	5843838	A2	-	-	-	30	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70445	Magnetic	448908	5842930	A2	-	-	-	145	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70446	Dark reflector	448792	5843781	A2	4.0	0.8	0	-	A long and thin linear dark reflector with no shadow, possibly in a slight depression. Looks more anthropogenic than surrounding seabed features.	
70447	Magnetic	448669	5844394	A2	-	-	-	14	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70448	Magnetic	448632	5844142	A2	-	-	-	17	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70449	Debris	448556	5843957	A2	7.4	1.0	0.3	-	Possible object with rope or chain attached. An indistinct dark reflector measuring 1m x 0.6 m with a dull shadow and possible rope orientated to the north visible as a very indistinct curvilinear thin dark reflector	
70450	Magnetic	447837	5842659	A2	-	-	-	20	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70451	Dark reflector	447615	5844361	A2	3.4	0.4	0.2	-	A distinctive irregular shaped linear dark reflector with a dull shadow, located in between sandwaves and looks to be an object rather than part of them	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70452	Magnetic	447578	5843824	A2	-	-	-	20	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70453	Magnetic	447236	5844040	A2	-	-	-	48	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70454	Magnetic	447062	5844336	A2	-	-	-	49	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70455	Debris	446424	5843694	A2	4.9	2.8	0.2	277	A distinct but thin right angled linear dark reflector with a bright shadow. Has a large magnetic anomaly associated indicating ferrous debris	
70456	Debris field	446339	5844375	A2	25.8	18.1	0.9	-	A large spread of possible debris, 250 m from wreck 70459. Approximately nine small irregularly shaped dark reflectors, some with shadows, some without. The debris field is located on an area of sandwaves and the full extent may be buried. Largest feature measures 2.7 m x 1.8 m	
70457	Magnetic	446199	5843670	A2	-	-	-	287	Large symmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70458	Magnetic	446154	5843670	A2	-	-	-	299	Large symmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70459	Wreck	446041	5844450	A1	88.0	40.0	10.0	775	A wreck broken in two. In the sidescan data a large spread of highly dispersed wreck debris is visible, with some structure and possible deck planking discernible as parallel dark reflectors with shadows. The stern and hull are not clear and the full extent of the wreck is likely buried by the large sandwaves in the area. In the bathymetry data the wreck is clearly lying in two parts 17m from one another with both sections orientated north-west to south-east. There is a large amount of scouring visible orientated north-west to south-east and measuring over 100m. The individual dimensions of the northern section are 41m x 23m x 10m and the southern section are 44m x 19m x 8m. The wreck has a large magnetic anomaly associated indicating a ferrous composition. In the UKHO database this is recorded as Phillip M, a steam ship with dimensions of 80.5m x 11.9m x 7m which was torpedoed and sunk in 1944. The wreck is described as lying in two parts on the seabed, probably inverted, with measurements of 55m x 30m x 7.7m last observed in 1999.	11092 (UKHO)
70460	Debris	446039	5844401	A1	1.6	0.2	0.2	-	Small piece of possible wreck debris, a thin curvilinear dark reflector with a shadow located within sandwaves and situated 27 m south-west of wreck 70459	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70461	Bright reflector	445715	5844227	A2	7.3	1.1	0	-	A large and thick curvilinear bright reflector, one end appears to fork, very distinct anomaly on a rough and uneven area of the seabed, situated within sandwaves.	
70462	Magnetic	445598	5844152	A2	-	-	-	208	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70463	Magnetic	445231	5843920	A2	-	-	-	40	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70464	Magnetic	445145	5843920	A2	-	-	-	140	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70465	Magnetic	444825	5844171	A2	-	-	-	125	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70466	Magnetic	444242	5843639	A2	-	-	-	66	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70467	Magnetic	444149	5843070	A2	-	-	-	61	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70468	Magnetic	443703	5844186	A2	-	-	-	42	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70469	Magnetic	443609	5843618	A2	-	-	-	26	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70470	Debris	443566	5844007	A2	2.5	1.0	0	-	Possible rounded dark reflector object with no shadow (0.9 x 0.7 m) with a rope or chain attached, again with no shadow. Located within an area of large sandwaves.	
70471	Magnetic	443536	5843665	A2	-	-	-	45	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70472	Magnetic	443387	5843746	A2	-	-	-	146	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70473	Dark reflector	443201	5842896	A2	3.8	0.7	0	-	A long and thin dark reflector with no shadow. Isolated and distinct feature on a sandy area of the seabed.	
70474	Debris	442829	5844132	A2	5.7	0.6	0.0	126	A distinct horseshoe shaped curvilinear dark reflector with no shadow, located within sandwaves. Looks slightly broken up or buried in parts. Has a medium magnetic anomaly associated indicating ferrous debris	
70475	Magnetic	442811	5844082	A2	-	-	-	40	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70476	Magnetic	442688	5844458	A2	-	-	-	16	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70477	Magnetic	442487	5844254	A2	-	-	-	21	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70478	Magnetic	442445	5842572	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70479	Magnetic	441841	5842994	A2	-	-	-	180	Medium anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70480	Magnetic	441531	5842566	A2	-	-	-	107	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70481	Magnetic	441178	5844460	A2	-	-	-	50	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70482	Magnetic	439306	5842926	A2	-	-	-	17	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70483	Magnetic	438749	5842360	A2	-	-	-	23	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70484	Magnetic	438624	5842364	A2	-	-	-	22	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70485	Magnetic	438618	5843790	A2	-	-	-	14	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70486	Magnetic	438489	5844374	A2	-	-	-	10	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70487	Magnetic	438324	5844140	A2	-	-	-	65	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70488	Magnetic	438199	5842052	A2	-	-	-	26	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70489	Magnetic	437503	5844509	A2	-	-	-	58	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70490	Magnetic	437457	5844446	A2	-	-	-	45	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70491	Dark reflector	436891	5843933	A2	2.4	0.6	0.1	-	An irregularly shaped dark reflector with a bright shadow. It appears to be a thin linear feature with a rounded dark reflector at one end. Located within sandwaves, possibly natural.	
70492	Rope/chain	436750	5841279	A2	14.2	0.3	1.0	-	Short, curvilinear dark reflector possibly with a slight shadow. Feature is not particularly distinct, possibly short length of rope or chain.	
70493	Rope/chain	436598	5841819	A2	42.7	0.4	0	-	A long length of rope or chain, visible as a slightly curvilinear dark reflector with no shadow, possibly in a slight depression, the feature is located perpendicular to sandwaves.	
70494	Bright reflector	436386	5841067	A2	7.3	5.3	0	-	Rounded bright reflector with a slightly darker reflector in the centre. Identified in an area of textured seafloor.	
70495	Bright reflector	436136	5841143	A2	4.9	0.9	0	-	Straight, elongated bright reflector that appears to be quite isolated.	
70496	Magnetic	436117	5841464	A2	-	-	-	45	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70497	Magnetic	435895	5841784	A2	-	-	-	48	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70498	Magnetic	435847	5841261	A2	-	-	-	64	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70499	Magnetic	435847	5841877	A2	-	-	-	61	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70500	Magnetic	435826	5841150	A2	-	-	-	253	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70501	Magnetic	435764	5842595	A2	-	-	-	73	Medium symmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70502	Magnetic	435704	5842886	A2	-	-	-	241	Large anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70503	Rope/chain	435606	5842596	A2	7.2	0.5	0	-	Bright curvilinear item of debris in a 'C' shape. Possible disturbance to surrounding sediment. Not particularly distinct, possible short length of rope or chain.	
70504	Magnetic	435552	5843199	A2	-	-	-	63	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70505	Magnetic	435469	5843891	A2	-	-	-	69	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70506	Magnetic	435186	5843596	A2	-	-	-	263	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70507	Magnetic	434933	5842138	A2	-	-	-	249	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70508	Magnetic	434576	5843899	A2	-	-	-	255	Large distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70509	Magnetic	434464	5840546	A2	-	-	-	111	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70510	Magnetic	434448	5843370	A2	-	-	-	70	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70511	Magnetic	434424	5844278	A2	-	-	-	156	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70512	Magnetic	434420	5843727	A2	-	-	-	294	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70513	Magnetic	434410	5840860	A2	-	-	-	36	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70514	Magnetic	434405	5841204	A2	-	-	-	44	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70515	Magnetic	434324	5844467	A2	-	-	-	446	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70516	Magnetic	434307	5844495	A2	-	-	-	132	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70517	Dark reflector	434300	5844354	A2	3.2	0.4	0.3	-	Elongated dark reflector with slight shadow	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70518	Magnetic	434221	5840653	A2	-	-	-	20	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70519	Dark reflector	434155	5843628	A2	2.9	0.7	1.7	-	Relatively indistinct dark reflector with a triangular shadow. Close to similar anomaly 70520	
70520	Bright reflector	434147	5843636	A2	8.0	3.7	0	-	Slightly rectangular bright reflector with indistinct thin linear dark reflectors within this. Possibly shadows. Not particularly distinct but looks relatively anomalous. Similar contact nearby (70519).	
70521	Magnetic	433962	5841796	A2	-	-	-	33	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70522	Magnetic	433853	5843190	A2	-	-	-	71	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70523	Magnetic	433852	5841313	A2	-	-	-	37	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70524	Magnetic	433829	5840434	A2	-	-	-	43	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70525	Debris	433768	5841827	A2	11.8	3.8	1.0	-	Large, irregular dark reflector, not particularly well defined but with a distinct shadow, possibly debris identified in an area of megaripples.	
70527	Magnetic	433658	5845726	A2	-	-	-	501	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70528	Magnetic	433425	5846588	A2	-	-	-	38	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



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70529	Magnetic	433375	5844958	A2	-	-	-	98	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70530	Magnetic	433316	5842340	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70531	Magnetic	433261	5845178	A2	-	-	-	224	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70532	Magnetic	433196	5843381	A2	-	-	-	32	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70533	Magnetic	433049	5841825	A2	-	-	-	14	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70534	Magnetic	433032	5842317	A2	-	-	-	19	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70535	Dark reflector	432926	5845457	A2	3.4	0.4	0.4	-	Small, elongated dark reflector with a broad bright reflector. Quite distinct.	
70536	Magnetic	432891	5845147	A2	-	-	-	37	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70537	Magnetic	432838	5845047	A2	-	-	-	33	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70538	Magnetic	432787	5847169	A2	-	-	-	86	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70539	Magnetic	432560	5846510	A2	-	-	-	136	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70540	Magnetic	432506	5842643	A2	-	-	-	57	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70541	Magnetic	432504	5840940	A2	-	-	-	62	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70542	Magnetic	432142	5846243	A2	-	-	-	79	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70543	Dark reflector	432002	5847855	A2	19.0	2.1	0	-	Curvilinear dark reflector with no discernible height, in an elongated 'c' shape.	
70544	Magnetic	431993	5847927	A2	-	-	-	94	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70545	Magnetic	431965	5848728	A2	-	-	-	38	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70546	Magnetic	431910	5848089	A2	-	-	-	105	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70547	Bright reflector	431845	5847684	A2	2.8	1.6	0	-	Small bright reflector, with darker reflector around rim. Possibly a natural feature.	
70548	Magnetic	431842	5844213	A2	-	-	-	31	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70549	Magnetic	431708	5848772	A2	-	-	-	121	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70550	Magnetic	431696	5844740	A2	-	-	-	78	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70551	Magnetic	431658	5842024	A2	-	-	-	44	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70552	Dark reflector	431645	5846233	A2	7.2	0.5	0.5	-	Long, straight and narrow dark reflector with a broad, distinct shadow. Identified in an area of textured seafloor.	
70553	Magnetic	431620	5845127	A2	-	-	-	68	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70554	Magnetic	431616	5844790	A2	-	-	-	79	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70555	Dark reflector	431549	5847373	A2	4.4	0.4	0.3	-	Curved elongated dark reflector with an irregular shadow identified in an area of megaripples.	
70556	Dark reflector	431534	5846342	A2	6.3	2.0	0.4	-	Straight elongated dark reflector with a larger dark contact at the front. Slight shadow and some possible disturbance to surrounding sediment.	
70557	Bright reflector	431519	5847683	A2	4.6	1.3	0	-	Distinct, curved bright reflector. Possibly a shadow but with no discernible contact. Identified in an area of textured seafloor, may be part of a natural formation.	
70558	Magnetic	431504	5842911	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70559	Magnetic	431484	5841571	A2	-	-	-	59	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70560	Dark reflector	431458	5848228	A2	2.3	0.6	0.2	-	Small dark reflector with a slightly angular shadow. Identified in an area of ripples.	



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70561	Dark reflector	431428	5844360	A2	4.0	0.5	0.2	-	Straight, short dark reflector with a very slight shadow. Feature is not particularly distinct.	
70562	Dark reflector	431412	5846495	A2	3.4	0.3	0.2	-	Short, straight dark reflector with a slightly rounded shadow.	
70563	Dark reflector	431386	5848806	A2	3.5	0.3	0.2	-	Small, slightly elongated dark reflector with a slight shadow.	
70564	Magnetic	431261	5848896	A2	-	-	-	122	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70565	Wreck	431217	5841986	A1	70.0	31.0	6.3	200	A possible area of dispersed wreck, visible in the sidescan data as several dark reflectors that are not always distinct, with broad shadows. An elongated dark reflector with some possible associated scour and a distinct, rounded shadow is also visible which may be part of some vessel structure. In the bathymetry data this is visible as a large wreck situated within sandwaves and partially buried by sediments. The wreck appears to be broken up with large sections disjointed from the main structure of the wreck. There is some scouring coming from the wreck orientated south-east and measuring approximately 50m. A large magnetic anomaly is associated indicating some ferrous content. In the UKHO record this is an unknown wreck described as being broken up and almost buried by sandwaves with debris in the wrecks vicinity, likely boilers and engine.	10722 (UKHO); 892268 (NRHE)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70566	Magnetic	431129	5844010	A2	-	-	-	40	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70567	Magnetic	431088	5843109	A2	-	-	-	22	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70568	Bright reflector	431067	5848781	A2	2.6	1.0	0	-	Two short, straight bright reflectors close to each other. Image possibly distorted by movement of the sonar fish.	
70569	Magnetic	431048	5843905	A2	-	-	-	58	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70570	Magnetic	431035	5848341	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70571	Magnetic	431007	5847422	A2	-	-	-	305	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70572	Magnetic	430952	5842480	A2	-	-	-	225	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70573	Dark reflector	430914	5845897	A2	4.1	0.2	0.2	-	Slightly curved elongated dark reflector with a very slight shadow.	



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70574	Debris field	430902	5848141	A2	31.0	13.0	1.3	106	Large area of possible debris, some slightly darker reflectors and bright reflectors, some of which appear to be relatively straight. Not particularly distinct. In the bathymetry data this is visible as a large oval mound, located on a rough and sandwave rich area of the seabed. Has a medium magnetic anomaly associated indicating ferrous debris	
70575	Dark reflector	430895	5845895	A2	6.0	0.3	0.3	-	Small, relatively straight dark reflector with a slight shadow. In line with another similar contact, possibly part of the same, partially buried feature.	
70576	Debris	430895	5848188	A2	4.8	1.9	0.9	158	A distinct but poorly defined dark reflector with height identified in an area of megaripples. Some disturbance to surrounding sediment. Has a medium magnetic anomaly associated indicating ferrous debris	
70577	Magnetic	430893	5843903	A2	-	-	-	58	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70578	Magnetic	430888	5847340	A2	-	-	-	55	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70579	Dark reflector	430872	5843755	A2	2.5	0.2	0.2	-	Straight, narrow dark reflector with a very slight shadow. Not particularly distinct	
70580	Magnetic	430872	5847034	A2	-	-	-	99	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70581	Dark reflector	430804	5848049	A2	3.0	0.6	0.2	-	Small, distinct dark reflector with a very slight shadow. Identified in an area of megaripples.	



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70582	Dark reflector	430756	5846123	A2	3.0	0.2	0.1	-	Short, straight distinct dark reflector with a very slight shadow	
70583	Dark reflector	430721	5844754	A2	6.9	0.8	0.6	-	Straight, narrow dark reflector with a distinct but irregular shadow. Feature is identified in an area of, and perpendicular to, megaripples.	
70584	Magnetic	430668	5843112	A2	-	-	-	61	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70585	Magnetic	430619	5843102	A2	-	-	-	31	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70586	Magnetic	430610	5848511	A2	-	-	-	92	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70587	Magnetic	430609	5844209	A2	-	-	-	364	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70588	Magnetic	430606	5848846	A2	-	-	-	94	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70589	Magnetic	430520	5848897	A2	-	-	-	45	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70590	Magnetic	430503	5847230	A2	-	-	-	151	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70591	Magnetic	430494	5848400	A2	-	-	-	39	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



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70592	Magnetic	430456	5847097	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70593	Magnetic	430444	5845598	A2	-	-	-	67	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70594	Magnetic	430412	5848557	A2	-	-	-	23	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70595	Magnetic	430409	5848055	A2	-	-	-	594	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70596	Magnetic	430362	5847371	A2	-	-	-	663	Large anomaly monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70597	Dark reflector	430308	5845494	A2	6.9	2.0	1.7	-	Two dark reflectors or one broken up dark reflector with a distinct, irregular shadow. Feature identified in an area of textured seafloor.	
70598	Bright reflector	430297	5848546	A2	5.4	3.3	0	-	Triangular bright reflector with a small dark reflector at front. In an area of textured seafloor, looks anomalous.	
70599	Magnetic	430290	5845592	A2	-	-	-	92	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70600	Magnetic	430260	5845299	A2	-	-	-	79	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70601	Seafloor disturbance	430166	5847846	A2	10.7	6.3	0.3	-	Possible 'X' shaped seafloor disturbance, comprised of some bright reflectors and some dark reflectors, possibly with height.	
70602	Magnetic	430144	5845429	A2	-	-	-	841	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



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70603	Magnetic	430137	5849410	A2	-	-	-	428	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70604	Magnetic	430137	5848871	A2	-	-	-	44	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70605	Magnetic	430128	5849097	A2	-	-	-	428	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70606	Magnetic	430106	5846681	A2	-	-	-	28	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70607	Magnetic	430095	5848288	A2	-	-	-	225	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70608	Magnetic	430033	5847568	A2	-	-	-	294	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70609	Magnetic	429987	5846807	A2	-	-	-	60	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70610	Dark reflector	429842	5849672	A2	1.4	0.6	0.8	-	Small dark reflector with a distinct but tapered shadow. Identified in an area of megaripples, appears quite distinct.	
70611	Magnetic	429816	5845514	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70612	Magnetic	429794	5848360	A2	-	-	-	99	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



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70613	Magnetic	429783	5849881	A2	-	-	-	130	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70614	Magnetic	429772	5847316	A2	-	-	-	52	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70615	Magnetic	429652	5846468	A1	-	-	-	1697	Very large negative monopole only identified on one survey line. Indicative of possible substantial buried ferrous debris.	
70616	Debris	429625	5848286	A2	3.0	1.6	0.4	-	Slightly square object, not particularly distinct. Comprises four, short, straight, parallel dark reflectors with a slight shadow, possibly debris	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70617	Wreck	429617	5846348	A1	56.7	47.0	6.4	6367	Large wreck possibly in two parts, lying perpendicular to one another. Identified as distinct dark reflectors with broad shadows. The wreck appears to be intact in its two parts, with the majority of the hull intact and with deck structure visible as some straight, slatted features. In the bathymetry data the wreck is clearly broken in two parts with some standing structure visible. The two parts measure 77m in length when added together in the bathymetry data, close to the original recorded dimensions (73.2m). There is a very large magnetic anomaly associated indicating a ferrous construction. The UKHO records this as the <i>Rye</i> , a steamship lying in two parts at right angles, sunk in 1941 by torpedo fire. Original dimensions were 73.2m x 10.4m x 4.6m. Last observed in 2014 with dimensions 40m x 40m x 6m.	10544 (UKHO); 907459 (NRHE)
70618	Debris	429562	5846957	A1	3.1	2.5	2.0	1182	Distinct dark reflector with a broad shadow. Feature identified in an area of textured seafloor. Has a very large magnetic anomaly associated indicating ferrous debris	
70619	Dark reflector	429554	5848941	A2	7.0	2.4	1.0	-	Irregularly shaped dark reflector with a broad, slightly irregular shadow. Identified as two rounded dark reflectors connected in the centre	
70620	Debris	429512	5846995	A2	3.4	1.9	2.0	67	Distinct dark reflector with a broad shadow. Feature identified in an area of textured seafloor. Has a medium magnetic anomaly associated indicating ferrous debris	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70621	Magnetic	429501	5845892	A2	-	-	-	129	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70622	Magnetic	429492	5846128	A2	-	-	-	45	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70623	Magnetic	429458	5847054	A2	-	-	-	515	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70624	Debris	429364	5847229	A2	4.1	2.2	1.4	202	Distinct dark reflector with a broad shadow. Feature identified in an area of textured seafloor. Has a large magnetic anomaly associated indicating ferrous debris	
70625	Magnetic	429359	5848209	A2	-	-	-	133	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70626	Magnetic	429316	5847322	A2	-	-	-	270	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70627	Magnetic	429254	5847128	A2	-	-	-	72	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70628	Magnetic	429137	5849801	A2	-	-	-	43	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70629	Magnetic	429095	5848900	A2	-	-	-	212	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70630	Magnetic	429074	5845972	A2	-	-	-	66	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70631	Magnetic	429062	5847041	A2	-	-	-	27	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70632	Magnetic	429055	5846006	A2	-	-	-	51	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70633	Dark reflector	429036	5846962	A2	4.4	0.4	0.3	-	Very narrow, straight dark reflector with a slight shadow. Not particularly distinct.	
70634	Magnetic	429030	5848829	A2	-	-	-	81	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70635	Magnetic	429026	5849810	A2	-	-	-	48	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70636	Magnetic	428994	5847172	A2	-	-	-	55	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70637	Magnetic	428946	5849408	A2	-	-	-	113	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70638	Magnetic	428889	5849291	A2	-	-	-	58	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70639	Wreck	428802	5847632	A1	146.4	46.6	11.7	818	Large dispersed wreck. Possibly two sections of wreck visible. A thick slightly curvilinear dark reflector, possibly the hull edge, is discernible in the sidescan sonar data. The wreck is comprised of numerous straight dark reflectors with shadows. The wreck is orientated north-west to south-east and lies perpendicular to the large sandwaves. The full extent and detail is likely covered by sands. The wreck has a possible associated piece of debris at its northern end (70640) which is a long, thin and indistinct linear dark reflector with a broad shadow and dimensions of 20.5m x 1.1m x 3.3m. In the bathymetry data the wreck appears upright and with some structure visible. There is a large magnetic anomaly associated with the wreck indicating a ferrous construction. The UKHO records this wreck as the Trevethoe, a motor vessel built in 1940 and sunk in 1941, with original dimensions of 131.8m x 17.1m x 7.5m. Last observed in 2014 as upright but collapsed and in two parts with dimensions 140m x 25m x 5m.	10546 (UKHO); 907460 (NRHE)
70640	Debris	428758	5847714	A1	20.5	1.1	3.3	-	A long, thin and indistinct linear dark reflector, with a long, broad shadow. Possible wreck debris located 9 m to the north-west of wreck 70639	
70641	Magnetic	428647	5848054	A2	-	-	-	45	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70642	Dark reflector	428588	5848570	A2	11.3	0.4	0.1	-	Long and thin curvilinear dark reflector with a slight but distinct shadow.	
70643	Magnetic	428505	5849281	A2	-	-	-	676	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70644	Magnetic	428419	5849889	A2	-	-	-	28	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70645	Wreck	428283	5848091	A1	24.0	8.5	5.4	52	Medium sized wreck, visible as a distinct dark reflector outline that is likely the hull, with some dark reflectors in its centre. The wreck has a broad, irregular and distinct shadow and has been identified in an area of megaripples. There is a possible broken off linear piece of debris extending from the wreck in one of the sidescan sonar images. The wreck is orientated north-east to south-west. In the bathymetry data this is visible as a large and distinct wreck lying in between large sandwaves. The wreck is intact and upright with some slight scouring orientated north-east to south-west and measuring 16m either side. There is a medium magnetic anomaly associated with this wreck indicating some ferrous debris, though the nearest line of data is 25m from the wrecks location. In the UKHO record this is an unknown wreck that is largely intact and partially buried, previously observed in 2016 with dimensions of 24m x 10m x 4m.	82114 (UKHO)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70646	Dark reflector	428180	5849375	A2	2.6	0.3	0.1	-	Short, straight narrow dark reflector with a slight but distinct shadow.	
70647	Dark reflector	428169	5849394	A2	5.4	0.4	0.1	-	Short, straight narrow dark reflector with a slight but distinct shadow. Feature is not particularly distinct.	
70648	Magnetic	428107	5849613	A2	-	-	-	93	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70649	Magnetic	428061	5848208	A2	-	-	-	56	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70650	Magnetic	428002	5849599	A2	-	-	-	78	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70651	Debris field	427880	5849577	A2	16.4	6.9	0.6	-	A medium sized spread of possible debris comprising approximately eight dark reflectors with height. Possibly natural however looks a little anomalous. Possible debris field.	
70652	Dark reflector	427831	5848600	A2	2.9	0.4	0.2	-	Short, straight dark reflector with slight height.	
70653	Magnetic	427682	5849792	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70654	Dark reflector	427667	5848061	A2	2.6	0.3	0.6	-	Straight, narrow dark reflector with a broad shadow. Numerous similar but smaller contacts identified nearby	
70655	Magnetic	427658	5850018	A2	-	-	-	29	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70656	Magnetic	427425	5849416	A2	-	-	-	136	Medium and distinctive dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70657	Magnetic	427326	5848829	A2	-	-	-	38	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70658	Dark reflector	427033	5850434	A2	4.6	0.4	0.3	-	Small, short, straight dark reflector with a slight shadow.	
70659	Wreck	426967	5850445	A1	56.0	22.0	6.7	9466	Large wreck that appears to be intact though possibly partially buried by sandwaves. It is possibly listing slightly to the starboard side and has a broad shadow. Some elongated straight dark reflectors are visible. The wreck is orientated east to west with a large amount of scouring orientated north-west to south-east. In the bathymetry data the wreck appears to cut through a megaripple. There is a very large magnetic anomaly associated indicating a ferrous construction. The UKHO record (10849) gives this as an unknown wreck lying in two parts, last observed in 2014 with dimensions of 50m x 10m x 5.1m.	10849 (UKHO)
70660	Magnetic	426880	5849236	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70661	Dark reflector	426817	5850012	A2	6.9	0.9	0.3	-	Narrow dark reflector with a broad shadow. A distinct 's' shaped dark reflector identified in front of the contact. Feature looks a little anomalous.	
70662	Magnetic	426787	5848935	A2	-	-	-	18	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70663	Magnetic	426760	5850126	A2	-	-	-	340	Large anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70665	Debris field	426553	5849978	A2	24.7	14.0	3.2	194	An indistinct possible debris field comprising an area of numerous small dark reflectors, some of which appear to be slightly slatted, with distinct, irregular shadows. Located on a very rough and uneven area of the seabed with sandwaves. The full extent is possibly buried by sands. In the bathymetry data this is visible as an indistinct medium sized triangular mound that appears to be largely covered by sediment. The orientation is unclear, possibly north-east to south-west. Has a medium magnetic anomaly associated indicating ferrous debris	
70666	Magnetic	426493	5850084	A2	-	-	-	26	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70667	Magnetic	426488	5849307	A2	-	-	-	16	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70668	Magnetic	426435	5849675	A2	-	-	-	57	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70669	Magnetic	426319	5848674	A2	-	-	-	27	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70670	Rope/chain	426220	5849495	A2	55.0	0.2	0.2	-	Straight , narrow linear item with a very slight shadow. Identified in an area of megaripples. Feature appears to be slightly intermittent suggesting partial burial by mobile sediments. Possible rope or chain.	
70671	Magnetic	426213	5850327	A2	-	-	-	15	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70672	Dark reflector	426185	5850409	A2	2.8	0.9	0.4	-	Short, straight dark reflector in an patch of disturbed seafloor in an area of megaripples, looks distinct	
70673	Magnetic	426145	5849832	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70674	Magnetic	426063	5850154	A2	-	-	-	40	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70675	Magnetic	426015	5849775	A2	-	-	-	19	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70676	Magnetic	425970	5850552	A2	-	-	-	54	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70677	Magnetic	425963	5849551	A2	-	-	-	15	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70678	Magnetic	425937	5850353	A2	-	-	-	24	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70679	Magnetic	425884	5850357	A2	-	-	-	61	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70680	Magnetic	425702	5850101	A2	-	-	-	41	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70681	Magnetic	425643	5849614	A2	-	-	-	14	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70682	Magnetic	425500	5849633	A2	-	-	-	11	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70683	Magnetic	425489	5850285	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70684	Magnetic	425148	5850043	A2	-	-	-	20	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70685	Magnetic	425089	5850228	A2	-	-	-	42	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70686	Magnetic	424644	5850275	A2	-	-	-	55	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70687	Magnetic	424444	5848813	A2	-	-	-	33	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70688	Magnetic	424071	5848790	A2	-	-	-	42	Small irregular anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70689	Magnetic	424052	5849094	A2	-	-	-	33	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70690	Magnetic	423728	5850769	A2	-	-	-	47	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70691	Magnetic	423713	5849164	A2	-	-	-	139	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70692	Bright reflector	423667	5849174	A2	4.4	3.0	0	-	Circular bright reflector with a dark reflector in the centre. Identified within an area of megaripples, possibly a natural feature.	
70693	Magnetic	423262	5850476	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70694	Magnetic	423235	5849551	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70695	Magnetic	423207	5849185	A2	-	-	-	85	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
70696	Magnetic	423104	5850773	A2	-	-	-	16	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70697	Magnetic	422908	5850623	A2	-	-	-	31	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70698	Magnetic	422890	5849463	A2	-	-	-	15	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70699	Magnetic	422784	5849039	A2	-	-	-	109	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70700	Magnetic	422571	5849429	A2	-	-	-	224	Large and distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70701	Magnetic	422490	5849054	A2	-	-	-	28	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



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70702	Magnetic	422435	5849009	A2	-	-	-	19	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70703	Magnetic	422290	5849776	A2	-	-	-	22	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70704	Wreck	422267	5849082	A1	26.0	7.0	2.0	117	Wreckage of an unknown sailing vessel. Appears on the sonar data to be relatively intact though partially buried. Numerous short, straight dark reflectors with height. A medium sized wreck that is located within large sandwaves and thus difficult to distinguish in the bathymetry data. Appears to be aligned north-east to south-west and very little detail is visible - the wreck is mostly buried by sediments and the hull edge is difficult to see. Has a medium magnetic anomaly associated indicating a ferrous construction. This is an unknown wreck in the UKHO record which was last observed in 2014 as intact, mainly covered by a sandwave and measuring 46m x 8m x 2m.	10545 (UKHO)
70705	Magnetic	422091	5849938	A2	-	-	-	42	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70706	Magnetic	422088	5849332	A2	-	-	-	43	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70707	Magnetic	421931	5849407	A2	-	-	-	40	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70708	Magnetic	421831	5849489	A2	-	-	-	58	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70709	Wreck	421671	5849182	A1	153.0	38.0	10.2	10244	Wreckage of steamship <i>Montferlan</i> . Identified on the bathymetry data as a distinct mound aligned north-east to south-west with scour to the south-west of the wreck. Bathymetry detail suggests that the wreck is upright with some debris to the north-east. Appears on the sonar data to be partially disintegrated, possibly broken up into sections, with a long distinct shadow. Numerous straight, sometimes slatted, sometimes square, dark reflectors identified. Feature has a very large associated magnetic anomaly. UKHO record states the original length was 128m. Last observed in 2014 with measurements of 160m x 34m x 7.7m.	10549 (UKHO); 907461 (NRHE)
70710	Magnetic	421494	5850694	A2	-	-	-	59	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
70711	Magnetic	421409	5849573	A2	-	-	-	44	Small symmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70712	Magnetic	421381	5850683	A2	-	-	-	49	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70713	Magnetic	421210	5850816	A2	-	-	-	77	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70714	Magnetic	421207	5849111	A2	-	-	-	64	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70715	Debris field	421173	5849391	A2	20.0	17.0	2.9	178	A broad, elongated dark reflector with several straight dark reflectors jutting out from its edge. Feature appears to be partially buried. In the bathymetry data this is visible as a large and distinct mound that has a slight circular profile with one side steeper than the other. Identified on the magnetometer data as a medium asymmetric dipole indicating ferrous material. Possibly a debris field or a small, partially buried wreck.	
70716	Mound	420995	5849159	A2	18.5	7.0	0.6	-	A medium sized mound within a depression, the depression measures 16m x 7m x -0.5m in the bathymetry data. In the sidescan data the feature is visible as a broad, slightly rounded dark reflector with a distinct, tapered shadow, with possible associated scour. Contact possibly sits within a slight depression.	
70717	Magnetic	420991	5850668	A2	-	-	-	41	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70718	Magnetic	420969	5850103	A2	-	-	-	146	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70719	Dark reflector	420943	5849672	A2	2.4	0.5	0.4	-	Distinct but irregular dark reflector with height, appears to be in a slight zigzag. Object identified in an area of megaripples.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70720	Magnetic	420940	5850715	A2	-	-	-	87	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70721	Magnetic	420927	5850593	A2	-	-	-	51	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70722	Magnetic	420807	5849404	A2	-	-	-	495	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70723	Magnetic	420768	5850761	A2	-	-	-	100	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70724	Magnetic	420764	5850468	A2	-	-	-	287	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70725	Magnetic	420754	5849207	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70726	Magnetic	420737	5850735	A2	-	-	-	24	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70727	Dark reflector	420735	5850102	A2	0.7	0.2	0.1	-	Short, straight dark reflector with a very slight shadow. Identified in an area of megaripples.	
70728	Magnetic	420530	5849111	A2	-	-	-	112	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70729	Magnetic	420396	5849951	A2	-	-	-	55	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70730	Magnetic	420316	5850327	A2	-	-	-	56	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70731	Magnetic	420224	5849195	A2	-	-	-	185	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70732	Magnetic	420032	5849147	A2	-	-	-	41	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70733	Magnetic	419991	5850091	A2	-	-	-	83	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70734	Magnetic	419974	5849184	A2	-	-	-	238	Large dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70735	Debris field	419825	5849775	A2	26.0	12.0	2.5	-	A large group of small dark reflectors with a distinct, jagged shadow. Identified in an area of megaripples and the full extent may be buried. In the bathymetry data this is visible as a large and distinct mound with scour to the east and north-east of the target. Possible debris field.	
70736	Magnetic	419809	5849809	A2	-	-	-	95	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70737	Magnetic	419665	5850149	A2	-	-	-	72	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70738	Magnetic	419647	5850360	A2	-	-	-	76	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70739	Magnetic	419573	5850705	A2	-	-	-	23	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70740	Magnetic	419534	5850533	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70741	Magnetic	419329	5850307	A2	-	-	-	775	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70742	Dark reflector	419321	5849324	A2	0.8	0.7	0.2	-	Small round dark reflector with a short but distinct shadow. Possibly natural however looks anomalously round.	
70743	Magnetic	419320	5850103	A2	-	-	-	331	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70744	Wreck	419288	5849507	A1	68.0	11.3	6.0	10181	Large wreck that appears in the sonar data to be partially broken up with numerous straight dark reflectors and some slatted items. In the bathymetry data the wreck is visible as intact and lying upright on the edge of a large sandwave. The wreck is orientated north-east to south-west with scouring measuring 30m and orientated to the south-east. Associated wreck debris may be buried by sands. Wreck is identified on the magnetometer data as a very large magnetic anomaly indicating ferrous material. Associated UKHO record of an unknown wreck, last observed in 2014 measuring 60m x 10m x 4.1m.	10548 (UKHO); 892271 (NRHE)
70745	Magnetic	419265	5849383	A2	-	-	-	25	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70746	Magnetic	419150	5849325	A2	-	-	-	138	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70747	Magnetic	419125	5851125	A2	-	-	-	24	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70748	Magnetic	419071	5850689	A2	-	-	-	84	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70749	Magnetic	419066	5851187	A2	-	-	-	37	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70750	Dark reflector	419064	5850541	A2	1.8	0.3	0.2	-	Elongated dark reflector with a distinct shadow.	
70751	Magnetic	419015	5849935	A2	-	-	-	75	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70752	Magnetic	419009	5849664	A2	-	-	-	146	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70753	Dark reflector	418931	5849803	A2	0.9	0.2	0.2	-	Small, dark reflector with a distinct shadow which appears to extend out beyond the contact. Some possible associated scour.	
70754	Dark reflector	418930	5849791	A2	2.0	0.4	0.4	-	Small dark reflector with a distinct, rounded, relatively broad shadow. Some possible associated scour.	
70755	Magnetic	418916	5850637	A2	-	-	-	63	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70756	Magnetic	418884	5849422	A2	-	-	-	24	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70757	Magnetic	418523	5850069	A2	-	-	-	41	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70758	Magnetic	418379	5850671	A2	-	-	-	250	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70759	Magnetic	418305	5850967	A2	-	-	-	382	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70760	Magnetic	418276	5850891	A2	-	-	-	38	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70761	Magnetic	418101	5850986	A2	-	-	-	184	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70762	Magnetic	418059	5850991	A2	-	-	-	236	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70763	Magnetic	417939	5849439	A2	-	-	-	49	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70764	Magnetic	417769	5849397	A2	-	-	-	32	Small anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70765	Magnetic	417414	5851081	A2	-	-	-	105	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70766	Magnetic	417339	5850021	A2	-	-	-	55	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70767	Magnetic	416973	5850755	A2	-	-	-	91	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70768	Magnetic	416881	5849985	A2	-	-	-	11	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70769	Magnetic	416815	5849811	A2	-	-	-	71	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70770	Magnetic	416536	5851027	A2	-	-	-	143	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70771	Magnetic	416273	5849462	A2	-	-	-	26	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70772	Magnetic	416270	5849491	A2	-	-	-	30	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70773	Magnetic	416231	5851312	A2	-	-	-	799	Large dipole anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70774	Magnetic	416223	5849757	A2	-	-	-	96	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70775	Magnetic	416096	5851067	A2	-	-	-	35	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70776	Magnetic	416077	5851249	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70777	Magnetic	415948	5851087	A2	-	-	-	15	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70778	Magnetic	415790	5851270	A2	-	-	-	29	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70779	Magnetic	415763	5849825	A2	-	-	-	48	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70780	Dark reflector	415670	5850820	A2	1.2	0.3	0.2	-	Elongated dark reflector with a distinct, slightly irregular shadow.	
70781	Magnetic	415655	5850729	A2	-	-	-	36	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70782	Debris field	415394	5849528	A2	9.9	0.4	1.1	260	Small patch of disturbed seafloor. Possibly several small objects with height piled up. Interpreted as being a small debris field. Associated large magnetic anomaly suggests ferrous debris.	
70783	Magnetic	415373	5851454	A2	-	-	-	60	Medium negative monopole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70784	Debris	415366	5849564	A1	0.8	0.6	0.8	1113	Distinct dark reflector with an irregular shadow. Other similar but smaller contacts identified nearby. Possibly part of nearby debris field (70785). Has a very large magnetic contact associated indicating ferrous debris	
70785	Debris field	415354	5849572	A1	10.8	2.4	1.3	1113	Small patch of disturbed seafloor comprised numerous dark reflectors with height. Very large monopole identified on the magnetometer data indicating ferrous material. Possible small debris field.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70786	Magnetic	415318	5850961	A2	-	-	-	71	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70787	Magnetic	415303	5851388	A2	-	-	-	78	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70788	Magnetic	415281	5851195	A2	-	-	-	36	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70789	Magnetic	415184	5849952	A2	-	-	-	184	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70790	Magnetic	415045	5850663	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70791	Mound	415020	5849973	A2	9.1	1.1	1.2	-	Small patch of dark reflector, not particularly distinct, but with a clear shadow and some possible scour. Possibly natural however looks a little anomalous. Identified as a small mound on the bathymetry data.	
70792	Magnetic	414893	5850619	A2	-	-	-	40	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70793	Magnetic	414871	5850387	A2	-	-	-	22	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70794	Dark reflector	414866	5849913	A2	1.8	1.6	0.7	-	Broad, slightly irregular dark reflector with a distinct shadow. Possibly several objects close together. May be a natural feature.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70795	Magnetic	414746	5850304	A2	-	-	-	35	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70796	Magnetic	414654	5850537	A2	-	-	-	58	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70797	Magnetic	414371	5850803	A2	-	-	-	76	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70798	Dark reflector	414339	5850340	A2	1.0	0.1	0.3	-	Small dark reflector with a distinct shadow. Bright reflector at the front of the contact, possibly related.	
70799	Magnetic	414289	5850975	A2	-	-	-	53	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70800	Magnetic	414188	5850981	A2	-	-	-	20	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70801	Magnetic	414181	5849933	A2	-	-	-	172	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70802	Magnetic	414007	5851075	A2	-	-	-	217	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70803	Magnetic	413984	5851304	A2	-	-	-	97	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70804	Magnetic	413882	5851313	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70805	Magnetic	413875	5851575	A2	-	-	-	15	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70806	Magnetic	413857	5849835	A2	-	-	-	51	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70807	Magnetic	413733	5851587	A2	-	-	-	11	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70808	Magnetic	413700	5851069	A2	-	-	-	79	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70809	Wreck	413550	5850143	A1	47.0	18.0	7.6	1779	Wreck of steam paddle schooner <i>Seagull</i> . The wreck is orientated in a NW - SE direction. Wreck appears to be partially disintegrated on the sonar data with numerous straight dark reflectors and a broad, irregular shadow. In the bathymetry data the wreck appears intact and upright on a sandwave rich area of the seabed, again some superstructure is discernible in the data. Wreck is identified on the magnetometer data as a large asymmetrical dipole. The UKHO record states that the original dimensions were 52.1m x 7m. This wreck was last observed in 1994 by divers, who measured the length as 40m and the height as 8.6m.	10550 (UKHO); 892272 (NRHE)
70810	Debris field	413518	5850156	A1	8.0	3.3	0.4	-	Small patch of disturbed seafloor with some possible straight features with height, however nothing is clearly discernible. Possible debris associated with the wreck 70809	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70811	Magnetic	413517	5850235	A2	-	-	-	81	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70812	Magnetic	413491	5851668	A2	-	-	-	110	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70813	Magnetic	413294	5851181	A2	-	-	-	74	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70814	Magnetic	413256	5849895	A2	-	-	-	69	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70815	Magnetic	413243	5849961	A2	-	-	-	75	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70816	Debris	413210	5850774	A2	8.3	0.4	0.1	-	Short curvilinear dark reflector with a slight shadow. Possible item of debris however not particularly distinct.	
70817	Magnetic	413169	5849901	A2	-	-	-	67	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70818	Dark reflector	412926	5850034	A2	0.8	0.7	0.5	-	Relatively indistinct, straight dark reflector with a relatively broad shadow. Possibly a natural feature.	
70819	Magnetic	412731	5850815	A2	-	-	-	36	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70820	Magnetic	412715	5851475	A2	-	-	-	301	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70821	Magnetic	412714	5851035	A2	-	-	-	30	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70822	Magnetic	412605	5849769	A2	-	-	-	69	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70823	Debris	412557	5850455	A2	82.7	0.9	0.4	110	Long, straight linear item of debris with height identified on the sonar data. Feature correlates with a medium asymmetric dipole identified on the magnetometer data indicating ferrous debris.	
70824	Magnetic	412502	5850689	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70825	Magnetic	412445	5851504	A2	-	-	-	158	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70826	Magnetic	412413	5849863	A2	-	-	-	36	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70827	Magnetic	412322	5850037	A2	-	-	-	53	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70828	Magnetic	412261	5850645	A2	-	-	-	52	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70829	Dark reflector	412242	5849928	A2	2.7	0.1	0.2	-	Faint, straight, elongated dark reflector with a slight shadow.	
70830	Magnetic	412230	5850469	A2	-	-	-	88	Medium distinct negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70831	Dark reflector	412223	5849946	A2	2.3	0.8	0.3	-	Distinct, straight elongated dark reflector with a broad shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70832	Debris	412148	5850351	A1	1.6	0.3	0.5	-	Small dark reflector, not particularly distinct, identified towards the bow of wreck 70834. Likely to be items of debris associated with wreck.	
70833	Debris	412143	5850353	A1	0.9	0.6	0.6	-	Small dark reflector identified at the bow of a wreck. Partially obscured by the wreck shadow. Possible similar debris identified nearby (70832). Likely to be items of debris associated to wreck 70834.	
70834	Wreck	412105	5850354	A1	66.0	12.8	6.4	147	Wreck of the steam screw barque <i>Xanthe</i> (UKHO) sunk in 1869. Identified on the sonar data as a distinct, upright wreck. Wreck appears to be relatively intact, with some possible straight deck features and some associated items of debris. In the bathymetry data the wreck consists of one distinct target aligned east to west, lying on the seabed at a depth of 29m. Wreck is identified on the magnetometer data as a medium magnetic anomaly. UKHO record states that the original dimensions were 62.2m x 8.5m x 4.9m and that the wreck was last observed in 2002, with dimensions of 55m x 10m x 7m.	10660 (UKHO); 892273 (NRHE)
70835	Magnetic	411891	5850871	A2	-	-	-	66	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70836	Magnetic	411629	5850952	A2	-	-	-	49	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70837	Rope/chain	411622	5850101	A2	67.1	1.1	0.3	64	Long and reasonably straight linear dark reflector with slight height. Possible rope or chain. Has a medium magnetic anomaly associated indicating ferrous debris.	
70838	Rope/chain	411607	5850260	A2	128.2	0.4	0.4	-	Long and thin curvilinear dark reflector with slight height. Possible rope/chain, feature curves round in a loop at one end.	
70839	Rope/chain	411475	5850313	A2	105.3	0.5	0.5	35	A long, thin and curvilinear dark reflector with a slight shadow, likely long length of rope or chain. Has a small magnetic anomaly associated indicating ferrous debris.	
70840	Magnetic	411359	5850463	A2	-	-	-	308	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70841	Magnetic	411189	5850739	A2	-	-	-	327	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70842	Magnetic	411177	5850603	A2	-	-	-	662	Large negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70843	Magnetic	411154	5850789	A2	-	-	-	40	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70844	Debris	411081	5851344	A2	7.1	0.4	0	-	Short, narrow curvilinear bright reflector identified in an area of rippled seabed.	
70845	Magnetic	410999	5851831	A2	-	-	-	44	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70846	Magnetic	410993	5850260	A2	-	-	-	39	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70847	Debris	410940	5851086	A2	35.3	0.4	0.4	-	Relatively straight linear item of debris, orientated east - west, with an irregular, intermittent shadow. Identified in an area of textured seafloor.	
70848	Magnetic	410900	5850242	A2	-	-	-	63	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70849	Magnetic	410851	5851515	A2	-	-	-	33	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70850	Magnetic	410795	5851571	A2	-	-	-	38	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70851	Magnetic	410762	5850475	A2	-	-	-	95	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70852	Magnetic	410694	5849930	A2	-	-	-	40	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70853	Magnetic	410575	5851709	A2	-	-	-	48	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70854	Magnetic	410573	5851587	A2	-	-	-	61	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70855	Magnetic	410464	5851920	A2	-	-	-	67	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70856	Rope/chain	410452	5851174	A2	43.4	0.3	0.2	94	Long length of a slightly curvilinear dark reflector with a slight shadow. Possible rope or chain. Has a medium magnetic anomaly associated indicating ferrous debris.	
70857	Magnetic	410399	5851420	A2	-	-	-	46	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70858	Magnetic	410367	5850127	A2	-	-	-	206	Large dipolar anomaly only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
70859	Magnetic	410341	5851681	A2	-	-	-	43	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70860	Magnetic	410327	5849961	A2	-	-	-	134	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris with no surface expression.	
70861	Magnetic	410266	5850427	A2	-	-	-	26	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
70862	Magnetic	410254	5851569	A2	-	-	-	62	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70863	Debris field	410221	5851797	A2	29.9	12.8	0.9	40	Small patch of disturbed seafloor. Appears to be slightly darker reflector with some objects with height. Has a small magnetic anomaly associated indicating ferrous debris.	
70864	Magnetic	410145	5850132	A2	-	-	-	84	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70865	Magnetic	410080	5850090	A2	-	-	-	79	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70866	Magnetic	410048	5851912	A2	-	-	-	70	Medium anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70867	Magnetic	409983	5851893	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70868	Magnetic	409858	5851319	A2	-	-	-	170	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70869	Magnetic	409809	5850446	A2	-	-	-	198	Medium asymmetric dipole Identified on more than one survey line. Indicative of possible buried ferrous debris.	
70870	Magnetic	409231	5851189	A2	-	-	-	415	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70871	Rope/chain	409224	5851490	A2	27.9	0.3	0.2	-	Short, relatively straight linear item of debris possibly with a slight shadow. Not particularly distinct.	
70872	Magnetic	409102	5850383	A2	-	-	-	81	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70873	Magnetic	408920	5850554	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70874	Rope/chain	408842	5850853	A2	71.8	0.2	0.2	-	Curvilinear item of debris with a slight shadow. Possible rope or chain.	
70875	Dark reflector	408818	5851046	A2	3.7	1.5	0.4	-	Small round dark reflector with a brighter reflector in the centre and a distinct, irregular shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70876	Magnetic	408780	5850544	A2	-	-	-	48	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70877	Magnetic	408775	5851203	A2	-	-	-	154	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70878	Magnetic	408658	5852225	A2	-	-	-	25	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70879	Magnetic	408520	5852354	A2	-	-	-	37	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70880	Magnetic	408487	5852290	A2	-	-	-	114	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
70881	Debris	408481	5850795	A2	2.5	1.9	0.5	241	Small, circular dark reflector with a bright reflector in the centre with a broad distinct shadow. Has a large magnetic anomaly associated indicating ferrous debris	
70882	Magnetic	408463	5852212	A2	-	-	-	29	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70883	Debris	408450	5850815	A2	8.1	0.2	0.2	-	Short, straight linear item of debris curved round in a 'v', or possibly two objects close together.	
70884	Dark reflector	408420	5850627	A2	3.1	2.4	0.6	-	Dark circular dark reflector with a bright reflector in the centre and a distinct shadow. Some slight disturbance to surrounding sediment.	
70885	Magnetic	408400	5850489	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70886	Magnetic	408392	5851348	A2	-	-	-	33	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70887	Magnetic	408380	5851461	A2	-	-	-	87	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70888	Debris	408377	5851568	A2	1.8	1.7	0.5	54	Small, round dark reflector with a bright reflector in the centre in a depression. Has a medium magnetic anomaly associated indicating ferrous debris	
70889	Magnetic	408357	5850798	A2	-	-	-	53	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70890	Magnetic	408348	5851600	A2	-	-	-	77	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70891	Magnetic	408329	5852368	A2	-	-	-	90	Medium distinctive dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70892	Dark reflector	408288	5851095	A2	7.8	1.2	0.5	-	Narrow dark reflector in a 'V' shape with a slight shadow. Looks a little irregular, may also be a slightly triangular object.	
70893	Dark reflector	408269	5850876	A2	5.8	0.9	0.8	-	Straight dark reflector with a broad, distinct shadow. Object appears to be slightly rectangular	
70894	Magnetic	408265	5852699	A2	-	-	-	692	Large dipole anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70895	Magnetic	408253	5850701	A2	-	-	-	46	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70896	Magnetic	408216	5850658	A2	-	-	-	238	Large asymmetric dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70897	Mound	408208	5851780	A2	5.0	3.4	1.4	-	Distinct dark reflector within a slight depression with a relatively broad shadow. Visible in the bathymetry as a distinct mound in the centre of a slight depression or scour measuring 17 m x 14 m x 0.6 m.	
70898	Magnetic	408186	5850687	A2	-	-	-	313	Large asymmetric dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70899	Dark reflector	408170	5850847	A2	4.4	1.9	1.1	-	Distinct, 'v' shape dark reflector with a distinct, tapered shadow. Some disturbance to surrounding seabed.	
70900	Debris	408162	5850457	A2	8.7	1.7	1.2	-	A broken up or partially buried piece of debris, the feature has two distinct circular dark reflectors with shadows and a short curvilinear linear dark reflector with height coming from this.	
70901	Dark reflector	408137	5851136	A2	3.3	0.9	0.7	-	Distinct dark reflector with a broad, slightly angular shadow.	
70902	Magnetic	408094	5852138	A2	-	-	-	34	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70903	Magnetic	408061	5851869	A2	-	-	-	103	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70904	Magnetic	408025	5851490	A2	-	-	-	220	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70905	Dark reflector	408005	5851031	A2	1.6	1.5	0.3	-	Small, circular dark reflector with a bright reflector in the centre with a distinct curved shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70906	Magnetic	407965	5852058	A2	-	-	-	26	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70907	Magnetic	407771	5851284	A2	-	-	-	42	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70908	Magnetic	407756	5852353	A2	-	-	-	54	Medium distinctive dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70909	Magnetic	407724	5850649	A2	-	-	-	45	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70910	Magnetic	407667	5852948	A2	-	-	-	57	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70911	Magnetic	407640	5853077	A2	-	-	-	92	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70912	Magnetic	407639	5851465	A2	-	-	-	41	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70913	Rope/chain	407630	5853193	A2	92.7	0.8	0.4	305	Curvilinear dark reflector with slight height possibly split apart or partially buried across its extent. Possible rope or chain orientated north-west to south-east on a relatively flat and even area of the seabed. Has a large magnetic anomaly associated indicating ferrous debris.	
70914	Magnetic	407630	5852981	A2	-	-	-	117	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70915	Mound	407613	5852594	A2	16.0	15.0	1.9	128	Large, rounded, poorly defined dark reflector with a broad, long shadow. In the bathymetry data this is visible as a large circular mound. Has a large medium magnetic anomaly associated indicating ferrous debris is contained	
70916	Dark reflector	407518	5851012	A2	2.6	0.7	0.6	-	An irregularly shaped thin dark reflector, relatively straight and with a fairly broad shadow.	
70917	Magnetic	407474	5853234	A2	-	-	-	54	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70918	Magnetic	407469	5852212	A2	-	-	-	154	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70919	Dark reflector	407440	5851807	A2	4.1	0.5	0.5	-	Dark reflector with a broad, distinct shadow. Looks quite large however image likely distorted by movement of sonar fish.	
70920	Magnetic	407407	5850803	A2	-	-	-	37	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70921	Rope/chain	407326	5851962	A2	69.9	0.5	0.1	31	Faint linear dark reflector, curved into a 'v' shape with a rounded joint, with a slight shadow, possibly rope or chain. Has a small magnetic anomaly associated indicating ferrous debris.	
70922	Magnetic	407291	5851104	A2	-	-	-	193	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
70923	Dark reflector	407269	5851868	A2	1.8	1.5	0.4	-	Small, circular dark reflector with a bright reflector in the centre with a distinct shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70924	Magnetic	407269	5851069	A2	-	-	-	43	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70925	Dark reflector	407266	5851035	A2	2.4	0.9	0.6	-	Faint dark reflector with a distinct, broad shadow.	
70926	Magnetic	407211	5853274	A2	-	-	-	25	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70927	Magnetic	407206	5850855	A2	-	-	-	228	Large positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70928	Dark reflector	407187	5851658	A2	6.4	1.5	0.4	-	Narrow elongated dark reflector with a broad distinct shadow. Object extends out with a very slight shadow.	
70930	Magnetic	407157	5851175	A2	-	-	-	22	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70931	Magnetic	407156	5851314	A2	-	-	-	26	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70932	Rope/chain	407100	5851063	A2	9.3	0.5	0.2	-	Relatively short linear dark reflector with a slight shadow. Possible rope or chain identified in a relatively featureless area of seafloor.	
70933	Magnetic	407047	5852501	A2	-	-	-	161	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70934	Wreck	406929	5852021	A1	105.0	46.4	1.9	1056	Large wreck visible as numerous small objects with height, some of which are quite straight. No distinguishable structural elements are visible and it appears badly degraded, though still with some height. The wreck is orientated north to south on a relatively flat and even area of the seabed. In the bathymetry data this wreck is visible as mostly buried and broken up and situated in a depression. Has a very large magnetic anomaly associated indicating a ferrous construction. UKHO record 10554 states this is the <i>Sheaf Water</i> , a steamship torpedoed by a German E-Boat in 1942 with original dimensions of 97.5m x 13.1m. Previously identified in 2002 with dimensions as 110m x 25m x 2m.	10554 (UKHO); 907463 (NRHE)
70935	Debris	406866	5852138	A2	4.3	3.3	1.4	-	A triangular dark reflector with a distinct dark reflector at the front with a distinct, narrow shadow. Possible debris, located 80 m from dispersed wreck (70934)	
70936	Bright reflector	406791	5851618	A2	7.1	0.1	0	-	Straight, elongated bright reflector. Possibly a shadow with no discernible contact.	
70937	Dark reflector	406764	5852637	A2	4.7	0.5	0.3	-	Short straight distinct dark reflector with a broad shadow.	
70938	Magnetic	406737	5852583	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70939	Dark reflector	406699	5852290	A2	4.2	0.9	0.4	-	Straight, distinct dark reflector, which bends round slightly at one end, with a broad shadow. Object possibly distorted by movement of the sonar fish.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70940	Magnetic	406685	5851341	A2	-	-	-	86	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70941	Bright reflector	406611	5852664	A2	6.5	0.7	0	-	Short, straight narrow bright reflector identified in an isolated area of seafloor.	
70942	Magnetic	406605	5852642	A2	-	-	-	358	Large anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
70943	Dark reflector	406587	5852212	A2	4.3	1.4	0.3	-	Small, circular dark reflector with a bright reflector in the centre and a distinct shadow.	
70944	Magnetic	406561	5851181	A2	-	-	-	38	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70945	Magnetic	406516	5851497	A2	-	-	-	37	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70946	Rope/chain	406463	5853677	A2	65.1	0.4	0.3	-	Relatively straight linear dark reflector with a shadow on a flat and even area of the seabed, possible rope or chain.	
70947	Magnetic	406445	5851623	A2	-	-	-	59	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70948	Debris field	406424	5852262	A2	31.0	31.0	-0.7	386	Slightly diamond shaped debris field comprising bright reflectors with a dark reflector running through the centre. Possible scour. In the bathymetry data this is visible as a large depression with slight mound in the centre. Has a large magnetic anomaly associated indicating ferrous debris.	
70949	Seafloor disturbance	406349	5851117	A2	7.5	6.5	0.5	-	A few short, straight dark reflectors with a slight shadow, possibly partially buried by sandy sediments.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70950	Magnetic	406261	5851245	A2	-	-	-	45	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70951	Magnetic	406216	5852461	A2	-	-	-	51	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70952	Rope/chain	406176	5852858	A2	98.2	0.6	0.3	-	A long straight and narrow linear dark reflector with a slight shadow, possible rope or chain associated or caught on wreck (70962).	
70953	Magnetic	406141	5851570	A2	-	-	-	65	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70954	Wreck	406125	5853694	A1	73.2	29.6	5.1	12104	Large wreck that appears to be mostly intact. It has numerous dark reflectors, some of which are quite straight and have long, distinct shadows. These may be deck structure visible in the sidescan sonar data. The vessel has a large height measurement and is orientated north-east to south-west on a relatively flat and even area of the seabed. In the bathymetry data this wreck appears upright with a distinct area of scour orientated south-east and a depth of 1m below the seabed. There does not appear to be any outlying debris visible. There is a very large magnetic anomaly associated indicating a ferrous construction. Associated with UKHO record 10680 of unknown wreck. Last observed with dimensions 80m x 20m x 4m in 1983.	10680 (UKHO); 892279 (NRHE)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70955	Rope/chain	406125	5852888	A2	14.2	0.6	0.1	-	Short and straight curvilinear item of debris with slight height, possibly a rope or chain. Identified close to similar linear feature and wreck (70962).	
70956	Rope/chain	406096	5852907	A2	82.9	1.1	0.2	-	Very long, relatively straight and narrow dark reflector with slight height. Possibly fishing gear attached to wreck 70962.	
70957	Magnetic	406089	5853496	A2	-	-	-	12	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70958	Debris field	406085	5852987	A1	44.4	19.2	0.2	-	Large patch of a dispersed dark reflectors with height. Approximately four anomalies, one thin linear dark reflector and smaller anomalies. Located directly next to wreck 70962 and likely associated debris	
70959	Rope/chain	406077	5853046	A2	33.1	0.4	0.3	-	Faint curvilinear dark reflector with slight height, possible rope or chain associated with nearby wreck (70962).	
70960	Rope/chain	406070	5853720	A2	70.1	0.4	0.1	-	Long and thin linear dark reflector identified close to wreck. Possibly related rope or chain or modern material snagged on the wreck (70954).	
70961	Magnetic	406069	5851369	A2	-	-	-	168	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70962	Wreck	406058	5852977	A1	107.0	43.5	4.0	30656	A large area of dispersed wreck, visible as numerous dark reflectors, some of which are quite straight, with distinct broad shadows which may be deck structure. Parts of the hull outer edge appear intact. The wreck has a debris field (70958) and possible rope or chain features in close proximity (70952, 70955, 70956 and 70959). The wreck is orientated north to south. In the bathymetry data this wreck is recorded with a general seabed depth of 14m and is visible as one distinct target with one high point at the northern end. Has a large magnetic anomaly associated indicating a ferrous construction. In the UKHO database this is recorded as <i>Fulgens</i> , a steamship built in 1912 with dimensions of 93.1m x 12.9m and sunk in 1915 by torpedo.	10556 (UKHO); 907465 (NRHE)
70963	Magnetic	406046	5851855	A2	-	-	-	109	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70964	Magnetic	406037	5852080	A2	-	-	-	29	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70965	Debris field	405986	5853162	A2	29.0	15.0	0.7	345	Small patch of objects with height with distinct shadows, possible debris field. In the bathymetry data this is visible as a depression (-0.8 m) with slight mound in the centre on a slope. Has a large magnetic anomaly associated indicating ferrous debris	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70966	Magnetic	405904	5854081	A2	-	-	-	56	Medium symmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70967	Dark reflector	405903	5851454	A2	7.8	0.4	0.2	-	Straight, narrow, distinct dark reflector with slightly curved shadow.	
70968	Magnetic	405841	5852185	A2	-	-	-	58	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70969	Rope/chain	405828	5852225	A2	67.2	0.4	0.2	-	A long, thin and faint linear dark reflector with associated dark reflector. Feature appears to be in a relatively broad 'v' shape. Object on end of possible rope or chain measures 2.3m x 1.8m x 0.8m.	
70970	Magnetic	405824	5851595	A2	-	-	-	131	Medium distinctive dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70971	Dark reflector	405778	5851519	A2	12.4	0.7	0.4	-	Long, thin and straight, poorly defined dark reflector with a distinct shadow.	
70972	Rope/chain	405726	5851715	A2	56.7	0.3	0.4	-	Linear dark reflector with a very slight shadow, possibly rope or chain although may just be a scar. Has a UKHO record (10553 - British fishing vessel <i>Nikki</i> ) 13m to the north-east but no visible remains.	10553 (UKHO)
70973	Magnetic	405678	5852003	A2	-	-	-	28	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70974	Rope/chain	405662	5853148	A2	46.0	0.7	0.3	-	Straight, linear item of debris with a slight shadow identified in a relatively featureless area of seafloor, possible rope or chain.	
70975	Magnetic	405458	5852406	A2	-	-	-	615	Large anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70976	Dark reflector	405441	5851506	A2	3.1	0.2	0.2	-	Very slight dark reflector, not particularly distinct, with a broad shadow.	
70977	Magnetic	405438	5852011	A2	-	-	-	107	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70978	Debris	405427	5851976	A2	4.8	2.5	1.6	34	Straight, but relatively indistinct dark reflector but with a clearly defined shadow. Shadow appears to be slightly square with a dark reflector in the centre. Has a small magnetic anomaly associated indicating ferrous debris	
70979	Dark reflector	405401	5852664	A2	4.1	0.9	0.7	-	Distinct long and slightly curvilinear dark reflector with a distinct jagged shadow. Other, smaller objects identified in the surrounding area.	
70980	Magnetic	405370	5851605	A2	-	-	-	36	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70981	Debris field	405293	5852497	A2	22.7	11.9	1.0	-	Distinct slightly rounded dark reflector with a broad shadow within a small debris field or seafloor disturbance with some large objects with height. In the bathymetry data this is visible as three slightly distinct mounds in a circular arrangement on a relatively flat and even area of the seabed, slightly more distinct than surrounding features	
70982	Magnetic	405215	5853665	A2	-	-	-	25	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70983	Magnetic	405183	5851919	A2	-	-	-	64	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70984	Dark reflector	405155	5851768	A2	1.9	1.8	0.8	-	Straight dark reflector, slightly triangular with a long, narrow shadow.	
70985	Dark reflector	405133	5851794	A2	2.0	1.7	0.8	-	Faint dark reflector, slightly triangular, with a long, narrow shadow.	
70986	Dark reflector	405110	5851766	A2	6.5	0.4	0.2	-	Long and straight dark reflector, not particularly distinct, with a slight shadow.	
70987	Bright reflector	405062	5852152	A2	5.7	0.5	0	-	Straight and narrow bright reflector. Not particularly distinct feature.	
70988	Rope/chain	405057	5853805	A2	31.9	0.3	0.2	-	Short, slightly angular linear item of debris with height. Similar linear feature identified nearby. Possibly joined and partially buried, or split in two parts, may be rope or chain. Individually features measure 13.6m x 5.5m.	
70989	Rope/chain	405000	5852448	A2	38.0	0.3	0.2	-	Dark, linear feature with a slight shadow. Possible rope or chain.	
70990	Bright reflector	404986	5851814	A2	3.8	2.1	0	-	Bright, straight 'V' shaped object identified.	
70991	Magnetic	404900	5852184	A2	-	-	-	27	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70992	Magnetic	404887	5853971	A2	-	-	-	42	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
70993	Rope/chain	404788	5851740	A2	64.8	0.3	0.1	157	Faint, narrow linear item of debris with a very slight shadow. Possible rope or chain. Has a medium dipole anomaly associated indicating a ferrous composition.	
70994	Magnetic	404787	5853518	A2	-	-	-	39	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
70995	Debris	404710	5851809	A2	5.6	0.2	0	88	Small narrow, but relatively distinct dark reflector with no discernible height. Feature appears to have some slight associated scour. Has a medium dipole anomaly associated indicating ferrous debris	
70996	Magnetic	404661	5854180	A2	-	-	-	75	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
70997	Dark reflector	404657	5852481	A2	6.8	0.4	0.3	-	Straight dark reflector with a distinct shadow.	
70998	Dark reflector	404649	5852896	A2	6.1	0.4	0.2	-	Straight narrow dark reflector with a distinct, relatively broad shadow. Similar feature identified nearby, possibly part of a longer, partially buried, linear feature (70999).	
70999	Dark reflector	404635	5852909	A2	9.9	0.2	0.2	-	Straight narrow dark reflector with a distinct, relatively broad shadow. Similar feature identified nearby, possibly a longer, partially buried, linear feature (70998).	
71000	Dark reflector	404575	5853973	A2	3.6	3.1	1.7	-	Slightly triangular dark reflector, not particularly distinct, with a long, narrow and bright shadow.	
71001	Seafloor disturbance	404559	5852372	A2	22.0	5.0	1.1	-	Elongated seafloor disturbance with irregular shadows or numerous objects with height close together in a line. In the bathymetry data this is visible as a linear alignment of small mounds, slightly more distinct than surrounding seabed features, aligned east to west.	
71002	Dark reflector	404548	5853642	A2	0.4	0.3	0.4	-	Distinct, relatively straight dark reflector with a broad shadow.	
71003	Magnetic	404541	5851825	A2	-	-	-	402	Large dipolar anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71004	Magnetic	404512	5852601	A2	-	-	-	191	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71005	Magnetic	404498	5853434	A2	-	-	-	83	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71006	Magnetic	404490	5853306	A2	-	-	-	28	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71007	Dark reflector	404399	5851916	A2	18.1	1.1	0.6	-	Elongated, relatively straight dark reflector with a slightly irregular jagged shadow.	
71008	Debris	404365	5852692	A2	5.0	2.5	1.1	77	Dark reflector with a broad, slightly jagged shadow, distinct feature with a medium magnetic anomaly associated indicating ferrous debris	
71009	Debris	404352	5852638	A2	7.0	5.2	3.0	-	A large dark reflector with a distinct, broad shadow, appears to be broken up or partially buried and looks particularly distinct. Possibly debris. Visible in the bathymetry data as a pointed mound with a circular profile. Close to a debris field 71011	
71010	Dark reflector	404340	5852252	A2	2.6	0.5	0.4	-	Two dark reflector objects with a broad shadow with other bright reflectors surrounding them	
71011	Debris field	404337	5852642	A2	23.2	5.1	1.8	-	A large patch of dark reflectors with a long, distinct jagged shadow. Possibly debris field, feature looks particularly distinct compared to surrounding sediment. Visible in the bathymetry data as an irregular shaped large oval mound close to another smaller mound, More distinct than surrounding seabed features. Is close to a piece of debris 71009.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71012	Magnetic	404310	5852174	A2	-	-	-	24	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71013	Magnetic	404296	5854168	A2	-	-	-	38	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71014	Magnetic	404232	5851985	A2	-	-	-	136	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71015	Dark reflector	404182	5853087	A2	10.6	0.5	0.3	-	Elongated, slightly curved dark reflector with a distinct shadow.	
71016	Dark reflector	404136	5852961	A2	8.0	0.3	0.3	-	Straight, slight, dark reflector with a distinct shadow.	
71017	Debris	404133	5852674	A2	3.5	1.7	1.1	55	Dark reflector with a distinct, slightly irregular shadow. Shadow appears to extend beyond the limits of dark reflector, has a medium magnetic anomaly associated indicating ferrous debris	
71018	Magnetic	404133	5853090	A2	-	-	-	130	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71019	Rope/chain	404118	5853471	A2	20.9	0.3	0.3	-	Slight linear item, not particularly distinct, with a faint shadow. Very long and thin possible rope or chain feature.	
71020	Magnetic	404088	5855253	A2	-	-	-	72	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71021	Debris	404054	5852315	A2	5.6	1.9	0.7	-	Elongated, irregularly shaped dark reflector with a distinct shadow with some slight scour, possibly debris	
71022	Dark reflector	404029	5853119	A2	9.0	0.3	0.3	-	Long, thin and straight dark reflector with a distinct shadow.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71023	Mound	404025	5854891	A2	36.7	22.0	3.0	-	Mound with a distinct, broad shadow, comprised of small, dark reflectors with height. Visible in the bathymetry as a distinct and large circular mound.	
71024	Rope/chain	404024	5854631	A2	22.6	0.1	0.1	-	Faint, curvilinear dark reflector identified with slight shadow, possible length of rope or chain.	
71025	Magnetic	404022	5854153	A2	-	-	-	56	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71026	Mound	404016	5855180	A2	21.0	20.0	1.3	-	Small mound with a distinct, irregular shadow, possibly comprising small objects with height. In the bathymetry data this is visible as an irregular mound near the southern end of a natural depression.	
71027	Debris field	404000	5852417	A2	54.0	16.0	0.8	-	Possible debris field comprising over ten dark and bright reflectors, some long thin and distinct linear dark reflectors with shadows visible (8.2m x 0.8m x 0.7m maximum).	
71028	Magnetic	403995	5851922	A2	-	-	-	120	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71029	Debris	403994	5854060	A2	1.9	0.2	1.6	32	Dark reflector with a long, narrow shadow. Has a small magnetic anomaly associated indicating ferrous debris	
71030	Dark reflector	403954	5852726	A2	4.4	1.0	0.4	-	Straight dark reflector with a broad shadow. Feature looks fairly straight however may just be distorted by movement of sonar fish.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71031	Debris	403929	5853910	A2	2.1	0.5	0.9	226	Indistinct slightly irregular dark reflector with a long shadow. Full extent is possibly covered by sandy sediments. Has a large magnetic anomaly associated indicating ferrous debris.	
71032	Magnetic	403915	5854331	A2	-	-	-	73	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71033	Magnetic	403858	5851976	A2	-	-	-	108	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
71034	Rope/chain	403849	5854418	A2	13.6	0.3	0.1	-	Faint, slightly curved linear dark reflector with a slight shadow, possibly rope or chain.	
71035	Magnetic	403849	5853353	A2	-	-	-	31	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71036	Rope/chain	403842	5854306	A2	24.8	0.2	0.4	37	Distinct, relatively straight linear dark reflector with height. Feature bends round at an angle at one end. Possible rope or chain on an otherwise featureless area of the seabed. Has a small negative monopole associated indicating some ferrous content.	
71037	Rope/chain	403840	5853945	A2	25.5	0.8	0.3	-	Long and thin linear item of debris with a slight shadow. Identified in a relatively featureless area of seafloor, possible rope or chain feature.	
71038	Dark reflector	403837	5853230	A2	8.8	0.2	0.3	-	A long and straight, slight, dark reflector with a distinct shadow. Identified in an area of megaripples however appears to be perpendicular to the orientation of the natural features.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71039	Magnetic	403835	5852029	A2	-	-	-	199	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71040	Magnetic	403822	5852844	A2	-	-	-	54	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71041	Debris	403761	5854672	A2	1.0	0.9	0.5	103	Dark reflector with broad slightly irregular shadow. Possibly related to a linear dark reflector 4 m away (71042). Identified in a relatively featureless area of seabed. Has a medium magnetic anomaly associated indicating ferrous debris	
71042	Dark reflector	403758	5854662	A2	19.2	0.3	0.3	-	Long, thin and slightly curvilinear dark reflector with height. Possibly associated with ferrous debris object (71041)	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71043	Wreck	403723	5852349	A1	60.0	56.0	1.9	322	<p>A large wreck broken into two sections, that appear to be in a poorly preserved condition lying at right angles one another. The larger section is to the north and orientated east to west with dimensions of 52m x 17m x 0.5m. The wreck has straight edges along its length and the deck appears to be intact showing some superstructure. The boundaries of the wreck are not always discernible in the data. There is slight scouring orientated north-west to south-east. The second section of the wreck has dimensions of 37m x 14m x 1.9m and is orientated north-east to south-west. This section of the wreck appears more degraded in the sidescan sonar data with little detail other than the hull edge discernible. The complete dimensions of the wreck site are 60m x 56m x 1.9m. This wreck has a large magnetic anomaly measuring 322 nT associated, indicating a ferrous construction or cargo. In the bathymetry data this is visible as a large wreck split in two parts that appears to be very degraded and poorly preserved with little height off the seabed. Overall the wreck appears to be poorly preserved and as it is located within large sandwaves, there is potential for associated debris to be buried in the vicinity. UKHO record 86378 is associated with this wreck. It is unknown and described as being split into two pieces, one measuring 50m and the other 35m long.</p>	86378 (UKHO)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71044	Magnetic	403709	5853753	A2	-	-	-	253	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71045	Dark reflector	403707	5853319	A2	6.6	0.6	0.2	-	Straight, slight, dark reflector with a distinct shadow in an area of relatively featureless seabed.	
71046	Debris	403698	5852274	A2	2.5	0.3	0.5	109	Small straight object within a depression and some irregular bright shadow. Has a medium magnetic anomaly associated indicating ferrous debris	
71047	Dark reflector	403652	5852168	A2	5.1	2.7	0.6	-	Rounded object with possible irregular object or sediment build up adjacent	
71048	Magnetic	403647	5853542	A2	-	-	-	362	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71049	Magnetic	403611	5852965	A2	-	-	-	79	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71050	Magnetic	403595	5855307	A2	-	-	-	40	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71051	Debris	403587	5855192	A2	3.2	0.4	0.2	27	Short and straight dark reflector with a distinct, slightly broad shadow. Has a small magnetic anomaly associated indicating ferrous debris	
71052	Rope/chain	403563	5854315	A2	92.5	0.3	0.1	-	A long and thin linear dark reflector in a broad 'v' shape with a slight shadow, or a linear split in two/partially buried in its centre . Very long and distinct possible rope or chain, appears to be covered by sediment in parts.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71053	Magnetic	403518	5852408	A2	-	-	-	148	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71055	Magnetic	403491	5854782	A2	-	-	-	68	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71056	Magnetic	403486	5852275	A2	-	-	-	71	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71057	Magnetic	403467	5853573	A2	-	-	-	54	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71058	Dark reflector	403457	5852745	A2	3.7	1.7	1.5	-	Irregular series of dark reflectors, possibly with a faint, long, narrow shadow. Possibly natural however looks a little anomalous to surroundings.	
71059	Dark reflector	403457	5853696	A2	2.1	0.6	0.7	-	Short, straight dark reflector with a relatively broad shadow.	
71060	Debris	403450	5852335	A2	1.6	0.7	0.4	175	Small straight object with angular bright shadow, has a medium dipole associated indicating ferrous debris	
71061	Magnetic	403426	5852756	A2	-	-	-	41	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71062	Magnetic	403409	5854938	A2	-	-	-	153	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71063	Magnetic	403407	5852958	A2	-	-	-	539	Large asymmetric dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71064	Debris	403387	5852775	A2	35.2	4.0	0.4	70	Elongated, large dark reflector with an irregular shadow. In the bathymetry data this is visible as a long and thick linear item of debris orientated north-west to south-east and possibly broken up or partially buried in parts. Has a medium dipole associated indicating ferrous debris	
71065	Dark reflector	403386	5855256	A2	10.5	8.0	0.9	-	Two elongated, slightly rectangular dark reflectors with a broad, slightly irregular shadow situated parallel to one another. The smaller object measures 3.8 m x 2.8 m x 0.9 m and the larger object 4 m x 3.6 m x 0.8 m. In the multibeam data this is visible as two mounds situated within a depression	
71066	Magnetic	403377	5854967	A2	-	-	-	133	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71067	Debris	403366	5852457	A2	6.3	1.8	0.4	92	Irregular and possibly segmented dark reflector with slightly curved bright shadow. Has a medium magnetic anomaly associated indicating ferrous debris	
71068	Magnetic	403343	5855465	A2	-	-	-	21	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71069	Magnetic	403311	5852521	A2	-	-	-	645	Large dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71070	Dark reflector	403224	5853126	A2	5.4	1.2	0.3	-	Straight dark reflector, possibly with a taller section at one end, and a distinct shadow.	
71071	Magnetic	403222	5852538	A2	-	-	-	352	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71072	Magnetic	403217	5852685	A2	-	-	-	17	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71073	Magnetic	403179	5854938	A1	-	-	-	949	Very large dipole identified on more than one survey line. Indicative of possible substantial buried ferrous debris.	
71074	Magnetic	403177	5852564	A2	-	-	-	226	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71075	Magnetic	403157	5852804	A2	-	-	-	66	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71076	Dark reflector	403156	5853066	A2	7.9	0.2	0.3	-	Distinct, narrow elongated dark reflector with a broad shadow.	
71077	Bright reflector	403155	5853210	A2	6.2	1.0	0	-	Short, narrow, rectangular bright reflector. Possibly a shadow but with no discernible contact.	
71078	Magnetic	403087	5852984	A2	-	-	-	179	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71079	Magnetic	403051	5853039	A2	-	-	-	121	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71080	Debris	403019	5853862	A2	4.9	3.5	1.7	141	Slightly triangular dark reflector with a stronger response at the front of the feature, with a long, narrow shadow. Has a medium magnetic anomaly associated indicating ferrous debris	
71081	Magnetic	402897	5853157	A2	-	-	-	74	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71082	Debris field	402897	5855122	A2	42.0	12.0	2.7	-	Large area of possible partially buried debris field, tens of small exposed dark reflectors with shadows, which appears to be on a raised area of the seabed as there is a very large and bright shadow displaying substantial height visible, the sss dimensions are larger (55.5m x 28.1m) but in the bathymetry data this feature is more defined and visible as a large elongated mound with a steep south side and the northern side displaying no clearly defined edge, the feature is orientated north-west to south-east.	
71083	Rope/chain	402876	5854834	A2	59.2	0.8	1.3	-	Long and thin slightly curvilinear dark reflector with a slight shadow. Possible rope or chain. Also has a small object at one end measuring 0.8m x 0.8m x 1.3m.	
71084	Dark reflector	402874	5852852	A2	3.3	2.6	0.2	-	A small angular object with some scour and corresponding shadow	
71085	Magnetic	402868	5856051	A2	-	-	-	46	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71086	Magnetic	402827	5854036	A2	-	-	-	132	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71087	Magnetic	402782	5852993	A2	-	-	-	12	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71088	Debris	402774	5853831	A2	6.7	0.3	0.5	-	Straight, distinct dark reflector with a broad shadow. Possibly two linear contacts close together with a third in its shadow.	
71089	Magnetic	402761	5853242	A2	-	-	-	25	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71090	Dark reflector	402750	5854987	A2	5.3	3.2	0.3	-	Two long and thin dark reflectors in a 'v' shape with a slight shadow. Smaller linear measures 3.7 m x 0.3 m x 0.2 m and larger linear 5.3 m x 0.4 m x 0.2 m	
71091	Dark reflector	402636	5853108	A2	2.0	1.1	0.4	-	Angular object with angular scour and angular bright shadow, located in sandwaves	
71092	Magnetic	402568	5853189	A2	-	-	-	61	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71093	Magnetic	402567	5853091	A2	-	-	-	16	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71094	Magnetic	402562	5853209	A2	-	-	-	53	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71095	Dark reflector	402526	5853432	A2	6.7	0.2	0.2	-	Straight dark reflector with a slightly rounded shadow	
71096	Magnetic	402492	5855653	A2	-	-	-	515	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71097	Debris field	402489	5856330	A2	21.1	0.6	0.2	137	A large spread of debris consisting of a curvilinear, thin dark reflector that is in a slight 'v' shape, a possible rope or chain possibly partially buried by fine sediments. Two objects, a relatively poorly defined dark reflector with an irregular shadow measuring 1.6 m x 0.5 m x 0.5 m and a relatively straight dark reflector with a slight shadow measuring 2.9 m x 0.5 m x 0.1 m. Has a medium magnetic anomaly associated indicating ferrous debris	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71098	Magnetic	402467	5855677	A2	-	-	-	92	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71099	Magnetic	402443	5853664	A2	-	-	-	49	Small distinct negative monopole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71100	Magnetic	402425	5853407	A2	-	-	-	19	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71101	Magnetic	402414	5853236	A2	-	-	-	162	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
71102	Seafloor disturbance	402391	5853488	A2	10.2	5.2	0.7	-	Large irregular area of dark reflector objects with some angular bright shadows.	
71103	Magnetic	402386	5853657	A2	-	-	-	204	Large distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71104	Debris	402380	5855778	A2	40.2	0.3	0.1	368	Long, faint linear dark reflector with a very slight shadow, not particularly distinct. Has a dark reflector with a narrow shadow at one end measuring 2.2 m x 0.5 m x 0.8 m. Possibly a length of rope/chain with an object such as an anchor at one end. Has a large magnetic anomaly associated indicating ferrous debris	
71105	Magnetic	402357	5853620	A2	-	-	-	100	Medium irregular dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71106	Dark reflector	402355	5853542	A2	8.3	1.4	0.6	-	Irregular object, possibly several adjacent objects, with irregular bright shadow	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71107	Magnetic	402341	5853745	A2	-	-	-	35	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71108	Magnetic	402332	5853707	A2	-	-	-	40	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71109	Debris field	402331	5854753	A2	22.4	17.5	0.4	126	An area of several, faint objects with relatively broad shadows, possible large area of seafloor disturbance. Has a medium magnetic anomaly associated indicating ferrous material is present.	
71110	Dark reflector	402282	5854774	A2	4.7	0.2	0.5	-	Slightly 's' shaped narrow dark reflector with a relatively broad shadow.	
71111	Dark reflector	402228	5853594	A2	4.1	0.2	0.2	-	Straight, narrow dark reflector with a broad shadow	
71112	Dark reflector	402181	5855359	A2	8.1	0.3	0.3	-	Slightly curved elongated, narrow dark reflector with a slight shadow. Identified in a relatively featureless area of seabed, indistinct anomaly.	
71113	Magnetic	402137	5853592	A2	-	-	-	91	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71114	Magnetic	402095	5856299	A2	-	-	-	54	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71115	Rope/chain	402089	5854097	A2	53.3	0.4	0.1	101	Linear item of debris identified towards the edge of the data therefore measurements should be considered a minimum. Has a medium magnetic anomaly associated indicating ferrous debris, possibly chain.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71116	Magnetic	402081	5853919	A2	-	-	-	187	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71117	Wreck	402077	5855893	A1	50.2	26.4	1.7	13265	A large area of dispersed wreck remains. The wreck appears broken up with tens of individual linear dark reflectors with shadows visible. The wreck is orientated north-west to south-east. In the bathymetry data the wreck is visible as an oval shaped uneven mound and appears very degraded with little height standing on a featureless area of the seabed. There is a very large magnetic anomaly associated indicating a ferrous construction. UKHO 10568 records this as the HMS <i>Francolin</i> , a trawler bombed and sunk by a German aircraft in 1941. Last observed in 2015 as 40m x 16m x 1.6m.	10568 (UKHO); 907473 (NRHE)
71118	Magnetic	402075	5855279	A2	-	-	-	25	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71119	Debris	402073	5854603	A2	4.7	3.7	0.8	54	Faint, broad dark reflector with an irregular jagged shadow. Has a medium magnetic anomaly associated indicating ferrous debris	
71120	Magnetic	402048	5855989	A2	-	-	-	321	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71121	Dark reflector	402039	5853872	A2	16.0	3.0	0.3	-	Irregular object with irregular bright shadow. In the bathymetry data this is visible as a long and thin linear mound, possibly outcropping geology	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71122	Debris field	402025	5854516	A2	83.4	19.1	0.3	362	Large area of several dispersed linear items of debris with height. Has a large magnetic anomaly associated indicating ferrous debris	
71123	Dark reflector	402018	5853565	A2	1.3	0.7	0.4	-	Irregular object with an angular bright shadow	
71124	Magnetic	402015	5856509	A2	-	-	-	50	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71125	Magnetic	402011	5856297	A2	-	-	-	61	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71126	Magnetic	402000	5856033	A2	-	-	-	396	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71127	Magnetic	401961	5853630	A2	-	-	-	64	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71128	Wreck	401921	5856180	A1	16.3	8.0	0.9	954	A large spread of several dark reflectors, some of which appear to be relatively straight, with height. Visible in the bathymetry data as an elongated long mound orientated north to south on a relatively flat and even area of the seabed. The vessel has a large magnetic anomaly associated indicating ferrous content. Has a UKHO record (82483) associated which states unknown wreck last observed in 2015 with dimensions of 15m x 6m x 1m.	82483 (UKHO)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71129	Wreck	401875	5853654	A1	30.0	16.0	2.6	555	A medium sized wreck, sections of the hull outline of the vessel are discernible in the sidescan sonar data with some internal structure visible within this. The vessel comprises indistinct dark and bright reflectors, some linear and some irregular anomalies across its extent. There are numerous slatted dark reflectors with shadows and associated debris scattered across the seafloor around the wreck. In the bathymetry data the wreck goes beyond the data extent and so sidescan co-ordinates have been used. A large mound is partially visible within the bathymetry data, though there is little detail or structure discernible. Has a large dipole associated indicating a ferrous construction. Associated with the UKHO record 10560 for wreck of <i>HMS Dungeness</i> although this record has a position 50m from the observed wreck.	10560 (UKHO); MNF38252 (NHER)



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71130	Debris	401822	5856630	A2	5.0	4.6	1.7	70	Large dark reflector with associated scour and a long, distinct but tapered shadow. Object is sat within a rounded patch of bright reflector interpreted to be a depression. In the bathymetry data this is visible as a distinct rounded mound in the centre of a slight depression or scour (21 m x 15 m x -1 m). Has a medium sized magnetic anomaly associated indicating ferrous debris. Has a UKHO record associated (82482) for an obstruction which was last observed in 2015 with dimensions of 3.5 m x 3.5 m x 1.6 m	82482 (UKHO)
71131	Wreck	401775	5856176	A1	13.0	7.0	3.0	368	A recorded wreck visible as a seafloor disturbance comprised of several dark reflectors with a distinct, broad shadow. The feature has a large height measurement and appears to be partially buried by sediments. No discernible wreck features are visible which suggests this is very degraded. The wreck is visible in the bathymetry data as a distinct oval shaped mound orientated north-west to south-east in a featureless area of the seabed. The wreck has a large magnetic anomaly associated indicating ferrous material. UKHO 82484 records this as an unknown wreck, last identified in 2015 with dimensions of 9m x 4.5m x 2.3m and orientated 130 ° on the seabed.	82484 (UKHO)
71132	Magnetic	401769	5856248	A2	-	-	-	29	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71133	Debris	401768	5854018	A2	4.0	0.5	0.3	475	Angular and poorly defined object with a relatively broad shadow and some scour, has a large magnetic anomaly associated indicating ferrous debris	
71134	Magnetic	401739	5853966	A2	-	-	-	42	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71135	Magnetic	401734	5854916	A2	-	-	-	79	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
71136	Magnetic	401727	5853854	A2	-	-	-	28	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71137	Magnetic	401723	5856646	A2	-	-	-	32	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71138	Magnetic	401718	5855476	A2	-	-	-	25	Small and distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71139	Bright reflector	401713	5854300	A2	8.9	2.7	0.3	-	A long, straight and distinct bright reflector. Possibly a shadow however with no discernible contact.	
71140	Magnetic	401675	5855045	A2	-	-	-	61	Medium distinct dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71141	Dark reflector	401666	5854116	A2	5.6	0.7	0.4	-	Curvilinear dark reflector with a relatively broad shadow. Identified in an area of megaripples lying perpendicular to orientation of ripples.	
71142	Dark reflector	401659	5854223	A2	3.0	0.2	0.1	-	Small straight object with small tapered shadows at each end.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71143	Dark reflector	401656	5854587	A2	7.2	4.4	0	-	Two similar looking, slightly elongated, straight dark reflectors with a relatively irregular shadow. Situated next to one another on a flat and even area of the seabed, smaller anomaly measures 6.7 m x 0.7 m and larger feature measures 7.2 m x 1.4 m	
71144	Dark reflector	401621	5855053	A2	2.3	0.7	0.5	-	Short, relatively straight dark reflector with a broad, distinct shadow.	
71145	Bright reflector	401605	5854301	A2	3.1	1.9	0	-	Circular bright reflector with an irregularly shaped dark reflector in its centre.	
71146	Bright reflector	401555	5854388	A2	3.7	0.4	0	-	Straight, narrow bright reflector, looks quite distinct. Possibly a shadow, but no discernible dark reflector at front.	
71147	Magnetic	401553	5856720	A2	-	-	-	53	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71148	Magnetic	401534	5855240	A2	-	-	-	248	Large asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71149	Magnetic	401529	5856199	A2	-	-	-	12	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71150	Bright reflector	401504	5854334	A2	2.8	0.4	0	-	Small straight object with no obvious reflector.	
71151	Dark reflector	401502	5854303	A2	2.6	0.7	0.5	-	Slightly curved object with an irregularly shaped bright shadow	
71152	Magnetic	401474	5856193	A2	-	-	-	90	Medium asymmetric dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71153	Dark reflector	401467	5854106	A2	3.3	0.5	0.3	-	Straight edge of an object that seems to be within a depression and some slanted bright shadow	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71154	Bright reflector	401467	5855878	A2	9.6	1.0	0	-	Straight, narrow bright reflector. Possibly a shadow but with no discernible contact.	
71155	Magnetic	401465	5854269	A2	-	-	-	181	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
71156	Bright reflector	401440	5854631	A2	1.7	1.1	0	-	Circular, bright reflector with a dark reflector in its centre.	
71157	Magnetic	401429	5856233	A2	-	-	-	81	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71158	Debris	401428	5854135	A2	1.5	0.5	0.2	146	Small object within a depression and some angular shadow, located close to wreck and may be associated debris. Has a medium magnetic anomaly associated indicating ferrous debris	
71159	Bright reflector	401423	5854576	A2	2.2	1.2	0	-	Small, circular bright reflector with a hole at the centre, very distinct object on a sandy and even area of the seabed.	
71160	Dark reflector	401421	5854773	A2	5.8	0.5	0.2	-	Short, straight dark reflector, slightly rectangular with a distinct shadow.	
71161	Magnetic	401385	5854637	A2	-	-	-	40	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71162	Wreck	401376	5854164	A1	54.5	18.2	2.6	370	Large area of indistinct wreck remains consisting of an elliptical area of dark and bright reflectors with some bright shadows. A large area of seabed is disturbed around the wreck suggesting that there may be further buried debris under sediments. It is also difficult to distinguish the full extends in the sidescan data. In the bathymetry data this is visible as a broken up and poorly preserved wreck, the southern section of the wreck is larger and more defined. The northern section of wreck is visible whilst the centre is broken up and appears to be partially buried. Has a large dipole identified on more than one survey line associated indicating a ferrous composition. Associated UKHO record 86203 is of an unknown wreck - the wreck was last observed in 2016 and measured with a length of 30m.	86203 (UKHO)
71163	Debris	401329	5855793	A2	49.7	6.0	0.3	-	Linear item of debris with height, folded round in a 'V' shape. 70 m from wreck (71172) and may be associated debris	
71164	Magnetic	401322	5854326	A2	-	-	-	49	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71165	Magnetic	401321	5855374	A2	-	-	-	89	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71166	Magnetic	401309	5854776	A2	-	-	-	72	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71167	Debris	401306	5855773	A2	21.0	0.3	0.3	-	Very slight, linear item of debris located 35 m from wreck 71172	
71168	Dark reflector	401292	5854578	A2	8.8	1.3	0.1	-	A long, thick and straight object with possible shadow and secondary dark reflector.	
71169	Magnetic	401274	5854309	A2	-	-	-	45	Symmetric small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71170	Debris	401270	5854436	A2	8.2	6.1	0.3	119	A large piece of debris comprising some linear dark reflectors with shadows likely covered by fine sediment. Has a medium dipole associated indicating ferrous debris	
71171	Mound	401261	5856319	A2	3.2	3.0	1.3	-	Distinct, slightly square dark reflector with a clearly defined, tapered shadow. Visible in the bathymetry data as a small mound in the centre of a small depression of scour measuring 12 m x 12 m x 0.2 m	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71172	Wreck	401255	5855809	A1	93.5	29.0	5.5	4056	Large area of dispersed wreck, visible in the sidescan data as numerous objects with height, some of which appear to be quite straight and possibly structural. One contact has a long, slightly tapered shadow. The wreck is visible in the bathymetry data as upright and intact, orientated north-west to south-east. Two distinct possible structural elements can be seen in the centre of the wreck, possibly boilers, which are the highest point of the wreckage. The northern end of the vessel appears to be mostly buried or broken up. There is a very large magnetic anomaly associated with this wreck indicating a ferrous construction. UKHO 10571 records this as a dispersed unknown wreck fouled by boat sweep.	10571 (UKHO); 907472 (NRHE)
71173	Dark reflector	401249	5854602	A2	3.9	0.5	0.5	-	Relatively straight, narrow dark reflector with a broad, rounded shadow.	
71174	Debris	401248	5854713	A2	5.7	0.2	0.0	-	Straight, linear dark reflector with no discernible height. Located 91 m north-east from wreck 71181 and may be associated debris	
71175	Debris	401240	5854713	A2	6.3	0.6	0.0	-	A long, thin and straight dark reflector with no discernible height. Located 83 m north-east from wreck 71181 and may be associated debris	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71176	Wreck	401228	5854614	A1	19.8	8.0	1.0	-	Possible wreck with no UKHO record. A discrete but irregular outline of parallel dark reflectors with some irregular bright shadow, likely to be structural possible deck remains. Looks to be intact with a slatted texture and orientated north-east to south-west on a rocky area of the seabed. As there is no magnetic anomaly this is likely to be a non-ferrous wreck. In the bathymetry data this wreck is visible as a linear mound orientated north-east to south-west on a rough and uneven area of the seabed.	
71177	Magnetic	401204	5854502	A2	-	-	-	22	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71178	Magnetic	401202	5854377	A2	-	-	-	69	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71180	Magnetic	401175	5854574	A2	-	-	-	62	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71181	Wreck	401163	5854662	A1	73.0	48.7	3.1	25165	A large area of dispersed wreckage. A large amount of structural debris is visible as linear dark and bright reflectors, as well as a possible slatted deck area. The wreck appears to be orientated north-east to south-west lying within sandwaves and more debris may be buried by sediment. In the bathymetry data this appears as a partially buried wreck, which looks to be broken up, with scour on the west side measuring approximately 60m. A UKHO record (58447) for an unknown wreck is in the vicinity of the wreck with dimensions of 30m x 8m x 3m. Observed in 2015 with dimensions 77m x 16m x 2.5m.	58447 (UKHO)
71183	Debris	401157	5854730	A2	2.8	0.4	0.2	-	Two short, straight parallel dark reflectors with a broad, slightly irregular shadow. Possibly debris associated with wreck (71181) 20 m to the south	
71184	Debris field	401155	5854537	A2	10.5	4.5	0.5	-	Possible debris field. An irregular area of objects with angular bright shadows located on a rough and uneven area of the seabed, possibly partially buried by sediments. Approximately five features.	
71185	Dark reflector	401131	5857129	A2	0.7	0.3	0.5	-	Dark reflector, slightly straight, with a distinct shadow and some possible associated scour.	
71186	Debris field	401050	5854541	A2	21.4	12.2	0.8	213	Group of variously shaped objects with slight shadows. Possible large area of disturbed seabed. Has a large magnetic anomaly to the north-east associated indicating ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71187	Dark reflector	401038	5854543	A2	6.3	0.2	0.1	-	Long and straight dark reflector with possible slight shadow	
71188	Wreck	400957	5857290	A1	26.0	8.0	4.1	1479	A wreck in poor quality data and possibly buried by sediments concealing its full extents. There is one particularly large object with height which may be one edge of the hull structure, with several possible other objects with height surrounding this. Largest measurements from the sidescan data are 48m x 19.5m but the extents are unclear and partially buried so bathymetry dimensions have been used. Has a very large magnetic anomaly associated indicating a ferrous construction. The UKHO records this wreck as the <i>Ole Bull</i> built in 1901 and was sunk when it struck a mine in 1917. Last recorded in 2015 with dimensions of 22m x 4m x 4.5m.	10574 (UKHO); 907476 (NRHE)
71189	Magnetic	400937	5855391	A2	-	-	-	20	Small negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71190	Magnetic	400925	5856157	A2	-	-	-	262	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71191	Magnetic	400886	5855920	A2	-	-	-	63	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71192	Dark reflector	400864	5854943	A2	3.7	0.1	0.3	-	Straight object with bright shadow	
71193	Dark reflector	400856	5854931	A2	5.3	3.4	0.3	-	Irregular slightly right angled object with some bright shadow	
71194	Dark reflector	400805	5855070	A2	4.7	0.4	0.4	-	Long, thin and straight dark reflector with an irregular shadow and three straight bright reflectors at the front.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71195	Magnetic	400781	5857165	A2	-	-	-	151	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71196	Dark reflector	400778	5855929	A2	9.1	0.2	0.2	-	Very narrow dark reflector, relatively straight with a distinct, but slight, shadow. Identified in a relatively featureless area of seabed.	
71197	Magnetic	400772	5855161	A2	-	-	-	101	Medium distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71198	Mound	400771	5855487	A2	4.6	3.7	0.7	-	Dark reflector with a distinct, broad shadow. Identified in the bathymetry data as a small but distinct rounded mound in a depression measuring 13 m x 9 m.	
71199	Magnetic	400757	5855618	A2	-	-	-	18	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71200	Magnetic	400738	5855240	A2	-	-	-	127	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71201	Magnetic	400650	5857288	A2	-	-	-	98	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71202	Dark reflector	400611	5855654	A2	5.5	0.6	0.3	-	Faint dark reflector with a distinct, rectangular shadow.	
71203	Debris	400540	5855313	A2	2.1	0.2	0.2	128	Relatively short, straight, dark reflector with a slightly irregular shadow. Has a medium dipole associated indicating ferrous debris	
71204	Magnetic	400463	5855618	A2	-	-	-	192	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71205	Magnetic	400459	5855566	A2	-	-	-	31	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71206	Magnetic	400437	5855779	A2	-	-	-	68	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71207	Debris	400434	5855240	A2	2.2	0.4	1.3	124	Cluster of dark reflectors with a tall bright shadow. Has a medium magnetic anomaly associated indicating ferrous debris	
71208	Debris field	400412	5855310	A2	14.3	10.7	0.2	52	Small patch with several small objects with height. Objects appear to be relatively straight with broad shadows. Has a medium magnetic anomaly associated indicating ferrous debris	
71209	Debris	400280	5855520	A2	2.5	0.7	0.3	19	Small, narrow, curvilinear item of debris with height, has a small negative monopole associated indicating ferrous debris.	
71210	Magnetic	400235	5855597	A2	-	-	-	29	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71211	Magnetic	400221	5855465	A2	-	-	-	73	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71212	Debris	400199	5855502	A2	2.1	0.5	1.9	681	Small straight object with a long, narrow and bright shadow. Has a large magnetic anomaly associated indicating ferrous debris	
71213	Debris field	400199	5855579	A2	13.0	7.5	1.4	44	A group of distinct dark reflectors with bright shadows, mostly linear features that may be broken up or partially buried by sediment. The largest measures 3.3 m x 0.2 m. The feature has a small magnetic anomaly associated indicating some ferrous content	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71214	Magnetic	400170	5855281	A2	-	-	-	91	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71215	Magnetic	400161	5855708	A2	-	-	-	50	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71216	Magnetic	400141	5855493	A2	-	-	-	44	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71217	Magnetic	400137	5857083	A2	-	-	-	538	Large dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71218	Magnetic	400120	5856492	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71219	Dark reflector	400063	5855701	A2	2.8	0.1	0.2	-	Small straight object with some bright shadow	
71220	Magnetic	400055	5855762	A2	-	-	-	33	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71221	Dark reflector	399981	5857016	A2	2.1	1.4	0.7	-	Faint, slightly triangular dark reflector with a long, very narrow, slight shadow.	
71222	Magnetic	399926	5855928	A2	-	-	-	32	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71223	Magnetic	399913	5855781	A2	-	-	-	141	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71224	Magnetic	399898	5855552	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71225	Magnetic	399887	5855665	A2	-	-	-	66	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71226	Magnetic	399844	5856278	A2	-	-	-	78	Medium distinct dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71227	Magnetic	399817	5855666	A2	-	-	-	42	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71228	Magnetic	399788	5856999	A2	-	-	-	157	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71229	Magnetic	399776	5856812	A2	-	-	-	49	Small irregular anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
71230	Magnetic	399767	5855751	A2	-	-	-	70	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71231	Dark reflector	399752	5856321	A2	4.5	0.7	0.8	-	Faint dark reflector with an angular, slightly irregular shadow. Object appears to have relatively straight elements.	
71232	Magnetic	399730	5855644	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71233	Magnetic	399716	5857337	A2	-	-	-	42	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71234	Magnetic	399662	5857741	A2	-	-	-	46	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71235	Magnetic	399659	5855691	A2	-	-	-	41	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71236	Magnetic	399641	5856014	A2	-	-	-	39	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71237	Magnetic	399588	5856917	A2	-	-	-	196	Medium positive monopole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71238	Magnetic	399528	5856109	A2	-	-	-	13	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71239	Magnetic	399518	5857330	A2	-	-	-	25	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71240	Magnetic	399503	5856650	A2	-	-	-	34	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71241	Magnetic	399486	5856268	A2	-	-	-	40	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71242	Magnetic	399476	5855928	A2	-	-	-	29	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71243	Debris field	399461	5856564	A2	22.0	6.3	1.0	-	Small patch of possible objects, some of which are quite straight, with irregular shadows. Possibly debris field.	
71244	Magnetic	399400	5855903	A2	-	-	-	16	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71245	Magnetic	399373	5856846	A2	-	-	-	16	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71246	Dark reflector	399341	5855971	A2	3.3	0.1	0	-	Small linear object with varying bright shadow	
71247	Magnetic	399299	5855974	A2	-	-	-	30	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71248	Magnetic	399260	5857708	A2	-	-	-	19	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71249	Magnetic	399259	5856740	A2	-	-	-	227	Large dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71250	Magnetic	399256	5856227	A2	-	-	-	60	Medium negative monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71251	Magnetic	399253	5857364	A2	-	-	-	26	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71252	Magnetic	399180	5856952	A2	-	-	-	99	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71253	Magnetic	399127	5856739	A2	-	-	-	38	Small distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71254	Dark reflector	399079	5857144	A2	21.5	0.4	1.0	-	A small dark reflector with a broad shadow with a faint linear dark reflector attached, not particularly distinct.	
71255	Bright reflector	399078	5856593	A2	4.2	0.3	0	-	Distinct and thin straight object with no obvious dark reflector.	
71256	Debris field	399014	5856256	A2	6.7	4.7	0.1	52	Irregular and discrete area of irregular dark reflectors with some shadow within a large scour. Possible area of disturbed seabed. Identified approximately 17m south-south-west of a magnetic anomaly measuring 52 nT, however difficult to discern which feature, if any, it is associated with.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71257	Debris field	399007	5856265	A2	14.0	9.0	1.1	52	An area of disturbed seabed, slightly oval shaped outline with internal linear and curvilinear dark reflectors with shadows. Visible in the MBES data as a distinct, oval shaped low mound. Identified approximately 17m south-west of a magnetic anomaly measuring 52 nT, however difficult to discern which feature, if any, it is associated with.	
71258	Seafloor disturbance	398992	5856258	A2	14.3	3.9	0	-	Irregular area of small straight objects and bright shadow with the largest object measuring 2.3m x 0.2m x 0.2m.	
71259	Dark reflector	398973	5856292	A2	7.8	1.8	0.1	-	Angular area of dark reflector with some scour and some bright shadow	
71260	Debris	398962	5856255	A2	6.2	0.4	1.0	81	Sub rounded edge of an object with a bright shadow, has a medium magnetic anomaly associated indicating ferrous debris.	
71261	Magnetic	398832	5857559	A2	-	-	-	66	Medium positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71262	Debris	398783	5857174	A2	2.7	0.5	1.2	23	Dark reflector with a distinct, angular shadow. Has a small negative monopole associated indicating ferrous debris	
71263	Bright reflector	398758	5857006	A2	2.8	1.5	0	-	Circular bright reflector with darker reflector in centre, identified close to a rope or chain (71264).	
71264	Rope/chain	398751	5857009	A2	259.0	0.8	0.4	591	A possible rope or chain feature visible as a long and thin curvilinear dark reflector with slight height. This is orientated north-west to south-east. Has a large dipole associated indicating a ferrous composition. Close to a bright reflector (71263).	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71265	Magnetic	398724	5856709	A2	-	-	-	15	Small dipolar anomaly only identified on one survey line. Indicative of possible buried ferrous debris.	
71266	Magnetic	398723	5857115	A2	-	-	-	36	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71267	Magnetic	398613	5856787	A2	-	-	-	26	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71268	Dark reflector	398517	5857127	A2	3.3	0.5	0.2	-	Small straight object with angular bright shadow	
71269	Magnetic	398515	5857022	A2	-	-	-	33	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71270	Dark reflector	398500	5856736	A2	3.9	1.9	0.4	-	Irregular object with a rounded bright shadow	
71271	Debris	398473	5856764	A2	3.2	0.6	0.1	30	Irregular curvilinear objects with some bright shadow, possibly broken up or partially buried. Has a small distinct dipole associated indicating ferrous debris	
71272	Debris	398470	5856736	A2	4.9	1.9	0.3	125	Rounded object within some disturbance, has a medium distinct dipole associated indicating ferrous debris	
71273	Dark reflector	398454	5856802	A2	2.9	0.2	0.1	-	Straight edge of an object with tapered bright shadow	
71274	Magnetic	398418	5857029	A2	-	-	-	73	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71275	Dark reflector	398413	5856766	A2	5.9	0.2	0.2	-	Two straight edged objects with irregular bright shadows situated next to one another, very similar in size and appearance, individual dimensions are 2.9 m x 0.2 m x 0.2 m and 2 m x 0.2 m x 0.1 m	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71276	Debris	398407	5857039	A2	4.4	2.6	0.4	-	Irregular dark reflector with two straight flared linear objects with some height	
71277	Magnetic	398333	5857815	A2	-	-	-	82	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71278	Dark reflector	398329	5856944	A2	2.2	0.7	0.3	-	Irregular object with some data missing though assumed darker reflectors and irregular bright shadow	
71279	Magnetic	398324	5857437	A2	-	-	-	115	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris with no surface expression.	
71280	Magnetic	398316	5857891	A2	-	-	-	49	Small asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71281	Dark reflector	398245	5857040	A2	4.5	1.2	0.2	-	Medium sized, curved object with some slight scour and some bright shadow	
71282	Debris	398243	5857305	A2	8.7	4.3	0.2	13	An area of linear dark reflectors. A straight edged feature with three perpendicular objects coming off it and some bright shadow, the full extent is possibly covered by sediment. Feature is oriented in a north-east to south-west direction on a rough and uneven area of the seabed. Has a small magnetic anomaly associated indicating some ferrous content	
71283	Magnetic	398133	5857329	A2	-	-	-	38	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71284	Magnetic	398075	5857584	A2	-	-	-	104	Medium distinct dipole only identified on one survey line. Indicative of possible buried ferrous debris.	



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External References
71285	Dark reflector	398061	5857505	A2	2.0	0.5	0.8	-	Small straight object with irregular bright shadow	
71286	Magnetic	397977	5857280	A2	-	-	-	42	Small positive monopole only identified on one survey line. Indicative of possible buried ferrous debris.	
71287	Magnetic	397969	5857387	A2	-	-	-	133	Medium dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71288	Magnetic	397930	5857304	A2	-	-	-	181	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71289	Magnetic	397927	5857425	A2	-	-	-	37	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71290	Magnetic	397923	5857657	A2	-	-	-	40	Small dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71291	Magnetic	397882	5857699	A2	-	-	-	175	Medium dipole identified on more than one survey line. Indicative of possible buried ferrous debris.	
71292	Seafloor disturbance	397875	5857464	A2	9.1	8.1	0.3	-	Irregular area of objects with some irregular bright shadow, possible medium sized area of disturbed seabed.	
71293	Magnetic	397824	5857480	A2	-	-	-	72	Medium asymmetric dipole only identified on one survey line. Indicative of possible buried ferrous debris.	
71294	Magnetic	397770	5857521	A2	-	-	-	88	Medium irregular anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	
71295	Magnetic	397733	5857497	A2	-	-	-	200	Medium anomaly identified on more than one survey line. Indicative of possible buried ferrous debris.	





## 12.9 Appendix IX: Maritime Archaeological Potential

### *Introduction*

- 12.9.1 Subsequent to the inundation of the Norfolk Vanguard development area by post Devensian rising sea levels due to isostatic rebound, any evidence of human activity can be expected to be of a maritime nature, relating to seafaring and the human exploitation of the sea. As an island, the UK has a long maritime history and, as such, there is potential for the presence of archaeological material spanning from the Mesolithic period to the present day within the study area.
- 12.9.2 The surface of the seabed within the former offshore East Anglian Zone is characterised by a series of sandbanks; elevated, elongated, round or irregular topographic features which are present as layers overlying hard substrata. Sandbanks are not only comprised of finer grained sediments (more suited to the preservation of archaeological material than coarser grained deposits such as gravels), but also often present navigational hazards to vessels passing through the area. In general, therefore, areas in which sandbanks are present have a greater potential for wreck sites to exist. Within the region, these areas of sandbanks have previously been mapped as Areas of Marine Archaeological Potential (AMAP) by the ALSF Navigational Hazards project (Bournemouth University, 2007). The results have noted that the extensive offshore area in the southern extremity of the North Sea, stretching out to the north of Great Yarmouth and to the east of the approaches to the Wash is characterised by a series of shallow long narrow gravely sandbanks running in a northwest to southeast direction across the offshore approached to the coast.
- 12.9.3 This potential for, and the nature of, maritime receptors that may be present within Norfolk Vanguard is discussed below. Alongside other sources, where relevant, the following environmental baseline has been informed by two strategic desk-based assessments undertaken by Wessex Archaeology; the *Early Ships and Boats* project (Wessex Archaeology, 2013c) and the Aggregates Levy Sustainability Fund (ALSF) funded *Assessing Boats and Ships: 1860-1950* (Wessex Archaeology, 2011a-d). The Early Ships and Boats project comprised a strategic desk-based assessment of known and dated vessels from the Prehistoric period up to 1840 within England's wreck resource (including both onshore and English inshore waters up to the 12nm limit) in order to evaluate potential records for selective investigation. *Assessing Boats and Ships: 1860-1950* comprised a national stock-take of wrecks dating between 1860 and 1950, providing supplementary guidance on key themes and interests represented by the known resource with the ultimate aim of enabling better informed decision-making to be undertaken in respect of the wrecks of vessels lost during this period. In each case, the results of these projects enable the special interest of potential wreck sites within the study area to be understood against the existing baseline of currently known and recorded wrecks in England's territorial waters.

### *Pre- 1580*

- 12.9.4 Maritime discoveries of pre-1508 date are very rare. Little is known about Prehistoric maritime activities or types of craft while the data available for the Romano-British and Medieval periods is limited in comparison to subsequent periods. On this basis, all material from this period will be of special interest solely due to the rarity of any discoveries.
- 12.9.5 There are no known or charted wrecks of documented losses from this period within the project area.
- 12.9.6 There is no evidence for Palaeolithic maritime activities in the archaeological record for the UK, although archaeological material from elsewhere suggests that early modern

humans did undertake maritime activities (e.g. Johnstone, 1980; Lourandos, 1997). The resources and skills required to construct simple watercraft, such as hide-covered log or boat rafts, would have been available during this period and it has been postulated that late Upper Palaeolithic communities utilised such craft for coastal journeying and fishing (McGrail, 1987 & 2004). Palaeolithic activity within the study area is signified by the discovery of a number of Palaeolithic flint hand axes and flint implements (**1009** to **1025**), including a set of early hominin footprints (**1017**).

- 12.9.7 During the Mesolithic period that followed, patterns of human settlement associated with inland water ways and coastal environments suggest the likely use of watercraft for fishing and transport although, as for the Palaeolithic, however the lack of available evidence means that the nature of these maritime activities remain unclear. Archaeological discoveries of Mesolithic logboats (e.g. McGrail, 2004: 174) attests to the ability of Mesolithic communities to construct rafts and hide boats. Unfortunately, their light construction makes it less likely that they would survive in the archaeological record.
- 12.9.8 The majority of the proposed project area was probably submerged during the Mesolithic although areas that were coastal or nearshore at this time, particularly those associated with river inlets, are a likely context for the discovery of the remains of early maritime activities and are possible to have existed within the provisional OCC. The extensive deposition of Holocene alluvium associated with the fairly rapid post-Devensian rise in sea level may have concealed any remains of the early prehistoric watercraft.
- 12.9.9 The Early Ships and Boats project (Wessex Archaeology, 2013c) states that within England's wreck resource, just 19 records exist with a date range that falls within the Early Prehistoric Period (Palaeolithic to Mesolithic). These records comprise 18 logboats and one findspot; none have been scientifically dated or identified as surviving in datable archaeological contexts (Wessex Archaeology, 2013c: 33). This highlights the potential importance and historical value of remains of watercraft dating to this period should they be discovered within Norfolk Vanguard.
- 12.9.10 During the Neolithic and early Bronze Age (4,000 to 700 BC) the coastline in the East Coast region would have attained a form similar to that of today whilst the evidence for human activity diversified. This is demonstrated by the movement of goods across the sea with the introduction into the UK of non-native species of livestock and cereals (May 1976) and the discovery of porcellanite stone axes from Ireland, on the UK mainland, and the Western Isles of Scotland (Breen and Forsythe, 2004: 32). The discovery of deep water fish in shell middens at Neolithic sites also demonstrates that marine fishing was being carried out at this time (Ellmers, 1996).
- 12.9.11 As with the Mesolithic, the evidence for Neolithic watercraft is extremely limited in the UK to discoveries of logboats and the precise nature of maritime activities remains unclear. The discovery of a prehistoric logboat has been reported from the River Orwell (Suffolk HER FRT 004) although this date is unproven and it may be of later date. Further logboats of unknown date have also been reported from the River Stour (Suffolk HER - HRK Misc) and on the River Orwell opposite Pond Ouze Point (Suffolk HER - IPS Misc). Activity dating to this period within the provisional OCC is represented by the discovery of a Neolithic polished flint axehead (NRHE 133662).
- 12.9.12 The scale of seafaring activities is considered to have grown through the Bronze Age (2,400 to 700 BC) and Iron Age (700 BC to AD 43) with evidence of significant advances in technology and vessel size. Logboats and hide boats remained in use alongside new vessel types such as the flat-bottomed sewn plank boats suited to a wider variety of uses

in a wider range of environments (McGrail, 2004). These are the earliest known form of plank construction with planks lashed together and made watertight.

- 12.9.13 Some 97 records with a date range that falls within the Late Prehistoric period (Neolithic to Iron Age) were identified as part of the Early Ships and Boats project (Wessex Archaeology, 2013c: 33) within England's wreck resource, comprising two boat burials, three designated wrecks, 84 logboats and eight findspots. Of the 84 logboats, only two were identified as surviving in an archaeological context. This rarity once again highlights the potential importance and historical value of remains of watercraft dating to this period.
- 12.9.14 The potential for the discovery of further examples of early craft within stratified contexts is well demonstrated by the extraordinary discovery of six logboats in a clay-pit at Must Farm near Peterborough in 2011, variously dating between the Middle Bronze Age and the Early Iron Age (Cambridge Archaeological Unit, 2012; English Heritage, 2012: 5). Although discovered onshore, these logboats are testament to the high level of preservation afforded by waterlogged environments and signify the potential for similar finds to exist within comparable environments both offshore and onshore. A few pre-transgression channel features have been observed in NV West, containing Holocene sediments. Such sediments could periodically bury and expose sites such as vessel remains in areas of mobile sediment.
- 12.9.15 A closer unity of people between Britain and the southern North Sea margin was established during the Romano-British period (AD 43 to 410) with an expansion and diversification of trade with the Continent. The later Iron Age saw the emergence of a distinct tradition of Romano-Celtic shipbuilding representing both Roman and northern European methods, capable of regular coastal and oceanic voyages and reflecting substantial, sea-going trade.
- 12.9.16 A significant number of the vessels involved in these movements are likely to have passed through the study area. Trading ports were active on the Suffolk and Norfolk coast and the Roman military establishment made extensive use of the East Anglian coastal waters, transporting goods from garrison to garrison (Rippon, 2008: 86). Caister-on-Sea, for example, provided a clear entry port to the rich farmlands of East Anglia and offered the shortest sea crossing to the mouth of the Rhine.
- 12.9.17 The recorded remains of vessels from this period continue to be rare despite the growth of seafaring activity and the wide range of ocean-going vessels indicated to have been in use in contemporary accounts. The Early Ships and Boats project revealed a total of 34 records within England's wreck resource with a date range that falls within the Roman period, comprising two designated wrecks, 23 logboats, five findspots and four undesignated wrecks (Wessex Archaeology, 2013c: 34). None of the 23 logboats were identified as surviving in an archaeological context.
- 12.9.18 The 'Dark Ages' which succeeded the Roman occupation of Britain saw the migration of Saxon, and later Norse and Danish, settlers into Britain which brought both renewed expansion of trade routes and new shipbuilding customs. A network of Saxon trade and migration routes existed in the southern North Sea, with a number of important ports or landing places along the East Anglian coast. According to the Anglo-Saxon Chronicle, the Saxon leader Cerdic landed at the shore close to Great Yarmouth in AD 495 (Online Medieval and Classical Library) and Dunwich (Dumnoc) is listed as a port in the Anglo-Saxon Chronicle for 636 (Comfort, 1994: 5).
- 12.9.19 There are several archaeological examples of Saxon boats in Suffolk including the lapstrake built boat burials at Ashby Dell (Suffolk HER - HRF 012) and Sutton Hoo (Suffolk

HER - SUT 004, 005, 038). The lap-strake or clinker technique (essentially fastening overlapping planks together to form the hull) was a specifically northern European technique that was best known in the construction of Viking ships of the later 8th and 9th centuries.

- 12.9.20 Viking raids on the eastern British coast began in the 8th century and during the subsequent period of Viking settlement the North Sea continued to act as a communication, trade and migration route to the Scandinavian home countries with England's existing trade routes across the North Sea functioning into the 9th century, although a lower volume of trade passed along them (Friel, 2003: 44). The first evidence of a purpose-built English royal naval force comes from this period at the time of Alfred (King of Wessex 871-99), when a fleet of large, oared ships was built to help fight the invading Danes (English Heritage, 2012: 5). Following the Danish raid in Kent in 885, Alfred's fleet is recorded to have travelled up the River Stour where a battle with the Danes took place (Asser, 1983: 87). Although the Anglo-Saxon fleet emerged as victorious, they were caught unaware when attempting to leave the Stour and were attacked and defeated by a Danish force at the mouth of the river (Huntingdon, 1969: 81).
- 12.9.21 Direct evidence for seafaring activity of this period within East Anglia includes the timbers of a clinker vessel (c. AD 890 to AD 970) at Buss Creek and two oaken rudders (c. AD 850 to AD 950) found offshore close to Southwold in the 1980s (Bacon, 1996: 18-22). The first rudder was trawled up in a fishing net in 1981 while the larger was washed up on the beach at Easton and found by a fisherman after a storm in 1986. To highlight the rarity of vessel remains dating to this period, the Early Ships and Boats project revealed that just 40 records within England's wreck resource have a date range that falls within the post-Roman to Norman Conquest (410 to 1066 AD) period, comprising four boat burials (including the early 7th century Sutton Hoo near Woodbridge, Suffolk), 28 logboats (none of which were identified as surviving in an archaeological context), six findspots and one undesignated wreck (Wessex Archaeology, 2013c: 34).
- 12.9.22 By the time of the Norman Conquest in 1066 many East Anglian ports had developed into busy trading centres, with Norfolk and Suffolk establishing larger fleets than any other region of England at this time (Williams, 1988: 257). This expansion continued throughout the medieval period with the southern North Sea acting as the artery for increasing trade between the UK and Europe.
- 12.9.23 Fishing was also important and during the 13th, 14th and 15th centuries the most notable market in Norfolk and Suffolk was that of preserved fish (Hutchinson, 1994: 129). Great Yarmouth, in particular, became one of the major herring markets in Europe. English 'Doggers' of 30 to 40 tonnes, with crew of 20 to 30, began fishing in Icelandic waters from the 14th century onwards (Hutchinson, 1994: 57). These fleets acted in convoy throughout the 15th century, reaching a peak in the early 16th century (Marcus, 1954: 296).
- 12.9.24 The available archaeological and historical evidence indicates the development of a wide range of functional vessels during the medieval period associated with the increasing need for inexpensive and spacious cargo transporters and the need to defend these merchant vessels against piracy.
- 12.9.25 By the end of the medieval period the use of both clinker and carvel strakes as a construction technique (flush laid planking fixed to frames) became more common, with consistent use of more than a single mast, increased tonnages, incorporated deck levels and the development of reliable navigation techniques and aids facilitated an even greater expansion of the trade routes. This period also saw the advent of maritime exploration, through the greater use of flush laid strake built ships on a global scale as vessels from

Europe reached the New World and, subsequently, mapped the spice routes to the Far East.

12.9.26 However, while the design and construction of larger ships was becoming somewhat measured and standardised, the range and varieties of smaller, vernacular craft are likely to have remained extensive with the use of simple rafts and skin or hide covered boats as well as wooden vessels associated with transport and fishing, for example. The wide range of historical influences upon the design of such vessels, coupled with the specific requirements of the local environment, suggest that the number of vessels operating in the seas and rivers around Britain would have been numerous and diverse. Boats and ships from the Medieval and Early Tudor period are sufficiently rare that all examples are likely to be considered of special interest. The Early Ships and Boats project identified just 51 records with a date range that falls within the Medieval and Early Tudor period (1066 to 1540), comprising seven designated wrecks, 20 logboats (none of which were identified as surviving in an archaeological context), ten findspots, one historic vessel and 13 undesignated wrecks, a number of which are likely to post-date 1509 (Wessex, Archaeology 2013c: 34).

#### *1509 to 1815 AD*

12.9.27 In general terms, post-medieval shipwreck remains are better represented in the archaeological record than earlier periods although those subject to archaeological investigation are only a fraction of the numbers likely to have been lost. There are two reported wrecks from this period, located within the provisional OCC, dated to 1254 and 1315 (NHRE 1546047; 926650). Both consist of cargo vessels reported to have stranded near Bacton. However, there are no documented losses dating to this period. The absence of such records does not necessarily denote the absence of sites dating to this period within the study area.

12.9.28 Technological advances in the construction, fitting and arming of ships, and in navigation, sailing and steering techniques, continued into the post-medieval period. Shipbuilding of larger vessels continued to develop around the carvel and flush strake techniques while the form and construction of local craft remained diverse, continuing to incorporate traditions of earlier periods such as the clinker construction technique.

12.9.29 The great innovations in ship design during this period were stimulated by the development and growth of new trans-oceanic communication networks which saw the opening up of the New World. The late 15th and early 16th century voyages of exploration precipitated global mercantile trade and expansion and the emergence of the 'Golden Age' in northern Europe (Glete, 1999) with the establishment of the East India Company in 1599.

12.9.30 By the beginning of the 17th century the volume of trade, and the numbers of vessels involved in such trade, increased dramatically. The length of voyages, the hazards of trans-oceanic journeys and the requirements of trade saw the evolution of even larger vessels with round-bellied, capacious holds to accommodate more/larger cargo.

12.9.31 The East Coast played a key role in this 'Golden Age' with established overseas trade connections ranging from the Baltic Sea to the Iberian Peninsula and beyond (Williams, 1988: 70). By the late 18th century, statistics from the Lloyds Register of the English and Welsh regions (1776) attributed 10% of the total of shipbuilding tonnage to East Anglia (Stammer, 1999: 254). It is notable that at least ten of the 14 documented Recorded Losses dating to the 18th century within the area were cargo vessels, a testament of the growth in trade during this period.

- 12.9.32 Alongside this global growth of trade and prosperity came an increasing need to protect financial interests and from the 16th to mid-19th centuries the separation of merchant ships and ships built for fighting also became more marked. Fighting ships were designed to fight broadside to broadside with heavy ordnance. Battles at sea became larger and more destructive and a standing Royal Navy, established during the Tudor period, grew to become an established and organised force. The expansion of the Navy in the Tudor period also saw the opening of a network of royal dockyards.
- 12.9.33 The East Coast region was subject to three major battles during the 17th century (Wessex Archaeology, 2003). The Battle of Gabbard Shoal (1653), The Battle of Lowestoft (1665) and the Battle of Sole Bay (1672) formed part of the Anglo-Dutch wars in this region, a series of battles fought for control of the seas and trade routes rather than territory and marking a new era in the history of naval warfare. Twenty Dutch ships and two English vessels were lost during the Battle of Lowestoft with three Dutch ships and four ships from the combined English and French fleet lost at the Battle of Sole Bay. These warships are yet to be confidently located. It is thought that the battles took place further towards the coast rather than in the proximity of Norfolk Vanguard. Nonetheless, the location of these battles is not definitively understood and the potential for the remains of such vessels to exist within the study areas should not be discounted. As testament to this potential, between 2005 and 2016, 19 cannonballs were reported from the East Coast dredging region through the Marine Aggregates Protocol for Reporting Finds of Archaeological Interest (<http://www.arcgis.com/home/item.html?id=99a2073a1b874527865fb06bfde67552>).
- 12.9.34 In addition to this global explosion in trade and naval warfare, the East Coast economy was still underpinned by local trade and marine exploitation. The fishing industry continued to thrive with the developed quays of Southwold and Lowestoft and the established ports of Great Yarmouth and King's Lynn prospering following their expansion with the Icelandic cod fishing fleets during the mid-17th and 18th centuries (Gould, 1997), particularly with the development of deep sea fishing in the 19th century (Rasmussen, 1985: 217).
- 12.9.35 In the 18th century, East Anglia was at the forefront of the 'Agricultural Revolution' whereby communications were developed to serve the farming economy and to facilitate the diverse trade of Norfolk and Suffolk of which grain was the principal export (Gilman, 1997: 67).
- 12.9.36 Although there is significantly more historical data for maritime activities in this period, particularly with regard to East India Company shipping and naval warfare, the number of known wrecks from the 16th to early 19th centuries remain low in the archaeological resource, although a larger number of records relating to known sites exists in comparison to earlier periods. For example, the Early Ships and Boats project (Wessex Archaeology 2013c) identified 34 and 68 records with a date range that falls between the Mid to Late Tudor period (1540 to 1603) and the Stuart period (1603 to 1714) respectively, as well as an additional 145 with a date range falling within the Hanoverian period (1714-1837) (although a number of these will post-date 1815). Despite this, known examples of wrecks dating to this period are still rare in comparison to those post-dating 1840. Additionally, the smaller vessels and local craft employed in the day to day activities of coastal communities, and deployed as auxiliary vessels to the Royal Navy, are still comparatively absent from both the historical and archaeological record and discoveries are rare. Any wrecks from this period, therefore, will be of special interest.

*1816 to 1913 AD*

- 12.9.37 By the start of the 19th century, coastal and international trade were dominated by wooden sailing vessels, and the 'wooden walls' of the naval fleets during the French Revolutionary Wars represented the zenith of the naval sailing vessel (Lavery, 1991). However, during the course of the 19th century the technological innovations of the Industrial Revolution brought fundamental changes in maritime technology, which amongst other advances in naval engineering, enabled the development of steam propulsion, oil engines and iron and steel construction.
- 12.9.38 The use of iron in shipbuilding began during the 18th century but it wasn't until the first half of the 19th century that the technology came into widespread use. Initially, iron was used to supplement structural elements in shipbuilding although it was later used for angular joints or knees and the framing of vessels and ultimately replacing wood as the covering for the hull. Steel was used periodically for ship construction from the late 1850s but did not supersede iron until the later 19th century (Greenhill, 1993: 89; Ville, 1993: 52).
- 12.9.39 The first Atlantic crossing by a paddle steamer took place in May 1819 and by the 1820s steamboat transport formed an extensive network around the British Isles (Pearsall, 1985: 195). The high cost in coal consumption, however, limited their range and value to the trade economy and, as such, they were largely confined to the passenger trade where reliable quick passages were more important than cost (MacRae and Waine, 1990: 11). The introduction of the screw propeller began in the 1830s but it wasn't until the development of the compound engine in 1854 that vessels equipped with screw propulsion could truly compete with the sail.
- 12.9.40 The first steam powered naval vessel HMS *Agamemnon* was ordered by the Royal Navy in 1849 with the first iron naval ship HMS *Warrior* built in 1861 ([www.royalnavy.mod.uk](http://www.royalnavy.mod.uk), accessed May 2017). Following a period of experimentation, designs were standardised by the 1890s with new steel battleships and the large armoured cruisers built to defend trade routes. The development of the torpedo, or mine, from early experiments in the 1860s saw the evolution of small and fast torpedo boats and, in response, heavily armed torpedo boat destroyers and led to the development of the submarine and ultimately the all-big-gun dreadnought battleships in the early 20th century.
- 12.9.41 The use of metal in shipbuilding increased both durability and capacity while the use of steam propulsion allowed for greater speed, thus facilitating the further growth of long distance trade. However, the transition was gradual with wooden sailing vessels such as schooners, brigs, brigantines and snows continuing to dominate until the second half of the 19th century and continuing in use well into the 20th century (Ville, 1993: 52). The use of wood in the construction of local craft also continued with new technologies contributing but rarely supplanting local maritime traditions and cultural values.
- 12.9.42 By the late 19th century a global network had been established linking the major cities of the world into an integrated global transport system. Coastal traffic also continued to grow during this period. The transport of coal was a major contributor to coastal trade with c. 22 million tons carried coastwise (Jackson, 1983: 117). The East Coast coal trade formed a large proportion of this, from the northern coalfields to the London market. Norfolk and Suffolk's principal export however was agricultural goods such as grain across the North Sea with the import of timber coming from Scandinavia and the Baltic.
- 12.9.43 The dominance of Great Yarmouth as a fishing port in the region continued into the 19th century, with the well-established herring stock exported on mass to the Mediterranean and Northern Europe. In the late 19th and early 20th century, the Yarmouth/Lowestoft autumn herring fishery was by far the biggest fishery on the East Coast.

- 12.9.44 The recording of shipping losses became more centralised in the late post-medieval period, and as such from this period onwards the available record of shipping casualties is both more complete and accurate. Wrecks dating to latter part of this period are also more likely to be visible in hydrographic surveys. With the use of metal in boat and ship construction becoming more common for wrecks of this period, their remains are often more evident on the seabed than their predecessors as their upstanding components are more clearly apparent to bathymetric and geophysical survey, and they generate strong magnetic anomalies. Metal wrecks were also considered to represent worse navigational hazards to shipping than their wooden counterparts and were recorded more scrupulously as a result. A number of recorded losses and geophysical anomalies within the study area have been identified and assigned to the date range 1816-1913.
- 12.9.45 In general terms, known wrecks identified as dating between 1816 and 1913 are more plentiful in the archaeological resource in comparison to those dating to earlier periods. This is particularly the case for wrecks dating from the mid-19th century onwards. While the Early Ships and Boats project identified 384 records in England's wreck resource from the prehistoric period to 1840 (Wessex Archaeology, 2013c), the Assessing Boats and Ships 1860-1913 project (Wessex Archaeology, 2011b) identified 518 wrecks in England's wreck resource dating to a 53 year period alone, spanning 1860 to 1913. Due to the number of records, for a wreck of this period to be of special interest, it is likely to have to make a distinctive contribution in respect of a number of integral factors. It must also be considered to have relative merit in comparison to other wrecks or surviving vessels of the period. The special interest of boats and ships of this period is likely to be multi-faceted. Consequently, any wrecks from this period that may be discovered within Norfolk Vanguard may only be of special interest if their remains can make a specific contribution to current knowledge and understanding.

*1914 to 1945 AD*

- 12.9.46 The East Coast was subject to a high level of hostility throughout both World Wars, with the East Anglian region providing a focus for military activity. The rapid technological advances of the preceding century facilitated the development of more homogenous naval fleets of larger, faster and more durable vessels, heavily armed and incorporating the widespread use of submarines.
- 12.9.47 A great number of vessels were lost during the World Wars, including both warships and submarines, but a much greater number of merchant vessels were lost as the disruption and destruction of shipping became an established military tactic (Firth, 2014). Large numbers of mines were laid by the Germans off the East Coast while German U-boats were engaged in unrestricted attacks on the British merchant fleet from September 1915 onwards within an 'unrestricted submarine warfare' zone surrounding the UK. At the height of the campaign, between February and April 1917, U-boats sank 500 merchant ships (Hewitt, 2008: 17).
- 12.9.48 During the war years the number of ships passing through the study area intensified as a result of increased demand for shipping to fulfil military requirements and to supply the wartime demands. For example, the East Coast trade route from the 'Great North Coalfield' was still the main supply line to London, which accounted for the single largest consumption for fuel in England (Hewitt, 2008: 7). To protect the maritime trade merchant fleets started operating in convoys escorted by minesweepers (Steffen, 2005: 802), and a great number of non-military vessels were requisitioned by the Royal Navy to support the war effort in this respect.



- 12.9.49 Convoys were also utilised in WWII in an attempt to transform the east coastal trade route into an indestructible highway (Hewitt, 2008: 17, 23). The main convoy route during WWII passed to the west of Norfolk Vanguard, between the Thames (Southend) to the Firth of Fort (Methil) or the Tyne. These convoy routes ran for the duration of the war between September 1939 and May 1945.
- 12.9.50 As in WWI, large numbers of steam trawlers and drifters were bought or hired by the Admiralty to supplement the Royal Navy's dwindling resources in WWII.
- 12.9.51 The advent of flight brought another dimension to 20th century warfare and the deployment of aircraft to destroy both merchant and military ships became a key strategy during WWII (Bowyer, 2003: 26). Alongside mines and submarines, aircraft posed a significant threat to shipping in WWII which was measurably enhanced as the accuracy and effectiveness of dive-bombing techniques increased (Whitley, 2002: 12). Three known records located within the provisional OCC refer to WWII ships sunk by German aircraft.
- 12.9.52 Dozens of vessels such as these were lost due to enemy action, some sunk by torpedoes or gunfire from submarines, with the additional threat of German motor torpedo boats, known as E-Boats and fighter/bomber aircraft (Larn and Larn, 1997). The distance between the coast of Norfolk and Suffolk and the coasts of German-occupied France and Holland was relatively short and ships were lost off Norfolk almost daily from 1939 to 1941.
- 12.9.53 The high levels of losses between 1914 and 1945, combined with the increased likelihood of discovering wrecks from this period through geophysical survey or historical accounts, means that only remains contributing to an understanding of technological changes and to local and global activities during this period are likely to be of special interest. However, many vessels of little archaeological value may have additional significance with regards to loss of life or through identifiable connections with significant events.

*Post- 1946*

- 12.9.54 Maritime activity within Norfolk Vanguard in the post-war era is multi-faceted, with the southern North Sea providing an arena for military, commerce, fishing and leisure activities. Although ships and boats are less numerous than in preceding years, the overall volume of seafaring activity continues to be very high (Wessex Archaeology, 2009: 61). Only remains of this period with unusual or specific potential to further understanding are likely to be regarded of special interest.



## 12.10 Appendix X: Maritime Recorded Losses

ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 1546047		Unknown	Cargo Vessel	Medieval	1254	A cargo vessel reported to have stranded near Bromholm Priory, at Bacton, with her goods. This vessel may be identifiable with another vessel reported as wrecked 'near Great Yarmouth', also in November 1254 (1446402), but this cannot be confirmed given
NHRE 926650		Unknown	Cargo Vessel	Medieval	1315	A Flemish cargo vessel reported to have stranded near Broomholm on her passage from what is now Belgian Flanders for England, with a general cargo. She was a wooden sailing vessel.
NHRE 1216226		Unknown	Cargo Vessel	Post-medieval	1762	A cargo vessel reported to have stranded at Bacton while in ballast. She is recorded as a wooden sailing vessel.
NHRE 1319386		<i>Dolphin</i>	Cargo Vessel	Post-medieval	1762	An English cargo vessel reported to have stranded near Happisburgh, en route from Newcastle-upon-Tyne to London with coal. Recorded to have been a wooden sailing vessel.
NHRE 1355782		<i>Friendship</i>	Cargo Vessel	Post-medieval	1762	An English cargo vessel reported to have stranded at Bacton, en route from Riga with timber, masts and flax. Recorded to have been a wooden sailing vessel.
NHRE 1216246		<i>Providence</i>	Cargo Vessel	Post-medieval	1762	An English cargo vessel reported to have stranded at Bacton, en route from 'Cammis' to London with oats and butter. The vessel is recorded to have been a wooden sailing vessel.
NHRE 1320371		<i>Providence</i>	Cargo Vessel	Post-medieval	1767	An English cargo vessel reported to have stranded at Walcott, near Happisburgh, due to bad weather. She was bound from London northwards in ballast.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 927487		<i>HMS Peggy</i>	Sloop of War	Post-medieval	1770	An English sloop-of-war, built in 1749, reported to have stranded on Happisburgh Beach, en route from South Shields to Great Yarmouth with volunteer marines. She was a wooden sailing vessel.
NHRE 1311391		<i>Albion</i>	Brigantine	Post-medieval	1774	A British brigantine reported to have stranded near Yarmouth at Eccles-on-Sea. She was laden with coals from Shields to London.
NHRE 1327191		<i>Friendship</i>	Cargo Vessel	Post-medieval	1786	A Dutch or German wooden sailing vessel, reported to have stranded at Happisburgh, en route from Emden to London.
NHRE 1383833		<i>Supply</i>	Brigantine	Post-medieval	1791	An English brigantine reported to have stranded at Happisburgh, en route from King's Lynn to Caernarvon and / or Carmarthen with wheat, rye, barley, peas and malt. She is recored to have been a wooden sailing vessel.
NHRE 1336346		<i>Good Intent</i>	Craft	Post-medieval	1792	A British craft reported to have stranded on the shore near Happisburgh. She was heaing to Blyth from London.
NHRE 1336335		<i>Hoffnung</i>	Cargo Vessel	Post-medieval	1792	A Prussian wooden sailing vessel, reported to have stranded and bilged at Happisburgh, en route from Szczecin to London laden with barrel staves.
NHRE 1336459		<i>William</i>	Cargo Vessel	Post-medieval	1793	An English wooden sailing vessel, reported to have stranded and bilged at Happisburgh, en route from Klaipeda for Great Yarmouth laden with timber.
NHRE 1337878		<i>Two Brothers</i>	Cargo Vessel	Post-medieval	1797	A British cargo vessel reported to have stranded near Happisburgh, loaded with coal.
NHRE 1338047		<i>Peace And Plenty</i>	Cargo Vessel	Post-medieval	1798	An English cargo vessel reported to have stranded near Happisburgh, laden with coal.
NHRE 928052		<i>Comet</i>	Ketch	19th century	1880	An English ketch reported to have stranded near Bacton beach. She was built in 1819 and had a total of four crew.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 928047		<i>Emerald</i>	Ketch	19th century	1880	An English ketch reported to have stranded at Bacton beach. She was built in 1816 and the total of 10 crew were lost during wrecking.
NHRE 1338880		<i>Kitty</i>	Brig	19th century	1802	An English wooden sailing vessel, reported to have stranded at Bacton on her passage from Sunderland with coal.
NHRE 1376722		<i>Vrouw Cornelia</i>	Craft	19th century	1803	A Dutch wooden sailing vessel, reported to have stranded at Bacton beach on her passage to London.
NHRE 1397863		Unknown	Brig	19th century	1807	A wooden sailing vessel, reported to have stranded at Happisburgh during a gale.
NHRE 1397862		Unknown	Craft	19th century	1807	A wooden sailing vessel reported to have stranded at Happisburgh during a gale, on her passage from Sunderland.
NHRE 928241	NHER MNF18662	<i>Hunter</i>	Sailing Vessel	19th century	1807	A British revenue cutter reported to have stranded on the beach at Happisburgh after grounding on Haisborough Sand during a gale.
NHRE 1397860		<i>Margaret</i>	Cargo Vessel	19th century	1807	An English wooden sailing vessel reported to have stranded at Happisburgh during a gale.
NHRE 1341255		<i>Fame</i>	Craft	19th century	1809	A wooden sailing vessel reported to have stranded on Happisburgh Beach.
NHRE 1341256		<i>Royal Merchant</i>	Cargo Vessel	19th century	1809	An English wooden sailing vessel reported to have stranded on Happisburgh Beach.
NHRE 1341806		<i>Prince William Henry</i>	Cargo Vessel	19th century	1810	A British wooden sailing vessel, reported to have stranded on Happisburgh beach on her passage from Great Yarmouth in ballast.
NHRE 1218611		<i>Maria</i>	Cargo Vessel	19th century	1812	An English wooden sailing vessel reported to have stranded on Happisburgh Beach on her passage from Newcastle-upon-Tyne with coal.
NHRE 1343379		<i>Hopewell</i>	Cargo Vessel	19th century	1814	A British cargo vessel reported to have run ashore at Bacton, near Mundesley, from London to Leeds.
NHRE 1343486		<i>Verandering</i>	Cargo Vessel	19th century	1814	A Dutch cargo vessel reported to have stranded near Bacton at Hasbro'. She was from Embden, laden with oasts.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 1344193		<i>Benjamin</i>	Craft	19th century	1815	A British craft reported to have stranded near Happisburgh, from Sunderland.
NHRE 1345333		<i>Thomas</i>	Cargo Vessel	19th century	1817	An English cargo vessel reported to have run ashore near Bacton. The vessel with 'THOMAS of Boston, William Fowel', painted on the stern, contained several packing cases, and a quantity of oats.
NHRE 1315686		Unknown	Craft	19th century	1824	Two crafts were reported to have stranded at Happisburgh. Both vessels were driven ashore due to bad weather. One consisted of a barge 'Alexander' (NHRE 1315682).
NHRE 1315682		<i>Alexander</i>	Barge	19th century	1824	An English barge reported to have stranded at Happisburgh. She was bound to London from Hull with flagstones and cement.
NHRE 1351795		<i>Barton</i>	Craft	19th century	1824	An English craft reported to have stranded north of Happisburgh, due to severe gale winds.
NHRE 1236794		<i>Huddersfield</i>	Cargo Vessel	19th century	1827	A British cargo vessel reported to have run ashore near Happisburgh, from London.
NHRE 1315958		Unknown	Smack	19th century	1829	A boat supposed to be a smack's, drifted on shore near Bacton, very likely all crew were lost.
NHRE 1237163		<i>Ocean</i>	Brig	19th century	1830	An English wooden sailing vessel reported to have stranded on Bacton beach after springing a leak, having just delivered her cargo at Mundesley, i.e. she was now in ballast. She began her voyage at Newcastle-upon-Tyne laden with coal.
NHRE 1237913		<i>Hercules</i>	Craft	19th century	1832	A craft, en route from Rotterdam, reported to have stranded near Hasbro' Lights, Happisburgh beach.
NHRE 927864		<i>Autumn</i>	Snow	19th century	1854	An English snow reported to have stranded near Bacton. Having sprung a leak at sea in gale wind conditions the vessel was run on shore in a sinking condition and soon broke up, being very old. The crew were saved by the Bacton lifeboat. The vessel was insured at Lloyd's. She was built in 1790 at Whitby, with iron bolts.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 1489537		<i>Quicksilver</i>	Cargo Vessel	19th century	1858	An English wooden sailing vessel reported to have foundered off Happisburgh after a collision, en route from Sunderland to London.
NHRE 927930		<i>Princess</i>	Smack	19th century	1866	A British smack reported to have stranded near Happisburgh. She was built in 1865 and out of a total of six crew, one was lost during wreckage.
NHRE 927933		<i>Thomas</i>	Sloop	19th century	1866	A British slopp reported to have stranded near Watch House, a quarter of a mile north of Bacton. She was built in 1857 and a the total crew of three were lost during the wreck.
NHRE 1223030		<i>Edith</i>	Schooner	19th century	1884	An English Schooner reported to have stranded at Happisburgh. She was built in 1858 at Padstow, and the total crew of five were lost during wrecking.
NHRE 928459		<i>Myth</i>	Fishing Vessel	19th century	1885	An English Dandy reported to have stranded at Bacton beach. She was built in 1870 and from a total of 13 crew, one was lost during the wrecking.
NHRE 928485		<i>Aerial</i>	Brig	19th century	1886	An English brig reported to have stranded at Bacton beach, due to bad weather. She was built in 1839 at Newcastle-on-Tyne.
NHRE 1223358		<i>Hilda</i>	Fishing Vessel	19th century	1886	An English Dandy reported to have stranded off Happisburgh beach due to bad weather.
NHRE 928672		<i>Lively</i>	Schooner	19th century	1888	An English schooner reported to have stranded at Walcott Gap, near Happisburgh.
NHRE 1349732		<i>Flora</i>	Schooner	19th century	1892	A German schooner reported to have stranded and lost at Bacton due to bad weather. She was built in 1858.
NHRE 1348480		<i>Lively Oak</i>	Schooner	19th century	1893	An English schooner reported to have stranded at Bacton beach. She was built in 1868.
NHRE 928329		<i>Mayland</i>	Ketch	19th century	1897	An English ketch reported to have foundered at Happisburgh, following a collision with the wooden brig Canadian, of Sunderland. She was built in 1868 and had a total crew of four.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 928339		<i>Vedra</i>	Snow	19th century	1897	An English snow reported to have stranded near Bacton beach. She was built in 1861 in Sunderland. Out of a total of seven crew, three were lost.
UKHO 69837		<i>Seymolicus</i>	Fishing Vessel	WWI	1914	Recorded by UKHO as <i>Seymolicus</i> , a wooden fishing vessel, mined and sunk 18/11/1914. Wreck amended to dead in 1988. Feature not identified on the geophysical data.
UKHO 11145		<i>Young Frank</i>	Fishing Vessel	WWI	1915	Recorded by UKHO as <i>Young Frank</i> , a fishing vessel, bombed and sunk by a submarine 23/08/1915. Wreck amended to dead in 1994. Nothing anthropogenic identified on the geophysical data.
NRHE 892290	UKHO 10572; NHER MNF38251	<i>Unknown</i>	Unknown	Modern (WWI)	Unknown	Recorded by UKHO in 1948 as the remains of an old war wreck in the intertidal area. NHER data describes it as a WWI wreck of unknown name marked on an Admiralty Chart in 1957. Nothing found in 1983 and not seen in the 2016 geophysical data.
NHER MNF18663		<i>Unknown</i>	Unknown	Modern (WWI)	Unknown	NHER data describes a WWI wreck of unknown name marked on Admiralty Charts in 1957. Not seen in the 2016 geophysical data.
UKHO 69079		<i>Quest</i>	Fishing Vessel	WWI	1915	Recorded by UKHO as <i>Quest</i> , a fishing vessel reported sunk 30/07/1915. Not observed at this location.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
NHRE 1349364	UKHO 11135	<i>Lembit</i>	Schooner	Modern	1916	An English schooner reported to have stranded on Happisburgh beach on a northbound voyage from Gravesend with burnt ore. She was constructed of wood in 1892, and built as a sailing vessel. Subsequent attempts to locate the wreck were unsuccessful despite intensive sonar and echo sounder surveys. The wreck continued to be charted on Dutch fisheries charts dated to 1972, although its remains were still not found during a full search of the area. This wreck has since been amended to dead.
NHRE 929125		<i>Enterprise</i>	Barge	Modern	1917	An English wooden sailing barge, reported to have stranded at Happisburgh beach. She was built in 1891 in Great Yarmouth, fitted with three masts, one deck and screw driven with an oil engine.
UKHO 11151 and 11152		<i>Nelson, Ethel And Milly</i>	Unknown	WWI	1917	UKHO provides two different records and wreck numbers at the same location; that of <i>Nelson, Ethel and Milly</i> . Reported as being torpedoed by a submarine and sunk 15/08/1917. Nothing identified on the geophysical data. Both have been amended to dead wrecks.
NHRE 929136		<i>Clansman</i>	Cargo Vessel	Modern	1924	A British cargo vessel reported to have stranded 3 miles northeast of Happisburgh Lighthouse. It was built in Belfast by Clark & Co., screw driven and propelled by a two cylinder compound engine.
UKHO 11102		<i>Boy Edward</i>	Fishing Vessel	Modern	1930	Reported by UKHO as <i>Boy Edward</i> , a fishing vessel reported sunk 05/11/1930. Not observed at this location.
UKHO 10558		<i>Nimrod</i>	Unknown	Modern	1975	Recorded by UKHO as <i>Nimrod</i> which ran aground in 1975 near Happisburgh. Nothing identified in 1983 and not seen in 2016 geophysical data.
UKHO 10897		<i>Beaver</i>	Unknown	Unknown	Unknown	Recorded by UKHO as <i>Beaver</i> , a wreck which was amended to lifted in 1995.



ID	Other Data Sources	Name	Type	Period	Year Lost	Description
UKHO 11105		Unknown	Unknown	Unknown	Unknown	An unknown wreck, first reported in 1916. The original source identifying the location of the wreck is unknown, although available evidence suggests that no geophysical signature has been associated with this site to date. Attempts to locate the wreck in subsequent surveys were unsuccessful and this wreck was amended to dead. No geophysical anomaly observed in 2013 data or in previous zoning assessment. The record was last amended in 2014 but no additional surveying details were added.
UKHO 11107		Unknown	Unknown	Unknown	Unknown	An unknown wreck, first reported in 1921. The wreck was initially observed as being charted on German and Dutch shipping charts. However, subsequent attempts to locate the wreck were unsuccessful despite intensive sonar and echo sounder searches. The wreck site was amended to dead in 1969, although it continued to be charted on Dutch fisheries charts dated to 1972. No geophysical anomaly was observed in 2013 data or in the previous zoning assessment. The record was last amended in 2014 but no additional surveying details were added.
UKHO 10572		Unknown	Unknown	Unknown	Unknown	Recorded by UKHO in 1948 as the remains of an old war wreck in the intertidal area. Nothing found in 1983 and not seen in the 2016 geophysical data.
UKHO 10766		Unknown	Foul Ground	Unknown	Unknown	Recorded by UKHO as foul ground. First identified in 1987 described as a pile of debris. Not located in 2014 and nothing seen in the 2016 geophysical data.

## 12.11 Appendix XI: Aviation Archaeological Potential

### *Introduction*

- 12.11.1 A guidance note published by English Heritage (now Historic England) entitled *Military Aircraft Crash Sites* (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 (*ibid.*: 2). All aircraft that crashed while in military service are automatically protected under the Protection of Military Remains Act 1986.
- 12.11.2 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.
- 12.11.3 There is potential for aircraft crash sites dating from the early 1900s to the present day to be present within the study area, and this potential is discussed below.

### *Pre-1939*

- 12.11.4 There are no known or charted aircraft or documented losses dating to this phase within the study area.
- 12.11.5 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.
- 12.11.6 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.
- 12.11.7 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 at sea, particularly within regions that attracted intense aircraft hostility such as the East Coast. WWI airfields in the area include RAF/RNAS Bacton, in use between 1915 and 1919, that was built to accommodate aircraft from the No. 219 Squadron intercepting Zeppelin bombers.
- 12.11.8 During the interwar period, civil aviation increased significantly, 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).

- 12.11.9 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). Civil aviation also increased significantly during the 1920s and 1930s, with over-seas services established to a number of European and worldwide destinations (Wessex Archaeology, 2009: 16).
- 12.11.10 Pre-1939 aircraft crash sites at sea are likely to be relatively rare, and the lightweight construction of the earlier airframes means that they are less likely to survive within the marine environment unless buried within seabed sediments. Any early aircraft crash sites from this period are likely to be important if discovered.

#### *1939 to 1945*

- 12.11.11 This period is characterised by technological innovations which extended the reliability and range of aircraft and the deployment of aircraft as a key strategy during WWII. Aircraft activity increased dramatically during this time and the highest potential for aircraft material on the seafloor is from this period. By WWII, aircraft were more heavily built and therefore material from their crash sites is more likely to survive in the archaeological record.
- 12.11.12 During WWII airpower became increasingly important at a strategic and operational level. Forming the frontier between the Allies and Axis, the North Sea became a significant focus for a high volume of aviation activity in WWII with hostile aircraft activity particularly concentrated off the east and south coasts of England (Wessex Archaeology, 2008: 16). During the Blitz, Great Yarmouth suffered more bombing than any other coastal town in the country.
- 12.11.13 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. Several airfields were located in proximity to the proposed project landfall indicating the concentration of aircraft movement over this region would have been high. These included RAF Matlaske, RAF Oulton, RAF Foulsham, RAF Coltishall, and RAF Ludham. Two RAF airfield decoys were also located in proximity to these airfields and indicate the lengths taken to protect this vulnerable coastline.
- 12.11.14 The *Aircraft Crash Sites at Sea* project (ALSF 5223; Wessex Archaeology, 2008) considered a selection of sources which may be considered to indicate the potential for aircraft remains of this period to exist within the study area. One of the most complete sources of information was provided by published aviation researcher Ross McNeill, who identified 11,090 RAF aircraft losses in the North Atlantic, North Sea, English Channel, Irish Sea and Biscay areas between 1939 and 1990, the majority of which occurred in WWII (Wessex Archaeology, 2008: 18). Of these, 217 are thought to have occurred off the coast of Norfolk. While Wessex Archaeology cannot verify the accuracy of the data supplied by McNeill, it was collated through a systematic study based on both primary and secondary sources and suggests a high volume of potential aircraft crash sites within the study area.
- 12.11.15 A further survey of crash sites in England, carried out by English Heritage in consultation with the MoD as part of the Monuments Protection Programme (MPP), revealed that WWII losses tended to cluster along the southern and eastern margins of England. The study suggested that c. 1,000 British aircraft were lost off the coast of

Suffolk (English Heritage, 2002: 5). Located beneath flight paths of enemy bomber formations from the Continent to the East Coast, the skies above the study area are likely to have been a focus for air combat during WWII.

- 12.11.16 There are three WWII aircraft casualties whose records place them within the study area (NHRE 1327660; NRHE 1318577; and NHER MNF17517). The NRHE records consist of British bombers reported to have crashed near Happisburgh. The NHER record refers to a German bomber with twin radial engines, whose remains were discovered by divers in 1981 offshore east of Happisburgh Church. Two geophysical anomalies are located close to the given position (**71080** and **71088**), however they indicate isolated pieces of debris that do not suggest aircraft remains. Therefore, it is likely that either the aircraft has dispersed from the area or the position is inaccurate and as such the record has not been ascertained at the location through the geophysical survey assessment, resulting in it being referred to as a Recorded Loss.
- 12.11.17 Analysis of maps showing the location of WWII Air/Sea Rescue Operations that took place within the vicinity of the study area indicated that there were at least 18 recorded Air/Sea Rescue Operations (sporadically recorded between February 1941 and March 1945), nine of which were recorded as unsuccessful. 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 aircraft crash sites in the study area.
- 12.11.18 This evidence demonstrates a high potential for the presence of WWII aircraft remains to exist within the project area. As outlined above, all aircraft that crashed while in military service are automatically protected under the Protection of Military Remains Act 1986, and all remains of aircraft from this date will be of high importance.

#### *1945 to Present*

- 12.11.19 From the end of WWII until the early 1990s, military aviation activity was dominated by the Cold War. During this period, aircraft research, design and development further increased to the benefit of both the military and commercial sector. 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).
- 12.11.20 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 for most people and the volume of airliner activity across the study area is likely to have been considerable. 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).



## 12.12 Appendix XII: Aviation Recorded Losses

ID	Name	Type	Period	Year Lost	Description
NRHE 1327660	Wellington MK I L4257	Bomber	WWII	1939	A British bomber reported to have flown into the sea in bad weather, 5 miles south-east of Happisburgh Light Vessel. It was built in Weybridge by Vickers and consisted of an MK I heavy bomber, one of a batch of 175.
NRHE 1318577	Hampden MK I P1321	Bomber	WWII	1940	A British bomber reported to have stranded near Happisburgh. It was a Mk I medium bomber, one of a batch of 200 standard Bomber Command aircraft. It was damaged by flak over Castrop-Rauxel, Germany, and crash landed on the beach near Happisburgh.
NHER MNF17517	Unknown	Bomber	WWII	1940	Aircraft crash site, consisting of a German bomber with an intact twin radial engine, located off the coast of Happisburgh. Remains were discovered by divers in 1981 although the position provided is inaccurate and has not been confirmed since.



### 12.13 Appendix XIII: Intertidal Heritage Assets

Co-ordinates are in ETRS89 UTM Zone 31N.

WA ID	Site Type	Description	Period	NRHE / NHER	Easting	Northing
1001	Findspot	Prehistoric flint flake.	Prehistoric	NHER MNF46197	401797	5853261
1002	Findspot	Prehistoric flint flake.	Prehistoric	NHER MNF46198	401845	5853227
1003	Findspot	Prehistoric flint core.	Prehistoric	NHER MNF46202	401868	5853208
1004	Findspot	Prehistoric flint flake.	Prehistoric	NHER MNF46203	401897	5853192
1005	Findspot	Prehistoric flint scraper.	Prehistoric	NHER MNF46207	401825	5853256
1006	Findspot	Prehistoric flint scraper.	Prehistoric	NHER MNF46206	401531	5853606
1007	Findspot	Flint flake.	Prehistoric	NHER MNF46200	402166	5853026
1008	Findspot	Two prehistoric flint artefacts.	Prehistoric	NHER MNF18837	401802	5853345
1009	Findspot	Lower Palaeolithic flint hand axe.	Palaeolithic	NHER MNF44878	402101	5853111
1010	Findspot	Lower Palaeolithic lithic working and butchery site, comprising over 200 worked flints, environmental evidence.	Palaeolithic	NHER MNF39512	401935	5853311
1011	Findspot	Palaeolithic flint handaxe.	Palaeolithic	NHER MNF31462	401299	5853891
1012	Findspot	Palaeolithic flint handaxe.	Palaeolithic	NHER MNF31657	400961	5854205
1013	Findspot	Two Lower Palaeolithic flint handaxes.	Palaeolithic	NHER MNF40679	401096	5854131
1014	Findspot	Palaeolithic handaxe and two flakes and three cores.	Palaeolithic	NHER MNF62113	401008	5854152
1015	Findspot	Lower Palaeolithic flint handaxe.	Palaeolithic	NHER MNF62279	401428	5853767
1016	Findspot	Palaeolithic flint handaxe.	Palaeolithic	NHER MNF8369	403207	5852225
1017	Findspot	Early hominin footprints dating to Early Pleistocene and early Middle Pleistocene. Flint objects and cut-marked bones have also been found associated with environmental remains.	Palaeolithic	NHER MNF66407	401289	5853867
1018	Findspot	Primary Palaeolithic flint flake.	Palaeolithic	NHER MNF28062	402030	5853253
1019	Findspot	Palaeolithic flint handaxe.	Palaeolithic	NHER MNF58130	402691	5852616
1020	Findspot	Lower Palaeolithic flint handaxe.	Palaeolithic	NHER MNF62276	401346	5853826
1021	Findspot	A Palaeolithic flint handaxe found on beach at high water line in 1975.	Palaeolithic	NRHE 133942	403205	5852222
1022	Findspot	A Palaeolithic handaxe found in 1978 on Happisburgh beach, near the Lifeboat station.	Palaeolithic	NRHE 1230284	401430	5853769



WA ID	Site Type	Description	Period	NRHE / NHER	Easting	Northing
1023	Findspot	A Palaeolithic handaxe found on Happisburgh beach in 1995.	Palaeolithic	NRHE 1230286	401337	5853875
1024	Findspot	A Palaeolithic handaxe found on Happisburgh beach in 1995.	Palaeolithic	NRHE 1230287	400959	5854202
1025	Findspot	A Palaeolithic flint implement found in the parish of Happisburgh.	Palaeolithic	NRHE 619088	401993	5853228
1026	Findspot	A Neolithic polished flint axehead found in 1951.	Neolithic	NRHE 133662; NHER MNF7080	398765	5856218
1027	Findspot	Neolithic polished flint axehead.	Neolithic	NHER MNF20919	400187	5855030
1028	Findspot	Two Neolithic polished flint axeheads.	Neolithic	NHER MNF41193	401617	5853569
1029	Findspot	Neolithic flaked flint axe.	Neolithic	NHER MNF62280	401578	5853559
1030	Findspot	Multi-period finds.	Neolithic - post-medieval	NHER MNF68884	401653	5853416
1031	Findspot	Multi-period objects, coins and pottery sherds.	Prehistoric - post-medieval	NHER MNF54968	400960	5854052
1032	Findspot	Prehistoric, Roman, medieval and post-medieval finds.	Prehistoric - post-medieval	NHER MNF57872	401603	5853585
1033	Findspot	Multi-period finds.	Prehistoric - post-medieval	NHER MNF44734	402020	5853226
1034	Findspot	Blade fragment of a leaf shaped sword.	Bronze Age	NHER MNF18519	402009	5853150
1035	Findspot	Copper alloy flanged axehead found on Happisburgh beach.	Bronze Age	NHER MNF38613	401923	5853347
1036	Chapel	Site of Primitive Methodist chapel built in 1883. Three-bay gabled front with serrated brick cornices. Two round-arched windows flank a central window.	19th century	NRHE 1494240	403198	5853555
1037	Findspot	Early Saxon silver pyramid mount with garnet.	Medieval	NHER MNF56876	401923	5853347
1038	Findspot	Medieval gold ring dating to the late 12th or 13th century.	Medieval	NHER MNF50467	401847	5853310
1039	Findspot	Medieval coin, possibly a groat of Edward III.	Medieval	NHER MNF19144	401334	5853818
1040	Findspot	Medieval harness pendant and coin of Charles I.	Medieval	NHER MNF38365	399082	5855800
1041	Findspot	Gold coin, Edward IV.	Medieval	NHER MNF17121	397417	5857267
1042	Findspot	Medieval coin, Jean I of Brabant.	Medieval	NHER MNF13733	399019	5856003
1043	Findspot	Medieval coin, copy of sterling groat.	Medieval	NHER MNF23058	400421	5854772
1044	Well	The site of a square timber framed well, exposed by erosion in 1947. Its base was excavated in August 1948 and contained 13th century pottery. Finds in Norwich Museum.	Medieval	NRHE 133669; NHER MNF7085	399995	5855171



WA ID	Site Type	Description	Period	NRHE / NHER	Easting	Northing
1045	Lighthouse	Happisburgh Low Lighthouse was one of two lighthouses erected in Happisburgh in 1791. By 1886 the lighthouse had fallen, probably as a result of coastal erosion. In 1980, when recorded by the RCHME, remains of part of the foundations still survived <i>in situ</i> but the majority of the remains lay on the beach or had been covered by sand.	Post-medieval	NRHE 524226; NHER MNF15435	402104	5853068
1046	Findspot	Post-medieval coin, George I.	Post-medieval	NHER MNF22617	401759	5853448
1047	Well	Flint and brick-lined well, now demolished.	Post-medieval	NHER MNF38949	401623	5853508
1048	Sea defence	Posts from a 19th century breakwater visible on aerial photographs.	Post-medieval	NHER MNF45564	401322	5853886
1049	Sea defence	Line of posts possibly representing a former groyne or sea defence.	Post-medieval	NHER MNF46053	403326	5852149
1050	Brickyard	Site of brickyard that has since been eroded away.	Post-medieval	NHER MNF46986	399700	5855387
1051	Road	An undated road from a map dating to 1797. It has since been destroyed by coastal erosion.	Post-medieval	NHER MNF7087	399896	5855268
1052	Drain	Drain eroding from Happisburgh cliffs, subsequently destroyed.	Post-medieval - modern	NHER MNF64669	401602	5853541
1053	Sea defence	Line of concrete or stone blocks, possibly early sea defences, possibly dating to the late 19th/early 20th century	Post-medieval - modern	NHER MNF44671	399563	5855489
1054	Structure	Intertidal structure visible on aerial photographs taken in 1940; possibly related to WWII training or construction of coastal defences. It is possible that the remains relate to a wreck site that is no longer visible.	Post-medieval - modern	NHER MNF44454	400056	5855159
1055	Structure	Intertidal structure visible on aerial photographs taken in 1940; possibly related to WWII training or construction of coastal defences. It is possible that the remains relate to a wreck site that is no longer visible.	Post-medieval - modern	NHER MNF44455	401360	5853919
1056	Anti-tank blocks	WWII anti-tank blocks are situated in the vicinity of Cart Gap to the north of Eccles-on-Sea. The anti-tank blocks were built of concrete and were constructed during the period of 1940 to 1941. At the time of a field visit between 1986 and 1988 it was noted that the blocks had tumbled over. During the WWII their purpose were to block vehicular access through the Cart Gap.	Modern (WWII)	NRHE 1425416; NHER MNF44616	402742	5852566



WA ID	Site Type	Description	Period	NRHE / NHER	Easting	Northing
1057	Anti-tank blocks	Five WWII anti-tank blocks along Walcott beach.	Modern (WWII)	NRHE 1417005; NHER MNF32635	398867	5856101
1058	Artillery battery	A WWII Coast Artillery Battery is situated on Happisburgh beach and about 38 metres northeast of Beach Road. The battery was built of concrete and was constructed during the period of 1940 to 1941. The battery is equipped with mounting for two six-inches guns. In addition, there remains a slight section of semi-circular tunnel jetting out from the cliff to the east of the life boat station. The coast battery was abandoned in the late 1940s as the 4.7 inches Happisburgh Emergency Coast Battery became operational (see NRHE 1416985). At the time of a field visit on 30th October 1994 it was noted that the remains of the battery were in very bad condition and are threatened by coastal erosion.	Modern (WWII)	NRHE 1416996; NHER MNF32636; NHER MNF44679	401521	5853642
1059	Machine gun post	A WWII machine gun post is situated in the vicinity of Cart Gap to the north of Eccles-on-Sea. The gun post was built of brick and was constructed during the period of 1940 to 1941. The polygonal structure was built into the cliff and is presumed to be a purpose-built machine gun post. At the time of a field visit between 1986 and 1988 it was noted that the structure was in fair condition.	Modern (WWII)	NRHE 1425414; NHER MNF44616	402758	5852583
1060	Pillbox	A WWII War polygonal pillbox is situated in the vicinity of Cart Gap to the north of Eccles-on-Sea. The pillbox was built of reinforced concrete and brick and was constructed during the period of 1940 to 1941. At the time of a field visit between 1986 and 1988 it was noted that the pillbox had tumbled over the cliff and its condition was very bad.	Modern (WWII)	NRHE 1425415; NHER MNF44616	402749	5852575
1061	Pillbox	The former site of a WWII pillbox is situated in the vicinity of Walcott Gap at Walcott. The pillbox was built of reinforced concrete and was constructed during the period of 1940 to 1941. At the time of a field visit between 1986 and 1988 it was noted that the pillbox had been destroyed due to sea erosion and sea defence works. The pillbox had been seen on a postcard dating to 1955, depicting it <i>in situ</i> in the early 1950s.	Modern (WWII)	NRHE 1425466; NHER MNF44725	399069	5855836.441



WA ID	Site Type	Description	Period	NRHE / NHER	Easting	Northing
1062	Military Defence	WWII barbed wire obstructions and possible weapons pits, visible on aerial photographs	Modern (WWII)	NHER MNF44670	402233	5852925
1063	Military Defence	Site of barbed wire obstructions and two pillboxes.	Modern (WWII)	NHER MNF44674	401663	5853406
1064	Military Defence	WWII coastal defences visible on aerial photographs, comprising barbed wire obstructions, anti-tank cubes and a pillbox.	Modern (WWII)	NHER MNF44715	399852	5855152
1065	Military Defence	WWII coastal defences, including anti-tank ditches, anti-tank cubes, barbed wire and pillboxes	Modern (WWII)	NHER MNF45206	397981	5856734