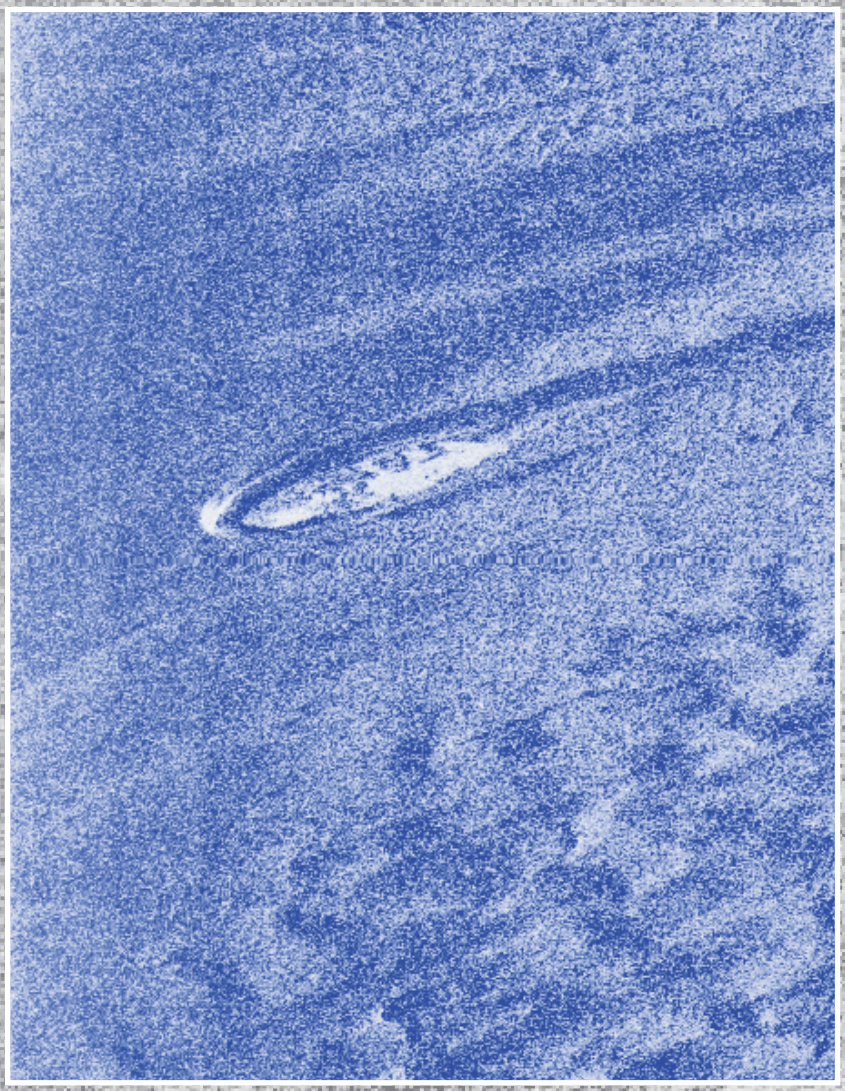
Wessex Archaeology

Wash Cable Route Corridor

Archaeological Assessment



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WASH CABLE ROUTE CORRIDOR

ARCHAEOLOGICAL ASSESSMENT

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Summary

Wessex Archaeology was commissioned by AMEC Wind Energy and Renewable Energy Systems Limited, on behalf of Centrica Renewable Energy Limited to undertake an archaeological assessment of the potential impact upon archaeological remains from the proposed cable route for three offshore wind farms; Lincs, Docking Shoal and Race Bank, the impact of which is discussed in Wessex Archaeology's Lincs Offshore Wind Farm Archaeological Assessment, Docking Shoal and Race Bank Offshore Wind Farms Archaeological Desk-based Assessment and Docking Shoal Offshore Wind Farm Archaeological Assessment.

To provide archaeological context for the DBA a broad Cable Route Study Area was created, covering the eastern half of the Wash and forming a rough rectangle of approximately 48 by 20 kilometres. Searches for known archaeological material were conducted within the Cable Route Study Area and also the Docking Shoal and Race Bank Study Areas to the north. Information was sought from a wide range of local and national bodies, including the Historic Environment Record maintained by Norfolk County Council, the National Monuments Record and the UK Hydrographic Office. The resultant data were then filtered to focus only on those sites that lie within the Wash Cable Route Corridor and a 500m buffer zone placed around it by Wessex Archaeology. The remaining data were used to inform a wider assessment of archaeological potential of the area. Archaeological interpretation and assessment of geophysical data (multibeam bathymetry, sidescan sonar, magnetic and single beam shallow seismic data) was undertaken by Wessex Archaeology and is included in this report.

This report sets out the methodology employed in carrying out the study and an account of the policy and legal framework affecting archaeological sites and wrecks in the UK. The archaeological heritage is discussed with particular reference to the maritime and prehistoric archaeology and history of the Wash. Maritime sites and the potential for the survival of former prehistoric land-surfaces offshore form the main focus of this assessment.

In summary, the known and potential archaeology within the Wash Cable Route Corridor and the 500m buffer zone comprises:

- 219 known wrecks and geophysical anomalies, 28 of which are of sufficient interest to require exclusion zones.
- 87 documented losses some of which may lie more than 500m from the cable route corridor.
- Unknown and undocumented wrecks from various periods, possibly dating back to the Mesolithic.
- Stray finds of shipborne debris from various periods.
- The potential for the presence of submerged prehistoric land-surfaces dating from 700,000 BP to 4,000 BC, possibly containing archaeological data and sites.

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Datasets were provided by the National Monuments Record, Metoc plc (Seazone) and Norfolk Historic Environment Record. Wessex Archaeology is grateful to the staff of all these organisations for their co-operation.

Margaret Christie and Brian Hession carried out the assessment and compiled this report. Kitty Brandon prepared the illustrations. Stephanie Arnott and Cristina Serra processed and interpreted the geophysical data which was collected and supplied by Emu Limited and Osiris Projects. The project was managed for Wessex Archaeology by John Gribble and Paul Baggaley.

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1. INTRODUCTION

1.1. PROJECT BACKGROUND

1.1.1. Wessex Archaeology (WA) was commissioned by AMEC Wind Energy and Renewable Energy Systems Limited, on behalf of Centrica Renewable Energy Limited to prepare an assessment of the potential effect upon archaeological remains of the construction of a cable route through the Wash. The cable route will serve the proposed Race Bank, Docking Shoal and Lincs Offshore Wind Farm developments off the Norfolk and Lincolnshire coasts to the north of the Wash (**Figure 1**).

1.1.2. This assessment outlines the known and potential archaeological resource within the proposed cable route corridor and in an area around it. The assessment is based on a desk-based study and the interpretation and assessment of geophysical data. The full range of data searches includes maritime sites and those elements of the local terrestrial archaeology that may be represented in or on the seabed as a result of sea level change.

1.1.3. An assessment of the impact of the cable route upon the archaeology was undertaken and mitigation measures are recommended. This assessment will supplement the Environmental Statement on the potential impact of the offshore elements of the cable route.

2. LEGISLATION AND POLICY

2.1. INTRODUCTION

2.1.1. England's heritage-related planning guidance and legislation is currently going through a period of major review. As a consequence, it is appropriate to highlight that changes, to both legislation and the planning process, may be made over the next three to five years. The majority of what is set out in this section reflects the situation as of January 2007.

2.2. PROTECTION OF WRECKS ACT (1973)

2.2.1. Under the Protection of Wrecks Act (1973) (PWA), wrecks and wreckage of historical, archaeological or artistic importance can be protected by way of designation. It is an offence to carry out certain activities in a defined area surrounding a wreck that has been designated, unless a licence for those activities has been obtained. Generally, the relevant Secretary of State must consult appropriate advisors prior to designation (English Heritage in the case of the Wash cable route scheme), though it is also possible to designate a wreck in an emergency without first seeking advice.

2.2.2. There are no sites presently designated under this legislation within the Cable Route Study Area (see **3.2** below for description of study areas). However, if any important wreck or ship borne artefact is discovered during construction, the designation of an area around the find remains a possibility.

2.3. MERCHANT SHIPPING ACT (1995)

2.3.1. Within the context of the Merchant Shipping Act (1995), 'wreck' refers to flotsam (floating material from a ship), jetsam (a vessel's equipment or cargo that is deliberately thrown overboard to lighten the load in an emergency), derelict (material or a vessel abandoned at sea) and lagan (goods or wreckage on the sea bed that are attached to a buoy so they can be recovered) found in or on the shores of the sea or any tidal water. It includes a ship, aircraft or hovercraft, parts of these, their cargo or equipment. It may be of antique or archaeological value such as gold coins, a yacht or dinghy abandoned at sea, or items such as drums of chemicals or crates of foodstuffs (Definition from the Receiver of Wreck).

2.3.2. The ownership of underwater finds that turn out to be 'wreck' is decided according to procedures set out in the 1995 Act. 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. This applies whether material has been recovered from within or outside UK Territorial Waters, unless the salvor can prove that title to the property has been vested in him/her (e.g. by assignment to him/her of rights devolving from the owner of the vessel or its contents at the time of loss). Even if ownership can be proved the salvor is still required to notify the Receiver.

2.3.3. The Crown makes no claim on wreck found outside UK Territorial Waters that remains unclaimed at the end of the statutory one year, and the property is returned to the salvor. Ownership of unclaimed wreck from within Territorial Waters lies in the Crown, or in a person to whom rights of wreck have been granted.

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

2.4. PROTECTION OF MILITARY REMAINS ACT (1986)

2.4.1. Under the Protection of Military Remains Act (1986) (PMRA), all aircraft that have crashed in military service are protected and the Ministry of Defence (MoD) has powers to protect vessels that were in military service when they were wrecked. The MoD can designate named vessels as Protected Places, even if the position of the wreck is not known. In addition, the MoD can designate Controlled Sites around wrecks whose position is known. In the case of Protected Places, the vessel must

have been lost after 4th August 1914, whereas in the case of a wreck protected as a Controlled Site no more than 200 years must have elapsed since the loss.

2.4.2. In neither case is it necessary to demonstrate the presence of human remains on the site. Diving is not prohibited at a Protected Place but it is an offence to tamper with, damage, move or remove items from the wreck. However, diving, salvage and excavation are all prohibited on Controlled Sites, though licences for restricted activities can be sought from the MoD. Additionally, it is an offence to carry out unauthorised excavations for the purpose of discovering whether any place in UK waters comprises any remains of an aircraft or vessel which has crashed, sunk or been stranded while in military service.

2.4.3. In November 2001, the MoD reported on the *Public Consultation on Military Maritime Graves and the Protection of Military Remains Act 1986*. The report recommended that a rolling programme of identification and assessment of vessels against set criteria be established to designate all other British vessels in military service when lost, as Protected Places. These criteria include:

- Whether or not human remains are known or likely to be present;
- Whether or not there is evidence of sustained disturbance and looting;
- Whether or not designation is likely to curb or put a stop to such disturbance and looting;
- Whether or not diving on the vessel or site attracts sustained and significant public criticism or approval.

2.4.4. Following this, designations were made by Statutory Instrument 2002 No. 1761 where 11 wrecks were designated as 'controlled sites' and a further 6 wrecks were designated 'protected places'. The Ministry of Defence announced a second tranche of designations under the Protection of Military Remains Act (1986) in October 2006, which came into force on the 1st November 2006. None of the known vessels or casualties noted here have been designated a Protected Place or Controlled Site under the Act.

2.4.5. The type of vessel that can be protected under the Act has been substantially widened recently following an Appeal Court decision made regarding the *SS Storaa*, an armed merchant vessel torpedoed and sunk with the loss of 22 lives off the Sussex coast in 1943 following an E-boat attack.

2.4.6. Salvage rights to the wreck were bought in 1985. However in 2000 a request was made to the MoD that the vessel be designated under the Act. The MoD refused the request on the grounds that the vessel was not eligible for designation under the Act, because it was not in military service at the time of its sinking.

2.4.7. In 2003 an application was made to the MoD to designate the *Storaa* to protect it as a war grave. This request was also refused by the MoD. A further request was then made for a judicial review of this decision. This was heard by the High Court in 2005.

2.4.8. The High Court ruled that the Act could apply to merchant vessels and that the Secretary of State for Defence should reconsider whether or not the *Storaa* should be designated under the Act. The decision reasoned that because the *Storaa* was sailing

in convoy, it could be regarded as serving with the armed forces. The *Storaa* was obliged to obey the commander of the naval vessel leading the convoy, and at the time of its sinking it was providing armed protection for both its cargo and the rest of the convoy.

2.4.9. The MoD appealed the High Court decision in 2006. The Appeal Court decision of 5 October 2006 upheld the decision of the High Court.

2.5. PLANNING POLICY GUIDANCE

2.5.1. Planning law only applies within local authority regions which, as a general rule, extend only to the mean low water mark. However, English Heritage (EH) included the following statement in *England's Coastal Heritage* (1996):

'Although it remains government policy not to extend the Town and Country Planning system to the territorial sea, the principles set out in Planning Policy Guidance Note 16: Archaeology and Planning (PPG16) (Department of the Environment 1990) should be applied to the treatment of sub-tidal archaeological remains in order to secure best practice'.

2.5.2. PPG16 sets out the Secretary of States' policy on archaeological remains. It acknowledges the potentially fragile and finite or irreplaceable nature of such remains (para. 6), and states that the desirability of preservation of archaeological remains and their setting is a material consideration within the planning process (para. 18). PPG16 provides that there is a presumption in favour of the physical preservation of nationally important archaeological remains (para. 8), and that where preservation *in situ* is not justified it is reasonable for planning authorities to require the developer to make appropriate and satisfactory provision for excavation and recording of remains (para. 25).

2.5.3. Paragraph 19 of PPG16 suggests that it is in developers' own interests to include an initial assessment of whether the site is known or likely to contain archaeological remains as part of their research into the development potential of a site. Paragraph 22 adds: 'Local planning authorities can expect developers to provide the results of such assessments as part of their application for sites where there is good reason to believe there are remains of archaeological importance'. PPG16 also notes that in spite of the best pre-planning application research, there may be occasions when the presence of archaeological remains only becomes apparent once development has commenced (para. 31).

2.5.4. *England's Coastal Heritage: A Statement on the Management of Coastal Archaeology* was published in 1996 by EH and the Royal Commission on the Historical Monuments of England (RCHME). The document sets out a number of principles for managing coastal archaeology:

- The coastal zone of England includes a finite, irreplaceable, and, in many cases, highly fragile archaeological resource which by virtue of its value, variety, and vulnerability justifies a presumption in favour of the physical preservation *in situ* of the most important sites, buildings, and remains;
- Although archaeological remains situated within inter-tidal and sub-tidal areas may be less visible and accessible than remains on dry land, this does not affect

their relative importance and they should be managed in accordance with the principles which apply to terrestrial archaeological remains;

- As historic landscapes can extend seamlessly from dry land, through the inter-tidal zone, and into sub-tidal areas, effective management of the coastal archaeological resource cannot be achieved without due consideration of marine as well as terrestrial archaeological remains.

2.5.5. The document also made a number of detailed recommendations, which include the following notes under the heading Development Control and Environmental Assessment:

'Coastal archaeological interests should be adequately reflected in structure and local plans, and consistently and comprehensively included in Environmental Assessment procedures for coastal and marine developments (including harbour works, mineral extraction, oil and gas related projects, capital dredging projects, cable projects, and waste water treatment and disposal) and other activities requiring sectoral consent'.

2.5.6. *England's Coastal Heritage* identifies the Lincolnshire coast, the Wash and the Norfolk coast as areas of High Archaeological Potential. It goes on to state that within such areas:

'Survey priorities will be determined through a consideration of the level of threat to important archaeological remains and the need to contribute adequate archaeological data to wider coastal zone management initiatives such as Coastal Zone Management Plans, River Catchment Management Plans, Estuary Management Plans, Shoreline Management Plans and Coastal Planning Strategies, in partnership with other agencies'.

2.5.7. *Identifying and Protecting Palaeolithic Remains; Archaeological Guidance for Planning Authorities and Developers* (English Heritage 1998) draws attention to the importance of Palaeolithic remains and states that they must be considered in line with PPG16 when potentially affected by development proposals. Palaeolithic archaeological sites are defined as any land where artefacts or traces of a human presence of Pleistocene date have been found. The document notes that Palaeolithic remains have particular importance if:

- Any human bone is present in relevant deposits;
- The remains are in an undisturbed, primary context;
- The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was unknown;
- Organic artefacts are present;
- Well-preserved indicators of the contemporary environment (floral, faunal, sedimentological) can be directly related to the remains;
- There is evidence of lifestyle (such as interference with animal remains);
- One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another;
- Any artistic representation, no matter how simple, is present;
- Any structure, such as a hearth, shelter, floor, securing device, etc. survives;
- The site can be related to the exploitation of a resource, such as a raw material;
- Artefacts are abundant.

2.5.8. The document goes on to note that sites containing any of these features are so rare in Britain that they should be regarded as of national importance and whenever possible should remain undisturbed.

2.5.9. The advice offered to developers and planning officers includes the following:

- It is advisable for prospective developers to research the archaeological potential of their sites (including that for Palaeolithic remains) at an early stage;
- It is the responsibility of developers to supply the relevant planning authority on the archaeology of their sites with proposals for the way in which this will be accommodated within the development scheme, so that an informed planning decision can be reached. Information on the Palaeolithic remains or the potential for such remains within a certain site may be acquired from a desk-based assessment but when this is inadequate it may be necessary to obtain further information from a limited field evaluation by suitably qualified archaeologists;
- Planning authorities may apply a condition to a consent which prohibits the start of development until the applicant has ensured appropriate provision has been made for an adequate record of the site's archaeological remains.

2.6. PREHISTORIC ARCHAEOLOGICAL REMAINS

2.6.1. In 2002 the Department of Trade and Industry produced a document: *The scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains*. Although not legislative the paper makes suggestions for discussion of protocols and a reporting regime for the commercial sector:

'The ideal structure would require or encourage the industry and its sub-contractors to check whether their activities are in archaeological prospective zones, and to identify, and report, when their activities positively detect prehistoric artefacts, or, in the case of acoustic surveys, provide very strong evidence. If this can be achieved at a minimal or acceptable cost/delay to industry, then there is a positive advantage in allowing operators to start activities in zones of archaeological potential, while avoiding positively identified sites, if any.' (8.6).

2.7. PROTECTING OUR MARINE HISTORIC ENVIRONMENT

2.7.1. In March 2004, a consultation document was circulated setting out the key issues and questions in relation to legislation and the management of the marine historic environment (DCMS, 2004). The document includes various suggestions for change, including a more unified designation scheme (combining the PWA and the Ancient Monuments and Archaeological Areas Act 1979). The document also includes provision for publishing the criteria that marine cultural heritage sites will need to satisfy in order to be designated. Standardised restrictions are also proposed, so that all sea-users can broadly anticipate what activities are allowed.

2.8. JNAPC CODE OF PRACTICE FOR SEABED DEVELOPMENT

2.8.1. The Joint Nautical Archaeology Policy Committee *Code of Practice for Seabed Development* was first published in 1995. The Code has recently been reviewed and an updated version published in April 2006.

2.8.2. The Code sets out archaeological principles applicable to seabed developments which are similar to those found in current policy and practice on land. Procedures for consultation and co-operation between seabed developers and marine archaeologists are outlined, as are their respective roles in the development process. The aim of the Code is to ensure a best practice model for seabed development both within and beyond the remit of the formal Environmental Impact Assessment (EIA) process.

2.8.3. The document offers guidance to developers on issues such as risk management and legislative implications and provides a comprehensive list of expert contacts for further advice. The Code also highlights the responsibility of developers in protecting the UK's marine heritage and identifies the potential benefits to companies which follow best practice.

2.9. COWRIE HISTORIC ENVIRONMENT GUIDANCE FOR THE OFFSHORE RENEWABLE ENERGY SECTOR

2.9.1. There is a specific requirement to address the historic environment – the architectural and archaeological heritage and landscape – as part of the Environmental Impact Assessment process. The requirements of EIA are defined in European Council Directives on Environmental Assessment 85/3378/EEC (amended in 1997 by Directive 97/11/EC).

2.9.2. The guiding principles for cultural heritage in EIA are presented in the COWRIE Guidance (2007: 28) and include:

- Assessing all beneficial and adverse impacts on cultural heritage, including direct, indirect, temporary, permanent and cumulative effects.
- Evaluate the significance of any impacts on the cultural heritage resource to take account of both the intrinsic value of the resource and how much it will be changed.
- Use relevant international, national and local legislation and policy to explain the significance, and make explicit the basis for any statements concerning value or importance.
- Consider a variety of approaches to mitigation, including design modification, appropriate investigation and recording measures.
- Propose realistically achievable mitigation measures and fully monitor and document any agreed actions, including responsibility for their implementation.

2.9.3. Mitigation measures applicable to archaeological sites generally take the form of prevention or avoidance; reduction; and remedying and offsetting (COWRIE 2007: 43). The measures proposed for this scheme reflect these three options.

2.10. MARITIME DESIGNATIONS

2.10.1. There are no sites within the CRSA subject to designation under the PWA (1973).

2.10.2. Listed in the table below are the nine sites protected as 'Protected Places' under the PMRA. All of these sites are military aircraft lost during World War II.

NMR ID	Name	Location
1399688	Heinkel He 1115b S4h	Not known
1399693	Heinkel He 1115b S4Dh	Not known
1357686	Hurricane Mk I V7376	Not known
1352258	Armstrong Whitworth Whitley Mk V T4201	Not known
1322653	Wellington Mk IC P9276	Not known
1318466	Mosquito Mk II Dz305	Not known
1357010	Master Mk II Em330	Not known
1356979	Stirling Mk III Eh960	Not known
1356978	Lancaster Mk III Ed826	Not known

Table 2.1 Sites Protected under the Protection of Military Remains Act (1986)

3. METHODOLOGY

3.1. INTRODUCTION

3.1.1. This assessment is intended to inform the preparation of an Environmental Statement that will accompany the application for the Docking Shoal, Race Bank and Lincs Offshore Wind Farms. The methodology adopted reflects best practice in carrying out archaeological desk-based assessments, as codified by the Institute of Field Archaeologists (IFA) *Standard and Guidance for Archaeological Desk-based Assessment* (IFA, 2001).

3.1.2. The approach adopted also reflects the requirements of Environmental Assessment arising from European Council Directive 85/337/EEC as amended by Directive 97/11/EC.

3.2. SEARCH AREAS

3.2.1. The proposed cable route will run through the Wash to the south-western corners of the Docking Shoal and Race Bank Offshore Wind Farms and the south-eastern corner of the Lincs Offshore Wind Farm (**Figure 1**). To provide archaeological context the Cable Route Study Area (CRSA) was created to cover a large portion of the Wash. The co-ordinates for the CRSA can be seen in **Table 3.1**.

Point	UTM Easting	UTM Northing
0	304005	5858098
1	311320	5865894
2	331380	5890148
3	334471	5889165
4	339259	5891855
5	347694	5880454
6	337549	5873471
7	337477	5873362
8	337391	5873264
9	337239	5873139
10	337066	5873047
11	336942	5873005
12	336812	5872979
13	332752	5869857
14	331342	5867459
15	330355	5863933
16	329227	5861677
17	329086	5859844
18	328522	5857446
19	325806	5856251
20	324713	5855483
21	324008	5854458
22	323365	5853288
23	322739	5850536
24	304005	5858098
Projection: WGS 84 UTM 31N		

Table 3.1 CRSA Co-ordinates

3.2.2. Subsequent to the completion of the Wash Desk-based Assessment, the final route of the cable was decided. This is referred to as the Cable Route Corridor in this report and can be seen in **Figure 1**.

3.2.3. The relationship between the Wash CRSA, the Docking Shoal Study Area (DSSA), Race Bank Study Area (RBSA) and the Lincs and Lynn and Inner Dowsing Data Search Areas are shown in **Figure 1**.

3.2.4. In order to assess the potential for prehistoric sites within the CRSA models of sea level change in the southern North Sea were analysed to identify the periods when the area was dry land, and hence inhabitable by humans (**Figure 4**).

3.3. SOURCES

3.3.1. The principal sources consulted in this assessment are as follows:

- Records of wrecks and obstructions collated by the UK Hydrographic Office (UKHO) and obtained from Metoc plc. as Seazone data.
- Records of known sites and recorded losses held in the maritime section of the National Monuments Record (NMR).
- Records of known terrestrial archaeological sites and finds held by the NMR.
- Records of known archaeological sites held by the Norfolk Historic Environment Record (NHER).
- Aerial photographs held by the NMR.

- Various secondary sources relating to the palaeo-environment and to the Palaeolithic and Mesolithic archaeology of Northern Europe.
- Secondary sources relating to known and potential wreck sites and casualties, as well as historical charts and sailing directions held by the UKHO.
- The MoD (Naval Staff Directorate) with respect to the PMRA (1986).
- The Receiver of Wreck at the Maritime and Coastguard Agency regarding reports of historic wrecks.

3.4. MARITIME RECORDS

3.4.1. In order to assess the maritime archaeological resource within the CRSA, records of wrecks and casualties were obtained, principally from the NMR, Seazone and NHER, as well as from geophysical datasets assessed by WA. Records of known maritime sites and casualty positions within the CRSA were overlaid on a base map of the development area in ArcMap9, a Geographical Information System (GIS). Known wreck sites and geophysical anomalies have been assigned 6000. They are presented in a gazetteer in **Appendix I** and were superimposed on a base map of the area (**Figure 2**). At an early stage in the Geophysical Assessment of the data all sites deemed to be natural were discounted. Therefore, only those that are of possible anthropogenic origin are listed in this report.

3.5. TERRESTRIAL RECORDS

3.5.1. Records of terrestrial archaeological sites of all time periods obtained from NMR and NHER were used to inform this document. ArcMap9 was used to display the records spatially.

3.6. CHRONOLOGY

3.6.1. Archaeological dating of remains relies on three distinct chronologies. These are as follows:

- Absolute (or calendar) dates, which are suffixed with **BC** (**B**efore **C**hrist), generically known as **big BC**. Such dates can be considered as part of our present day calendar, i.e. a date of 3,523 BC occurred 5,530 years ago.
- Calibrated radiocarbon dates, which are either related to our modern calendar as BC (**calBC**) dates, or presented as **BP** (before present) dates. BP dates are calculated in years before 1950, and take into account the increased radioactivity background count following the proliferation of nuclear testing after this date. Therefore, a calibrated date of 4,500 BP indicates a point in time 4,557 years before today (i.e. 2,550 BC).
- Uncalibrated radiocarbon dates, which are suffixed with **bc** (i.e. **little bc**), and are the original radiocarbon determinations based on the half-life of C14 without compensating for changes in the background count.

3.7. MARINE GEOPHYSICAL ASSESSMENT

3.7.1. Geophysical surveys of the Wash Cable Route Corridor were undertaken by Emu Limited and Osiris Projects between November 2005 and June 2006. Sidescan sonar, multibeam bathymetry, single beam shallow seismic and magnetometer datasets were collected. The data were not collected specifically for archaeological purposes

however. The data were audited and reviewed by WA between April and August 2006, (hereafter referred to as the WA Geophysical Assessment) (WA 2006d) and, in general considered suitable for archaeological interpretation.

3.7.2. Thereafter, WA was commissioned to archaeologically assess and interpret the geophysics within the Cable Route Corridor and to a distance of 500m beyond the current scheme footprint. The data were processed by WA for anomalies of archaeological potential in September and October. All anomalies were plotted in ArcMap9 and compared to previously existing records of wrecks and obstructions from the UKHO and NMR.

3.7.3. While the whole of the Cable Route Corridor area was surveyed and the data subsequently assessed by the WA geophysics team, the records listed in **Appendix I** are unlikely to represent all archaeological sites in the area for a number of reasons:

- The quality of the data was at times not high enough for reasonable archaeological assessment principally as a result of adverse weather conditions;
- The mobile sand environment in the Wash may periodically cover and uncover anomalies;
- Anomalies that are not upstanding and are highly degraded, particularly those made of wood, can be difficult to identify.

3.7.4. The data were graded as good, average or variable using the following criteria:

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 provided 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 these 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 or average to below average. The dataset is suitable for the identification of standing and some partially buried metal wrecks. Detailed interpretation of the wrecks and debris field is likely to be problematic. Wooden wrecks are unlikely to be identified.

Table 3.2 Data quality rating criteria in considering suitability for assessing archaeological potential.

Magnetic Data

3.7.5. A magnetometer dataset totalling 142.3MB was received by WA from Emu and Osiris. The dataset was processed in Geometrics MagPick software and an interpolated contour map was produced to show changes in the magnetic field strength over the survey area. The quality of both the Emu and Osiris data, for the purpose of identifying archaeological remains were judged to be average as the data were noisy.

Sidescan Sonar Data

3.7.6. Coda files supplied by Emu and Osiris contained both sidescan and seismic data totalling 70.8GB. The sidescan dataset was processed using Coda Geosurvey

software. The data were adversely affected by the weather and coverage was less than 200%. The quality of these data for the purpose of identifying archaeological remains was classed as average to good.

Seismic Data

3.7.7. This dataset which can provide evidence for the presence of palaeolandscapes was reviewed using Coda Geosurvey software a similar procedure to that used for sidescan sonar data. For this purpose it was only necessary to look at every fifth line of the dataset. These data were not adversely affected by the weather and penetration was deeper than proposed construction. The quality of these data can be said to be good.

Multibeam Bathymetry Data

3.7.8. 57.78MB of mulitbeam data were received. The data were visualised in IVS Fledermaus version 6. Although of adequate quality for processing, the data were, in places, of below average quality for the purpose of identifying archaeological remains. In addition to not covering the entire cable route corridor the data were poorly tidally corrected and poorly filtered.

Data overview

3.7.9. A total of 245 separate anomalies were identified by WA from the four datasets. The quality of data was adequate for interpretation and this therefore enabled the level of confidence in interpretation to be mainly medium. Features that were obviously wreck sites had a high level of confidence in their interpretation.

4. BASELINE CONDITIONS

4.1. MORPHOLOGY, GEOLOGY AND SEASCAPE

4.1.1. The CRSA consists of an irregular shaped polygon encompassing a large part of the Wash and extending inland in the south and east. The CRSA lies adjacent to, and southwest of the Docking Shoal and Race Bank Study Areas, and overlaps with the south-eastern corner of the Lincs and Lynn and Inner Dowsing Data Search Areas (**Figure 1**).

4.1.2. The Wash is described by the British Geological Survey (BGS 1991) as a 'low lying coastal embayment'. The morphology of the CRSA consists of an undulating seabed and shifting sandbanks many of which are exposed at all states of the tide. The seabed reaches a maximum depth of 24 metres and the tidal range exceeds 6 metres during spring tides. Sediment in the area is made up of sand, shell and pebbles. The coast of the CRSA is made up of sandy and gravelly beaches in the south-east, some marsh and chalk cliffs in the north and salt marsh and mud flats in the south-west.

4.1.3. Cretaceous chalk forms the base geology in the area. In places this is overlain by the Swarte Bank Formation, laid down at the end of the Anglian glaciation (c.478 – 423,000 BP), and is formed of poorly sorted, gravelly coarse-grained sands. Hunstanton Till is also likely to be found in the north-east of the study area. This is described by the BGS (1991) as reddish brown sandy clay with erratics of chalk, flint, Bunter and Carboniferous sandstones, igneous and metamorphic rocks.

4.1.4. The seabed sediments within the CRSA consist mainly of sand and gravel. The gravelly sediments are largely confined to channels and the outer edges of the Wash, while sandy sediments dominate in subtidal areas. Muddy sediment occurs in the mud flats and salt marshes in the south and south-west of the CRSA.

4.2. PREHISTORIC ARCHAEOLOGY

Glaciation and Sea Level Change

4.2.1. The archaeological potential of the CRSA is closely linked to relative sea level change through time. During the last 700,000 years the area has been shaped by a series of glacial and marine transgressions and regressions. For long periods much of the North Sea Basin was exposed as dry land, as sea water was taken up in the polar ice sheets. The exposure of areas of the current seabed would have presented opportunities for prehistoric human occupation at a number of times since c.700,000 BP (Wenban-Smith 2001: 2). **Table 4.1** summarises the main warm and cold periods and estimates of the sea level that prevailed during those periods. **Table 4.2** presents a comparison of the periods of human occupation discussed below and a postulated Wash landscape and climate for each period.

Oxygen Isotope Stage (OIS)	Age in years BP/BC	British Conventional Chronology	Archaeological Period	Climate	Sea Level Age	Relative Sea Level
–	4,000 BC	Flandrian		Warm	c. 4,000 BC	-6m
	5,500 BC		Mesolithic		c. 5,500 BC	-10m
					c. 6000 BC	-17m
					c. 6300 BC	
					c. 6,700 BC	-20m
					c. 9,000 BP c. 7,000 BC	-25m
	7,500 BC		Early Mesolithic		c. 9,500 BP c. 7,500 BC	-30m
1	10,000 BP/ 8,000 BC	Devensian			c. 10,000 BP c. 8,000 BC	-35m
			Late Upper Palaeolithic		c. 11,000 BP c. 9,000 BC	-40m
						-50m
2	12,000 BP/ 10,000 BC				c. 12,000 BP c. 10,000 BC	-60m
					c. 13,500 BP c. 11,500 BC	
	16,000 BP/ 14,000 BC					
2	25,000 – 18,000 BP		Early Upper Palaeolithic	Mainly cold	c. 18,000 BP c. 16,000BC	-120m
3	50,000 – 25,000 BP				c. 40,000 BP c. 38,000BC	-50m
4	70,000 – 50,000 BP		Middle Palaeolithic			
5a-d	110,000 – 70,000 BP					
5e	130,000 – 110,000 BP	Ipswichian		Warm	c. 122,000 BP	+8m
6	186,000 – 130,000 BP	Wolstonian		Cold	c. 128,000 BP	-100
7	245,000 – 186,000 BP			Warm	c. 186,000 BP	High?
8	303,000 – 245,000 BP		Lower Palaeolithic	Cold	c. 250,000 BP	Low?
9	339,000 – 303,000 BP			Warm	c. 300,000 BP	High?
10	380,000 – 339,000 BP			Cold	c. 339,000 BP	
11	423,000 – 380,000 BP	Hoxnian		Warm	c. 380,000 BP	High?
12	478,000 – 423,000 BP	Anglian		Cold	c. 425,000 BP	-120m+?
13	478,000 BP	Cromerian		Variable	c. 480,000 BP	Varying
17 or 19?	700,000 BP				c. 700,000 BP	

Table 4.1 Relative Sea Level Changes (after Wymer (1999), Shennan et al. (2000), Wenban-Smith (2002), Coles (1998), Jeglersma (1979), Parfitt et al (2005) and the work of the Land-Ocean Evolution Perspective Study (LOEPS)).

4.2.2. Immediately before and after some of the colder periods of the Lower and Middle Palaeolithic and since the end of the last very cold period of the Devensian glaciation (known as the Loch Lomond Stadial 13,000-11,500 BP) all or part of the CRSA was free of ice and exposed as dry land. A potentially habitable environment for human communities would have been available at these times in what are now submerged areas of the CRSA.

4.2.3. The earliest evidence for human occupation of south-east Britain comes from Pakefield in Suffolk where recent finds have pushed the previous dates for the human occupation of Britain back by 200,000 years. The Pakefield site has revealed evidence of human occupation during a warm period c.700,000 BP, on what is described as a floodplain that extended off the east coast of Britain (Parfitt et al. 2005: 1008). It suggests that the CRSA area may have been dry at this time, although

subsequent glaciations have made any confident reconstruction of the shoreline of this period difficult.

4.2.4. A warm climate might suggest that sea levels were the same or even higher than at present, but the processes of isostatic and eustatic change since deposits were laid down make it difficult to be more specific about the landscape of the region. The Cromerian period is also likely to have contained a number of other temperate phases possibly suitable for human occupation before the Anglian glacial phase c.450,000 BP (Parfitt et al. 2005: 1008).

4.2.5. The most extensive ice cover of Britain occurred during the Anglian glacial phase at the height of which the CRSA was completely covered by ice. However, it is likely that there would have been periods when land was exposed and possibly inhabitable before and after the glacial maximum.

4.2.6. It is widely accepted that the Wash and the surrounding Fenlands were excavated by the Anglian ice sheet (Clayton 2000: 811) with the Wash becoming a marine embayment during later marine transgression. There are some suggestions that the Wash embayment was first formed due to fluvial processes. It is possible that a pre-glacial 'Wash River' breached the cretaceous chalk escarpment that runs across the present coast to form the Wash, and the gap created by this river was then further excavated by the Anglian ice (Brew 1997: 136).

4.2.7. The full extent of the Wolstonian ice sheet (c.380,000 – 130,000 BP) is unknown, but it is considered likely that it may have reached as far south as the Wash (May 1976: 17-18). During the later Devensian glacial maximum (c.18,000 BP) the advance of the ice reached approximately as far as the southern limit of the present-day Wash (Brew 1997: 137).

4.2.8. The post-Devensian development of the Wash requires an examination of the surrounding fenland as the embayment formerly included a large area of land that now lies behind the modern banks that define the present coastline of the Wash (Brew and Williams 2002: 314). Following the retreat of the Devensian ice cover parts of the Wash would have remained above sea level until the late Bronze Age (c.1,000 BC). There is evidence that areas of Fenland may have existed as lakes at the end of the Devensian, as meltwater from the retreating ice sheet collected in hollows in the Wash. The duration or existence of these lakes is unclear (Brew 1997: 137).

4.2.9. In addition, based on the present day seabed contours, it seems likely that the Great Ouse and Nene were combined with the Welland and Witham to form a single large river within the present area of the Wash. This Greater Ouse River flowed to the north out to the Dogger Bank (Coles 1998). A reconstruction of the changes in sea level toward the end of the Devensian is presented in **Figure 4**.

4.2.10. During the Holocene, the Wash and Fenland embayment began to fill with sediments in response to rising sea levels. The Wash would have been gradually turned from a fluvial to estuarine and then marine environment as sea levels rose (Brew 1997: 138). By the Late Bronze Age (c. 1100-700 BC) the Wash embayment was probably substantially larger than at present along the south-west and western coasts, but the higher relief of the shoreline along many parts of the south eastern coast of the Wash

would have contained the extent of the rapid sea level rise to some degree. The Fenland edges of the Wash would have been increasingly inundated, reaching a maximum c.3,000 BP. Following this the intertidal areas of the Wash would have expanded due to increased sedimentation in the embayment, pushing the low-lying marshy coastline of the Fenland seaward.

4.2.11. The greatest extent of this coastline accretion was reached c.100 AD and although sea levels were rising again by the end of the Roman period (c.400 AD) the effects of this were negated by sedimentation, so the coast moved seaward again (Grady 1998: 86), burying the Roman land surface of the fens under 2-3 metres of alluvial deposits (Owen 1984: 46-49). The low-lying Fenland coast of the Wash stabilised by the 16th century and after this the major changes to the coastline were the product of human reclamation activities rather than natural processes, with reclamations of land occurring throughout the post-medieval period.

4.2.12. The relief of the south eastern edge of the Wash is substantially different to the Fenlands surrounding the rest of the Wash. In places there are chalk and greenstone cliffs that would have presented a barrier to sea level rise for some time. Sea level rise would have started the process of marine erosion on these soft cliffs.

4.2.13. The rate of past erosion of the cliffs is not clear, but substantial collapses of the cliff face can occur (**Plate 1**). To the north of these cliffs, the sediment sequence reveals thin basal peats dating to c.9,450 – 6,950 BC (representing a relatively dry land surface), turning to mud flat and saltmarsh sediments from 5,900 – 4,850 BC with some back barrier sediments representing areas immediately behind and probably protected by sand dune formations (Brennand and Taylor 2003: 2).

4.2.14. After this the exact nature of transgression is unclear. However there is evidence from the 'Seahenge' site, less than a kilometre to the east of Gore Point, north of Holme-next-the-Sea, that the present intertidal area was a back-barrier saltmarsh environment when the timber circle was constructed in the spring or summer of 2,049 BC. Based on this evidence there has been an overall inland movement of the barrier beaches of this kind in the area since the Bronze Age, driven by continued sea level rise (Murphy 2005: 6-7).

Topography and Climate

4.2.15. The seismic data reviewed by WA as part of this assessment contained no information that could add to the understanding of past landscapes within the Wash.

4.2.16. The Lower and Middle Palaeolithic landscape of Britain is difficult to reconstruct, but it is possible to make some generalisations based on existing evidence.

4.2.17. Recently discovered evidence from Pakefield in Suffolk denotes a phase of hominid (Homo Heidelbergensis) occupation in Britain during the Cromerian interglacial c.700,000 BP, during a period when a warm, seasonally dry, Mediterranean-type climate prevailed (Parfitt et al. 2005: 1010).

4.2.18. Evidence suggests this climate supported a number of habitat types with large grazing mammals such as the steppe mammoth, rhino, giant deer and bison, and predators including lions, grey wolves, and spotted hyenas. Broad leaf vegetation and forests existed, and a number of rivers, such as the Ancaster and Bytham Rivers

flowed through the region, with the Ancaster and related tributaries possibly flowing through the present Wash embayment (**Figure 5**) (**Table 4.2**) (Rose et al. 2001: 1).

4.2.19. The Anglian glaciation (c. 423,000 BP) brought ice cover and a periglacial climate to Britain. The earlier drainage systems of the region around the Wash, such as the Bytham and Ancaster Rivers were largely destroyed and ice completely covered the Wash. Sea level dropped substantially and Britain would have formed a continuous dry land surface with the European mainland. Fossil evidence of any flora and fauna that may have inhabited Britain in the periglacial conditions is sparse and it is highly unlikely there was any human occupation during this phase.

4.2.20. The subsequent Hoxnian interstadial (c. 380,000 BP) brought warmer conditions and it is suggested that rising sea levels cut Britain off from mainland Europe. Sea levels may have been higher than at present and the Wash and most of the CRSA may have submerged in this period. Deposits dating from the Hoxnian have produced bones of straight-tusked elephant, rhinoceros, wild boar, deer, beaver and lion from sites such as Swanscombe and Hoxne in Britain, as well as the skull fragments of a hominid (Wymer 1999: 21 and 75).

4.2.21. White and Schreve (2000: 1-14) state that Britain then reverted to a peninsula of the European mainland until the Wolstonian (186,000 BP) when it became an island again (Schreve et al. 2002: 1426). It is likely that areas of the CRSA would have been inhabitable by humans either side of the glaciations.

4.2.22. The Wolstonian period appears to have comprised a number of warm and cold periods. There have been no substantial studies for this period specifically dealing with the Wash or southern North Sea, but evidence from elsewhere in Britain has revealed some details of the interglacial periods of this period, such as the Purfleet (320,000 - 290,000 BP / OIS 9) and Aveley (180,000- 230, 000 BP) interglacials.

4.2.23. The Purfleet interstadial has been identified as a period when Britain was inhabited by a forest fauna of elephant, rhino, deer, monkeys and a Neanderthal hominid presence (Schreve 2001: 1698). Evidence from the River Nar, a tributary of the Great Ouse, suggests high sea levels for this period (White and Schreve 2000: 9) (**Table 4.2**).

4.2.24. The warm and cold climatic variations of the Wolstonian were followed by the Ipswichian interstadial (110,000 BP), which is also believed to have seen higher sea levels than at present. Climatic change continued and by c.70,000 BP cooler conditions began to take hold, signalling the onset of the Devensian, and sea levels fell, exposing inundated areas once again. However, as conditions became increasingly cooler, the landscape was predominantly glacial and the ice sheets covered the region down as far as the southern boundary of the Wash (Brew 1997: 137).

4.2.25. By 13,000 BP the Devensian ice sheets were in retreat and the Wash was part of an extensive lowland landscape. The immediate post-glacial landscape was colonised by grasses, sedges and herbs and increasingly mild temperatures provided a suitable environment for initial birch, willow, poplar, hazel and pine vegetation (Fryer et al. 2005: 10). A further improvement in climate allowed the establishment of oak and elm forests. It is possible that waterlogged areas of the early Wash embayment area

may have contained some aquatic vegetation including waterlilies, pondweeds and reeds because of its low-lying but still freshwater character (Fryer et al. 2005: 10).

4.2.26. A feature of the prehistoric landscapes described above is the remains of former river systems or 'palaeochannels'. These systems incised new valleys into the landscapes, and often cut through previous layers, removing and re-depositing sediments. These include remnants of the pre-Anglian Ancaster River and preserved remains of courses of the Great Ouse and Nene. These rivers passed through the prehistoric dry-land landscape that existed in the Wash in the later Devensian, and would have provided a variety of resources that would attract human occupation (Coles 1998).

4.2.27. After 13,000 BP sea levels began to rise again, initially quite swiftly, and the Wash embayment would have undergone significant changes. Evidence from seismic profiles shows that areas of the Wash embayment were probably flooded before c.6,400 BP (Brew 1997: 140), with the embayment growing slowly larger as sea levels rose and the coastline moved west.

4.2.28. At first sea level rise would have brought estuarine conditions to the embayment, before it became a shallow but fully marine embayment. The effect of sea level rise on the Wash during the Holocene is hard to determine precisely, although it is considered that by the Neolithic in 4,000 BC the Norfolk coastline was broadly similar to that of today (Murphy 2005: 6). Evidence from the 'Seahenge' site near the entrance to the Wash however, indicates there has been some inland movement of the shore since the Bronze Age (Brennand and Taylor 2003: 2) in this part of the CRSA, before the post-medieval reclamation established the current shoreline (**Table 4.2**).

Human period	Wash landscape and climate
Cromerian	Exposed and temperate
Lower Palaeolithic	Exposed and temperate at the beginning of the period
Middle Palaeolithic	Exposed and temperate at the end of the period
Upper Palaeolithic	Exposed and temperate at the end of the period
Mesolithic	Exposed and temperate becoming inundated
Neolithic	Partially exposed and temperate throughout
Bronze Age	Exposed and temperate becoming fully inundated by the end of the period
Iron Age	Inundated and temperate, some accretion
Roman Period	Inundation and accretion at the beginning of the period, stable by the end, temperate throughout
Iron Age onwards	Sea-level and climate similar to today

Table 4.2 The Wash landscape and climate in relation to human occupation

Potential for Evidence of Human Occupation

4.2.29. Archaeological remains can be moved from their original site of deposition (primary context) to other locations (secondary context) through glacial movements, and fluvial and marine processes. Despite the extensive reworking of the landscape, some deposits from these earlier periods may survive *in situ* in the North Sea and therefore in the CRSA (Hosfield 2001). Together with possible material in secondary contexts in the CRSA this could provide information relating to patterns of human land use and demography (Hosfield and Chambers 2004).

Lower Palaeolithic (700,000 – 245,000 BP)

4.2.30. The recent discovery of worked flints dating to c.700,000 BP at Pakefield in Suffolk, and also in deposits at Happisburgh in Norfolk suggests that the potential for evidence of human occupation in the CRSA may date back at least as far as these new discoveries. The surviving deposits at Pakefield from this period have been identified as part of the Bytham river system, a pre-Anglian river that flowed from midland England and the southern Pennines through North Central East Anglia (Rose et al. 2001: 10). The Ancaster River is also thought to have existed in the region at this time, flowing eastwards through the Wash (Rose et al. 2001: 10) (**Figure 5**).

4.2.31. Deposits associated with the Ancaster have been identified as part of the Cromer forest-bed formation, which also contained the early flint artefacts from Pakefield (Parfitt et al. 2005: 1008-9). Before the Anglian glaciation the CRSA area is likely to have been part of a low-lying wetland landscape that characterised the southern North Sea that would have been an ideal habitat with a wide range of resources attractive to early humans.

4.2.32. The Ancaster River was largely destroyed by subsequent glacial erosion (Rose et al. 2001: 10), although there is a possibility that some material associated with it could survive in a secondary context. As the Wash embayment is also believed to have been largely excavated by ice during the Anglian glaciation, it seems likely that most traces of the Ancaster were destroyed, along with any associated *in situ* pre-Anglian archaeological deposits (Clayton 2000: 811). Any archaeological material of this period remaining in the Wash is unlikely to survive in a primary context.

4.2.33. Britain is believed to have been cut off from the European mainland by the rising sea level during the Hoxnian (423,000 − 380,000 BP), although there were probably periods when it existed as a peninsula. Human remains from this period have been found in Swanscombe, Kent, (Wymer 1999: 75) and a flint flake with trimmed edge, interpreted as Clactonian industry (c. 400,000 BP), was found in Hunstanton in 1951. If the date for this flint is accurate there is the possibility of further material of this date occurring in the CRSA, either in primary context, or as derived material from deposits in the Wash or from the eroding cliffs at Hunstanton.

Middle Palaeolithic (245,000 – 50,000 BP)

4.2.34. There is evidence to suggest that the Wolstonian consisted of a number of cold and warm phases. As Palaeolithic groups appear to have favoured more open landscapes during the cool periods at the beginning and end of interglacial periods, there is the possibility of human occupation at times throughout this period (Wymer 2005: 13). The Middle Palaeolithic Ipswichian interglacial (130,000 BP) has produced no certain evidence of occupation of Britain, and the lack of artefacts from this period suggests Britain may have been uninhabited at this time (Wymer 1999: 33). A number of *in situ* flint artefacts have been recovered from a site of national importance at Lynford Quarry in Mundford, Norfolk, dating to the later Middle Palaeolithic period (65,000 - 32,000 BP) and attributed to Neanderthal inhabitants (Wymer 2005, 13).

Late Upper Palaeolithic and Mesolithic (50,000 – 4,000 BP)

4.2.35. The arrival in Britain of modern, Upper Palaeolithic humans before the onset of the Devensian glacial maximum (35,000 – 49,000 BP) is evidenced by a number of sites

in Britain, particularly cave sites such as Kent's Cavern, Paviland and Eel Point (Schulting et al. 2005: 493). Finds from the earlier part of the Upper Palaeolithic are unlikely in the CRSA as the Devensian ice sheet covered the north Norfolk coast (Wymer 2005: 13-14).

4.2.36. *In situ* worked flint from Titchwell, c.8km east of the Wash, has been interpreted as belonging to a late Upper Palaeolithic tradition of tool making and may date to just after the glacial maximum (11,000 - 10,000 BC). The extent of human occupation in Britain so soon after the Devensian glaciation is believed to have been very limited (Wymer and Robins 1994: 35-36).

4.2.37. As a post-Devensian, *in situ* site within peat deposits exposed by marine erosion, Titchwell suggests some potential for similar sites occurring elsewhere on the Norfolk coast. The nature and effect of marine transgression on the Norfolk coast may have varied substantially due to local conditions however, so the survival of similar deposits in the CRSA is not certain

4.2.38. During the Mesolithic (8,500 - 4,000 BC) Norfolk would have formed the western extremity of a great plain extending over what is now the North Sea. Much of what is now referred to as the Wash is thought to have been dry land in the early Mesolithic, rapidly becoming inundated by the middle of the period. From the middle Mesolithic the Wash is likely to have existed as an estuary within the surrounding lowland plain that lay off the present Norfolk coast.

4.2.39. In Norfolk the western coast of this plain is likely to have been seaward of today's coastline, while the southern coast of the Wash would have been far inland of its present position. As the sea level rose during the Mesolithic, most of the CRSA would have been inundated, with the exception of the more elevated areas already referred to along the coast in the south east.

4.2.40. During the Mesolithic the southern North Sea is likely to have consisted of low-lying fresh and brackish-water wetlands and lagoons supporting animals such as deer and aurochs (Murphy 2005: 6). This is the type of terrain known to have been favoured by Mesolithic hunters and fishers who would have hunted the game and used the waterways to navigate through the landscape

4.2.41. Small Mesolithic flint tools known as microliths and distinctive Mesolithic long blades have been found in Norfolk, particularly along waterways, suggesting occupation by small groups of hunter-gatherers during this period (Wymer 2005: 15).

4.2.42. There are a number of Mesolithic sites known in Lincolnshire, from upland and low-lying marshlands, which might suggest some early Mesolithic material could survive in the low-lying Wash. In the CRSA a small number of Mesolithic finds are recorded. A tool made from the metatarsal of red deer from an intertidal context near Holme-next-the-Sea suggests some preservation of organic Mesolithic material below the current high water mark. There is some question, however regarding the date of this find, and it may date from the early Neolithic.

4.2.43. Mesolithic flints from Hunstanton or the Hunstanton cliff section suggest that some Mesolithic material in the area may be derived from these cliffs.

4.2.44. In summary, while there is the potential for Early Mesolithic material in the CRSA, areas of the Wash would have been inundated for much of this period. It is believed that the Fenland shore only began accreting with the influx of marine sediments brought by sea level rise only from the late Bronze Age onwards (c.3,000 BP) (Brew et al. 2000: 269). In addition there has been substantial reclamation of the Fenland shore since Roman times. The effects of natural accretion and human reclamations on the shore mean that some of the evidence for terrestrial, later Mesolithic occupation in the vicinity of the Wash would now be buried some distance inland.

Neolithic (4,000 – 2,400 BC)

4.2.45. By the beginning of the Neolithic (4,000 BC) sea-level in this area had risen to a point approximately 6 metres below its present level (Shennan et al. 2000: 291). The Norfolk coast of the Wash would have been further to the north-west. The chalk cliffs that exist in the Hunstanton area probably existed further to the north-west, but it is not clear where, as the rate of erosion on the cliffs since this period is not known.

4.2.46. During the Neolithic the south western coast of the Wash would have been inland of the present shoreline. The higher elevation of the sections of the south eastern coast of the Wash means that the coast would have been quite close to its present position in places, but where the shoreline sloped more gently it probably lay some distance to the north west of its present position and may have had an extensive intertidal area.

4.2.47. A widespread Neolithic presence in Norfolk and Lincolnshire is attested by the presence of flint axes and pottery. The adoption of farming during this period led to a steady increase in population and as during the Mesolithic, activity was once again concentrated around coastal areas and in river valleys. Large numbers of flint finds have been located on the east coast of the Wash within the CRSA, and evidence of Neolithic flint industry has been found at Hunstanton.

4.2.48. There is no known evidence for Neolithic settlement within the CRSA. The nearest existing settlement of this period lies further inland at West Rudham. This may not be representative of the true pattern of Neolithic settlement in the vicinity however, as other evidence for settlement may have been removed through later land use, or may still remain undiscovered due to the absence of widespread development outside of the existing urban areas (Ashwin 2005: 17). Taking this, and the extended coast of the Neolithic period, into consideration there may be some potential for more isolated Neolithic finds and settlement within the CRSA.

Bronze Age (2,400 – 700 BC)

4.2.49. A steady rise in sea level continued throughout the Bronze Age (2,400 - 700 BC). In tandem with this, it is believed that from the late Bronze Age (c.1,000 BC) onwards the Fenland shore began accreting with the influx of marine sediments brought by sea level rise (Brew et al. 2000: 269). This expanded the mudflats and saltmarshes along the coast of the Wash.

4.2.50. The Bronze Age saw a rise in human population, although settlement patterns remained similar to those of the Neolithic. Settlement sites from the Bronze Age are notably hard to find in Norfolk, although environmental evidence indicates large-scale land clearance across the county during this period (Ashwin 2005: 21). Much

of the CRSA was inundated by this period although some areas remained above the maximum line of transgression along the south east of the CRSA.

4.2.51. The most significant archaeological features known from this period within the CRSA are the 'Seahenge' site and a second timber circle approximately 95m to the south east of 'Seahenge'. Evidence from the 'Seahenge' site suggests that it was built in a Bronze Age back barrier saltmarsh at Holme-next-the-Sea (Brennand and Taylor 2003: 2-3).

4.2.52. Both of these circles were found in the present intertidal zone and became exposed due to natural lowering of the beach level in the area and erosion of the seaward dune system during recent storm events. This exposed the peat deposit in which the circles were preserved. The 'Seahenge' circle and its central inverted tree stump was completely excavated and removed in 1999, and the other circle is being recorded as it is exposed by the sea. The process of erosion along this shoreline is continuing, and it is possible further archaeological deposits may be exposed in future. (Brennand and Taylor 2003: 2-3).

4.2.53. During a site visit undertaken by WA in April 2006, large chunks of peat that had clearly been recently eroded from the intertidal zone were recorded on the beaches at Holme-next-the-Sea and Hunstanton, confirming the continued erosion of peat within the intertidal zone (**Plate 2**).

4.2.54. A full examination of the archaeology and various interpretations of these timber circle sites lies outside the scope of this assessment, but they do represent a form of Bronze Age ritual practice sited near the boundary between the sea and the land, the exact purpose of which is open to a great deal of speculation. The construction of the monuments would have required the efforts of a large number of people working together and as such illustrate organised Bronze Age activity in the CRSA along the Bronze Age coastline.

4.2.55. There are a number of other isolated Bronze Age finds such as pottery and tools recorded within the CRSA, mostly in the Holme and Hunstanton area. Bronze Age remains in the Fenland areas of the CRSA have probably been buried beneath the natural accretion of sediments and human reclamation of the Fenland that have been underway since the late Bronze Age.

Iron Age to Medieval Period (700 BC – 1539 AD)

4.2.56. The maximum transgression of the Fenland coast is believed to have been reached by the late Bronze Age (c.1000 BC), and in this area of the Wash the coastline then began to move seaward due to the build up of sediments brought by transgression. However, this accretion was probably not sufficient for any further terrestrial occupation to have taken place in this part of the CRSA. A quantity of wood and a Roman coin of Philip I (3rd century AD) was dredged up from the Breast Sands area in the south of the CRSA, but it is not clear whether it represents a terrestrial site located on the post-Bronze Age accreted land surface, a maritime site such as a wreck, derived material or an isolated, *in situ* occurrence.

4.2.57. Terrestrial occupation along the top of the cliff line in the Hunstanton area is attested by finds of Iron Age date and later in the town, and from the cliff area. Marine transgression would have contributed to the erosion of the cliffs at Hunstanton,

possibly earlier than the late Bronze Age maximum. The exact rate of erosion in the past is not known, so it is possible that there is potential in the CRSA for derived terrestrial material originating from the cliffs of almost any period.

4.2.58. By the end of the Roman period sea level in the CRSA had begun to rise again, although on the Fenland coast of the Wash continued deposition of silts and marine sediments meant the coastline continued to accrete (Grady 1998: 86). This process would have buried earlier archaeological deposits, which means most of the earlier evidence for coastal occupation in this area is now buried onshore of the high water mark and lies some distance inland of the modern shoreline within the CRSA.

4.2.59. The presence of a Saxon fishtrap in the intertidal area near Holme suggests the coastline in this part of the CRSA was very close to its present location by that period. The archaeology of the CRSA after this period is predominantly maritime and is discussed separately below.

4.2.60. Evidence for coastal activity in later periods includes medieval pottery finds, possible medieval saltpans and a possible cockle boiling site near the Great Ouse River. Hunstanton is a medieval town with a number of medieval period finds and sites.

Post-medieval to Modern (1540 AD - Present)

4.2.61. Evidence for post-medieval exists in the form of a variety of buildings, including a water tower and churches. Navigational activity is represented by the now disused Hunstanton Lighthouse (**Plate 3**) and a number of quays and jetties.

4.2.62. The modern period is dominated by sites related to the defence of the Norfolk coast during World War II, including pillboxes, other gun emplacements, tank traps, road blocks and spigot mortar bases. Many of these structures have been incorporated into modern sea defences and lie above the high water mark, but in some areas the movement of beaches and sand dunes means that some features such as spigot mortar bases seen at Holme (**Plate 4)** may be eroding and lie at the upper edges of the intertidal zone.

4.3. KNOWN WRECKS AND GEOPHYSICAL ANOMALIES

4.3.1. A full list of all known wrecks from documentary sources, and geophysical anomalies identified in the WA Geophysical Assessment, within the Cable Route Corridor and the 500m buffer zone are listed in **Appendix I** and displayed in **Figure 2**.

4.3.2. There are 219 known wrecks and geophysical anomalies within Cable Route Corridor and the 500m buffer zone. The sites were located in the geophysical datasets and written records as outlined in **Table 4.3**.

Dataset	Number of sites located	Sites that require further investigation	Sites with clear archaeological potential
UKHO	9	1	8
Seismic	-	-	-

Sidescan sonar	142	134	8
Magnetometer	60	56	4
Sidescan sonar and bathymetry	2	-	2
Sidescan sonar and magnetometer	3	-	3
Sidescan sonar, magnetometer and bathymetry	3	-	3
Total	219	191	28

Table 4.3 Means of site location

4.3.3. 191 of the 219 anomalies require further archaeological investigation to confirm or deny their anthropogenic origin. 190 have geophysical signatures that are not clear enough to give an indication of what they are. Of these there are 56 magnetic anomalies with a small or medium sized amplitude for which there are no sidescan data. These are likely to be of anthropogenic origin and buried within the Holocene sands. 134 anomalies are recorded by sidescan but are insufficiently clear to identify their origin. The remaining site is a UKHO record that is classed as 'abey' meaning that although previously reported it has not been detected by repeated surveys, leading to doubts about its position or existence.

4.3.4. Of the 219 known sites and anomalies it is proposed that 28 are subject to exclusion zones. Eight of these sites (**6026**, **6099**, **6105**, **6110**, **6127**, **6158**, **6196** and **6211**) have also been discussed in the Docking Shoal Offshore Wind Farm Archaeological Assessment (WA 2006c).

4.3.5. Site **6026** (**Plate 5**) is a substantial dark reflector in a coherent ovoid shape. The shape is indicative of a wreck although there is no evidence of height. This however, could indicate the presence of a wooden vessel as a steel structure is more likely to demonstrate height. There are other, smaller, dark reflectors in the area which are, due to their numbers, thought to be natural seabed features. Although larger and of a more regular shape **6026** may also be natural feature and therefore a confidence rating of low has been applied.

4.3.6. Site **6099** (**Plate 6**) consists of four long thin anomalies that have a total length of 36.8m and may represent the edge of a buried wreck. A confidence rating of medium has been applied.

4.3.7. Site **6105** (**Plate 7**) is 22m long, 0.6m wide and 0.1m high and has a strong reflector. It is surrounded by sandwaves and no outcropping geology is visible within sub bottom profile data. This suggests that anomaly **6105** may be of anthropogenic origin. The site has been given a confidence rating of medium.

4.3.8. Site **6110** (**Plate 8**) is a dark reflector with an associated magnetic anomaly. The reflector measures 4.2m by 1m and the magnetic amplitude is not particularly high at 6.63nT. The site has been given a confidence rating of medium.

4.3.9. Sites **6127** and **6158** are substantial, isolated, magnetic anomalies with amplitudes of 568nT and 203nT respectively. There is no associated sidescan information. The high amplitude of the anomalies indicates substantial metal structures, possibly wreck and has led them to have been given a confidence rating of high.

4.3.10. Site **6196** is a magnetic anomaly with a high amplitude of 304nT. Picked up on two lines of data, a second amplitude of 76nt was recorded 5m away. This reduction in

the amplitude suggests that the anomaly is isolated and therefore more likely to be of anthropogenic origin. Located less then 300m west of Docking Shoal Offshore Wind Farm footprint the anomaly has been given a confidence rating of high.

4.3.11. Site **6211** is recorded by the UKHO as 'Live'. Despite this the site was not visible in the WA Geophysical Assessment. The site is described by the UKHO as a 6 tonne machinery unit lost in 1997. The site may have been assigned an incorrect position, have become covered by seabed sediments or may have been salvaged. It is not of particular archaeological interest.

4.3.12. Site **6300** (**Plate 9**) was noted in bathymetric, sidescan and magnetic data. The bathymetric data show an elongated mound which is higher at its south-western end and tails off to the north-east. The sidescan data show an upstanding object with a distinct outline of a regular ovoid shape and an internal square structure varying in height. The overall dimensions of the site are large at 48m long, 22m wide and 0.5m high. These factors are all indicative of a wreck site. A magnetic anomaly with an amplitude of 63.28nT was recorded from a vessel track 11m from the site. This is a lower amplitude than may be expected for a metal wreck and therefore may indicate that the site is a wooden shipwreck. The site was given a confidence rating of high.

4.3.13. Site **6301** (**Plate 10**) is a large object measuring 17m by 12m with a height of 0.5m noted in the sidescan data. The sidescan image is of an ovoid shape with internal structure and height and a distinct associated seabed scour that appears as a dark reflector. The same anomaly appears as a large mound in the bathymetric data. The shape and size of this anomaly are indicative of a wreck site and the anomaly has been given a confidence rating of high.

4.3.14. Site **6322** (**Plate 11**) is a group of light and dark reflectors showing evidence of structure with some shadowing which indicates relief above the seabed. The reflectors are distinct from the surrounding seabed and cover an area measuring 10.7m by 8.5m. The site may be that of a wreck, a confidence rating of medium has been applied.

4.3.15. Site **6341** (**Plate 12**) may be a partially exposed wreck site. The anomaly is a very large dark reflector measuring 27m by 19.9m. Distinct from the seabed, the anomaly lies in an area of disturbed seafloor and has been given a confidence rating of medium.

4.3.16. Site **6346** (**Plate 13**) is a seabed disturbance measuring 20.4 by 19m. It may be related to site **6520**, a 'Live' UKHO wreck 71m to the south-west. No further information for this site is available. A confidence rating of medium has been applied.

4.3.17. Site **6351** (**Plate 14**) is a large area of dark and light reflectors which are very distinct from the surrounding seafloor. The area covered measures 23.1m by 22.5m. The feature may be a wreck site and has been given a confidence rating of medium.

4.3.18. Site **6354** (**Plate 15**) is a large area (37.9m by 27m) of partially exposed material comprising a number of objects in a distinct group, many of which are linear with shadow implying relief above the seafloor. The site is at the location of a cardinal buoy. Such markers are sometimes placed at the site of a known obstruction. This

combination of factors suggests the presence of a wreck site. A confidence rating of high has therefore been applied. It should be noted that the sidescan images are likely to show ground tackle in addition to any potential wreck material.

4.3.19. Site **6385** (**Plate 16**) comprises a cluster of material with some height and a darker sediment pattern, forming an overall seafloor disturbance. The area covered is very large, measuring 89.2m by 55.4m with a maximum height of 0.1m. A mound was located in bathymetry data. The site is at the location of the Lynn Knock buoy. This coupled with the overall shape of the site and scatter of clearly defined objects with shadows strongly suggests that **6385** is a wreck site. A confidence rating of high has thus been applied.

4.3.20. Site **6425** (**Plate 17**) is an angular bright reflector with an associated magnetic anomaly of 152.9 nT 52m to the north-east. Although very distinct from the seabed the shape of the anomaly is not particularly indicative of a wreck. However the very high magnetic amplitude suggests that the anomaly is almost certainly a large metal object, anthropogenic in origin and a confidence rating of medium has been applied.

4.3.21. Site **6426** (**Plate 18**) is a very bright, high shadow. The site has been identified as a possible sailing vessel by its mast-like high shadow. A mound was seen in the bathymetry data at the site. Overall the site covers an area 18m by 10m with a height of 2.8m. There is an associated magnetic anomaly with an amplitude of 77.67nT 28m to the south. The evidence is suggestive of a wooden vessel with associated metal components. A confidence rating of high has been applied.

4.3.22. Site **6435** (**Plate 19**) is formed of a group of dark reflectors covering an area 22.4m long, 10.1m wide with a maximum height of 1.9m. The reflectors show structure and height and form a distinct ovoid shape with evidence of scour around it. A mound measuring 18m by 11m with a height of 1m was identified in the bathymetry data at the sidescan position although these data are not clear as they was recorded on the junction between adjacent lines. A magnetic amplitude of 73.16nT was also recorded 17.5m to the south-west of the centre of the site. The associated three datasets and the form of the anomaly as seen in the sidescan data indicates that the site is a wreck. The amplitude however, is lower than may be expected for a metal wreck and therefore may indicate that the site is a wooden shipwreck. A confidence rating of high has been applied.

4.3.23. Site **6438** (**Plate 20**) is recorded by sidescan data with dimensions of 2.3m by 1.6m with a height of 2.4m. The very dark reflector is seen in 2 lines. It has a distinct high shadow with scour. Two magnetic anomalies have been recorded nearby, both to the south-east and with amplitudes of 1204.15nT and 102.96nT. The high values of the magnetic anomalies suggest that the site is a large metal object of anthropogenic origin. A confidence rating of medium has been applied.

4.3.24. Site **6444** is a magnetic anomaly with an amplitude of 38.09nT. The anomaly lies 80m east of site **6521** the 'Live' UKHO record of a sailing vessel first recorded in 1958. A confidence rating of high has been applied.

4.3.25. Site **6512** is an unknown object recorded by the UKHO. First located 1917 the object is now classified as 'Dead'. The object may still exist within the seabed sediments but was not seen in the WA Geophysical Assessment.

4.3.26. Site **6513** is the wreck of *Borderer* an ex-motor torpedo boat lost in 1982. The vessel is classified as 'Live' by the UKHO and measures 14m in length. The wreck, however, was not detected in the WA Geophysical Assessment and it is possible that the site may have been covered by seabed sediments or was assigned an incorrect position by the UKHO.

4.3.27. Site **6515** is recorded by the UKHO as a possible sailing vessel. No further information is available. Although classified as 'Live' by the UKHO the wreck was not detected by geophysical survey. It is possible that the site may have been covered by seabed sediments or was assigned an incorrect position by the UKHO.

4.3.28. Site **6516** is recorded by the UKHO as a concrete coaster. Classified as 'Live' by the UKHO the wreck was not detected in the WA Geophysical Assessment. This may be because the site may have been covered by seabed sediments or was assigned an incorrect position by the UKHO. Concrete coasters are modern and of relatively little archaeological interest.

4.3.29. Site **6517** is recorded by the UKHO as a foul or fisherman's fastener. Classified as 'Live' by the UKHO the object was not detected in the WA Geophysical Assessment. This may be because the site may have been covered by seabed sediments or was assigned an incorrect position by the UKHO.

4.3.30. **6519** is a 650 tonne German submarine lost at the end of World War 1. The submarine was not detected in the WA Geophysical Assessment and is classified by the UKHO as 'abey'. This means that although it was previously reported it has not been detected by repeated surveys, which raises doubts about its position or existence. It is very likely that the submarine's position was incorrectly reported and an exclusion zone has therefore not been suggested.

4.4. RECORDED LOSSES AND ARCHAEOLOGICAL POTENTIAL FOR FURTHER MARITIME SITES

4.4.1. In addition to the known sites within the CRSA recorded by the UKHO there are records of vessels lost in the area for which the exact position and extent of survival (if any) is not known. These documented losses, listed by the NMR, are assigned to points known as Named Locations, seven of which exist within the CRSA. Named Locations represent losses within a broader area and therefore any losses recorded at these points do not necessarily lie within the CRSA.

4.4.2. Records of losses are generally dependent on the survival of written records. Records of losses were not systematically kept until the 18th century and even then, the records cannot be considered comprehensive. As the known and recorded sites in the CRSA may not be representative of the true number of sites that survive there, the potential for as yet unrecorded and unknown archaeological material representing the past maritime use of the CRSA is considered here in addition to the recorded losses.

4.4.3. The NMR records 87 documented losses within the seven Named Locations within the CRSA (**Figure 3**). The earliest recorded loss is the *Solebay* (**NMR1030311**), a sixth rate ship of the line lost in 1709. The most recent loss is an unknown brig lost in 1951 (**NMR1349848**). A breakdown of the recorded losses by date is displayed in **Table 4.4**.

Date of Loss	No of wrecks	No of Aircraft
1709 – 1749	1	0
1750 - 1799	16	0
1800 – 1849	35	0
1850 – 1899	18	0
1900 – 1938	6	0
1939 – 1945	0	9
1946 – 2001	1	0
Unknown	1	0
Totals	**77**	**9**

Table 4.4 Wrecks and Aircraft classified by date of loss

4.4.4. The list of recorded losses in the CRSA is not comprehensive, and it is possible that no records exist for many lost vessels. Estimates of the true number of vessels lost around the UK coast vary substantially and cannot be considered wholly reliable, but 'best guesses' suggest anything from 100,000 - 500,000 losses. This gives an average of between 8 and 40 wrecks for every mile of coastline, which suggests that the CRSA, which covers c.45km (c. 28 miles) of coastline, could conceivably contain between c.220 and 1120 wrecks.

4.4.5. The inundation of the Wash is believed to have occurred during the Mesolithic and exploitation of the coastal region by boat may have taken place in this period. While this implies potential for Mesolithic finds within the Wash, the survival of wooden artefacts of this date would be extremely unusual.

4.4.6. It is possible that the Neolithic inhabitants of the area made use of water transport to exploit the resources of the Wash and its waters in vessels such as log boats which are well documented from this period (McGrail 2004: 173). The possible use of the Wash as a focus for vessels used in seafaring across the southern North Sea at this time is speculative, but McGrail suggests distributions of stone artefacts within the British Isles indicate a seafaring tradition dating to the Neolithic (2004: 171).

4.4.7. Vessels dating to the Bronze Age have been discovered to the north, in the Humber Estuary. The Brigg raft and Ferriby boats are believed to have been restricted to tidal waters, and possibly used as cargo ferries on the Humber (McGrail 2004: 184-188). Similar vessels may have been used in the Wash during the Bronze Age, and the possibility of coastal traffic, possibly engaged in voyages across the southern North Sea cannot be excluded.

4.4.8. The large quantity of gold required for the manufacture of torcs found in Norfolk may indicate that people in the north and west of Norfolk obtained substantial wealth in gold by controlling trade in and out of the Wash (Hutcheson 2005: 26).

4.4.9. By the Roman period, maritime activity in the area can be inferred from the late Roman construction of shore forts. One of the earlier shore forts was built in the 3rd century AD at Brancaster to the east of the CRSA and another is suspected on the opposite side of the Wash at Skegness (Pearson 2002: 54-55). These forts have been interpreted as defensive structures against attacks by seaborne raiders, but they probably functioned primarily as centres for coastal trade (Gurney 2002: 5). Either interpretation suggests maritime activity in the Wash throughout this period. In addition there is speculation that a 'ferry' crossed the Wash in this period (Robinson 1981: 13).

4.4.10. The seafaring abilities of the people who settled Britain from the continent, including the Angles (who lent their name to the modern region of East Anglia) are clearly evident from the well known Saxon period boat burials at Sutton Hoo and Snape (Carver 1990: 117).

4.4.11. The later Viking centres of activity to the north-west in the Humber and the major settlement in York and around the North Sea coast of the UK, illustrate the possibility of vessels from this period crossing the waters of the CRSA (Binns 1985: 50-56). Raids and large-scale landings by Vikings from Denmark and Norway are known in this region in the 9th century although the precise location of many of these landings is not clear (Wade-Martins 1997: 27).

4.4.12. The Wash area is home to the ports of King's Lynn (known as Bishop's Lynn until the mid 16th century but commonly referred to as Lynn) and Boston. Lynn was a major port of the medieval period, flourishing after the Norman Conquest. Its position on the Great Ouse allowed it to serve as a port for an extensive hinterland in West Norfolk and Suffolk (Rutledge 2005: 78). Supporting an extensive foreign trade Lynn exported corn, wool, cloth and herring. In the 13th century the port collected the fourth highest duties of any south or east coast port, including London (Rutledge 2005:78)

4.4.13. Lynn was in decline by the 15th century, but it became very active again during the 16th century with coastal traffic in coal from Newcastle. Smaller ports on the Norfolk coast of the Wash are believed to have suffered from the continued coastal accretion in the area, although many remained engaged in the fishery trade, and these vessels could also have engaged in coastal trade or longer voyages across the North Sea (Rutledge 2005).

4.4.14. The waters of the Wash are noted as hazardous in sailing directions from the 19th century:

> '… Lynn Deep and the Wash, is for the most part occupied by numerous and dangerous sands.' (North Sea Pilot 1858: 100)

4.4.15. Further sailing directions from 1914 note:

> 'The rapidity of the tides in this deep bight, the low character of its shores, and the mist which almost constantly prevails, render this the most difficult portion of the navigation of the east coast…' (North Sea Pilot 1914: 181)

4.4.16. These statements make it clear that the waters of the Wash are and were hazardous and the potential for wrecked vessels in the Wash, possibly dating as far back as the Mesolithic, is high. The surviving remains of any known and unknown wrecks may also be widely spread across the seabed, beyond the original confines of the vessels' hull, depending on the circumstances of loss and the effects of post-depositional processes. The depositional environment in the Wash makes the survival of wooden vessels more likely than offshore. These remains may contain significant elements of structure, artefacts and stratified deposits, and consequently they must be considered an integral part of the wreck site.

4.4.17. In summary, the known and potential archaeology within the Wash Cable Route Corridor and the 500m buffer zone comprises:

- 219 known wrecks and geophysical anomalies, 28 of which are of sufficient interest to require exclusion zones.
- 87 documented losses some of which may lie more than 500m from the cable route corridor.
- Unknown and undocumented wrecks from various periods, possibly dating back to the Mesolithic.
- Stray finds of shipbourne debris from various periods.
- The potential for the presence of submerged prehistoric land-surfaces dating from 700,000 BP to 4,000 BC, possibly containing archaeological data and sites.

4.5. IMPORTANCE OF THE KNOWN SITES

4.5.1. Twenty-eight sites with archaeological potential have been identified within the study area. Four of these sites are magnetic anomalies (**6196**, **6127**, **6158** and **6444**) with very high amplitudes reflecting the strong likelihood that they are anthropogenic in origin. Six sites (**6300**, **6301**, **6354**, **6385**, **6426** and **6435**) have been given a confidence rating of high, reflecting the strong likelihood they are wrecks.

4.5.2. Of the nine known wrecks only three, **6513**, **6516** and **6519** have a recorded date. **6513** and **6516** are both modern (20th century) and are likely to be of limited archaeological potential. WWI submarine **6519** is of archaeological interest. However the site has been classed as 'abey' by the UKHO and is very likely not to exist.

4.5.3. 191 anomalies have geophysical signatures that are not clear enough to give an indication of what they are. These anomalies require further archaeological investigation to confirm or deny their anthropogenic origin and their importance therefore is currently unquantifiable.

4.6. IMPORTANCE OF ANY UNKNOWN SITES

4.6.1. Any further wreck sites that come to light during the course of development will have to be assessed for importance on a site by site basis. A level of importance from 'negligible' to 'international importance' is possible for each site.

4.6.2. Although no submerged prehistoric remains are currently known, were any to be discovered during the course of the development they are likely to be of national or international importance. This assessment is based on the relative paucity of such sites within the British and European record.

4.6.3. The importance of any isolated chance finds of submerged prehistoric material is more problematic. However, where such material is derived or in secondary context (i.e. not found in its original depositional context), the area of seabed from which it comes may not necessarily be important.

4.6.4. *England's Coastal Heritage* notes that the Wash has an apparent lack of intertidal archaeology as much of the Saxon and medieval intertidal zones are now extensively

buried under more recent land reclamations. While, this is true of the Fenland edges of the Wash, certain areas such as those near Holme have not undergone reclamation and must be considered to be of high archaeological potential. The reduction of the beach deposits in this area suggests that further as yet unknown material may be exposed which may be of national or international importance.

5. IMPACT ASSESSMENT

5.1. DEVELOPMENT OVERVIEW

5.1.1. The following information is taken from the 2006 AMEC report *Docking Shoal - Rochdale Envelope*.

Submarine cables

5.1.2. The Docking Shoal OWF will be linked to the onshore sub-station by up to four 132kV submarine cables, exported through two or three offshore sub-stations. Within the proposed Wash cable route corridor the export cables will be laid in pairs, with a 50m separation between each cable and a 500m separation between each cable pair.

5.1.3. Burial of all submarine cables is necessary to protect them from damage. Clearance of cable routes will be undertaken before cable laying and consists of dredging, and detecting and removing obstructions by towing a snagging device.

5.1.4. The two techniques likely to be employed to bury the submarine cables are ploughing and jetting. Some cutting may also be necessary if a rocky substratum is encountered. Both involve the creation of a trench in the seabed in which the cable is laid and then is then backfilled. Ploughing can bury a cable up to 3m into the seabed using a vehicle such as Sea Stallion 4 which has a diameter of 5.2m. Jetting can bury a cable even deeper, up to 5m, using a system such as the Sea Venture Jet Plough with a diameter of 5m.

5.1.5. The depth of burial of the cables is dependent on geophysical properties of substratum, local tide and current strength. Protection may then be employed over the backfilled trenches in the form of rock dumping or concrete mats.

5.1.6. A barge or other vessel will be used in the cable burial process and similarly in the event of post-construction repair operations.

5.2. IDENTIFICATION OF EFFECTS

5.2.1. When identifying effects the Rochdale Envelope worst case scenario approach has been applied.

5.3. CONSTRUCTION EFFECTS

5.3.1. The construction effects can be summarised as follows:

- Potential damage to prehistoric land surfaces from dredging;
- Potential damage and destruction of shipwrecks and aircraft from dredging;
- Potential damage to prehistoric land surfaces from ploughing and jetting;

- Potential damage and destruction of shipwrecks and aircraft from ploughing and jetting;
- Potential damage to shipwrecks, aircraft and prehistoric land surfaces from vessel anchors during construction.

5.4. OPERATIONAL EFFECTS

5.4.1. The operational effects can be summarised as follows:

- Potential damage to shipwrecks, aircraft and prehistoric land surfaces from vessel anchors during maintenance.

5.5. DECOMMISSIONING EFFECTS

5.5.1. The decommissioning effects can be summarised as follows:

- Potential damage to shipwrecks, aircraft and prehistoric land surfaces from vessel anchors during decommissioning.

5.6. EVALUATION OF EFFECTS

5.6.1. When evaluating the effects the Rochdale Envelope worst case scenario approach has been applied. This takes into account the worst case scenario identified effects without mitigation measures in place.

5.6.2. The effects on unknown wrecks, aircraft and prehistoric land surfaces during construction and repair operations will be localised, not extending beyond the immediate vicinity of the anchor or trench. Where direct disturbance of archaeological deposits cannot be avoided during the construction of the cable route impacts will be permanent and negative. The residual impact of changes in scour and sedimentation associated with the construction, operation and decommissioning of the wind farm may also be negative where wrecks, aircraft and/or prehistoric deposits are exposed to erosion. In some circumstances, the residual impact may be positive if increased sedimentation leads to burial of an archaeological site or feature, resulting in increased protection.

5.6.3. The significance of the effects is described using the significance levels: 'Not Significant', 'Minor', 'Moderate' and 'Major'. To assess the significance of effects upon the archaeology within the Wash the importance of the site and the scale of the impact need to be known. The only two sites for which importance can be ascribed are **6513** and **6516**. Both sites are 20th century and therefore can be described as Not Significant. The remaining 217 sites are of unknown importance (except in the case of **6519** for which the location is unknown) and therefore a significance of effect cannot be applied.

5.7. CUMULATIVE IMPACTS

5.7.1. The sites considered for this cumulative impact assessment are as follows:

- The Wash Cable Route Corridor;

- Docking Shoal Offshore Wind Farm;
- Lincs Offshore Wind Farm;
- Race Bank Offshore Wind Farm;
- Lynn Offshore Wind Farm;
- Inner Dowsing Offshore Wind Farm;
- Sheringham Shoal Offshore Wind Farm;
- Area 481 Aggregate Extraction Area.

5.7.2. All of the above developments have been subject to archaeological assessments that have identified all known wrecks, and assessed geophysical data as part of an attempt to identify unknown losses. These assessments have also assessed the potential for the presence of submerged prehistoric archaeology.

5.7.3. With respect to wrecks, in all cases the means of mitigating against damage to the known sites will be through the implementation of exclusion zones. This approach will have the effect of minimising the direct impacts from construction and dredging. It will also be used to protect geophysical anomalies that may represent currently unknown shipwrecks, aircraft or other features of anthropogenic origin. As a result the cumulative direct impact on known sites from turbine, installation, cable laying, anchoring and dredging, resulting from the above schemes, is negligible.

5.7.4. The effect on known sites of indirect impacts from, for example, scour and changes to sedimentation patterns are more difficult to quantify. Localised, scheme specific studies have, for the most part, indicated little change in sedimentation from wind farm construction, but the impact resulting from multiple schemes remains relatively under-researched. It should be noted that changes to sedimentation may serve to both cover up, and therefore protect, or uncover and destabilise sites. However, the possibility of impact remains.

5.7.5. This has been addressed by the generally adopted principle that further geophysical studies, undertaken during the working life of the schemes, will be archaeologically assessed. Thus any, currently known or unknown sites that may be exposed if scour or sedimentation changes occur, should be identified. Should this occur then the general archaeological principals of evaluation to a level suitable to identify importance and the significance of the effect, followed by remedial mitigation, can be applied.

5.7.6. With respect to submerged prehistoric archaeology, none of the archaeological assessments have identified any known sites or former land surfaces within the development areas. For aggregate extraction areas the need to keep recovered gravel free from contaminants, including peat, helps to protect submerged prehistoric deposits. However, in the case of wind farms turbine installation may pose a threat to as yet unconfirmed prehistoric archaeology, although other activities such as cable laying and anchoring are unlikely to penetrate the seabed to a depth sufficient to cause concern.

5.7.7. In view of the potential for cumulative impact from turbine installation it is appropriate to look at the worst case scenario for the scale of this effect. In order to do this the total surface area of the turbine foundations has been compared with the overall footprint of the schemes listed above as follows:

Name	Scheme area (m^2)	No. of turbines	Turbine foundation area (m^2)	Total turbine area (m^2)	% of OWF area subject to turbine impact
Lynn OWF	9,996,905	27	19.6	530	0.005
Inner Dowsing OWF	9,994,894	27	19.6	530	0.005
Docking Shoal OWF	74,977,392	166	380.1	63102	0.08
Race Bank OWF	52,761,439	166	380.1	63102	0.12
Lincs OWF	34,933,773	83	380.1	31551	0.09
Sheringham OWF	34,971,171	108	706.9	76341	0.22

Table 5.5 Scheme footprints

5.7.8. This assessment shows that the percentage of the seabed that is subject to permanent negative impact from turbine foundations is very small. Therefore the cumulative impact upon any submerged prehistoric deposits that may survive off the Lincolnshire and Norfolk coastline, from the construction of offshore wind farms is likely to be small. Notwithstanding this, there is still some potential for impact, which is addressed by means of mitigation that offsets the negative impact through compensatory works i.e. archaeological assessments of vibrocore and seismic data that serves to increase the archaeological knowledge base of this largely under-researched heritage asset.

5.8. MITIGATION AND MONITORING

5.8.1. The following measures are designed to mitigate the impact of the development upon known sites, and to establish the presence of unknown sites within the proposed cable route corridor. Should the footprint of the scheme change subsequent to the compiling of this report, full archaeological assessment will be necessary for any areas not already covered by this assessment.

5.8.2. Best practice favours *in situ* preservation and avoidance of archaeological remains. Where this is not possible the effects of the scheme can be offset with measures that will reduce, remedy or offset the effects. Such measures include archaeological watching briefs and/or monitoring, excavation and recording, and the establishment of a protocol for reporting and dealing with unexpected finds.

5.8.3. A Written Scheme of Investigation (WSI) is recommended to set out these measures and the procedures for dealing with any features that appear to be of archaeological importance that are discovered in the course of construction. The WSI would ensure compliance with the legislation referred to above.

5.8.4. As laid out in the COWRIE Guidance Note (WA 2007: 43) the objectives of a WSI are to:

- Set out the respective responsibilities of the developer, main contractors, and archaeological contractors/consultants, to include contact details and formal lines of communication between the parties and with archaeological curators;

- Ensure that any further geophysical and geotechnical investigations associated with the project are subject to archaeological input, review, recording and sampling;
- Provide for archaeological involvement in any diver and/or ROV obstruction surveys conducted for the scheme;
- Establish the exact position and extent of archaeological exclusion zones, and methodologies for their monitoring, modification and/or removal;
- Propose measures for mitigating effects upon any archaeological material encountered during the operation and decommissioning of the scheme;
- Establish the reporting, publication, conservation and archiving requirements for the archaeological works undertaken in the course of the scheme.

5.8.5. In view of their archaeological potential it is proposed that construction exclusion zones are placed around 29 sites (**Table 5.1**). Eight of these sites (**6026**, **6099**, **6105**, **6110**, **6127**, **6158**, **6196** and **6211**) have also been discussed in the Docking Shoal Offshore Wind Farm Archaeological Assessment (WA 2006c). The same mitigation is recommended in both reports. The size of the exclusions zones will be agreed with the Curator during the production of the Written Scheme of Investigation.

5.8.6. For construction reasons it may be appropriate for construction exclusion zones to be placed around sites **6513** and **6516**, though they are of little archaeological interest.

Sites proposed for construction exclusion zones (those sites highlighted are also included in the Docking Shoal Offshore Wind Farm Archaeological Assessment (WA2006c))	6026
	6099
	6105
	6110
	6127
	6158
	6196
	6211
	6300
	6301
	6322
	6341
	6346
	6351
	6354
	6385
	6425
	6426
	6435
	6438
	6444
	6512
	6513
	6515
	6516
	6517
	6520
	6521

Table 5.1 Sites proposed to have construction exclusion zones

5.8.7. A construction exclusion zone is defined as an area where any construction that would impact upon or disturb the seabed is prohibited.

5.8.8. Provisional exclusion zones are proposed for each of the 191 anomalies requiring further investigation. Once scheme details have been confirmed, any anomalies along the line of construction may be investigated and the provisional exclusion zones removed or scheme plans altered as necessary. Provisional exclusion zones not subject to further investigation will become construction exclusion zones by default.

5.8.9. It is recommended that proposed exclusion zones are marked on the scheme masterplans, including contract documents.

5.8.10. Of the 219 sites and anomalies located during the impact assessment 21 lie within 20m of the proposed cable route. Where these are not subject to exclusion zones, their presence should be noted by all scheme works as features to be aware of and avoid.

5.8.11. Due to the specification of the geophysical survey not all archaeological sites will have been detected by the WA Geophysical Assessment and some wrecks of archaeological importance may exist undetected within the cable route corridor and the 500m buffer zone. If any further sidescan sonar and/or magnetometer surveys are conducted, where the specifications are equal to, or better than those for the data assessed by WA, it is recommended that these new data be archaeologically assessed.

5.8.12. To further determine the potential for the presence of buried land surfaces and associated sites and to offset any potential damage to archaeology by compensatory survey, it is proposed that the results of any further marine geotechnical surveys (vibrocores or boreholes) are assessed by a suitably qualified archaeologist. Where practicable, provision should be made for the complete recovery of cores containing pre-inundation prehistoric material and/or organic deposits, and for the analysis of a suitable number of core samples.

5.8.13. Notwithstanding these precautions, features of archaeological interest may be encountered in the course of construction. In such instances the following should be complied with:

- The Merchant Shipping Act 1995 in respect of reporting and ownership of the wreck including notification of the Receiver of Wreck;
- The JNAPC Code of Practice for Seabed Developers;
- The Protocol for Finds of Archaeological Interest (BMAPA/EH 2005);
- The COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector

Table 5.2 Environmental Assessment Matrix

Environmental Effect	Description of Features Affected (Receptors)	Type of Effect	Geographical Extent/Policy Importance (or sensitivity)	Magnitude/ duration/ frequency of effect	Probability of Effect Occurring	Significance Level	Mitigation measures and Rationale	Significance Level After Mitigation and Geographical Extent
Construction								
Dredging in advance of cable laying	Prehistoric land surfaces	P	I	Uncertain until scheme plans are finalised (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Dredging in advance of cable laying	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor
Dredging in advance of cable laying	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Ploughing, jetting and cutting in advance of cable laying	Prehistoric land surfaces	P	I	Uncertain until scheme plans are finalised (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Ploughing, jetting and cutting in advance of cable laying	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor
Ploughing, jetting and cutting in advance of cable laying	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Deployment of vessel anchors	Prehistoric land surfaces	P	I	Uncertain (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Deployment of vessel anchors	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor

Environmental Effect	Description of Features Affected (Receptors)	Type of Effect	Geographical Extent/Policy Importance (or sensitivity)	Magnitude/ duration/ frequency of effect	Probability of Effect Occurring	Significance Level	Mitigation measures and Rationale	Significance Level After Mitigation and Geographical Extent
Deployment of vessel anchors	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Operation								
Deployment of vessel anchors	Prehistoric land surfaces	P	I	Uncertain (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Deployment of vessel anchors	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor
Deployment of vessel anchors	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Decommissioning								
Dredging in advance of cable laying	Prehistoric land surfaces	P	I	Uncertain until scheme plans are finalised (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Dredging in advance of cable laying	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor
Dredging in advance of cable laying	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Ploughing, jetting and cutting in advance of cable laying	Prehistoric land surfaces	P	I	Uncertain until scheme plans are finalised (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Ploughing, jetting and	Known wrecks	P	I	Varies by site	Varies by site	Varies by	Exclusion zone	Minor

Environmental Effect	Description of Features Affected (Receptors)	Type of Effect	Geographical Extent/Policy Importance (or sensitivity)	Magnitude/ duration/ frequency of effect	Probability of Effect Occurring	Significance Level	Mitigation measures and Rationale	Significance Level After Mitigation and Geographical Extent
cutting in advance of cable laying	and aircraft			(worst case High)		site		
Ploughing, jetting and cutting in advance of cable laying	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor
Deployment of vessel anchors	Prehistoric land surfaces	P	I	Uncertain (worst case High)	Uncertain	Major	Archaeological investigation of any vibrocores and geophysics conducted.	Offset by compensatory works (minor)
Deployment of vessel anchors	Known wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Minor
Deployment of vessel anchors	Unknown wrecks and aircraft	P	I	Varies by site (worst case High)	Varies by site	Varies by site	Exclusion zone	Moderate or minor

Key: P - Permanent
I - Important

6. ABBREVIATIONS & GLOSSARY

BGS	British Geographical Survey
CRSA	Cable Route Study Area
DCMS	Department of Culture Media and Sport
DoE	Department of the Environment
DSSA	Docking Shoal Study Area
DTI	Department of Trade and Industry
EH	English Heritage
IFA	Institute of Field Archaeologists
MSA	Merchant Shipping Act
NMR	National monuments Record
NHER	Norfolk Historic environment record
nT	NanoTesla
OD	Ordnance Datum
OWF	Offshore Wind Farm
PPG	Planning Policy Guidance
PMRA	Protection of Military Remains Act
PWA	Protection of Wrecks Act
RBSA	Race Bank Study Area
RCHME	Royal Commission on the Historical Monuments of England
UKHO	United Kingdom Hydrographic Office
WA	Wessex Archaeology
WSI	Written Scheme of Investigation

Anomaly: An object or feature on the seabed, identified from geophysical data which differs from the surrounding environment and which may anthropogenic, or humanly derived

Archaeology: The study of the development of the human species and its environment through their material remains.

Artefact: Any object or part of an object which has been made, used or modified in some way by human beings. Common examples include tools, utensils, art, food remains, and other products of human activity.

Bronze Age: The period in history after the Stone Age characterized by the development of bronze and its use, especially for weapons and tools. In the UK the Bronze Age dates to 2400-700 BC and is divided into three phases – Early (2400-1500 BC), Middle (1500-1100 BC) and Late (1100-700 BC).

Curator: A person or organisation responsible for the conservation and management of archaeological evidence by virtue of official or statutory duty, including for example County, District or Council archaeological officers, and the national bodies, English Heritage, Historic Scotland, Cadw (Wales), and Department of Environment, Northern Ireland.

Derelict: A vessel abandoned in open water by its crew without any hope or intention of returning

Flotsam: The part of the wreckage of a ship and its cargo found floating on the water

Jetsam: Goods cast overboard deliberately, as to lighten a vessel or improve its stability in an emergency, which sink where jettisoned or are washed ashore

Iron Age: A cultural stage characterized by the first use of iron as the main metal. In the UK the Iron Age dates to the period between c. 700BC and 43AD.

Lagan: Goods (or wreckage) on the sea bed that is attached to a buoy so that it can be recovered

Lithic: Composed of stone. 'Lithic implement' are tools made by humans from flaked or ground stone

Medieval: The period between the Dark Ages and the Renaissance (11th – 14th centuries AD).

Mesolithic: A transitional period of the Stone Age intermediate between the Palaeolithic and the Neolithic periods, characterized by adaptation to a hunting, collecting, and fishing economy based on the use of forest, lakeside, and seashore environments.

Mitigation: The process of avoiding, reducing or remedying adverse effects On the environment.

Palaeolithic: The earliest of three subdivisions of the Stone Age, preceding the Mesolithic and Neolithic. It lasted several million years, from the first appearance of stone tools to the Mesolithic microlith-using hunter-gatherers of the most recent postglacial period (± 8,500 years BC), and is normally divided into Lower, Middle and Upper phases.

Post-medieval The term used to describe the period covering the last 500 years, or since the end of the 14th century. In other areas it may be known as Historical Archaeology.

Prehistoric: The period prior to written records for any given area which is revealed by archaeological methods and interpreted with the help of anthropological and historical analogies.

Roman: Refers to the period between AD 43 and AD 410 when parts of the UK were under Roman control.

Site: A location where human activities once took place and left some form of material evidence.

Wreck: A vessel in a state of ruin from disaster at sea, on rocks, etc.

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7.3. DOCUMENTARY RECORDS

Reference	Date	Title	Seen	Copy
OCB108	1843-2006	The Wash – Skegness to Blakeney	Y	N
OCB1177	1920-1985	Approaches to Kings Lynn and Wisbech	Y	N
OCB1455	1843-1874	England East Coast Sheet IV from Cromer to Trusthorpe	Y	N

APPENDIX I: KNOWN WRECKS AND GEOPHYSICAL ANOMALIES

Known wrecks and geophysical anomalies that lie within the Wash Cable Route Corridor and the 500m buffer zone

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6021	Dark reflector	351211	5887941	unknown	25.9 x 7 x 0	Patch of 4 dark reflectors.	uncertain		Good	Medium	3032	merged with 6433
6022	Dark reflector	351801	5887700	unknown	3.5 x 1.6 x 0		uncertain		Good	Medium	3033	merged with 6397
6023	Dark reflector	350669	5888155	unknown	2.1 x 0.9 x 0		uncertain		Good	Medium	3034	
6024	Dark reflector	350193	5888278	unknown	5.6 x 3.9 x 0		uncertain		Good	Medium	3049	
6026	Dark reflector	344460	5895086	unknown	17.8 x 11.6 x 0	Substantial dark reflector with regular shape.	Possible wreck due to large size although without height and similar to natural features around.		Good	Low	3051	
6034	Dark reflector	346745	5898429	unknown	7.8 x 0.5 x 0		uncertain		Good	Medium	3069	
6035	Dark reflector	346714	5898415	unknown	4.9 x 3 x 0 x		uncertain	May be associated with 6034.	Good	Medium	3070	
6043	Debris	343544	5893145	unknown	6.5 x 3 x 0.2	2 objects (6.5 x 1 x 0.2 and 5.4 x 1 x 0.2). Covering an area 6.5 x 3 x 0.2.	Two very similar objects.		Good	Medium	3210, 3211	
6044	Debris	342818	5893263	unknown	3.2 x 0.3 x 0 x		Possible fishing gear.		Good	Medium	3209	
6046	Dark reflector	342734	5892419	unknown	8.6 x 5.2 x 0 x		uncertain		Good	Medium	3213, 3217	
6095	Seafloor disturbance	348063	5889204	unknown	14.8 x 18 x 0		uncertain		Good	Medium	3277	
6096	Dark reflector	351365	5888671	unknown	10.1 x 2.4 x 0		uncertain		Good	Medium	3278	
6097	Dark reflector	351722	5888664	unknown	7.3 x 3.7 x 0		uncertain		Good	Medium	3279	
6098	Dark reflector	348813	5888863	unknown	13.7 x 5.7 x 0		uncertain		Good	Medium	3280	
6099	Debris	352257	5888456	unknown	36.8 x 1 x 0.2	Four thin and long objects.	Size and shape may represent a buried wreck.		Good	Medium	3281	
6100	Dark reflector	352947	5888422	unknown	6.7 x 5.9 x 0	Possible evidence of structure.	uncertain		Good	Medium	3282	
6104	Dark reflector	351547	5888166	unknown	13.6 x 6 x 0		uncertain		Good	Medium	3286	
6105	Debris	351504	5887946	unknown	22.7 x 0.6 x 0.1	Linear object.	Though to be of anthropogenic origin due to distinctness from surrounding seabed.		Good	Medium	3287	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6120	Depression	343998	5895073	unknown	Depressions 11m apart, both with a depth of 0.4m (13.9 x 8.9 x 0.4 and 6.9 x 2.4 x 0.4). Covering an area 25 x 8 x -0.4.	Two depressions 11m apart. Bright shadow nearest to fish with a thin dark reflector outlining the back of each feature.	uncertain		Good	Medium	3303, 3304	
6127	Magnetic	344455	5894243	unknown		Isolated magnetic anomaly 568.54nT.	Although there is no associated sidescan, this mag anomaly has large amplitude of 568.5 and therefore may be of anthropogenic origin.		Good	High	4013, 4058	
6128	Magnetic	346043	5898010	unknown		Amplitude 13.84	uncertain		Good	Medium	4003	
6129	Magnetic	345963	5897020	unknown		Amplitude 10.39	uncertain		Good	Medium	4004	
6131	Magnetic	345283	5895310	unknown		Amplitude 5.9	uncertain		Good	Medium	4006	
6146	Magnetic	342295	5892640	unknown		Amplitude 6.22	uncertain		Good	Medium	4025	
6158	Magnetic	342950	5892345	unknown		Mag anomaly 203.05nT - no sidescan anomalies for over 200m and nothing on chart.	Although there is no associated sidescan, this mag anomaly has large amplitude of 203.1 and therefore may be of anthropogenic origin.		Good	High	4040	
6167	Magnetic	351964	5887830	unknown		Amplitude 5.04	uncertain		Good	Medium	4051	
6196	Magnetic	343425	5893940	unknown		Picked up in two lines with the anomalies 5m apart, the other value being 76.3nT.	A large magnetic anomaly with an amplitude of 304.3. Possibly associated with a charted obstruction of unknown origin and therefore of archaeological interest.	150m NE of charted obstruction.	Good	High	4015, 4057	
6211	Foul	343190	5893884	unknown	2 x 2 x 1	Machinery unit lost in 1997. 6 tonnes.	Modern so of little archaeological importance.	Classified as Live by the UKHO.			2301	UKHO9182
6300	Wreck	317854	5867975	unknown	Overall dimensions are 48 x 22 x 0.5.	An elongated mound seen in the bathymetry data. It is higher at its south-western end and tails off to the north-east. The higher section of the mound is 2.5m north-west of the centre of the sidescan anomaly while the mag anomaly (63.28nT) is 11m to the west. The sidescan shows an upstanding object regular in shape with a distinct outline and internal structure varying in height.	Uncharted wreck, possibly wooden due to its small magnetic amplitude in relation to its size.	A further mag anomaly, 4038, is located 80m south-west and may be related	Good	High	3000; 4037; 5000	
6301	Wreck	320287	5873331	unknown	Dimensions from the sidescan data are 16.7 x 7.8 x 1.	A large object of an ovoid shape with internal structure and height, distinct scour shown by dark reflector. Shown as a large mound in the bathymetry data.	Uncharted wreck as indicated by size and form.		Good	High	3001; 3560; 3561; 5001	
6303	Bright reflector	319417	5871307	unknown	1 x 0.5 x 0		uncertain		Good	Medium	3003	
6304	Linear	319674	5871257	unknown	25.1 x 1.2 x 0	Linear with object.	Possibly anchor scar or fishing gear.		Good	Medium	3005	
6305	Seafloor disturbance	319889	5871177	unknown	7.2 x 4.2 x 0	Mainly bright reflectors.	uncertain		Good	Medium	3006	
6306	Dark reflector	317589	5865664	unknown	Individually the features measure 5.4 x 1.2, 3.9 x 3.4 and 2.1 x 0.9. Separated by a maximum distance of 23m. Covering an area 27.5 x 5.4.	3 dark reflectors close together.	uncertain		Good	Medium	3007; 3025; 3026	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6307	Seafloor disturbance	319286	5869154	unknown	19.5 x 3.4 x 0	Containing a dark reflector.	uncertain		Good	Medium	3008	
6308	Dark reflector	320083	5871012	unknown	18.3 x 5.3 x 0		uncertain		Good	Medium	3009	
6309	Bright reflector	319852	5870370	unknown	2.9 x 0.2 x 0		uncertain		Good	Medium	3011	
6310	Dark reflector	319651	5869897	unknown	2 dark reflectors 13m apart, measuring 3.1x 0.1 and 1.1 x 0.7. Covering an area 15 x 3.1.	2 dark reflectors.	uncertain		Good	Medium	3020; 3021	
6311	Dark reflector	319541	5869655	unknown	8 x 4.8 x 0	Patch of small dark reflectors.	uncertain		Good	Medium	3022	
6312	Bright reflector	319394	5869209	unknown	2.7 x 1.4 x 0		uncertain		Good	Medium	3023	
6313	Dark reflector	319200	5868820	unknown	2.9 x 0.2 x 0		uncertain		Good	Medium	3024	
6314	Dark reflector	318851	5867524	unknown	3.3 x 0.7 x 0		uncertain	140m southeast of the No 2 red lateral buoy marking the edge of the Old Lyon Channel.	Good	Medium	3027	
6315	Bright reflector	326879	5878001	unknown	7 x 4.7 x 0	Isolated object.	uncertain		Good	Medium	3028	
6316	Linear	330491	5882067	unknown	181.3 x 0.1 x 0	Debris, rope/fishing gear, because of length and narrow width.	uncertain		Good	Medium	3029	
6317	Linear	330221	5881198	unknown	69.4 x 0.7 x 0	debris, rope/fishing gear, because of length and narrow width	uncertain	330m NE of navigation mark.	Good	Medium	3030	
6321	Mound	331120	5883567	unknown	69.8 x 37.3 x 0		uncertain		Good	Medium	3035	
6322	Seafloor disturbance	331847	5883767	unknown	10.7 x 8.5 x 0	A group of light and dark reflectors showing evidence of structure with some shadowing, distinct from the seabed.	Possible wreck as indicated by height and internal structure.		Good	Medium	3036	
6324	Dark reflector	332227	5883856	unknown	123.5 x 14.5 x 0	Similar to an elongated mound but with no height.	uncertain		Good	Medium	3038	
6325	Debris	331430	5882647	unknown	2.8 x 0.4 x 1		uncertain		Good	Medium	3039	
6326	Debris	331550	5882556	unknown	3.9 x 0.8 x 0.7		uncertain		Good	Medium	3040	
6328	Mound	331888	5882700	unknown	21.9 x 6.4 x 0	Indistinct.	uncertain		Good	Medium	3042	
6329	Debris	331799	5882619	unknown	2.7 x 0.6 x 0.6		uncertain		Good	Medium	3043	
6330	Debris	331799	5882640	unknown	3.5 x 0.5 x 0.5		uncertain		Good	Medium	3044	
6331	Linear	331780	5882724	unknown	56.1 x 7.7 x 0	Dark reflector.	uncertain		Good	Medium	3045	

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6334	Mound	336469	5887858	unknown	319.3 x 55.1 x 0	Possibly 2 mounds joined by a ridge. Angular shape.	uncertain	Obscured by a fish shoal on each mound.	Good	Medium	3048	
6335	Mound	336213	5887544	unknown	110.9 x 40.2 x 4.2		uncertain	Obscured by fish shoal.	Good	Medium	3049	
6336	Dark reflector	334766	5885925	unknown	103.9 x 17.4 x 0		uncertain		Good	Medium	3053	
6337	Debris	332811	5883169	unknown	2.3 x 0.8 x 0.9		uncertain		Good	Medium	3054	
6338	Bright reflector	333824	5884329	unknown	40.8 x 0.2 x 0	Linear, possible scar or rope.			Good	Medium	3055	
6339	Dark reflector	337365	5888210	unknown	17.7 x 1.7 x 0		uncertain		Good	Medium	3056	
6340	Seafloor disturbance	333940	5884061	unknown	Line of dark reflectors, each no bigger then 2.5m long. Covering an area 26.7 x 19.9.	Created by a line of dark reflectors, each no bigger then 2.5m long.	uncertain		Good	Medium	3057	
6341	Seafloor disturbance	334928	5884960	unknown	Visible dark reflector measures approximately 20.4 x 6.8.	A large dark reflector very distinct from the seabed in an area of disturbed seafloor.	Possibly a partially exposed wreck site.		Good	Medium	3058	
6342	Dark reflector	335076	5885141	unknown	2 bright reflectors, individually measuring 14.7 x 2.5 and 13.2 x 5.7. Covering an area 45.9 x 22.9.	2 parallel bright reflectors, located in a darker area of seafloor.	uncertain		Good	Medium	3059; 3060	
6343	Dark reflector	337558	5888380	unknown	16.2 x 7.5 x 0		uncertain		Good	Medium	3061	
6344	Seafloor disturbance	335150	5885839	unknown	45.6 x 14.5 x 0	Two patches of lighter reflection close together on a sandwave.	uncertain		Good	Medium	3062	
6345	Bright reflector	336861	5888077	unknown	5.7 x 2.4 x 0		uncertain		Good	Medium	3063	
6346	Seafloor disturbance	337002	5888179	unknown	20.4 x 19 x 0	A seabed disturbance.	Possibly related to 6520, a UKHO site.		Good	Medium	3064	
6347	Bright reflector	336954	5888181	unknown	2 bright reflectors 5.85 and 4.55m long. Covering an area 15.9 x 3.9m.	2 bright reflectors.	uncertain		Good	Medium	3065	
6348	Seafloor disturbance	336582	5887223	unknown	27.1 x 21.4 x 0		uncertain		Good	Medium	3066	
6349	Dark reflector	336625	5887271	unknown	2 dark reflectors 14.5m apart, individually measuring 6.2 x 1.1 and 4.4 x 1.2m. Covering an area 17.3 x 6.2m.	2 dark reflectors 14.5m apart.	uncertain		Good	Medium	3067; 3068	
6350	Debris	333248	5882701	unknown	7.5 x 0.6 x 0.3		uncertain		Good	Medium	3069	
6351	Seafloor disturbance	334379	5884078	unknown	23.1 x 22.5 x 0	A large area of dark and light reflectors very distinct from the seafloor.	Form indicative of a wreck site.		Good	Medium	3070	

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6352	Bright reflector	334304	5883954	unknown	20.1 x 16.6 x 0		uncertain	In an area of disturbed seafloor.	Good	Medium	3071	
6353	Bright reflector	336623	5887026	unknown	7 x 6.9 x 0		Probably modern object suspended in the water column.		Good	Medium	3072	
6354	Wreck	338186	5888946	unknown	37.9 x 27 x 0	A large area of partially exposed material. Lots of objects in a distinct group many of which are linear with shadow.	Form indicative of a wreck site.	At location of a west cardinal navigation mark.	Good	High	3073	
6355	Dark reflector	337758	5888202	unknown	51 x 9.9 x 0	2 dark reflectors, individually measuring 38.6x5.7m and 9.9x4.1m.	uncertain		Good	Medium	3074; 3075	
6356	Dark reflector	337822	5888178	unknown	11.9 x 4.3 x 0		uncertain		Good	Medium	3076	
6357	Dark reflector	337464	5887637	unknown	18.4 x 1.9 x 0	Linear object with scour on one side.	uncertain		Good	Medium	3077	
6358	Bright reflector	337343	5887079	unknown	12.4 x 8.4 x 0		uncertain		Good	Medium	3078	
6359	Dark reflector	335211	5884126	unknown	12.7 x 7.9 x 0		uncertain		Good	Medium	3079	
6360	Dark reflector	337452	5886900	unknown	15.6 x 14.5 x 0		uncertain		Good	Medium	3080	
6361	Dark reflector	337852	5887187	unknown	7.9 x 2.2 x 0		uncertain		Good	Medium	3081	
6362	Dark reflector	337916	5887270	unknown	8.3 x 2.1 x 0		uncertain		Good	Medium	3082	
6363	Dark reflector	337868	5887216	unknown	25.6 x 2.2 x 0	Linear.	uncertain		Good	Medium	3083	
6364	Dark reflector	337816	5887186	unknown	6.1 x 1.5 x 0		uncertain		Good	Medium	3084	
6365	Bright reflector	337892	5887210	unknown	23.9 x 22.6 x 0		uncertain		Good	Medium	3085	
6366	Dark reflectors	339393	5888972	unknown	14.9 x 8.9 x 0	Patch of dark reflectors.	uncertain		Good	Medium	3086	
6367	Dark reflector	339382	5889077	unknown	16.7 x 2.6 x 0	Linear feature.	uncertain		Good	Medium	3087	
6368	Debris	323335	5874288	unknown	11.4 x 6.6 x 0.6		uncertain		Good	Medium	3088	
6369	Debris	323443	5874385	unknown	3.2 x 1.5 x 0.7		uncertain		Good	Medium	3089	
6370	Dark reflector	324072	5875053	unknown	11 x 2.2 x 0		uncertain		Good	Medium	3090	
6371	Debris	328834	5881067	unknown	1.9 x 0.5 x 0.8		uncertain		Good	Medium	3093	
6372	Debris	330551	5883338	unknown	2.8 x 0.8 x 0.9		uncertain		Good	Medium	3095	
6373	Debris	331233	5884187	unknown	6.7 x 4.9 x 0	Group of debris objects.	uncertain		Good	Medium	3096	

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6374	Linear	327887	5880243	unknown	185 x 2.5 x 0	2 dark reflectors and 2 bright reflectors in a line. Probably modern in origin.	uncertain		Good	Medium	3097; 3098; 3099; 3118	
6376	Dark reflector	321741	5874040	unknown	11.5 x 8.9 x 0		uncertain		Good	Medium	3101	
6377	Wreck	323483	5876350	unknown	13.3 x 5 x				Good	Medium	3102	
6378	Seafloor disturbance	328856	5883420	unknown	17.1 x 10.2 x 0	Mainly a large bright reflector.	uncertain		Good	Medium	3103	
6379	Seafloor disturbance	324295	5878032	unknown	6.2 x 5.6 x 0	Mainly dark reflector.	uncertain		Good	Medium	3104	
6381	Linear	323141	5875649	unknown	42.2 x 0.1 x 0.1	Possibly modern debris.	uncertain		Good	Medium	3107	
6382	Linear	323106	5875606	unknown	15.2 x 0.7 x 0	Possible modern debris.	uncertain		Good	Medium	3108	
6383	Debris	323113	5875575	unknown	2.9 x 0.9 x 0.8	Possibly wreck debris.	uncertain	Located 65m to southwest of wreck 3106.	Good	Medium	3109	
6384	Dark reflector	323226	5875599	unknown	4.1 x 1.5 x 0		uncertain		Good	Medium	3110	
6385	Wreck.	329424	5883491	unknown	Mound measures 59 x 43 x 0.5m. The total area covered is 89.2 x 55.4 x 0.1.	Site comprising a cluster of material with some height and a darker sediment pattern forming an overall seafloor disturbance. Mound located in bathymetry data is 28m to the south of the sidescan position.	The overall shape of the site and scatter of clearly defined objects with shadows is strongly indicative of a wreck site.	At location of a lateral mark, the Lynn Knock buoy.	Good	High	3111; 5008	
6386	Bright reflector	324574	5877207	unknown	13.4 x 9.6 x 0		uncertain		Good	Medium	3115	
6387	Bright reflector	337810	5888227	unknown	13.9 x 3.6 x 0	Thin angular object	uncertain		Good	Medium	3116	
6388	Dark reflector	346077	5889530	unknown	2.6 x 0.6 x 0		uncertain		Good	Medium	3500	
6389	Dark reflector	341488	5890126	unknown	8.1 x 7.9 x 0		uncertain		Good	Medium	3504	
6390	Dark reflector	342124	5889756	unknown	2.8 x 0.6 x 0		uncertain		Good	Medium	3505	
6391	Dark reflector	344965	5889248	unknown	9.3 x 8.7 x 0		uncertain		Good	Medium	3506	
6392	Dark reflector	343114	5889568	unknown	2.1 x 1.4 x 0		uncertain		Good	Medium	3507	
6393	Dark reflector	342963	5889610	unknown	3.1 x 0.5 x 0		uncertain		Good	Medium	3508	
6394	Dark reflector	341899	5889689	unknown	8.1 x 3.5 x 0	Roughly rectangular outline with internal structure. Possibly debris.	uncertain		Good	Medium	3509	
6395	Dark reflector	340209	5889995	unknown	7.1 x 4.3 x 0	Looks similar to 3509 but much too far apart to be grouped together. Possibly debris.	uncertain		Good	Medium	3510	
6396	Dark reflector	341409	5889766	unknown	7 x 0.9 x 0	At crest of sand wave.	uncertain		Good	Medium	3511	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6398	Dark reflector	342802	5889379	unknown	2.3 x 2.1 x 0		uncertain		Good	Medium	3525	
6399	Dark reflector	340106	5889896	unknown	Continues beyond range to the right so these dimensions are less than the actual size. 39.3 x 9.9.		uncertain		Good	Medium	3526	
6400	Dark reflector	344649	5888779	unknown	Extends off range so dimensions are underestimates. 7.6 x 2.1m.		uncertain		Good	Medium	3529	
6401	Dark reflector	343031	5889100	unknown	4.1 x 1.7 x 0		uncertain		Good	Medium	3530	
6402	Debris	342239	5889339	unknown	10.1 x 1.7 x 0.4	In an area of sandwaves. Appears to stick out of the side of a sandwave.	uncertain		Good	Medium	3531	
6403	Dark reflector	341752	5889336	unknown	5.7 x 4.5 x 0	Bigger than others in immediate area.	uncertain		Good	Medium	3532	
6404	Dark reflector	343216	5888920	unknown	2.1 x 0.4 x 0		uncertain		Good	Medium	3533	
6405	Dark reflector	343268	5888951	unknown	2.5 x 0.7 x 0		uncertain		Good	Medium	3534	
6407	Dark reflector	341798	5889188	unknown	4.7 x 2.1 x 0		uncertain		Good	Medium	3536	
6408	Dark reflector	341664	5889225	unknown	0.9 x 0.8 x 0		uncertain		Good	Medium	3537	
6409	Dark reflector	340179	5888517	unknown	17.7 x 11.2 x 0	Patchy dark reflector. Lots of other dark reflectors around but this is unusually large.	uncertain		Good	Medium	3541	
6410	Dark reflector	340097	5888430	unknown	52.6 x 10.1 x 0	Patch of dark reflectors.	uncertain		Good	Medium	3542	
6411	Dark reflector	339763	5889008	unknown	2 x 1.6 x 0		uncertain		Good	Medium	3543	
6412	Dark reflector	339566	5888713	unknown	0.8 x 2.6 x 0		uncertain		Good	Medium	3544	
6414	Dark reflector	316143	5867308	unknown	1.7 x 1.6 x 0		uncertain		Good	Medium	3550	
6415	Debris	316695	5868165	unknown	1.1 x 0.3 x 0.7		uncertain		Good	Medium	3553	
6416	Dark reflector	318019	5869582	unknown	4.3 x 2.7 x 0		uncertain		Good	Medium	3554	
6417	Dark reflector	318165	5869225	unknown	8.8 x 3.5 x 0	Contains small debris object.	uncertain		Good	Medium	3555	
6418	Dark reflector	315987	5864256	unknown	8.1 x 2.2 x 0		uncertain		Good	Medium	3556	
6419	Dark reflector	320046	5869222	unknown	9.6 x 4.2 x 0	Looks like a scour beyond the object too.	uncertain		Good	Medium	3575	
6420	Bright reflector	320037	5868966	unknown	6.9 x 3.2 x 0	Bright reflector containing linear dark reflector	uncertain		Good	Medium	3576	
6421	Dark reflector	319481	5867743	unknown	21.2 x 8.8 x 0	With possible shadow	uncertain		Good	Medium	3577	
6422	Dark reflector	319521	5867683	unknown	8.2 x 6.3 x 0	Odd looking roughly circular dark reflector with possible depression in centre and linear offshoot to bottom right.	uncertain		Good	Medium	3578	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6423	Debris	319373	5867793	unknown	3.9 x 1.1 x 0.7	Appears to be a large scour around object but this may just be a natural feature of the seabed.	uncertain		Good	Medium	3579	
6424	Debris	327619	5879512	unknown	8.5 x 5.1 x 0	Group of debris objects.	uncertain		Good	Medium	3091; 3092	
6425	Bright reflector	330232	5882822	unknown	10.5 x 6.9 x 0	Angular bright reflector with magnetic hit (152.9 nT) 52m to north-east. Not particularly wreck shaped although distinct from seabed.	Object with associated high magnetic amplitude suggesting a large metal object of anthropogenic origin.		Good	Medium	3094; 4015	
6426	Wreck	323158	5875605	unknown	The sidescan anomaly measures 8.0 x 5.3 x 2.8 and is located 21m north-east of bathy mound. Overall extent is 18 x 10 x 2.8.	Very bright, high, distinct shadow. Magnetic anomaly (77.67Nt) 28m to the south. Mound identified in bathymetry data.	Possible sailing vessel as identified by mast like high shadow.		Good	High	3106; 4010	
6427	Dark reflector	331781	5886353	unknown	Group of 3 objects individually measuring 4.1 x 1.3, 11.4 x 1.1 and 3.8 x 2.9. Covering a total area 30 x 18.	Group of 3 objects. Possible debris.	uncertain		Good	Medium	3112; 313; 3114	
6429	Dark reflector	342865	5889400	unknown	2 dark reflectors 12m apart, individually measuring 6.3 x 1.8 and 2.6 x 1.0. Covering an area 13.5 x 6.3.	2 dark reflectors.	uncertain		Good	Medium	3512; 3513	
6430	Dark reflector	343271	5889410	unknown	2 dark reflectors 3m apart, individually measuring 2.4 x 0.7 and 1.3 x 0.5. Covering an area 4.8 x 0.7.	2 dark reflectors.	uncertain		Good	Medium	3514; 3515	
6431	Dark reflector	343633	5889246	unknown	2 dark reflectors 10.5m apart, individually measuring 2.4 x 0.6 and 1.8 x 0.4. Covering an area 12.6 x 0.6.	2 dark reflectors.	uncertain		Good	Medium	3516; 3517	
6432	Dark reflector	350235	5888003	unknown	2 dark reflectors 5m apart, individually measuring 1.1 x 0.8 and 3.8 x 1.1. Covering an area 7.3 x 1.1.	2 dark reflectors.	uncertain		Good	Medium	3518; 3519	
6434	Dark reflector	346349	5888596	unknown	2 dark reflectors 4m apart, individually measuring 2.7 x 0.9 and 3.9 x 1.0. Covering an area 3.9 x 5.	2 dark reflectors.	uncertain		Good	Medium	3527; 3528	
6435	Wreck	340784	5889038	unknown	A mound identified in the bathymetry data at the sidescan position measures 18 x 11 x 1. Overall dimensions are 22.4 x 10.1 x 1.9.	An ovoid shape with distinct outline and scour. Internal dark reflectors showing structure and height. Mag anomaly (73.16nT) is 17.5m to southwest of the centre of the wreck. Mound identified in the bathymetry data at the sidescan position although it is not very clear as it is located at the junction between adjacent lines.	Sidescan and bathymetry data with associated mag hit suggesting a wreck site.		Good	High	3538; 3564; 3565; 3566; 3567; 4128; 5004	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6436	Dark reflector	341305	5888694	unknown	2 dark reflectors 5.5m apart, individually measuring 4.4 x 1.8 and 5.2 x 4.0. Covering an area 9 x 4.4.	2 dark reflectors.	uncertain		Good	Medium	3539; 3540	
6437	Bright reflector	316117	5867274	unknown	2 bright reflectors 2m apart, individually measuring 15.0 x 0.6 and 12.1 x 1.1. Covering an area 15 x 2.8.	2 bright reflectors.	uncertain		Good	Medium	3551; 3552	
6438	Debris	340423	5888357	unknown	2.3 x 1.6 x 2.4 x 1204.15	A very dark reflector seen in 2 lines, it has a distinct high shadow with scour. Nearest mag anomaly is 8.5m to the south-east with a value of 1204.15nT, the other is 21m to the south-east and has a value of 102.96nT.	Debris with associated large magnetic amplitude suggesting a large metal object of anthropogenic origin.		Good	Medium	3562; 3563; 4024; 4127	
6439	Debris	322068	5872973	unknown	29 x 6 x 0	Curved, narrow objects.	Possibly fishing gear.	Midway between charted (195m to northeast) and Seazone (205m to southwest) positions of the Roaring Middle buoy.	Good	Medium	3569; 3570; 3571; 3572	
6440	Linear	321083	5871277	unknown	Individually measuring 12.5 x 2.4 and 18.4 x 1.6. Covering an area 30 x 4.	2 linear dark reflectors.	uncertain		Good	Medium	3573; 3574	
6441	Debris	319523	5868175	unknown	Dark reflector (5.1 x 2.1) and bright reflector (5.6 x 2.3). Covering an area 10.8 x 2.3.	Adjacent dark reflector and bright reflector.	uncertain		Good	Medium	3580; 3581	
6442	Magnetic	324256	5876370	unknown		2 mag anomalies 28m apart. The other value is 7.27nT.	uncertain		Good	Medium	4007; 4008	
6443	Magnetic	326746	5881420	unknown		Amplitude 19.96	uncertain		Good	Medium	4001	
6444	Magnetic	329676	5882385	unknown		Amplitude 38.09	Magnetic anomaly possibly associated with 6521, a sailing vessel recorded by the UKHO 80m to the west.		Good	High	4002	
6445	Magnetic	328421	5881015	unknown		Amplitude 12.19	uncertain		Good	Medium	4003	
6446	Magnetic	324006	5875615	unknown		Amplitude 17.74	uncertain		Good	Medium	4005	
6447	Magnetic	325926	5878460	unknown		Amplitude 18.03	uncertain		Good	Medium	4006	
6448	Magnetic	323671	5875815	unknown		Amplitude 5.81	uncertain		Good	Medium	4009	
6449	Magnetic	323931	5877345	unknown		Amplitude 7.84	uncertain		Good	Medium	4011	
6450	Magnetic	322401	5875445	unknown		Amplitude 13.42	uncertain		Good	Medium	4012	
6452	Magnetic	325481	5876695	unknown		Amplitude 9.07	uncertain		Good	Medium	4014	
6455	Magnetic	324336	5879070	unknown		Amplitude 11.6	uncertain		Good	Medium	4018	
6457	Magnetic	333506	5885225	unknown		Amplitude 12.92	uncertain		Good	Medium	4021	
6458	Magnetic	327601	5879155	unknown		Amplitude 12.98	uncertain		Good	Medium	4023	
6459	Magnetic	339845	5888150	unknown		Amplitude 9.18	uncertain		Good	Medium	4025	

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6460	Magnetic	340085	5887735	unknown		Amplitude 14.36	uncertain		Good	Medium	4026	
6461	Magnetic	340825	5888250	unknown		Amplitude 7.5	uncertain		Good	Medium	4028	
6463	Magnetic	318137	5865980	unknown		Amplitude 42.95	uncertain		Good	Medium	4030	
6464	Magnetic	319012	5869555	unknown		Amplitude 11.75	uncertain		Good	Medium	4032	
6465	Magnetic	316582	5864490	unknown		Amplitude 7.92	uncertain		Good	Medium	4034	
6466	Magnetic	318202	5868525	unknown		Amplitude 9.42	uncertain		Good	Medium	4035	
6467	Magnetic	317812	5867570	unknown		Amplitude 14.93	uncertain		Good	Medium	4036	
6468	Magnetic	317812	5867910	unknown		Amplitude 22.08	uncertain		Good	Medium	4038	
6478	Magnetic	350174	5888205	unknown		Amplitude 19.15	uncertain		Good	Medium	4049	
6479	Magnetic	342880	5889680	unknown		Amplitude 7.18	uncertain		Good	Medium	4050	
6480	Magnetic	347815	5888755	unknown		Amplitude 5.88	uncertain		Good	Medium	4051	
6481	Magnetic	341475	5890710	unknown		Amplitude 10.34	uncertain		Good	Medium	4053	
6482	Magnetic	341095	5891005	unknown		Amplitude 14.81	uncertain		Good	Medium	4054	
6483	Magnetic	313747	5858355	unknown		Amplitude 7.68	uncertain		Good	Medium	4101	
6484	Magnetic	316097	5863890	unknown		Amplitude 7.55	uncertain		Good	Medium	4102	
6485	Magnetic	314022	5861225	unknown		Amplitude 18.19	uncertain		Good	Medium	4103	
6486	Magnetic	314667	5862775	unknown		Amplitude 9.88	uncertain		Good	Medium	4106	
6487	Magnetic	314832	5862810	unknown		Amplitude 5.01	uncertain		Good	Medium	4107	
6488	Magnetic	313997	5859545	unknown		Amplitude 5.39	uncertain		Good	Medium	4108	
6489	Magnetic	316933	5867550	unknown		Amplitude 45.94	uncertain		Good	Medium	4109	
6490	Magnetic	316743	5867730	unknown		Amplitude 17.58	uncertain		Good	Medium	4110	
6491	Magnetic	316182	5864500	unknown		Amplitude 9.48	uncertain		Good	Medium	4111	
6492	Magnetic	314097	5860930	unknown		Amplitude 11.7	uncertain		Good	Medium	4112	
6493	Magnetic	314002	5859740	unknown		Amplitude 6.92	uncertain		Good	Medium	4113	
6494	Magnetic	315052	5865780	unknown		Amplitude 23.73	uncertain		Good	Medium	4114	
6495	Magnetic	316057	5867115	unknown		Amplitude 5.71	uncertain		Good	Medium	4115	
6496	Magnetic	316422	5867675	unknown		Amplitude 17.95	uncertain		Good	Medium	4116	
6497	Magnetic	315212	5863450	unknown		Amplitude 11.91	uncertain		Good	Medium	4117	
6498	Magnetic	317253	5868325	unknown		Amplitude 28.71	uncertain		Good	Medium	4118	
6499	Magnetic	315762	5865710	unknown		Amplitude 12.69	uncertain		Good	Medium	4119	
6500	Magnetic	315742	5865650	unknown		Amplitude 16	uncertain		Good	Medium	4120	
6501	Magnetic	316788	5866865	unknown		Amplitude 5.9	uncertain		Good	Medium	4121	
6502	Magnetic	317018	5866995	unknown		Amplitude 24.41	uncertain		Good	Medium	4122	
6503	Magnetic	316973	5867165	unknown		Amplitude 14.44	uncertain		Good	Medium	4123	
6504	Magnetic	316552	5866260	unknown		Amplitude 12.04	uncertain		Good	Medium	4124	
6505	Magnetic	317118	5867170	unknown		Amplitude 7.95	uncertain	At location of Bar Flat cardinal mark.	Good	Medium	4125	
6506	Magnetic	314857	5863570	unknown		Amplitude 8.45	uncertain		Good	Medium	4126	
6507	Debris	349253	5901055	unknown	18.2 x 1.8 x 0.4	Linear.	uncertain		Good	Medium	3582	
6508	Dark reflector	349175	5901043	unknown	6.7 x 1.1 x 0	Linear.	uncertain		Good	Medium	3583	
6509	Dark reflector	349500	5901258	unknown	16.8 x 2.7 x 0		uncertain		Good	Medium	3584	
6510	Dark reflector	349520	5901304	unknown	9 x 2.3 x 0		uncertain		Good	Medium	3585	
6511	Magnetic	349350	5900810	unknown		Amplitude 40.38	uncertain		Good	Medium	4055	
6512	Unknown	314512	5863667	unknown		Dead	uncertain	Located in 1917			2120	UKHO10135

Feature	Name/ classification	UTM Easting	UTM Northing	Date	Extent	Character	Archaeological Importance	Notes	Data Quality	Confidence	Sources	External Reference
6513	*Borderer*	318563	5871871	Lost in 1982.	14m long	Ex motor torpedo boat. Lost on the 01/11/1982. Classified as live by the UKHO.	Modern so of little archaeological importance.				2098	UKHO 10160
6515	Wreck	330219	5881389	unknown		Possible remains of sailing vessel. Classified as live by the UKHO	uncertain				2113	UKHO 8592/NMR913194
6516	Wreck	331521	5883580	modern		Concrete coaster. Classified as live by the UKHO.	Modern so of little archaeological importance.				2114	UKHO 8595/NMR892342/NMR913196
6517	Foul	334970	5886234	unknown		A foul or fisherman's fastener. Classified as live by the UKHO.					2127	UKHO 596/NMR892345/MNF38608
6519	Wreck	349769	5902486	Lost in 1918.	55.5 x 5.8 x 0	UB54, a German submarine. 650 tonnes. Lost on the 11/03/1918. Classified as Abey by the UKHO		Abey: meaning previously reported but detected by repeated surveys leading to doubts about its position or existence			2318	UKHO 8616
6520	Wreck			unknown		Live	uncertain				2117	UKHO 8599
6521	Wreck			unknown		Sailing vessel. Live	uncertain	First reported in 1958			2112	UKHO 8593/NMR913195

APPENDIX II: DOCUMENTED LOSSES

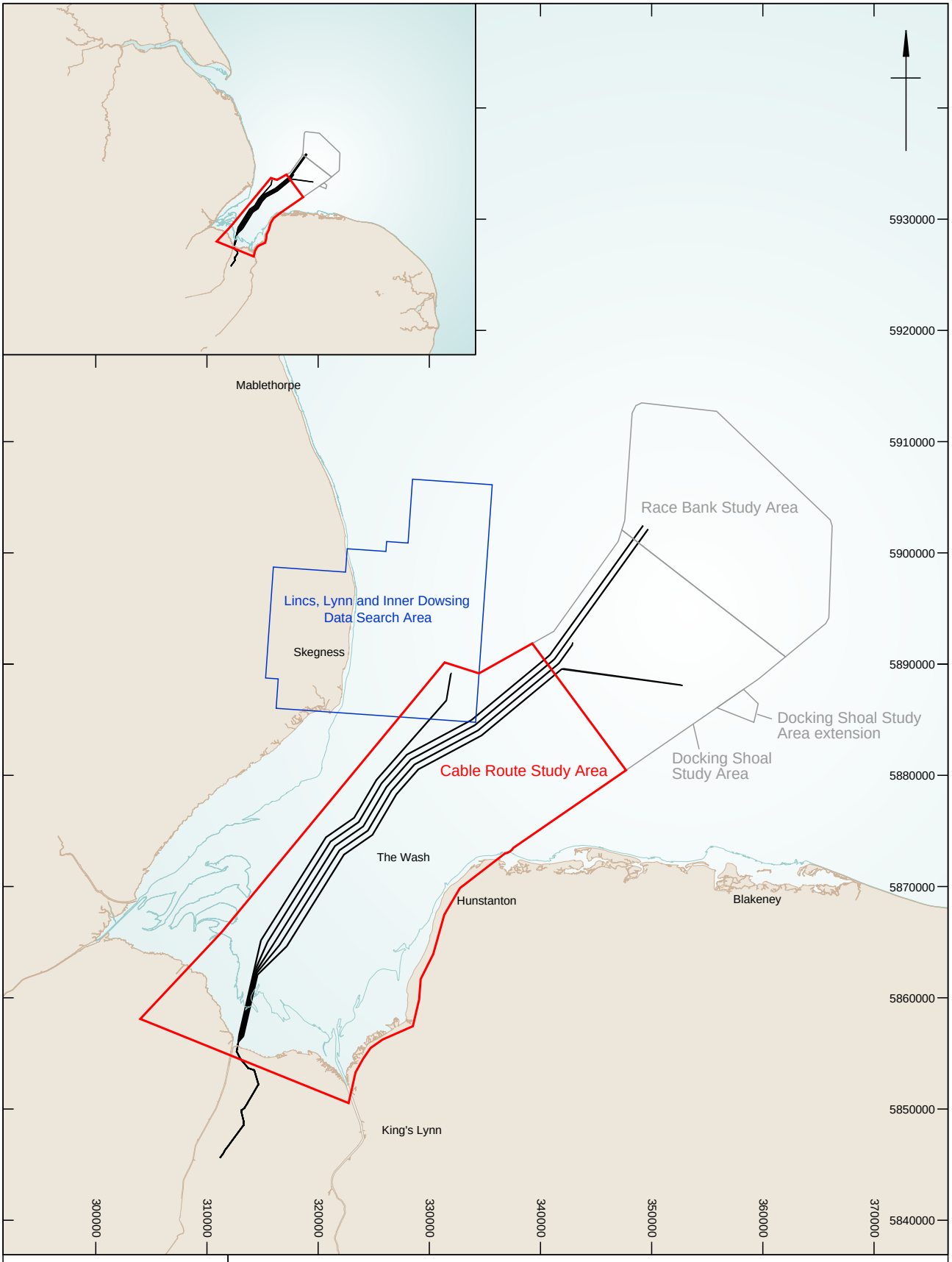
Documented Losses that may lie within the Wash Cable Route Corridor and the 500m buffer zone

NMR ID	NLO	Name	Description	Date	UTM Easting	UTM Northing
1030311	3	*Solebay*	British sixth rate ship of the line which stranded on Lynn knock while escorting a convoy of ships in the north sea. Built in 1694, she was a wooden sailing vessel.	1709	329643	5884145
1217120	5	*Eight Friends*	English craft which foundered off King's Lynn, possibly after departing from Brancaster; a wooden sailing vessel.	1773	323075	5872784
1311399	6	*Anna Maria*	German brigantine	1774	324859	5875497
1301906	6	Unknown	Craft	1775	324859	5875497
1301908	6	Unknown	Craft	1775	324859	5875497
1301903	6	Unknown	Craft	1775	324859	5875497
1301930	6	*William And Ann*	British cargo vessel which foundered following a collision off King's Lynn, en route from Sunderland to King's Lynn with coal; a wooden sailing vessel.	1776	324859	5875497
1387304	4	*Brothers Endeavour*	English cargo vessel which foundered in the well after springing a leak on her passage from Sunderland to great Yarmouth with coal; a wooden sailing vessel.	1776	326668	5879150
1324487	6	*John And Sarah*	English craft	1777	324859	5875497
1387330	6	*Forrest*	English craft which foundered near Lynn Deep; a wooden sailing vessel.	1777	324859	5875497
1328352	5	*Samuel*	British craft which foundered in the wash en route from Blyth to Herne Bay; a wooden sailing vessel.	1786	323075	5872784
1390033	6	*Wasp*	British brig which foundered in Lynn Deep on her passage from Sunderland with coal; a wooden sailing vessel.	1787	324859	5875497
926776	6	*Endeavour*	British craft	1789	324859	5875497
1384568	6	*Sunderland*	British collier which foundered in Lynn Deeps en route from Sunderland to London with coal; a wooden sailing vessel.	1789	324859	5875497
1336286	6	*Jannet*	English cargo vessel which was lost near Lynn Deeps en route from Sunderland to Rotterdam with coal; a wooden sailing vessel.	1792	324859	5875497
1391845	6	*Friends Increase*	English craft which foundered in Lynn Deep; a wooden sailing vessel.	1793	324859	5875497
1393291	6	*Courageux*	French lugger which foundered in Lynn deep following gun action and capture by an English collier. On a privateering cruise from Dunkirk, she was a wooden sailing vessel.	1797	324859	5875497

NMR ID	NLO	Name	Description	Date	UTM Easting	UTM Northing
1393937	3	Unknown	Brig which stranded on Lynn Knock during a gale; a wooden sailing vessel.	1800	329643	5884145
1338964	4	*Providence*	English craft which foundered in the Well Deep; a wooden sailing vessel.	1802	326668	5879150
1339363	6	*Cotton Planter*	English craft	1803	324859	5875497
1397719	6	*Lynn Packet*	English packet which foundered in Lynn Deep; a wooden sailing vessel.	1806	324859	5875497
1340464	6	*Medea*	British collier which foundered in King's Lynn roads en route from Newcastle-Upon-Tyne to King's Lynn with coal; a wooden sailing vessel.	1807	324859	5875497
1340542	6	*Ventriloquist*	Craft	1807	324859	5875497
1341582	6	*Union*	English craft which foundered near Lynn Roads; a wooden sailing vessel.	1810	324859	5875497
1401496	6	*John And Sarah*	English cargo vessel which foundered off Boston after springing a leak. En route from Sunderland to Boston with coal, she was a wooden sailing vessel.	1814	324859	5875497
1344180	1	*Ceres*	Welsh craft	1815	316602	5864484
1346835	5	*Hester*	English craft	1820	323075	5872784
1346833	5	Unknown	Sloop	1820	323075	5872784
1346834	5	*Alliance*	English craft	1820	323075	5872784
1346836	6	Unknown	Brig	1820	324859	5875497
1348672	6	*Lord Wellington*	British craft which foundered off Boston during a gale; a wooden sailing vessel.	1821	324859	5875497
1348709	6	*Endeavour*	English craft which foundered in Lynn Roads during a gale; a wooden sailing vessel.	1821	324859	5875497
1349453	1	*Fortune*	English cargo vessel which was wrecked at the entrance to Lynn Channel, bound for Wisbech with coal; a wooden sailing vessel.	1822	316602	5864484
930136	5	*Providence*	English craft	1822	323075	5872784
1349547	6	*Sophia*	English galliot which foundered off Boston during a gale. Bound from Sunderland to Southwold, she was a wooden sailing vessel.	1822	324859	5875497
1351099	5	*Agenoria*	English craft	1823	323075	5872784
1351101	6	*Neutral Fisher*	English schooner which capsized and was wrecked in Lynn Roads during a gale; a wooden sailing vessel.	1823	324859	5875497
1219027	6	*Haphazard*	English Humber sloop which foundered in Lynn Roads en route from Kingston-Upon-Hull to King's Lynn. Laden with deals and tar, she was a wooden sailing vessel.	1825	324859	5875497
1315839	5	*Neutral*	British cargo vessel which foundered off King's Lynn while en route from London to Wisbech. Laden with nuts and oranges, a wooden sailing vessel.	1826	323075	5872784

NMR ID	NLO	Name	Description	Date	UTM Easting	UTM Northing
1236800	6	*Fortune*	British cargo vessel	1827	324859	5875497
1315929	6	Unknown	English barque	1829	324859	5875497
1356190	3	*Wilton*	Craft	1829	329643	5884145
1237918	1	*Augusta*	Prussian cargo vessel	1832	316602	5864484
1238107	5	*John*	British craft which foundered off King's Lynn during a gale, while en route from Blyth to Dover; a wooden sailing vessel.	1833	323075	5872784
1316103/ 1316121/ 1316122	5	Unknown	Craft which foundered between the Outer Knock Buoy and the Long Sand; a wooden sailing vessel.	1833	323075	5872784
927734	6	*Margaret*	English brig which foundered in Lynn Roads during a gale; a wooden sailing vessel.	1833	324859	5875497
927733	6	*Amicus*	English craft	1833	324859	5875497
1316130	3	*Heckington*	English Craft	1834	329643	5884145
927732	6	*Peggy*	Craft	1834	324859	5875497
1238288	6	*Ann*	English craft	1836	324859	5875497
1350305	6	Unknown	Unknown lighter	1836	324859	5875497
928949	4	*Integrity*	British craft	1842	326668	5879150
942821	3	*Lord Mountstewart*	Irish brig	1853	329643	5884145
1245430	6	*True Friends*	English snow	1866	324859	5875497
943067	6	*Medora*	English cargo vessel	1867	324859	5875497
927945	6	*Enterprise*	Welsh brigantine	1867	324859	5875497
1341946	6	*Kate*	English craft	1868	324859	5875497
1384613	3	*Orb*	English brig which stranded on Lynn Knock sands. This sailing vessel was constructed from wood.	1871	329643	5884145
942831	3	*James*	English brig	1871	329643	5884145
942830	3	*Regina*	English brig	1871	329643	5884145
1221281	1	*Endeavour*	English sloop	1880	316602	5864484
1302414	5	*Henretta*	English sloop	1881	323075	5872784
1221785	1	*Mary Ann*	English sloop	1882	316602	5864484
928402	4	*Johanna*	Danish schooner	1883	326668	5879150
928649	5	*Greyhound*	British smack	1887	323075	5872784
928492	1	*Joseph And Mary*	British cutter	1889	316602	5864484
928513	6	*Advance*	English brigantine	1891	324859	5875497

NMR ID	NLO	Name	Description	Date	UTM Easting	UTM Northing
1351808	6	*Tankerton Tower*	English schooner	1893	324859	5875497
1351909	7	*Eagle*	English schooner	1896	312331	5855558
928347	6	*Acorn*	Norwegian schooner	1898	324859	5875497
1348003	1	*Wick Bay*	English cargo vessel	1908	316602	5864484
927530	1	*Victor*	English smack	1908	316602	5864484
927534	5	*Lizzie*	English smack	1909	323075	5872784
927563	5	Unknown	English lugger	1911	323075	5872784
1225434	6	*Caprice*	Norwegian schooner	1911	324859	5875497
1349396	5	*Hms Oceans Gift II*	British fishing vessel	1917	323075	5872784
1399688	5	Heinkel He 1115b S4h	German Heinkel he 111 bomber which was shot down in the wash.	1939	323075	5872784
1399693	5	Heinkel He 1115b S4Dh	German Heinkel he 111 bomber which was shot down in the wash. It was part of the coastal flying corps.	1939	323075	5872784
1357686	5	Hurricane Mk I V7376	British fighter	1940	323075	5872784
1352258	5	Armstrong Whitworth Whitley Mk V T4201	British heavy bomber	1940	323075	5872784
1322653	5	Wellington Mk IC P9276	British bomber	1940	323075	5872784
1318466	5	Mosquito Mk II Dz305	British fighter	1943	323075	5872784
1357010	1	Master Mk II Em330	British trainer	1944	316602	5864484
1356979	5	Stirling Mk III Eh960	British heavy bomber	1944	323075	5872784
1356978	5	Lancaster Mk III Ed826	British heavy bomber	1944	323075	5872784
1349848	6	Unknown	Unknown brig	1951	324859	5875497
892339	2	Unknown	Craft	Unknown	330103	5881435



Cable routes

0 10 20km

Drawing Projection: UTM WGS84 z31

Wessex Archaeology

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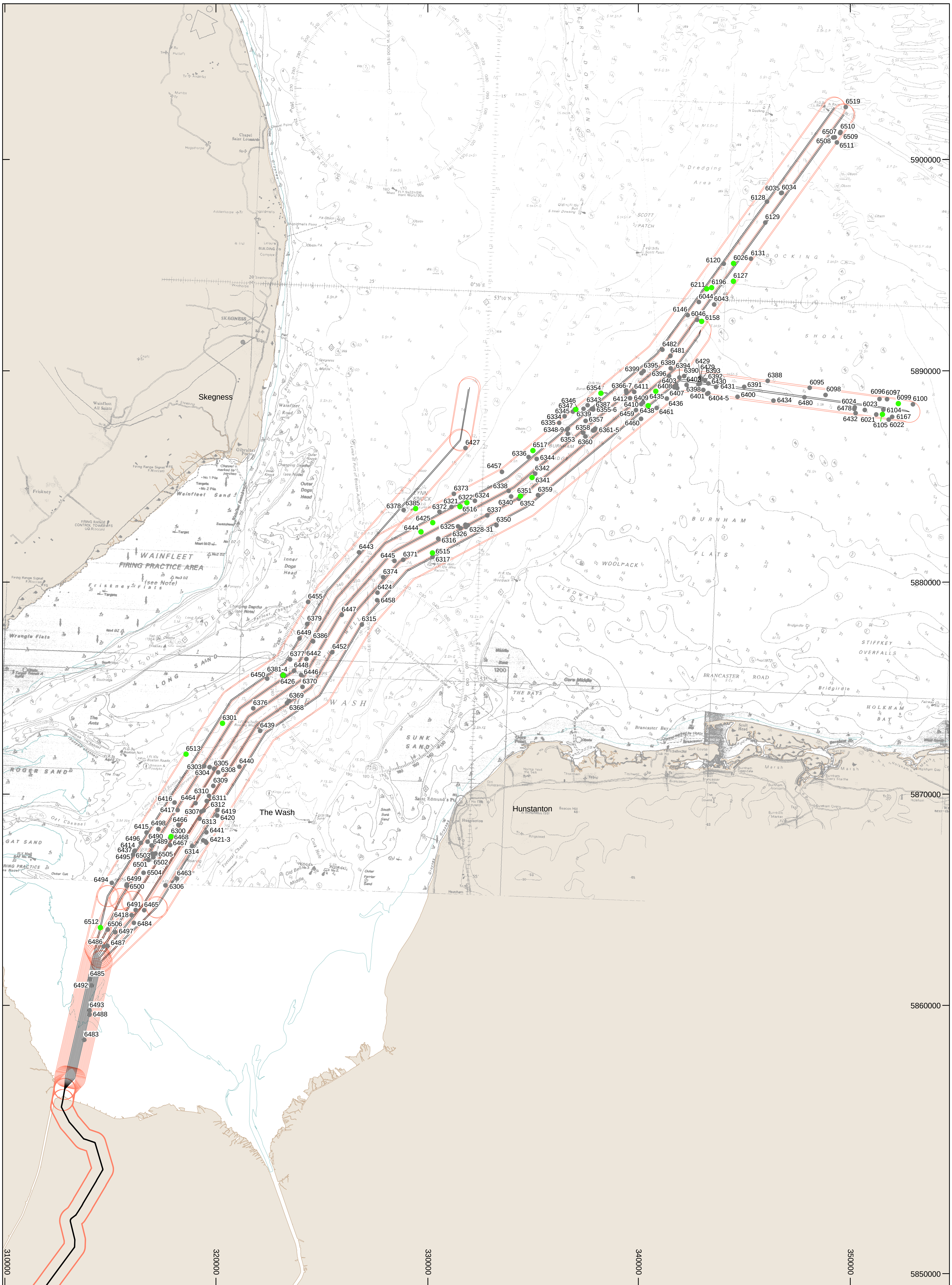
CRSA and adjacent wind farm areas

Figure 1



- Sites subject to exclusion zones
- Anomalies requiring further investigation
- Cable routes
- 500m buffer zone

0 5km

Wessex Archaeology

Drawing Projection: UTM WGS84 z31
Admiralty Chart 108 (dated 2000)
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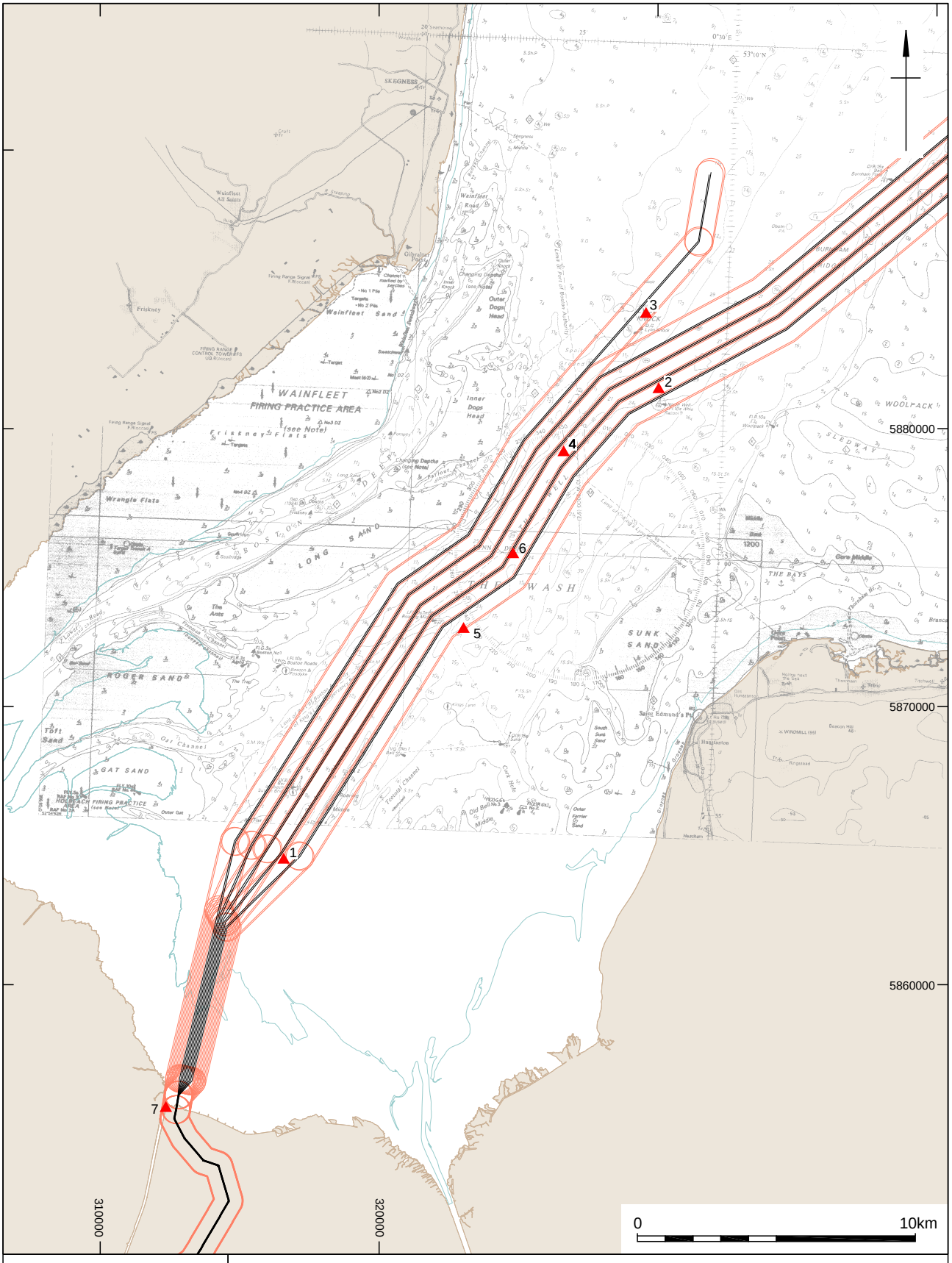
Known sites and geophysical anomalies within the cable route and the 500m buffer zone

Figure 2



▲ Named location
— Cable routes
— 500m buffer zone

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Admiralty Chart 108 (dated 2000)

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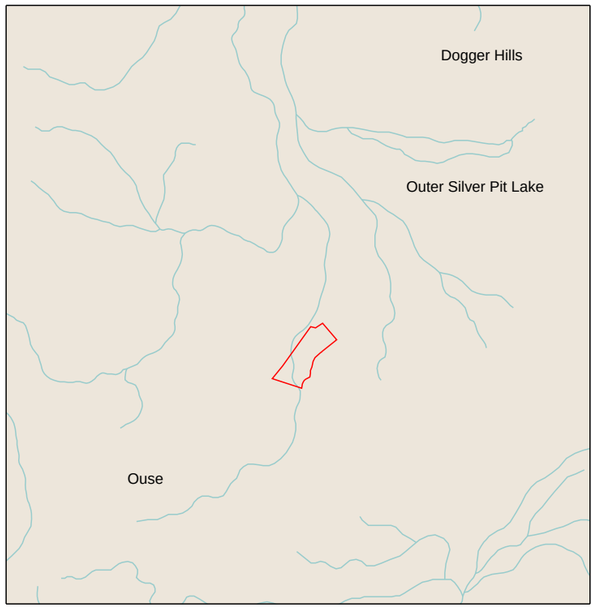
Named locations within the cable route and the 500m buffer zone Figure 3

18,000BP



16,000BP

13,000BP

10,000BP

5,000BC

Current coastline

Wessex Archaeology

0 100 200km

Cable Route Study Area

After Coles, 1998

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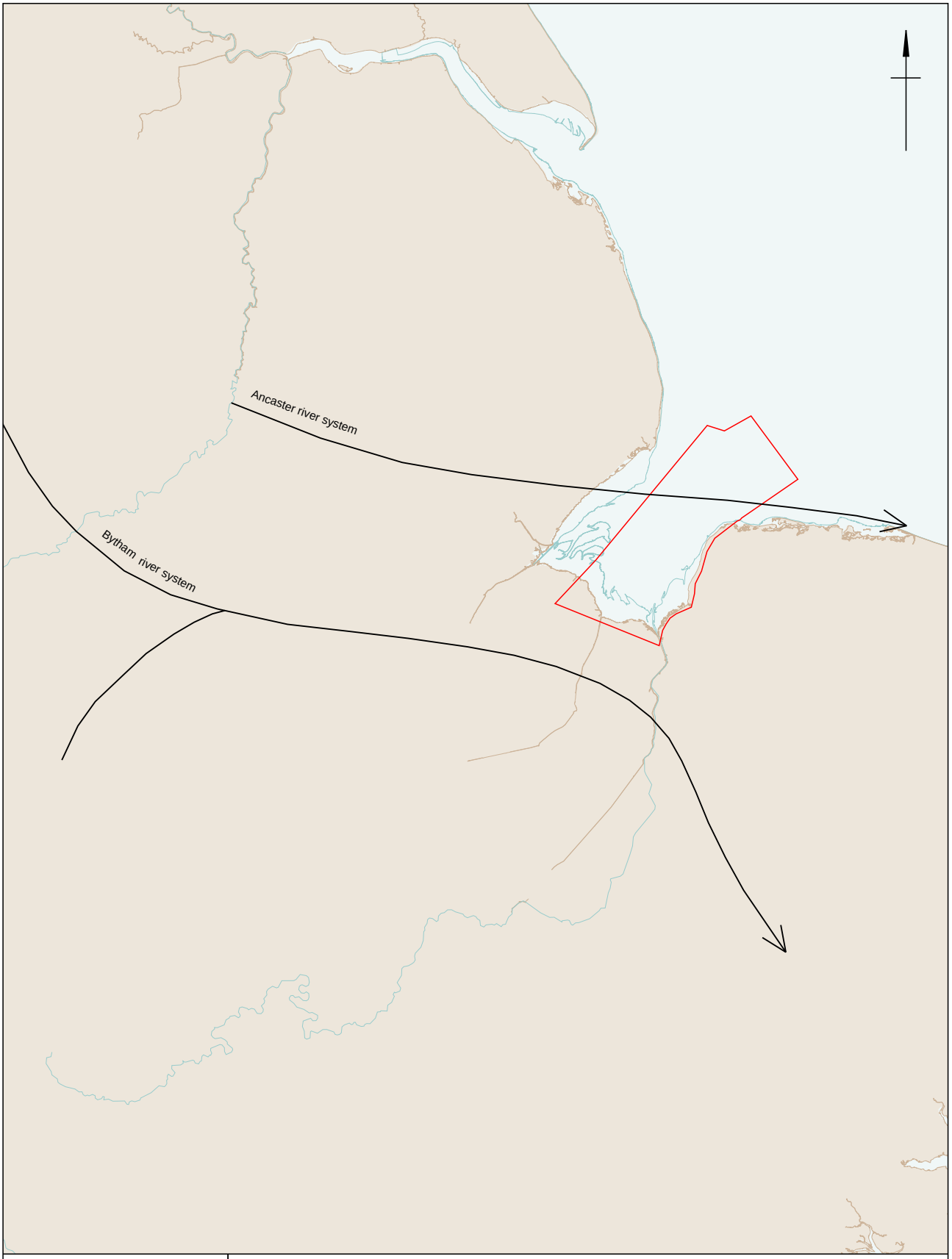
Post-Devensian sea level change

Figure 4



Cable Route Study Area

Drawing Projection: UTM WGS84 z31

0 50km

After J.Rose et al, 2001

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Estimated course of the pre-Anglian rivers Ancaster and Bytham Figure 5

Plate 1. An example of cliff collapse at Hunstanton in the east of the CRSA

Plate 2. Peat eroded from the intertidal zone on the beach at Holme-next-the-Sea

Plate 3. Hunstanton Lighthouse, part of the post-medieval maritime infrastructure of the Wash, lying within the CRSA

Plate 4. Two WWII spigot mortar bases on the sand dunes at Holme-next-the-Sea, illustrating how even recent sites can become intertidal through coastal erosion

Plate 5. Anomaly 6026

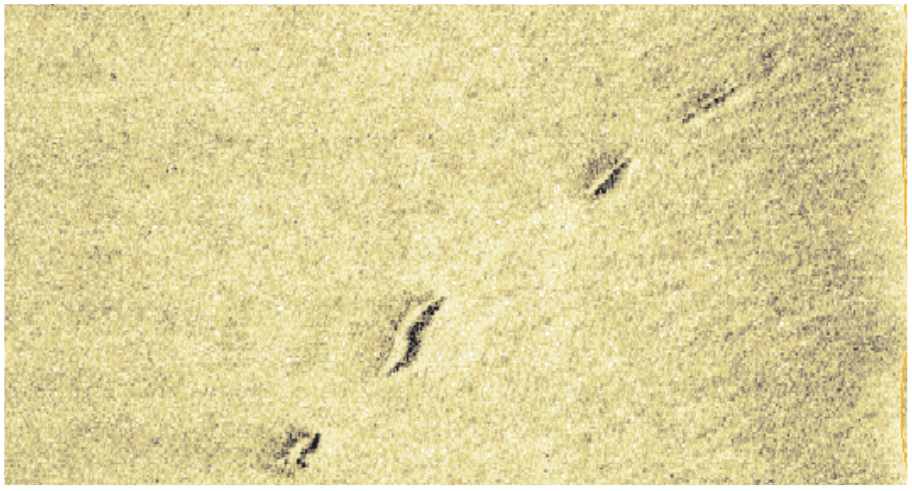

Plate 6. Anomaly 6099

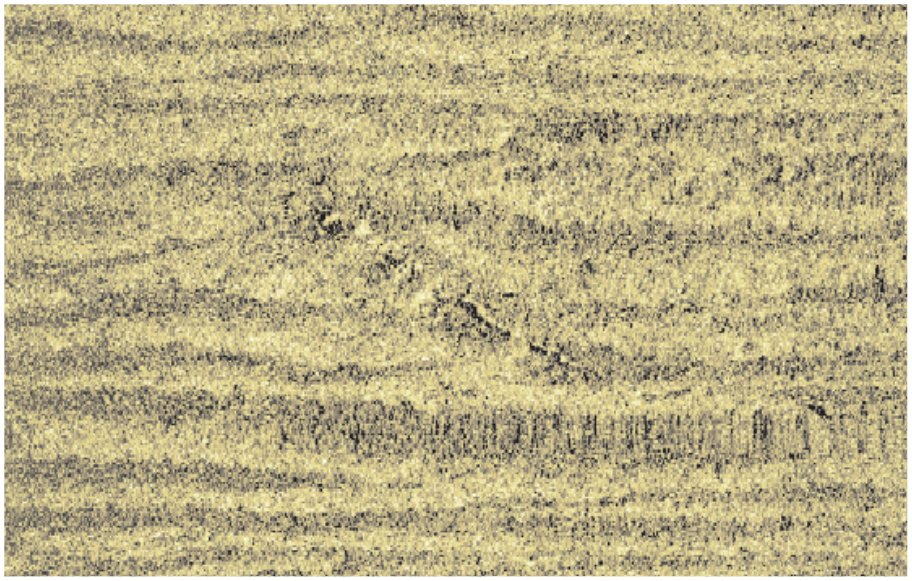

Plate 7. Anomaly 6105

Plate 8. Anomaly 6110

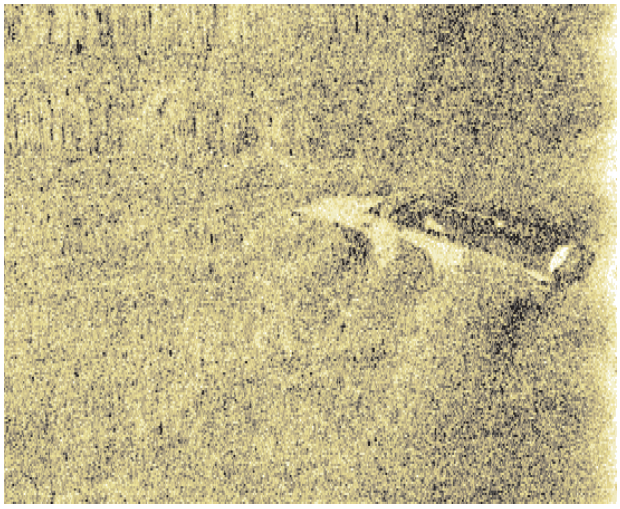

Plate 9. Anomaly 6300

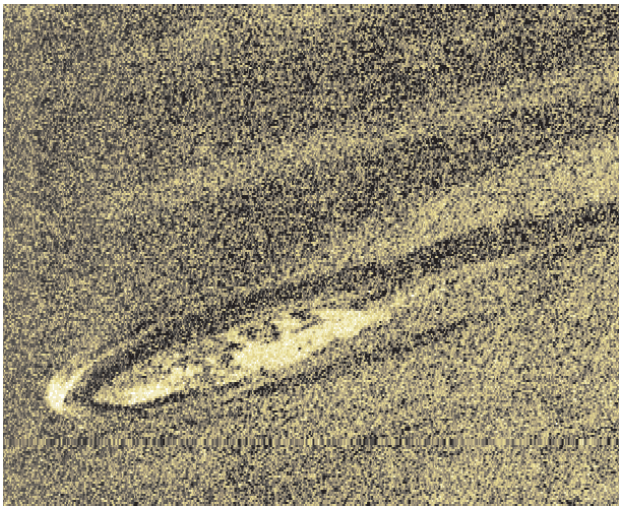

Plate 10. Anomaly 6301

Wessex Archaeology	Date:	28/04/06	Illustrator:	KJB
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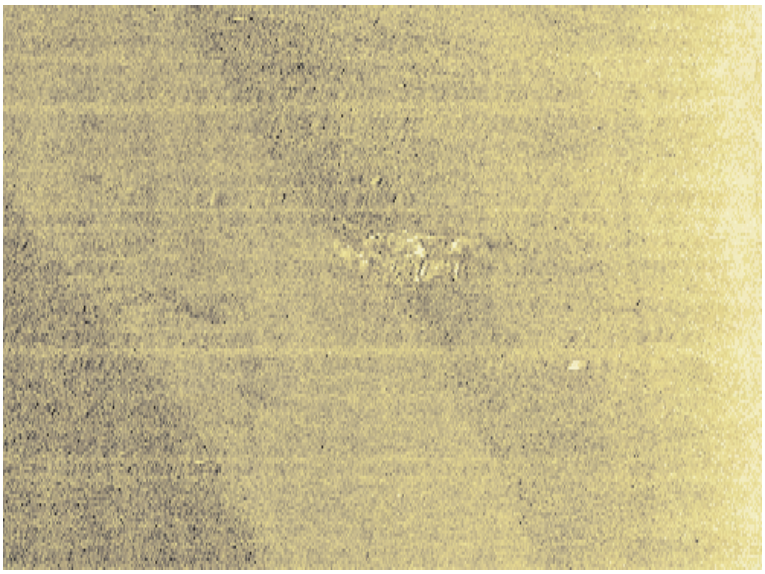

Plate 11. Anomaly 6322

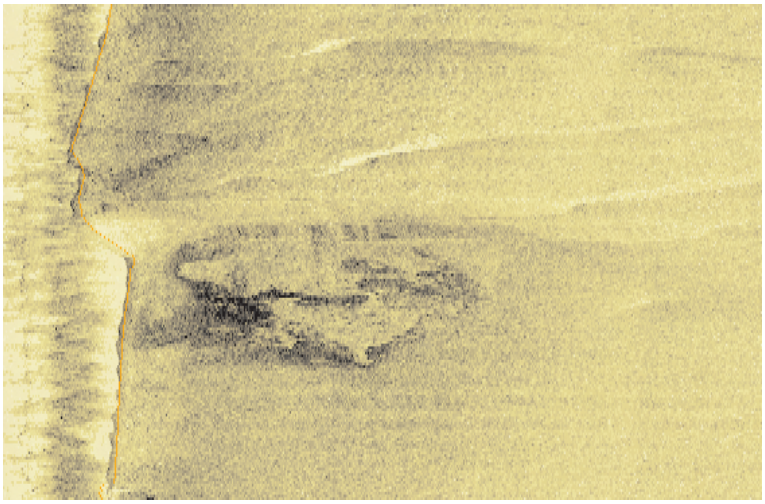

Plate 12. Anomaly 6341

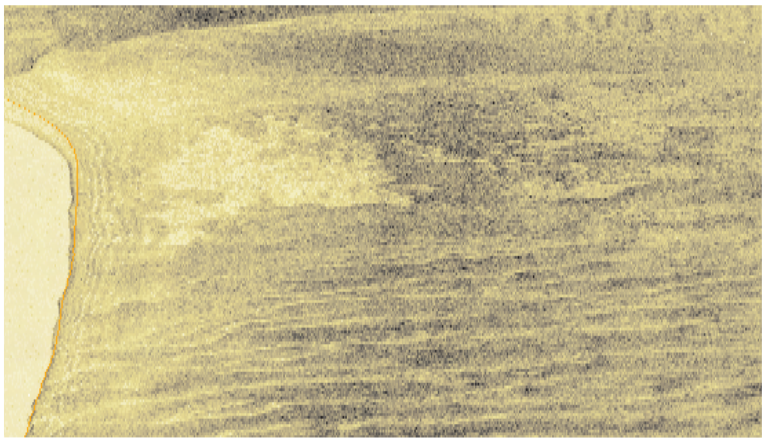

Plate 13. Anomaly 6346

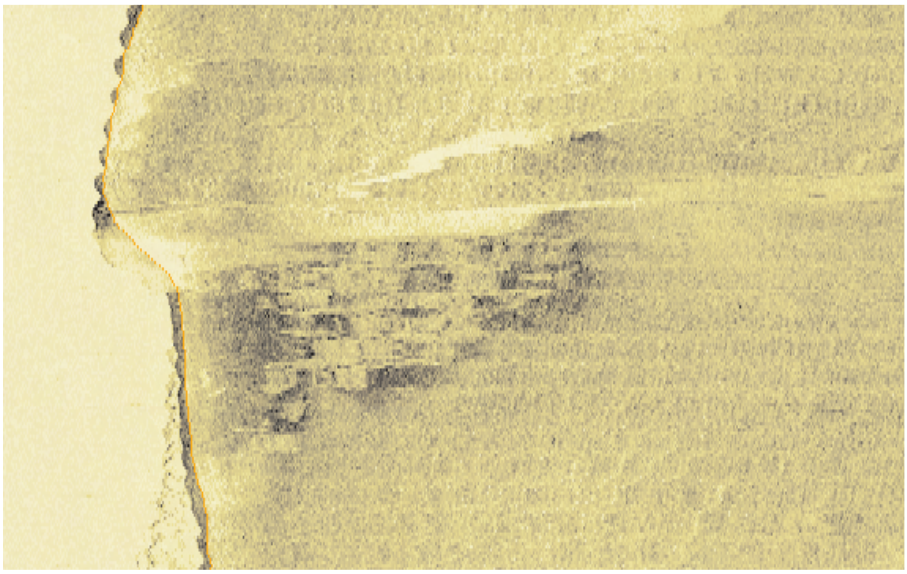

Plate 14. Anomaly 6351

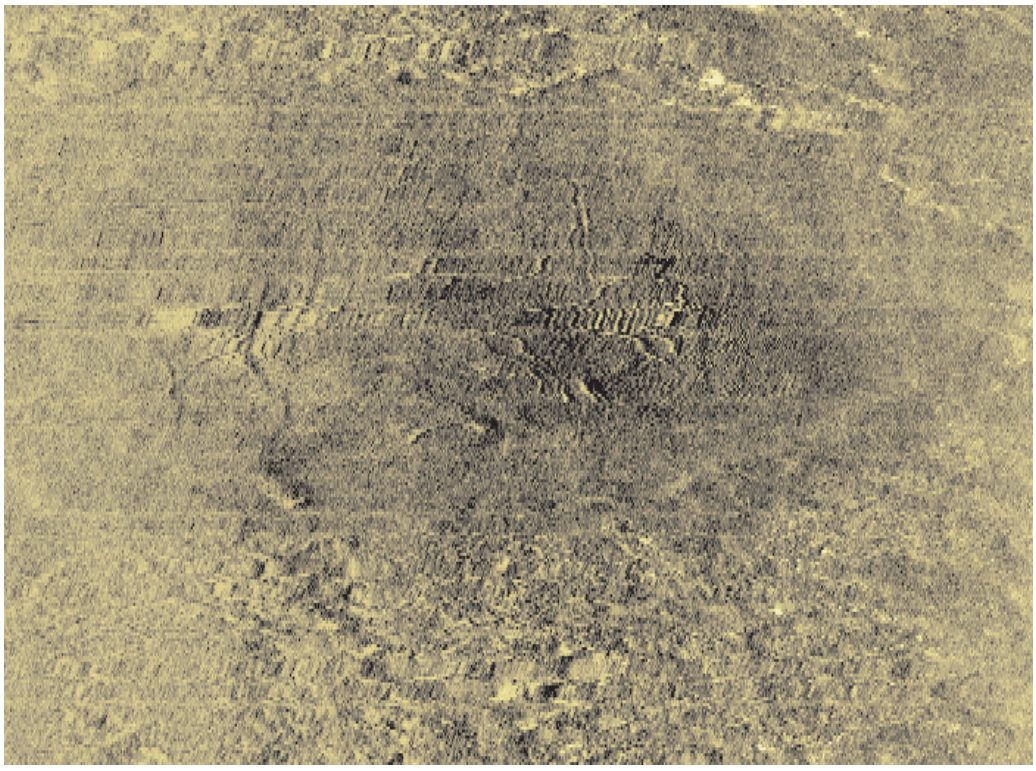

Plate 15. Anomaly 6354

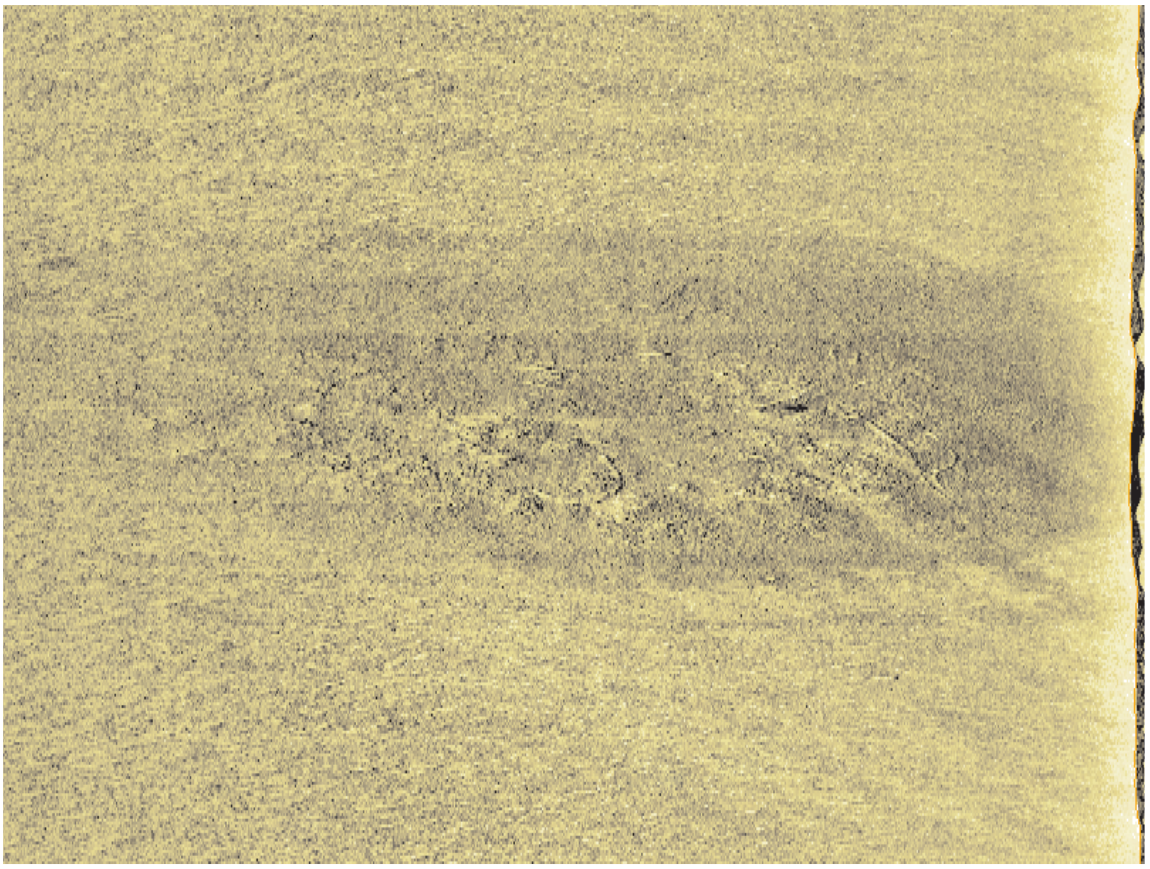

Plate 16. Anomaly 6385

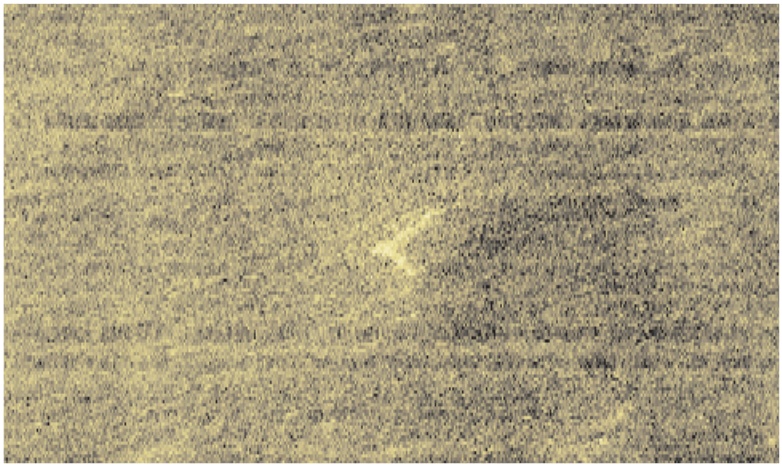

Plate 17. Anomaly 6425

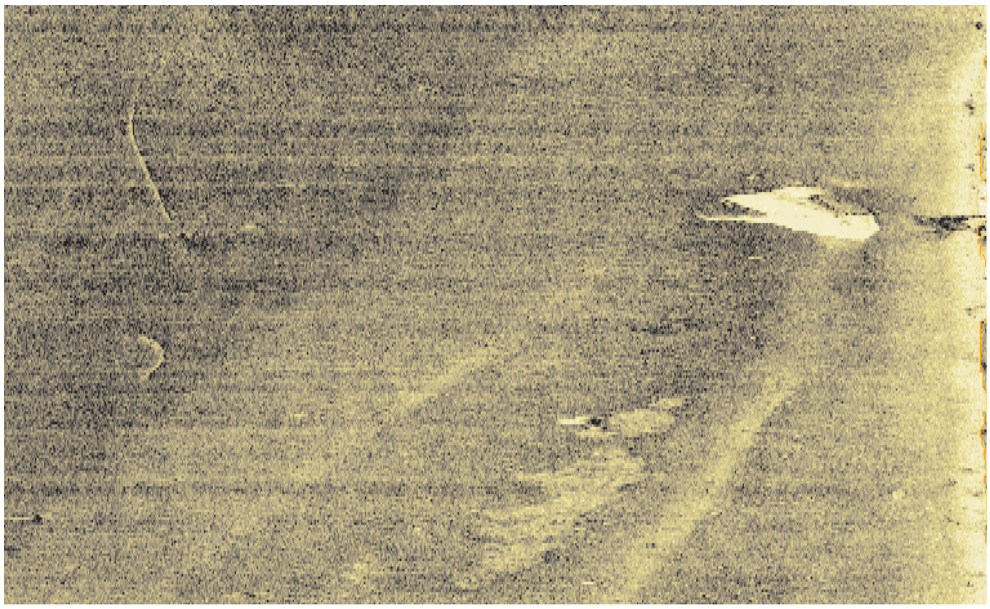

Plate 18. Anomaly 6426

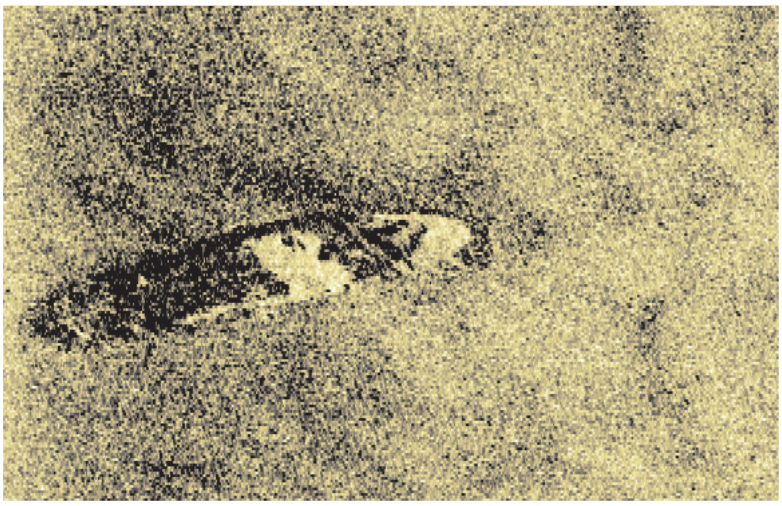

Plate 19. Anomaly 6435

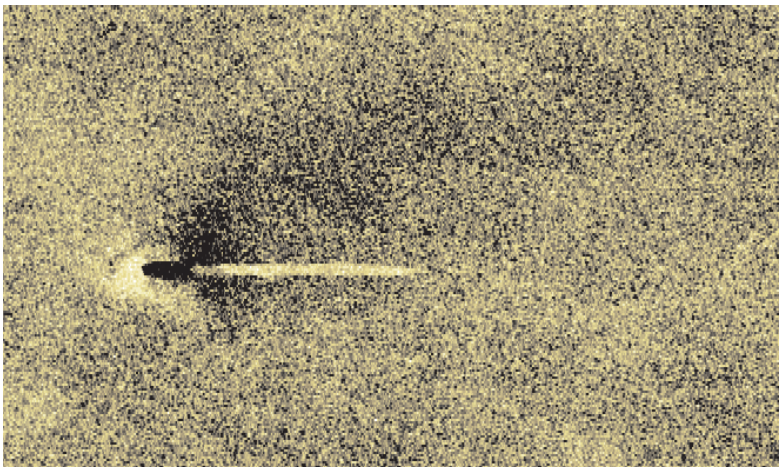

Plate 20. Anomaly 6438

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