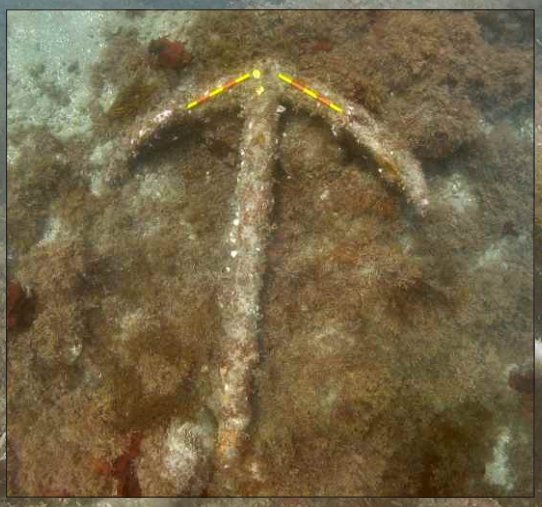
Wessex Archaeology

Strategic Environmental Assessment
Sea 6: Irish Sea

Maritime Archaeology



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MARITIME ARCHAEOLOGY

Technical Report

Ref: 58890
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1. INTRODUCTION

1.1. Wessex Archaeology has been commissioned by Geotek Ltd. and Hartley Anderson Ltd. to advise on maritime archaeology in support of the Strategic Environmental Assessment for oil and gas purposes of area SEA 6 (Irish Sea) (see **Figure 1**) by the Department of Trade and Industry (DTI).

1.2. In this report maritime archaeology is taken to refer to archaeology based on the investigation of the remains of ships, boats, maritime infrastructure and such other material remains as provide insights into past societies by way of their seafaring and sea-use. Archaeological issues relating to the wrecks of aircraft are not included.

1.3. A report specific to submerged prehistoric archaeology is being prepared as part of the Strategic Environmental Assessment of area SEA 6. Consequently, submerged prehistoric archaeology is not discussed in detail within this report but is alluded to when necessary to highlight the potential for maritime archaeological remains to be found within the submerged prehistoric environments.

1.4. This report comprises the following sections:

- Legal and Policy Framework;
- History of Maritime Activity in the Irish Sea;
- Archaeological Remains: spatial distribution;
- Previous Investigations;
- Possible Impacts of Oil and Gas Activities;
- Methods of Investigation.

2. LEGAL AND POLICY FRAMEWORK

2.1. OUTLINE

2.1.1. This section presents the legal and policy framework applicable to maritime archaeology in the SEA 6 area, encompassing waters administered by England, Scotland, Wales, Northern Ireland and the Isle of Man.

2.1.2. As there have been previous transboundary developments for oil and gas purposes in the SEA 6 area, law and policy applicable to sectors of the Irish Sea administered by the Republic of Ireland are also included.

2.1.3. The legal framework applicable to maritime archaeology is subject to a variety of jurisdictional divisions. It is generally accepted that states have jurisdiction in respect of heritage within their territory, and within their territorial waters (to 12 nautical miles (nm)). Accordingly, all the countries bordering SEA 6 exercise authority in respect of maritime archaeology to 12nm. Beyond 12nm, the situation is more complex. While there are grounds for exercising authority in respect of maritime archaeology on the Continental Shelf, these grounds are limited by international law.

2.1.4. Accordingly, this section deals with the exercise of authority within territorial waters in the first instance. The section then goes on to discuss the exercise of authority in respect of maritime archaeology on the Continental Shelf.

2.1.5. As indicated above, the SEA 6 area is subject to the jurisdiction of the United Kingdom and the Isle of Man, with the Republic of Ireland having jurisdiction over areas adjoining the SEA 6 area. While some law pertaining to heritage are UK-wide (i.e. apply to England, Scotland, Wales and Northern Ireland), some are specific to one or more of these home countries. Further, while some of the law is UK-wide, its administration is devolved to each of the home countries. The following paragraphs seek to reflect these divisions.

2.1.6. It should also be noted that in some cases, heritage law applicable to the sea is simply an extension of laws applicable to land, whereas in other cases the law is specific to the sea. Further, some of the law was introduced as heritage law, whereas other law was introduced for other purposes, but has a direct bearing on heritage issues and is administered accordingly.

2.1.7. Further, a distinction can be made between law relating to heritage material as property (i.e. ownership) and law that places controls on activities relating to such material (i.e. protection). Finally, some law is concerned primarily with the powers and duties of the agencies charged with administering heritage management.

2.1.8. In addition to law, this section also sets out some of the policy and guidance that informs the implementation of legal frameworks.

2.2. UNITED KINGDOM

Introduction

2.2.1. Maritime archaeological sites in the UK are not protected unless specific action has been taken to protect them. There are, however, two different acts under which wrecks that may be of archaeological interest may be designated, namely the *Protection of Wrecks Act 1973* (PWA 1973, which has two relevant sections), the *Protection of Military Remains Act 1986* (PMRA 1986). Designation of wrecks is also possible under a third act, the *Ancient Monuments and Archaeological Areas Act 1979* (AMAA 1979), which applies to England, Scotland and Wales, but not Northern Ireland which has its own equivalent legislation (see below).

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

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

2.2.4. The Department for Culture, Media and Sport (DCMS) is in the process of considering changes to heritage protection. As part of this consideration, DCMS – in conjunction with the Welsh Assembly Government, the Scottish Executive, and the Department for the Environment, Northern Ireland – has published a consultation paper on changes to the system for protecting the marine historic environment (DCMS 2004). The consultation period closed in 2004, and the Government's response is currently awaited.

2.2.5. The Joint Nautical Archaeology Policy Committee (JNAPC) *Code of Practice for Seabed Developers* (JNAPC 1995) is a UK-wide code developed in conjunction with key industries. The JNAPC Code is voluntary but provides a framework that seabed developers can use in conducting their activities in an archaeologically sensitivity manner. The Code is currently being revised.

Protection of Wrecks Act 1973: Section One

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

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

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

2.2.9. Section One of the PWA 1973 is administered by English Heritage (EH) in England, Historic Scotland (HS) in Scotland, Cadw: Welsh Historic Monuments in Wales and the Environment and Heritage Service in Northern Ireland (EHSNI).

2.2.10. The relevant Secretary of State must consult appropriate advisors prior to designation, though it is possible to designate a wreck in an emergency without first seeking advice. Advice is provided by the heritage agencies and by the Advisory Committee on Historic Wreck Sites (ACHWS).

2.2.11. There are currently a total of 58 sites protected under section one of the Act, two of the most recent being the seventeenth century Swash Channel wreck, Poole, and the early Royal Navy submarine *Holland V*, off the east Sussex coast, being designated in December 2004 and January 2005 respectively.

2.2.12. The *Holland V* was designated under Section One of the Act following an extended consultation process of the site, this being the normal procedure leading up to designation. The Swash Channel wreck was designated under a different and more rapid process after an emergency designation order was sought by EH. During an Environmental Impact Assessment (EIA) prior to channel deepening operations for Poole Harbour an unknown wreck was detected by geophysical investigations. Subsequent archaeological diving inspection identified the wooden remains of a substantial seventeenth century vessel. This method of designation highlights the capabilities of the Act for rapid protection of a previously unknown wreck.

2.2.13. Within the SEA 6 area there are six sites protected under Section One of the PWA 1973 Act. These range from the findspot of a brass guard from a Viking sword (The Smalls, Dyfed) to one of the Worlds first mechanically powered submarines (The *Resurgam*, Rhyl, Denbighshire), see **Appendix I** and **Figure 2**. Designation of The Smalls site, along with other sites outside the SEA 6 area, demonstrates the use of the PWA 1973 to protect relatively ephemeral sites where no hull or other structure is present.

Protection of Wrecks Act 1973: Section Two.

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

2.2.15. There is currently one designation under section two of the Act within the SEA 6 area: the wreck of the SS *Castilian*, East Platters, Anglesey. The SS *Castilian* was waiting to join a southbound merchant convoy from Liverpool during World War II when it ran aground on the East Platters on the night of the twelfth of February, 1943. The main cargo of copper ore and explosives remains on the wreck site (Jones 2001; MCA 2004), see **Appendix I**.

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

The Protection of Military Remains Act 1986

2.2.17. Under the *Protection of Military Remains Act 1986* the Ministry of Defence has powers to protect vessels that were in military service when they were wrecked. The MOD can designate named vessels as Protected Places even if the position of the wreck is not known. In addition, the MOD can designate Controlled Sites around wrecks whose position is known. In the case of Protected Places, the vessel must have been lost after the 4th August 1914, whereas in the case of a wreck protected as Controlled Sites, no more than 200 years must have elapsed since loss (MOD 2001).

2.2.18. In neither case is it necessary to demonstrate the presence of human remains. Diving is not prohibited at a Protected Place but it is an offence to tamper with, damage, move or remove sensitive remains. However, diving, salvage and excavation are all prohibited on Controlled Sites, although 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 contains remains of a vessel which has crashed, sunk or been stranded while in military service.

2.2.19. In November 2001 the MOD reported on a Public Consultation on the Military Maritime Graves and the PMRA 1986 (MOD 2001). As well as proposing the designation of 16 controlled sites and five protected places, the report recommended a rolling programme of identification and assessment of all vessels in military service when lost against criteria that included historical significance, to inform subsequent designations of Protected Places.

2.2.20. In 2002, six vessels were designated as Protected Places and twelve as Controlled Sites. Currently no Protected Places lie within the SEA 6 study area. There are, however, two vessels that have been designated as Controlled Sites. The British submarine HMS *H5* (**Plate 1**) was sunk after collision with the British cargo ship SS *Rutherglen* off the north west coast of Wales (**Figure 2**, and **Appendix II**). HMS *Dasher*, an escort carrier, was lost in the Clyde during exercises in World War II when a fuel explosion occurred during deck/landing operations.

2.2.21. Records of vessels lost while in military service do not always give an exact location for the loss. Given the extent of German submarine activity, coupled with the fact that the Firth of Clyde and Liverpool played key roles as convoy marshalling stations and naval exercise areas, the potential for wrecks eligible for further designation under the PMRA 1986 is high.

2.2.22. The extent of submarine activity in the SEA 6 area is illustrated by the known location of seven U-boats, with one, *U-33*, even being given the suicidal task of steaming up the Firth of Clyde to attack commercial shipping. The U-boat was subsequently detected and sunk by depth charges from HMS *Gleaner* (see Appendix III).

2.2.23. One U-boat in UK waters has been designated as a Protected Place, *U-12*, despite its actual position being unknown, but is likely to lie outside the SEA 6 area, possibly within the English Channel. This vessel is intended to represent symbolically the rest of the U-boats lost within UK territorial waters.

2.2.24. It is worth noting that under the *Protection of Military Remains Act 1986*, all aircraft that have crashed in military service automatically constitute a Protected Place.

Ancient Monuments and Archaeological Areas Act 1979

2.2.25. The main legislation concerning archaeological remains in the UK is the *Ancient Monuments and Archaeological Areas Act 1979*. This Act primarily deals with land sites but there is provision to designate sites of vessels in territorial waters as Scheduled Monuments.

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

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

2.2.28. There are currently no maritime Scheduled Monuments within the SEA 6 area. However, Scheduled Monuments in other UK waters illustrate the range of wreck sites that may be considered for designation:

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

Merchant Shipping Act 1995

2.2.29. The *Merchant Shipping Act 1995* (MSA 1995) is used to regulate the reporting and disposal of wreck – including wreck of archaeological interest – found or recovered from UK waters, or found or recovered outside UK waters but brought within those waters. Within the context of the MSA 1995, wreck refers to flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ships, aircraft and hovercraft, parts of these, their cargo and equipment.

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

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

2.2.32. The Receiver 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 will hold the wreck until the matter is settled, either through amicable agreement or by court judgement.

2.3. ENGLAND

2.3.1. The *National Heritage Act 2002* extended English Heritage's responsibilities to include archaeological sites out to the limit of territorial waters off England. EH became responsible for the implementation and administration of the PWA 1973 in England, and also for UK-wide aspects of the PWA 1973. EH's aspirations in respect of their new responsibilities were laid out in *Taking to the Water: English Heritage's Initial Policy for the Management of Maritime Archaeology in England* (English Heritage 2002). A Maritime Team based in Portsmouth administers English Heritage's marine responsibilities.

2.3.2. Prior to 2002, English Heritage's responsibilities in the marine sphere had been limited to the coast. In this context, EH and the Royal Commission on the Historic Monuments of England (RCHME – subsequently subsumed within EH) published *England's Coastal Heritage: a statement on the management of coastal archaeology* in 1996 (EH/RCHME 1996). The statement set out a number of key management principles, which include:

> *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.*

Where economic development in the coastal zone is likely to impact on important archaeological remains, decisions should be taken with regard to the best available information and the precautionary approach should be adopted wherever possible.

2.3.3. The statement also included a number of detailed recommendations, including one specifically addressing oil and gas (EH/RCHME 1996, 14):

Appropriate consultation procedures should be established prior to the approval of consent for development, production and pipeline works and controlled pipeline authorisations which may affect important archaeological remains. Where appropriate, provisions relating to archaeology should be included in conditions and restrictions applied to future rounds of licensing.

2.3.4. In addition, a general recommendation on development control and environmental assessment also includes specific reference to oil and gas (EH/RCHME 1996, 13):

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

2.3.5. A further key statement in England's Coastal Heritage invoked *Planning policy guidance: archaeology and planning* (PPG 16) (Department of the Environment 1990). PPG 16 is central to the regulation of development-led archaeology on land, but it applies to planning law which, as a general rule, extends only to the low water mark. However, England's Coastal Heritage included the following statement:

Although it remains government policy not to extend the Town and Country Planning system to the territorial sea, the principles set out in PPG 16: Archaeology and Planning should be applied to the treatment of sub-tidal archaeological remains in order to secure best practice.

The principles of PPG 16 include archaeology being a material consideration in development control, preservation in situ of nationally important remains, developer-funded investigation of remains that cannot be preserved in situ, and consents being subject to applications being accompanied by sufficient information on archaeological impacts.

2.3.6. English Heritage has also published, in conjunction with the British Marine Aggregate Producers Association (BMAPA), a Guidance Note on assessing, evaluating, mitigating and monitoring the archaeological effects of marine aggregate dredging (BMAPA and EH 2003). While the Guidance Note is concerned with aggregates, many of its details are relevant also to the implications of oil and gas development for maritime archaeology.

2.4. NORTHERN IRELAND

2.4.1. The Environment and Heritage Service (Department of the Environment, Northern Ireland) (EHSNI) administers the *Protection of Wrecks Act 1973* in Northern Ireland's territorial waters.

2.4.2. In partnership with the University of Ulster at Coleraine, EHSNI has set up a Centre of Maritime Archaeology to carry out surveys of the coastal zone, foreshore and seabed and to train future maritime archaeologists.

2.4.3. The *Historic Monuments and Archaeological Objects (NI) Order 1995 (HMAO),* provides for the protection of all archaeological sites and objects including those on the foreshore and the seabed.

2.4.4. Article 38(1) states that a monument situated in, on or under the seabed within the seaward limits of territorial waters adjacent to Northern Ireland may be included in the schedule under Article 3(1). Article 38(5) grants powers conferred by Article 24 to conduct archaeological investigations in territorial waters.

2.4.5. Under Article 29(1) any person that has a detecting device in their possession in a protected place without the written consent of the Department shall be guilty of an offence and liable on summary conviction to a fine. Restrictions on searching for archaeological objects are provided under Article 41 of the Order.

2.4.6. Reporting of archaeological objects is also a legal requirement. Article 42(1) states that any person who finds an object shall, within 14 days of finding the object, report the circumstances of finding, nature of the object, the owner or occupier of the land on which it was found; and deposit the object with the relevant authority.

2.4.7. Northern Ireland also uses planning law to regulate archaeology. Government policy on planning, archaeology and the built heritage is presented in *Planning Policy Statement 6* (DOE, 1999). While the *Planning Order (NI) 1991* has application only to the low water mark, the principles of *Planning Policy Statement 6* can be extended to the seabed (Williams 2001).

2.5. SCOTLAND

2.5.1. Historic Scotland (HS) carries the responsibilities of Scottish Ministers with regard to archaeological and built heritage matters, which extend offshore to the 12 mile territorial limit. There are three relevant pieces of legislation from which direct responsibilities arise: the *PWA 1973*, the *Ancient Monuments and Archaeological Areas Act 1979* and the *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997.*

2.5.2. HS policy regarding the management and protection of underwater archaeological remains is set out in the policy paper *Conserving the Underwater Heritage* (Historic Scotland 1999). The policies aim to fulfil four key objectives:

> ***Objective 1:*** *Develop a protection regime which is effective in securing the long-term future of the most important underwater sites, including securing them against inadvertent or deliberate damage or destruction.*
>
> ***Objective 2:*** *Pursue the beneficial management of key underwater sites which are under threat of degradation or loss.*

Objective 3: *Make or encourage others to make arrangements for recovering archaeological data, to the best possible standards, when sites cannot be saved.*

Objective 4: *Encourage the publication of information about all of these activities, and where appropriate publish such material at its own hand.*

2.5.3. As noted above, Historic Scotland has used the AMAA 1979 to designate wreck sites of archaeological interest, as well as the PWA 1973.

2.5.4. The *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997* contains the bulk of built heritage conservation planning law for Scotland. It requires Scottish Ministers to compile lists of buildings of archaeological or historic importance and provides for the designation of conservation areas.

2.5.5. The scope of the Act ends at the low water mark and it is therefore not possible for buildings or sites that are permanently submerged to be listed. However, it is possible for structures which are sometimes or partly below the sea to be listed (Historic Scotland 1999).

2.5.6. National Planning Policy Guidelines (NPPGs) provide statements of Government policy on nationally important land use and other planning matters. *NPPG5 Archaeology and Planning* sets out policy on how archaeological remains and discoveries should be handled. The guidance is aimed at planning authorities in Scotland, and is also of direct relevance to developers, owners, statutory undertakers, government departments, conservation organisations and others whose actions have a direct physical impact upon the natural or built environment (Scottish Office 1994a).

2.5.7. The *Planning Advice Note: Archaeology - the Planning Process and Scheduled Monument Procedures (PAN 42)* gives more detailed advice on planning procedures and the separate controls over scheduled monuments (Scottish Office 1994b).

2.6. WALES

2.6.1. Cadw administers the responsibilities of Ministers from the National Assembly of Wales (NAW) with regard to archaeological and built heritage matters, which extend offshore to the 12 mile territorial limit. The relevant pieces of legislation from which direct responsibilities arise are the *Protection of Wrecks Act 1973* and the *Ancient Monuments and Archaeological Areas Act 1979*.

2.6.2. The *Ancient Monuments and Archaeological Areas Act 1979* has yet to be used within the SEA 6 study area. However, one wreck in Wales has been protected under the AMAA 1979, the *Louisa*. The wreck, which is located on the river Taff, was protected under the AMAA 1979 because impoundment for a land reclamation scheme for Cardiff Bay removed the site from UK waters such that the site could not be designated under the PWA 1973.

2.7. ISLE OF MAN

Introduction

2.7.1. The following discussion has been summarised from a Manx government report by the Centre for Marine and Coastal Studies, University of Liverpool at the Port Erin Marine Laboratory, Isle of Man (Dryden, Holt, and Davies 2003). For a more detailed review of the current legislation contained within the document see http://www.jncc.gov.uk/PDF/iom_summary.pdf.

2.7.2. The Isle of Man has three key national legislative acts that can cover the protection of maritime archaeological remains, namely: the *Manx Museum and National Trust Act 1959 – 1986,* the *Wreck and Salvage (Ships and Aircraft) Act 1979* and the *Town and Country Planning Acts 1934 – 1999.*

Manx Museum and National Trust Act 1959 – 1986.

2.7.3. Under this Act, Manx National Heritage is conferred various powers and duties with overall aims to:

> *…promote the permanent preservation for the benefit of the people of the Isle of Man of lands and tenements (including buildings) of beauty or historic interest and, as regards lands, the preservation (so far as practicable) of their natural aspect, features and animal and plant life; the preservation of buildings of national interest or architectural, historic or artistic interest, and places of national interest or beauty, and their protection and augmentation of the amenities of such buildings and places and their surroundings.*

2.7.4. The Act provides definitions for monuments, ancient monuments and archaeological objects. Under the Act, the Trust may designate any monument as an Ancient Monument. If any ancient monument of national importance is under threat of destruction, removal or damage the Trust may make an order placing the monument under the protection of the Trust and enter the premises for inspection and may make a preservation order on the building. A preservation order prohibits the destruction or removal, alteration or extension of any part of the monument without application to the Trust. Preservation schemes may also be applied by the Trust in order to ensure the protection of adjacent areas necessary or expedient for the preservation of amenities of ancient monuments. The two Stephenson lighthouses located on the Calf of Man are designated Ancient Monuments.

2.7.5. Reporting of archaeological discoveries is regulated under Section 20 of the Act, which requires that all archaeological findings are reported within 14 days of finding to a police officer or an officer of the Trust, with fines stipulated for contravention. In addition it is an offence to export or remove archaeological objects to the UK or countries outside the UK or to sell such an item for export without a licence issued by the Trust.

2.7.6. Section 22 prohibits injury, defacement or destruction of archaeological objects without licence and Section 23 requires that excavation for excavation is only carried out in accordance with a licence issued by the Trust.

Wreck and Salvage (Ships and Aircraft) Act 1979

2.7.7. Under the *Wreck and Salvage (Ships and Aircraft) Act 1979*, the Department of Transport (DOT) appoints a Receiver of Wreck (ROW, Isle of Man). The role of the Receiver is to identify the owner of wreck and to protect wrecks within Manx territorial waters of historical, archaeological or artistic importance from outside interference. The DOT can also designate restricted areas for their protection including all areas within a set distance of the wreck (but not including areas above high tide mark or ordinary spring tides). Within such areas the following activities are prohibited unless a licence is given by the DOT (for salvage operations):

- Tampering/ damaging/ removing any part;
- Diving/ salvaging operations directed to the wreck;
- Dropping anything that may partly/ completely obliterate the site or obstruct access or damage the wreck.

2.7.8. The Harbour Board is charged with the responsibility of diving to remove or excavate objects within restricted areas. Designations are made by way of *Protection of Wrecks (Designation) Orders*, one of which has been made for HMS *Racehorse*. This order restricts access and diving, and requires reporting of all items of equipment, which may be salvaged, to the Manx Museum and National Trust or the ROW (Isle of Man). The issuing of a Designation Order and of any licence to gain access to a designated vessel is undertaken in consultation with Manx National Heritage.

Harbours (Isle of Man) Act 1961

2.7.9. Although, under Section 16 of the *Harbours (Isle of Man) Act 1961*, the DOT is able to remove any obstruction within a harbour or approaches, they are not permitted to remove any wreck (as defined in the *Wreck and Salvage (Ships and Aircraft) Act 1979*) causing an obstruction to prejudice or derogate the rights under the *Wreck and Salvage (Ships and Aircraft) Act 1979*.

2.8. REPUBLIC OF IRELAND

2.8.1. Some comment on the nature of legislation in the Republic Ireland regarding the maritime archaeological resource is warranted because of existing and potential transboundary considerations arising from the development of gas pipeline interconnectors with Scotland and the Isle of Man. The main Acts relating to the protection of maritime archaeological remains in the Republic of Ireland are the *National Monuments Acts 1930-2004* (Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) 1999). Archaeology in the Republic of Ireland is the responsibility of the Department of the Environment, Heritage and Local Government.

2.8.2. The Acts place a blanket limitation on wrecks over 100 years old (DAHGI 1999):

> *… a person shall not dive on, damage, or generally interfere with, any wreck which is more than one hundred years old or an archaeological object which is lying on, in or under the seabed or on, or in land covered by water except in accordance with a licence… the Minister may, at his or her discretion, grant or*

refuse to grant a licence and may make a licence subject to such conditions as he or she thinks fit and specifies in the licence.

2.8.3. Licences will only be issued by the Minister where damage or removal:

cannot reasonably be avoided, or

is in the interests of archaeological research (and long term conservation and storage facilities are available for any removed material), or

is for the purpose of conservation.

2.8.4. The Acts also require wrecks or artefacts to be reported (DAHGI 1999):

… a person finding a wreck over one hundred years old must within four days make a report of the find to the Minister for Arts, Heritage, Gaeltacht and the Islands or the Garda Síochaná. Section 3 (6) of the Act (as amended) also provides that a person finding an archaeological object which is lying on, in or under the seabed or on or in land covered by water must within four days make a report of the find to the Director of the National Museum of Ireland (N.M.I).

2.8.5. The Minister is also authorised to issue Underwater Heritage Orders for vessels or sites (not necessarily over one hundred years old) that are, or may prove to be:

the site where a wreck or an archaeological object lies or formally lay, and,

on account of the historical, archaeological or artistic importance of the wreck or the object, the site ought to be protected.

2.8.6. RMS *Lusitania* is an example of a vessel that has been designated by Underwater Heritage Order.

2.9. MARITIME ARCHAEOLOGY ON THE CONTINENTAL SHELF

2.9.1. Outside territorial waters, the mandate of coastal states for regulating maritime archaeology is less direct. The SEA 6 area beyond territorial waters falls within the UK Continental Shelf. While current international law in respect of the Continental Shelf is unequivocal that wrecks do not form part of the natural resources of the Continental Shelf that coastal states are entitled to regulate, some indirect regulation arises from the environmental controls placed on the regulated exploitation of natural resources.

2.9.2. In particular, insofar as Continental Shelf activities are subject to Environmental Impact Assessment under European Directives (85/337/EEC and 97/11/EC), the effects of those activities on the archaeological heritage have to be addressed and mitigation proposed. Similarly, the effects on the archaeological heritage of Continental Shelf activities have to be assessed by virtue of the Strategic Environmental Assessment Directive (2001/42/EC).

2.9.3. As noted above, archaeological material from beyond territorial waters may also be subject to the provisions of the *Merchant Shipping Act 1995*, as wreck found or taken into possession outside UK waters but brought into UK waters must be reported to the Receiver.

2.9.4. The provisions of the *Protection of Military Remains Act 1986* in respect of Controlled Sites are applicable in international waters, which would include the UK Continental Shelf, though they are enforceable only in respect of British-controlled ships, British citizens, and British companies.

2.9.5. A broader context is provided by international law, represented by customary law and the conventions to which the UK is party. The *United Nations Convention on the Law of the Sea 1982* (UNCLOS 1982), the *European Convention on the Protection of the Archaeological Heritage (Revised) 1992* (the Valletta Convention) and the UNESCO *Convention on the Protection of the Underwater Cultural Heritage 2001* (UNESCO 2001) are all relevant in this regard.

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

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

2.9.8. The UNESCO Convention concluded in 2001 is a comprehensive attempt to codify the law internationally in respect of the underwater archaeological heritage. Although the UK abstained in the vote on the final draft of the Convention, it has stated that it supports most of the articles, particularly the provisions in the Annex governing the conduct of archaeological investigations.

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

3. HISTORY OF MARITIME ACTIVITY IN THE IRISH SEA

3.1. INTRODUCTION

3.1.1. This section will present an overview of maritime activity in the SEA 6 study area. Discussion of maritime activity in early prehistory is primarily inferential, but based on a combination of archaeological and documentary evidence so far as later prehistoric, medieval, post-medieval and modern periods are concerned.

3.1.2. This section also addresses the relationship between original activities, the loss or disposal of material relating to those activities, and the survival of such material as maritime archaeological remains. This discussion encompasses ships, wrecks, maritime infrastructure, and shipping-related debris.

3.1.3. The Irish Sea is the most enclosed sea around the British Isles. To the north it is bounded by the North Channel, where the north-east coast of Ireland at Antrim is separated from the west coast of Scotland at the Mull of Kintyre by as little as 12 miles. The southern extent of the Irish Sea is the beginning of St. Georges Channel, at which point the distance between the south-east corner of Ireland and the south-west corner of Wales is 44 miles. The widest distance between Ireland and Britain occurs between Dublin and Holyhead, where the distance is 54 miles (McCaughan and Appleby 1989).

3.1.4. These short distances would not preclude significant volumes of traffic, even with early sea-going craft. The Irish Sea is ringed by major natural landmarks that would have been key navigational aids to early seafarers: the Wicklow Mountains, the Mourne Mountains, the chalk cliffs of Antrim, the Lake District Fells and the Mountains of Wales (Waddell 1991). Likely routes at this early stage would have been between north-east Ireland at Antrim and the Mull of Kintyre on the west coast of Scotland, where a good local knowledge of the tidal regime would have made crossings possible in less than a day.

3.1.5. These early shipping routes continued to be used throughout history and into the present day, and it is along these routes that higher concentration of wrecks may be expected.

3.1.6. Along-coast routes would also have always been used and would have been an integral part of early communication networks:

> *The proximity of the sea…is likely to have led to greater territorial knowledge and to more contacts between groups living near the coasts than between landlocked groups where travel and transport would have been more difficult* (Coles and Harding 1979).

3.1.7. Throughout prehistory and up to modern times coastal routes along the Irish Sea margins have been utilised as part of this communication network. Prior to the development of substantial rail and road networks, and the advent of steam and internal combustion, the conveyance of commodities and people by sea would have been substantially cheaper and quicker than travel by land.

3.1.8. Along the Irish Sea these communication networks benefited from the geography and topography of the coastal margins. Various indentations such as Belfast, Strangford, and Carlingford Loughs, along the east coast of Northern Ireland, have long been recognised as being important anchorages and as a means to penetrate deep into the hinterland. On the eastern margin of the Irish Sea, the Solway Firth, the Firth of Clyde and Morecambe Bay would have been similarly important.

3.1.9. Rivers, such as the Dee, Mersey and Liffey, have also been long recognised as key to the opening up and control of the hinterlands extending far inland. While the larger rivers that empty into the Irish Sea are navigable for some distances (to varying degrees), those that are not were also used as part of early trade networks. When larger ships were barred from entry to rivers (by shifting sandbars, narrow depths or other constraints), goods and/or passengers could be trans-shipped to smaller vessels that would have extended the sphere of maritime activity in the Irish Sea to areas that were distant from the sea itself.

3.2. LOWER, MIDDLE AND EARLY UPPER PALAEOLITHIC (500,000 – 18,000 BP)

3.2.1. To date there has been no finds of maritime archaeological remains within the SEA 6 study area from either the Lower, Middle or Early Upper Palaeolithic periods. This lacuna in the archaeological record is undoubtedly related to repeated episodes of cover by ice sheets. There is, however, evidence of Lower Palaeolithic remains from northern Wales. Excavations conducted by the National Museums and Galleries of Wales at Pontnewydd Cave, Denbighshire uncovered 19 teeth that have been dated to the Lower Palaeolithic. Middle Palaeolithic archaeological remains have also been recovered from the Ffynnon Beuno Cave site, also from Denbighshire, north Wales.

3.2.2. Only one Palaeolithic artefact has been discovered within the Irish archaeological record. This one find was a large coarsely struck flint, recovered from a gravel quarry in Co. Louth, on the east coast of Ireland. The flake showed signs of having been rolled and abraded by running water and was therefore likely to have come from a derived context (Mitchell and Ryan 1997).

3.2.3. The question as to whether Lower, Middle or Early Upper Palaeolithic populations engaged in maritime activity around Britain can hardly be answered on the basis of material evidence. If such activity did occur, and the evidence has survived the effects of successive glaciations, associated fluvial activity and marine transgressions, then it is possible that Lower, Middle or Early Upper Palaeolithic maritime material might be found in SEA 6. While the possibility cannot be excluded completely, the potential is very low.

3.3. LATE UPPER PALAEOLITHIC (18,000 BP – 9,000 BC)

3.3.1. During the Devensian maximum, Ireland, the Irish Sea and the SEA 6 study area, and much of north-west Europe were covered by ice. There was, however, a small part of south-west Ireland that, due to marine influences, remained free of ice. As a result of this build-up of ice, sea level globally began to drop and, at around 20,000 BP, Ireland and Britain were joined with continental Europe (Aalen 2000). However, no evidence of human occupation from this time has been recovered to date.

3.3.2. At around 13,000 years BP the glacio-isostatic adjustment of the crust as a result of the retreat of the ice cover and the total eustatic sea-level change from the combined global ice sheets initiated a process of sea level rise. The south eastern tip of Ireland was still joined to south-western England, with the rapid recession of the Irish Sea glacier leaving behind a large freshwater lake.

3.3.3. It was during this time that floral and fauna began to re-colonise Ireland, using the remaining land bridge to cross from Britain and/or continental Europe. By 12,000 years BP, at least 80 plant taxa, a large number of beetles and the giant deer (megaloceros giganteus) had reached the Isle of Man. During the Woodgrange interstadial (13,000 BP to 10,600 BP) in Ireland a similar pattern of plant, beetle and giant deer colonisation, including reindeer are present (Mitchell and Ryan 1997).

3.3.4. During the Late Upper Palaeolithic the first phase of human re-occupation of the British Isles following the Devensian glacial maximum began.

3.3.5. The type of maritime craft likely to have been used during this period would have ranged from simple hide-covered boats to log rafts and simple dugout logboats (McGrail 1987; 1991). The potential for hide covered boats to survive from this period is low, but associated artefacts such as paddles and fishing gear may help to shed light on Late Upper Palaeolithic maritime activity, and log rafts and dugout logboats may survive within sealed contexts.

3.3.6. These early craft might have been capable of coastal journeys and fishing expeditions, with cross channel journeys being possible given the reduced distances involved while sea level was still rising. However, the evidence for Late Upper Palaeolithic seafaring in the SEA 6 area remains conjectural.

3.4. MESOLITHIC AND NEOLITHIC (9,000 – 2500 BC)

3.4.1. By the Mesolithic, the basis for postulating maritime activity is much firmer. McErlean et al. state that the Mesolithic '*…covers a period of a dynamically changing coastline with a rising sea level progressively drowning a substantial part of the littoral zone. The exploitation of coastal and riverine resources was important in the Mesolithic subsistence economy and it is probable that many early coastal sites were located on old shorelines now underwater'* (McErlean, McConkey, McCooey and Williams 1998).

3.4.2. During the Mesolithic and into the Neolithic, as with the Palaeolithic period, maritime related artefacts are scarce within the archaeological record, although examples of vessels and associated maritime archaeological materials start to be found from the Mesolithic onwards.

3.4.3. Maritime technological capabilities are likely to have advanced from the construction of simple hide boats made from single hides to larger examples utilising multi-hide and woven basketry techniques (McGrail 1987; 1991). While simple log rafts of light poles could have been built in the Upper Palaeolithic, substantial rafts could not been built until the Mesolithic in the British Isles, when trees of sufficient size became available (ibid.). The same limiting factor to vessel size applies to the construction of substantial logboats.

3.4.4. There is one other vessel type that may have been constructed during the Mesolithic. It has been suggested that the rolls of bark stored at the Early Mesolithic site at Star Carr in Yorkshire may have been intended for the construction of bark-covered boats (Johnstone 1980), although they may have been too small for this purpose (McGrail 1987). Also found during the excavations at Star Carr were other maritime archaeological artefacts, such as a paddle and a wooden harpoon for fishing.

3.4.5. As the site of Star Carr was located in a lacustrine setting it may be argued that Mesolithic craft were confined to the sheltered waters of rivers and lakes. However, finds from sites such as Mollegabet II in Denmark illustrate that dugout logboats were in use at the coast in north-west Europe during the Mesolithic. Excavations at the submerged habitation site have uncovered the burial of a young male contained within a dugout canoe, and prior to its submergence the site would have been located in a coastal setting (Skaarup and Gron 2004). While no examples of any watercraft from the Mesolithic period have been found within the SEA 6 area, their use may be reasonably inferred.

3.4.6. It is clear from the archaeological record that coastal resources were being exploited within the SEA 6 area. Evidence includes the discovery of shell middens and flint scatters on raised beaches along the east coast of Northern Ireland, and the Early Mesolithic site of Mount Sandel, which is the earliest habitation site in Ireland dating around 7,000 BC (Woodman 1978). Mount Sandel is located on the lower reaches of the river Bann, in north-east Ireland. At the time of occupation of this seasonal hunter-gatherer camp site, much of Ireland was covered in forest, leaving the coast, rivers and lakes to be exploited by the first inhabitants. Whilst this site represents the earliest known evidence for human settlement in Ireland, the initial colonisation must have taken place as early as 8,000 – 9,000 BC to account for the insular character of Irish Early Mesolithic technology (McErlean, McConkey, McCooey and Williams 1998).

3.4.7. Sea level continued to rise during the Mesolithic and reached a peak at c.4000 years BP. This maximum is evident from the number of raised beaches around the coast of Northern Ireland and can be predicted for areas north of Morecambe Bay on the eastern side of the Irish Sea (Lambeck *et al.* 1995). At this stage any land bridge linking Ireland with the rest of the British Isles would have long disappeared and the people colonising Ireland must have travelled across the Irish Sea in boats. Likely routes could have been island hopping from south-west Scotland with the white, flint-rich chalk cliffs of the north-east coast of Antrim acting as beacons or, as current research favours, across the Irish Sea to the Leinster coast.

3.4.8. There have also been attempts to infer the need for sea-going craft in the Mesolithic from faunal remains recovered during land excavations. Skeletal remains of cod, a deep sea fish, from a site near Cushendun, Northern Ireland implies that deep sea fishing was taking place from ocean-going craft (Johnstone 1980).

3.4.9. Trade is also an indicator of maritime contacts and during the Neolithic period stone axes were a major currency, being traded throughout British Isles. Although a variety of rock types were utilised during the Neolithic, porcellanite (the contact metamorphosed degradation product of Tertiary basalt) was the single most

important raw material in axe production in Ireland, accounting for over half the 20,000 known stone axes (Cooney and Mandal 1995). Porcellanite is located on only two sites within the British Isles, on the slopes of Tievebulliagh Mountain in Co. Antrim and a short distance away at Brockley on Rathlin Island. Neolithic open-cast mines can still been seen at these sites where the stone was mined, probably using the basic fire-setting technique. Rough-out versions of the axes would then have been made on site before being removed to another site for finishing to the final polished product. These high status axes have been found throughout Ireland, Scotland, England and Wales. This trade was reciprocated as evidenced by the numerous finds of worked stone artefacts made from Arran pitch-stone, Welsh dolerite, Cornish gabbro and Cumbria Tuff (Breen and Forsythe 2004).

3.4.10. During the Neolithic period there have been a few examples of possible sea-going logboats uncovered from maritime settings along the east coast of Ireland. Two were excavated from Ballylig in Larne Lough, Co. Antrim, one from Greyabbey Bay and one from Cahore, Co.Waterford. During offshore trenching for a pipeline making landfall at Gormanstown, Co. Meath, a logboat (**Plate 2**) that may have been modified with outriggers to aid long-distance sea travel was uncovered under two metres of sand (Brady 2002). This find clearly highlights the potential for early craft to survive offshore, the site being located 1km from the present shoreline.

3.5. BRONZE AGE (2500 – 300 BC)

3.5.1. During the Bronze Age, technological advances meant that '…in theory, almost any type of raft and boat ever known could have been built' (McGrail 1990). Dugout logboats continue to be found from Bronze Age contexts, but it is no longer necessary only to infer the use of hide boats as was the case in preceding periods. A reappraisal of the archaeological evidence from a burial contained within an Early Bronze Age cemetery at Barns Farm, Dalgety, Fife has led the excavator to the conclusion that the body had been buried in a coracle. Grave 2 on the site had dimensions similar to a small coracle, measuring 2m by 0.95m and was D-shaped in profile. Organic material identified as leather was found lining the side of the grave, and this, coupled with an associated fish deposit has led the excavator to interpret it as a boat reused as a coffin (Watkins 1980).

3.5.2. It has also been suggested that a shale bowl from Caergwrle, Clwyd, decorated with wave-like decoration along its sides and triangles along its base, may have been a representation of a hide covered boat, with the triangular designs depicting the internal frame of the vessel (Breen and Forsythe 2004; Denford and Farrell 1980).

3.5.3. For the first time in the archaeological record sewn plank boats begin to be found within the British Isles. Sewn plank boats have been described as the most advanced form of early water transport and would have been readily adaptable for use in a variety of functions and in a range of environments (McGrail 1991). There have been several examples of these flat-bottomed sewn plank boats, ranging from the Brigg 'raft' and North Ferriby boats on the Humber, to fragments found at Caldicot and Goldcliff, Gwent (McGrail and Parry 1991) and the substantial remains of a boat at Dover, Kent (Clark 2002).

3.5.4. The Dover boat is particularly interesting given its sea-going capabilities and may well have taken part in early metallurgical trade across the English Channel. This cross-Channel trade in metal work and ore is also attested by the discovery of a number of marine sites comprising Bronze Age tools, thought to represent cargoes. Examples include bronze tools discovered in Langdon Bay, Kent; Bronze Age weapons discovered off Moor Sand, Devon, and a number of early tin ingots from within the Erme Estuary, Devon (Fenwick and Gale 1998; Muckelroy 1980).

3.5.5. To date there have been no examples of sewn plank boats from Ireland or elsewhere within the SEA 6 area, although the presence of examples from Caldicot and Goldcliff in Wales suggest that examples may well be found in the region.

3.6. IRON AGE AND ROMAN (300 BC – 500 AD)

3.6.1. During the Iron Age a new type of ship construction was being developed in north western Europe, known as the 'Romano-Celtic' type. The first example to be excavated in the British Isles was the Blackfriars boat excavated in London in 1962, consisting of the remains of a substantial seagoing trading vessel (Marsden 1994). Another example comes from the Severn estuary, the Barlands Farm boat (Lawer and Nayling 1993) which, although being smaller than the Blackfriars boat, would still have been capable of coastal and sea voyages. The presence of such craft on the western seaboard of Britain indicates the capabilities of Iron Age mariners.

3.6.2. Material from Iron Age contexts also indicate the form that hide covered boats may have taken. A hoard of gold objects recovered from Broighter, Co. Derry in 1896 contained a small model of a boat, of a type thought to have been in use around the last century BC (Raftery 2000). While there have been a number of theories as to the form the model is trying to represent, it is generally considered to depict a hide covered vessel and as such is the earliest example of such a craft within Ireland (Breen, and Forsythe, 2004). This model, depicting a vessel with a mast and sail, 18 oarsmen, and a substantial carrying capacity, would have been suitable for travel and trade across the Irish Sea, and possibly even with the rest of Continental Europe (Raftery 2000).

3.6.3. There are a number of military and civilian sites dating to the Roman occupation of the British Isles along the Severn Estuary, Liverpool Bay, and the Cardigan coasts. Many of the forts were established on navigable rivers and estuaries for ease of provisioning and rapid sea-borne supply. The fortress at Caerleon was also supplied from the sea, with the quays and wharves being examined in the 1960s. It is also likely that other forts had quays, wharves and jetties attached to them, but these have yet to be located (Murphy 2002).

3.6.4. Another piece of direct evidence for this period comes from the discovery of a Graeco-Italic anchor of the 2nd or 3rd century BC at Porth Felen, Aberdaron, Gwynedd (Boon 1977).

3.6.5. While it is generally accepted that there was no formal occupation of Ireland by Roman forces, the archaeological evidence confirms that contacts were maintained. The majority of Roman finds have come from the east coast centred around the rivers Liffey and Boyne, suggesting a direct route from occupied Britain, possibly Deva

(Chester), and from the north coast suggesting a route from either the Solway Firth or the Firth of Clyde (Cunliffe 2001).

3.6.6. The discovery of a quantity of early Roman and native Irish material – consisting of ingots of copper, coins dating to the Flavian period and pottery – from a site on the defended promontory fort of Drumanagh suggests that the site was either a Roman coastal fortification, or more likely a defended Romano-British trading post, or a native Irish settlement influenced by Roman material culture, dating to the first century AD.

3.6.7. Another possible trading port may have been Lambay Island, where a cemetery was found. Grave goods found within the inhumation burials included a sword, a shield, and various ornaments such as brooches, a torc and bracelets of jet and bronze. Cemeteries of this type are not found in Ireland and the grave goods are of a northern British type (Cunliffe 2001).

3.6.8. The discovery of the Lough Lene boat, a small vessel built using the Mediterranean construction technique (carvel construction fastened with mortise and tenon joints) in 1968 in Co. Westmeath, is also significant. This is an extremely rare example of such a vessel being found outside the Mediterranean. It is the only one of its kind to be found within Ireland and one of less than ten so far discovered within north-western Europe (Farrell 1989). While this craft was clearly from a lacustrine setting it does demonstrate the extent of contact and exchange of ideas with Continental Europe.

3.7. EARLY MEDIEVAL PERIOD (500 – 1177 AD)

3.7.1. The introduction of the Norse and Danish Vikings during the Early Medieval period into the Irish Sea had a major impact, from the western seaboard of Britain to Ireland and the Isle of Man. At first activities were confined to raiding, but settlement and the expansion of trade networks quickly followed.

3.7.2. Elements of Viking vessels have been found re-used in the construction of waterfronts, houses, drains and causeways from a series of excavations in Dublin and other Irish cities along the east coast of Ireland. Wexford, for example, was founded by the Vikings in 914 when they established a base or *longphort* at the confluence of John's River and the River Suir (McGrail 1993).

3.7.3. The importance of Dublin within the Viking world was clearly demonstrated after excavations at Roskilde Fjord, Denmark, uncovered five Viking ships. They had been deliberately sunk at the mouth of the harbour to restrict entry and protect the town. Of the five ships found, two could be classed as warships (Skuldelev 2 and 5), two as merchant vessels (Skuldelev 1, an ocean going vessel, and Skuldelev 3, a coastal vessel), with Skuldelev 6 a probable fishing boat or small ferry. Results of dendrochronological analysis of the timbers from Skuldelev 2 have shown that the vessel was probably constructed from timbers felled in Dublin between 1060-70 AD (Breen and Forsythe 2004; McGrail 1993).

3.7.4. Evidence for Viking vessels can also be obtained from the few ninth and tenth century AD Viking boat burials such as Scar on Sandy, Orkney and Balladoole, Isle of Man. Excavations of the burial at Balladoole showed the position of clenched

nails, skeleton and grave goods to be consistent with the general layout of a boat. The skeleton was found alongside grave goods consisting of weapons and equipment. An Irish ringed pin that would have been used to fasten a cloak was also found during the excavation, highlighting contact with Ireland (Redknap 2000). Two possible Viking boat burials have also been excavated within Northern Ireland, one from Portrush, Co. Antrim and the other close by on Rathlin Island.

3.7.5. During the later half of the nineteenth century a number of Viking artefacts were recovered from the shoreline from a place called Meols (from the Old Norse melr, 'sandbank'), at the mouth of the river Dee on the Wirral Peninsula. This is all that remains of an important Viking trading port. Viking settlement on the Wirral and the establishment of a royal burh at Chester boosted trading at Meols, and the range of metalwork from the tenth and eleventh century finds demonstrates the long distance contacts from England, the Irish Sea region and beyond (Redknap 2000).

3.7.6. Logboats continue to be used throughout this period. Again, most examples have been recovered from lakes and rivers, but the possibility of uncovering this type of craft from a maritime context remains. Logboats found in Armagh and Tyrone, Northern Ireland, have yielded dendrochronological dates of 492 AD and 431 AD respectively while a boat from Galway was dated to 1001 AD, clearly illustrating the survivability and usefulness of this type of craft (Lanting and Brindley 1996).

3.8. MEDIEVAL (1177 – 1600 AD)

3.8.1. The Norman invasion of Ireland began in 1169 and by the end of the twelfth century most of the island was under their control. The construction of castles and the fortification of key ports along the eastern seaboard of Ireland was an integral element in the maintenance of Norman control and ensured that communication and trade networks with Britain and Continental Europe stayed open.

3.8.2. During the medieval period, trade expanded between Dublin and other commercial ports across the Irish Sea, such as Chester and Bristol, as well as with overseas ports in Italy, France and Spain.

3.8.3. The discovery of a number of timbers exposed from the mud on the foreshore of Gwent led to the excavation of the remains of a medieval trading vessel, known as the Magor Pill wreck. During the excavation it became apparent that the vessel was carrying as part of its cargo a quantity of iron ore and its likely to have been employed in trade along the Severn and Bristol Channel (Nayling 1998).

3.8.4. Custom accounts can give an indication as to the extent of this trade and shipping. Records from Bristol show that between 1480 and 1489 there was around 70 to 90 ships and at least 93 shipwrights from Ireland based at Bristol and Bridgwater. Chester records show that Ireland's chief export to the port, until the end of the fifteenth century, was herring, while Chester's trade with Ireland was in salt (Sherbourne 1987).

3.8.5. Another example of the type of commodity being traded at this time can be found on the protected wreck located at Pwll Fanog in the Menai Strait, Gwynedd. The remains of a clinker built trading vessel with a cargo of slate was found by divers in

1976, with subsequent research giving a probable fourteenth or fifteenth century date for the vessel (Fenwick and Gale 1998).

3.8.6. Also during this period, military campaigns accounted for a lot of shipping in the Irish Sea. The campaigns of Edward I and Edward II against the Scots in the fourteenth century were supplied with men and supplies from Ireland in large numbers. Convoys sailed from the ports of Dublin and Drogheda to Skinburness or to Ayr in Scotland. Ireland was particularly important during this period as it was the English Crown's main source of grain (McCaughan and Appleby 1989).

3.8.7. By 1515, as a result of the Bruce invasion, Black Death, climatic deterioration and Gaelic resurgence, Norman (by this stage English) control had been reduced to a small hinterland along the east coast of Ireland, known as the Pale. It is important to note that within the Pale the English were able to retain control of the important port of Dublin, which was central to any attempt to control Ireland and exploit economic resources (Aalen 2000).

3.8.8. The colonisation of Ireland was to begin anew with the Tudor plantations dating between 1534 and 1609. These large-scale governmental schemes led to the transfer of land ownership to an immigrant landlord class, mainly of English or Scots origin. The military control of ports along the northern and eastern seaboard of Ireland were key to the initial stages of this colonisation and central to its maintenance.

3.9. POST MEDIEVAL (1600 – 1800 AD)

3.9.1. In the post medieval period, trade continues to play an important part in the economies of ports surrounding the Irish Sea. The international aspect of this trade also becomes apparent within the archaeological record.

3.9.2. In 1978, divers discovered the remains of a large shipwreck that had been carrying a cargo of uncut blocks of Italian Carrera marble (**Plate 3**), and is known as the Tal-y-Bont or Bronze Bell wreck. The site is likely to be that of a Genoese wreck depicted on an Admiralty chart from the eighteenth century close to Sarn Badrig reef, a notorious shipping hazard located in Cardigan Bay (**Figure 4**). The site was designated in 1978 and since then has been the focus of a number of archaeological investigations (Wessex Archaeology 2005a).

3.9.3. The mail route between Britain and Ireland was also a shipping route that had its share of wrecks. In 1675, the Royal yacht *Mary* sank when it struck the Skerries rocks, Anglesey, during one of her normal Chester to Dublin runs. The *Mary* was built by the Dutch East India Company (VOC), purchased by the City of Amsterdam, and given to Charles II upon his restoration to the throne. It was used for royal duties for a year and was then employed as a transport vessel for officials between Dublin and Chester. The wreck was discovered in 1971 by divers and was designated as a protected wreck in 1974 under the *Protection of Wrecks Act 1973*.

3.9.4. In the eighteenth century, French attention was directed toward Ireland and Wales with a series of planned invasions that, despite initial success in one case, were all ultimately unsuccessful.

3.9.5. As part of the main French invasion plan of Britain, a diversionary force was to set sail from Dunkirk and land in Ireland. The force consisted of 1300 troops on board six minor warships. The force left Dunkirk in October 1759, sailed via Scandinavia, the Faroes and the Hebrides, and arrived in Belfast Lough in February 1760, minus three ships. The troops, under the command of Admiral Francois Thurot, landed and seized the old Anglo-Norman castle of Carrickfergus. On the 23rd of February Lord Drogheda's Light Horse was sent out from Dublin to meet this threat. The French withdrew to their ships but were captured after naval action in Belfast Lough (Walsh 2004).

3.9.6. Another failed invasion attempt occurred in 1796 when 19 ships of the line left France to make for Bantry Bay, Cork. Due to severe weather only a small number of ships actually completed the journey, many of them suffering from storm damage. One vessel, *La Surveillante*, was leaking so badly that the French were forced to transfer the crew and troops to other ships and scuttle her (Breen 2001).

3.9.7. French plans to invade and burn the important port town of Bristol were laid down as a diversion to their invasions of Ireland. In February 1797, a force of 1800 former galley slaves and convicts (the Black Legion) on board the frigates *Resistance* and *Vengeance*, the corvette *Constance* and a lugger were given the task. Unable to sail up the Bristol Channel in an easterly gale, the force was eventually set ashore at 'Fisgard' (now Fishguard). They surrendered to local militia shortly after landing (Gardiner 2001).

3.9.8. Another French vessel was lost off the coast of Ireland in 1798, within the SEA 6 area in this instance, near Sheepland Harbour, Co. Down, Northern Ireland. The frigate *L'Amite* was carrying a load of guns intended for the United Irishmen's attempted uprising against English occupying forces and was on her way to Derry when she foundered on the coast. Nothing remains of the vessel structure and of seven cannon seen by divers in the 1960s only one remains on site (Wilson 1997).

3.9.9. The pressure of the threat of French invasion (real and imagined), alongside the need to patrol the Atlantic coast and protect shipping in the western approaches, necessitated an almost permanent British naval presence around the coast of Ireland. However, the pressure on the Royal Navy at this time meant that this protecting force consisted almost exclusively of large frigates, as ships of the line could not be spared permanently.

3.9.10. From the beginning of the sixteenth century onwards the production of coal in England increased considerably. Trade with Ireland was extremely important as Ireland had no commercially viable coal resources, although an attempt had been made to develop the mines at Coalisland, Co.Tyrone in Ulster. The coal was transported across Lough Neagh to Portadown, then via the canal to Newry and by sea along the coast to Dublin. Despite initial success the mine proved to be unproductive and Ireland again had to resort to importing coal by sea from England (McCutcheon 1984).

3.9.11. The growth of the coal industry also led to the development and expansion of previously minor ports. Maryport on the Solway Firth grew during the eighteenth century from a small settlement as a result of the coal trade. The main focus of the

port and town became the export of coal from local pits. A local directory of 1811 notes that '…the coal trade was the chief staple of this part of the country…' (Jackson and Jackson 1990).

3.10. MODERN

3.10.1. Throughout history the fishing resources of the Irish Sea have been exploited to aid subsistence and for trade. From the nineteenth century onwards the fishing industry dramatically increased, with fishing fleets sailing from various ports along the eastern and southern seaboard of Ireland, and from Scotland, The Isle of Man and Cornwall. Herring and mackerel are migratory fish, arriving in huge shoals at different times of the year, during the summer on the east coast of Ireland for herring and springtime for mackerel along the south coast (McCaughan and Appleby 1989).

3.10.2. Fishermen from the Isle of Man were heavily involved in this industry, with Manx boats sailing from the Shetland Islands to the mackerel fisheries off Kinsale Head, Cork on the south coast of Ireland. At its height around 1880, the Manx fishing industry employed thousands of men and boys (Corkhill 2001a).

3.10.3. In the 19th century Scotland's overseas trade shifted to the west coast, and the lower reaches of the River Clyde saw an increase in ship building. In the transition from wooden sailing ships to iron and steel steamships, Clyde builders and engineers were world leaders (National Museum of Scotland 2005).

3.10.4. The wreck of the *Royal Charter* is an example of one of the more successful of the early auxiliary steam sailing ships and was employed on the regular Liverpool to Australia run. She sank off Anglesey on the 26th of August, 1859 on a return journey from Melbourne with the loss of 459 passengers and crew.

3.10.5. The wreck of the *Iona* (**Plate 4**) is an example of an early side paddle steamship and is located in the upper reaches of the Clyde (**Figure 2**), not far from the Govan shipyard where it was built. After the outbreak of the civil war in America fast vessels were at a premium and much sought after by Confederate forces. The *Iona*, like her sister *Iona II*, were subsequently purchased by Confederate agents and attempts made to bring them across the Atlantic.

3.10.6. However, both were destined not to leave British waters. The *Iona* sank while still in the Clyde and the *Iona II* sank off the island of Lundy in the Bristol Channel. The Iona II is now a protected wreck under the *Protection of Wrecks Act 1973*, but falls outside the SEA 6 area.

3.10.7. Near the Tal-y-Bont wreck site referred to above is another vessel protected under the PWA 1973. The remains of what was initially thought to be the *Diamond* (**Plate 5**), a nineteenth century vessel of composite iron and wooden construction, was discovered near the notorious shipping hazard Sarn Badrig Reef in Cardigan Bay. Research into her true identity and extent is currently being undertaken by the Malvern Archaeological Diving Unit (MADU) (Cundy 2004).

3.10.8. During both World Wars submarine activity was extensive in the Irish Sea. During the First World War attempts had been made to sink mail ships travelling between

Dublin and Holyhead. The sinking of the SS *Leinster* was the last U-boat attack on a merchant ship in the First World War, with the loss of 501 passengers and crew.

3.10.9. There are a total of seven U-boat wrecks from the Second World War located in the Irish Sea (**Appendix III**) highlighting the extent of their activity. However, neither of the two Allied losses that are designated under the *Protection of Military Remains Act 1986* within the SEA 6 Study Area were lost as a result of U-boat actions. HMS *H5* was lost off Anglesey when she was rammed by a British cargo ship, SS *Rutherglen*. The British submarine was mistaken for a U-boat, and all hands were lost, including an American Naval Officer, the first American armed serviceman to be lost during the First World War. HMS *Dasher*, an escort carrier (World War II), was lost in the Clyde during exercises when a fuel explosion occurred during deck/landing operations.

4. ARCHAEOLOGICAL REMAINS: SPATIAL DISTRIBUTION

4.1. INTRODUCTION

4.1.1. The current mapped baseline of data upon which assessments of maritime archaeology are based has a number of inherent weaknesses, principally because of biases towards ships lost within the last 250 years. Although the baseline does account for maritime archaeological remains that are already known, they may not be a reliable guide to maritime archaeological potential.

4.1.2. The weaknesses in the baseline can take substantial time to address in seeking to gauge potential, and may in any case prompt conclusions that are misleading. At the same time, the relationship between wrecks and their environmental context is not yet well understood, so assessments of the potential for maritime archaeological material based on mapped environmental proxies (e.g. seabed type) may also be misleading.

4.1.3. This section discusses the difficulties of gauging at a strategic level the likely spatial distribution of maritime archaeological remains, and sets out the factors that should be taken into account in mapping known and potential sites in the course of individual Environmental Assessments.

4.2. WRECK INVENTORIES

4.2.1. The majority of the available sources for wreck sites draw heavily from written and hydrographic records that began to be kept during the eighteenth century and later. These include:

- the United Kingdom Hydrographic Office (UKHO);
- the maritime section of National Monument Records in England, Scotland and Wales;
- local authority Sites and Monument Records (SMRs, increasingly known as Historic Environment Records (HERS));
- other shipwreck databases such as those held by Northern Ireland and the Republic of Ireland.

4.2.2. The UKHO holds data for 3162 shipwrecks and obstructions within the SEA 6 area. A total of 1744 of these wrecks are charted and 1418 are uncharted. The bulk of these records are post 1700 AD.

4.2.3. There are more than 3000 wrecks within the Northern Ireland shipwreck database, with the bulk of these being located along the east coast. There are also at least 1163 wrecks around the Isle of Man (Corkhill 2001b).

4.2.4. These figures give some indication of the number of wrecks located in the SEA 6 area. These known wrecks can be plotted and used as a tool to aid plans for wreck avoidance. However, that this data is far from being a comprehensive record of all shipwrecks within the area.

4.2.5. Whilst the records from the eighteenth century onwards are extensive, they are not conclusive and do not always give exact positions. Wreck indexes often account for this ambiguity by assigning wrecks that are known to have occurred in a general area but without a precise location to a nominal position, known as a Named Location. Many wrecking events are grouped geographically by Named Locations, though such grouping need not imply any concentration in actual wrecks on the seabed.

4.2.6. It should be noted also that the wrecks which have been recorded, even from the eighteenth century onwards, are only a proportion of those lost in recent centuries. Only certain types of losses and wrecks would have been recorded. It is reasonable to assume, for example, that existing records seriously under-represent losses of smaller vessels such as coasting craft and fishing boats.

4.2.7. There is no comprehensive record that can be relied upon for shipwreck losses prior to the eighteenth century and the recording of such wreck events is sporadic. These limitations and the inherent bias toward documented wrecks can give a misleading impression on the quantity and distribution of wreck and underwater sites. As a result, archaeologists have to pursue different lines of enquiry to gauge the possible distribution of pre-eighteenth century wrecks, and the distribution of unrecorded wrecks post-eighteenth century.

4.3. WRECKS AND THEIR ENVIRONMENT

4.3.1. Another limitation with regard to the known spatial distribution of shipwrecks lies in the relationship between the wrecks and their environment. The relationship between wrecks and the seabed environment is not well understood. The dynamics of the environment will have an impact on the character, extent and survival of wreck and associated artefactual remains. Generally, the proportion of wreck remains surviving on the seabed will be low in higher energy environments such as areas with strong tidal regimes, areas exposed to storm surge and wave action, and in areas with sandy, aerobic sediments. In lower energy environments, such as sheltered bays, estuaries, and in areas with seabeds consiting of mud, silt or other anaerobic sediments, the proportion of surviving materials might be expected to be higher. It might be reasonable, therefore, to assume that the number of wrecks surviving in low energy environments will be much higher than in high energy environments. However, it does not follow that volumes of shipping in the past, and the incidence of wrecking, are higher in low energy environments than in high energy environments, hence environment may not be a reliable guide in gauging spatial distributions.

4.3.2. Further, even an association between the survival of archaeological material and the energy of the seabed environment cannot be assumed. Within the SEA 6 area, a site located in a high energy environment produced, as a result of excavation, a large number of fragile artefacts. The *Taymouth Castle* was sunk in January 1867 on the Antrim Coast between Tornamoney Point and Runaby Head, Northern Island. During excavations of the site in 1995 it was reported that while the hull was poorly preserved, a large mound of iron bowls, part of the ships manifest, had concreted together and formed a protective layer over a wide range of objects. Finds recovered from beneath this mound included a large amount of pottery, including Glaswegian spongeware, and a large number of alcohol bottles, some still corked with their original contents intact (Breen 1995).

4.4. THE INCIDENCE OF WRECKING: HAZARDS

4.4.1. In order for a wreck to survive on the seabed, there must first have been a wrecking incident. A substantial proportion of losses are related to the presence of natural hazards, which are often capable of being mapped. Such hazards include sandbanks, reefs, islets, headlands, areas of turbulent water and strong tidal currents. These hazards are magnified by less readily mapped variables such as wind, waves, storms, fog and so on.

4.4.2. One area of wreck concentrations is Sarn Badrig reef, one of three sub-tidal reefs that extend into Cardigan Bay from the shore, the other two being Sarn-y-Bwch and the Cynfelyn Patches. These reefs are glacial moraines resulting from the last glaciation and are composed of boulders, cobbles and pebbles mixed with various grades of sediments. At mean low water these reefs almost dry out, creating major shipping hazards, especially for coasting vessels.

4.4.3. There are at least 459 wrecks known on the Sarn Badrig reef (Cundy 2004), with one designated wreck, the *'Diamond'*, located just off the reef and another designated wreck – Tal-y-Bont – close by (Wessex Archaeology 2005a; 2005b).

4.4.4. A project that is seeking to map the coincidence of navigational hazards and environments conducive to the survival of wreck sites is currently underway at Bournemouth University (see below).

4.4.5. It should be borne in mind that impact with a navigational hazard is only one of several different types of incident that may result in a wreck on the seabed. Other significant types of incident include fire, foundering, collision, violent engagement and abandonment. The spatial distribution of these types of wrecking incident is not readily forecast, though any patterning in existing recorded losses attributable to these types may provide some indication.

4.5. VOLUMES OF SHIPPING

4.5.1. A further line of enquiry in gauging the spatial distribution of unrecorded wrecks is to consider the distribution and volume of historic shipping in general. As a proportion of these overall populations would have become wrecks, then it is reasonable to suggest that the distribution of shipping through time will provide a guide to the spatial distribution of wrecks. These populations also provide context for wrecks that are discovered, insofar as the archaeological importance of any wreck will be related to the insight it provides into the more general human activity in which it was a casualty.

4.5.2. A project seeking to record historic shipping activity against possible sea routes has been undertaken by Wessex Archaeology for English Heritage (see below). Discussion is currently underway about extending this project to Liverpool Bay.

4.5.3. While shipwrecks might be expected to cluster along shipping routes, these routes, be they ancient or modern, would not have been the only routes that vessels would have used, or the only corridors within which wrecks would have occurred.

Notwithstanding the various bases being developed for mapping the possible spatial distribution of unknown wrecks, there will be a residual possibility of encountering wrecks of archaeological interest throughout the SEA 6 area.

5. PREVIOUS INVESTIGATIONS

5.1. OUTLINE

5.1.1. Previous investigations within the study area fall under five broad themes:

- Historic and/or protected wrecks;
- Coastal surveys;
- Development-led investigations;
- Strategic investigations;
- Investigations prompted by research and outreach.

5.2. HISTORIC AND PROTECTED WRECKS

5.2.1. There are six wrecks protected under the *Protection of Wrecks Act 1973* within the SEA 6 area (**Appendix I**), which have all been subject to monitoring surveys as well as more detailed investigations and excavations from time to time.

5.2.2. The monitoring surveys are carried out on behalf of the heritage agencies and generally comprise diver inspection, and photographic and/or video recording. Measured surveys are also undertaken where they do not exist previously, and geophysical surveys have also been conducted in some instances.

5.2.3. Each site generally has a site licensee with an appropriate nominated archaeologist to offer advice on technical matters. These licensees usually conduct more detailed surveys and archival research and can be valuable sources of information. They are required to submit annual reports of the work carried out under licence to the heritage agencies.

5.2.4. The two wrecks protected under the Protection of Military Remains Act 1986 in the SEA 6 area do not appear to have been subject to specific on-site investigations.

5.3. COASTAL ARCHAEOLOGICAL SURVEYS

5.3.1. Extensive coastal archaeological surveys have taken place along the margins of the SEA 6 area. These surveys generally record terrestrial archaeological sites, but also include wrecks in inter-tidal areas when easily accessible, together with other maritime infrastructure at the coast.

5.3.2. The main coastal surveys that have taken place in the SEA 6 area (see Figure 3) are:

- Strangford Lough, one of three statutory Marine Nature Reserves in the UK and also an Area of Outstanding Natural Beauty was subjected to a five year archaeological survey of the maritime cultural landscape by the Environment and Heritage Service, Northern Ireland.
- Wales: a five year survey of the Welsh Coasts was carried out by four Archaeological Trusts, funded by Cadw: Welsh Historic Monuments.

- Scotland: the work of the Scottish Coastal Archaeology and Palaeo-environment (SCAPE) Trust has advanced the study of the coastal archaeological resource by supporting the work of local archaeological groups. In addition, Historic Scotland has commissioned 14 coastal zone assessments including several Focal Studies, essentially an intensive study of a particular aspect of coastal archaeology (e.g. shipwreck heritage of Fife; soft sediments in the inner Solway; and marine crannog investigation in the upper Clyde) (Dawson 2003). In 2002 SCAPE and the Firth of Clyde Forum were awarded an HS grant to survey the archaeology and geomorphology of the Firth of Clyde shoreline, with phase three of the project having commenced in winter 2004. **Figure 3** shows the previous phases, one and two, of the project.

5.4. DEVELOPMENT-LED INVESTIGATIONS

5.4.1. A series of archaeological investigations in the SEA 6 area has been prompted by development. These include the following (see **Figure 3**):

- Robin Rigg, Solway Firth, offshore wind farm;
- Barrow offshore wind farm;
- Rhyl Flats offshore wind farm;
- Shell Flat offshore wind farm;
- Belfast Lough, capital dredging scheme;
- Drogheda Port Development, capital dredging scheme;
- Dublin Bay sewerage pipeline development;
- IC2 gaspipeline interconnector: Scotland to Ireland.

5.4.2. These developments have generally been accompanied by Environmental Assessment, including assessment of the archaeological heritage, or other forms of archaeological assessment. These assessments have included desk-based, geophysical and geotechnical investigations. Some of the projects have also included field survey and excavation, together with monitoring and post-fieldwork analysis.

5.4.3. The following projects are offered as examples of development-led investigation that may be relevant to offshore oil and gas.

Dublin Bay Sewerage Pipeline Development, 2001

5.4.4. During the installation of an 11km subsea sewerage pipeline across Dublin Bay, trench dredging and backfilling operations uncovered a previously unrecorded shipwreck. The substantial remains of a wooden vessel, possibly seventeenth century, were uncovered from sand deposits near Bull Island, just ahead of trenching activities. Despite geophysical surveys prior to development the wreck had remained undetected and it was only when trenching activities began to remove the covering sand that its presence became apparent.

5.4.5. As the dredging activities were being monitored by a suitably qualified archaeologist, the vessel was rapidly recorded and reported to the heritage agency and the Dublin Corporation for consultation and recommendation.

5.4.6. After consultation, it was initially decided to follow best archaeological practice and protect the site by avoidance. The exposed sections of the wreck were reburied and the pipeline route was diverted to avoid direct impact upon the site. The Dublin City archaeologist also expressed the desire for a programme of controlled research to try to understand the character of the wreck and see how much impact the dredging had.

IC2 Gaspipeline Interconnector: Scotland to Ireland, 2002

5.4.7. During trenching operations at Gormanstown (**Plate 6**) near the landfall site for IC2, and despite the required EIA and associated geophysical surveys having been undertaken, an important archaeological discovery was uncovered. A monitoring archaeologist was present during trenching operations, as part of the overall project design, when an early dugout logboat was exposed. The small craft was recorded and excavated, with pipeline operations continuing after full recovery (Brady 2002).

5.4.8. The vessel was buried under two metres of sand and lay on to of, but not within, a boulder clay that represented a former coastal soil. This suggests that the logboat was used on the open sea and would be the first example to do so from the Irish archaeological record (Brady 2002).

5.5. STRATEGIC INVESTIGATIONS

5.5.1. Archaeological investigations are sometimes commissioned by heritage agencies to address overall strategic concerns, often relating to the quality or availability of baseline data, or the need for methodological development. Particular impetus has been given to strategic research relating to maritime archaeology in England by the Aggregate Levy Sustainability Fund (ALSF). One ALSF project – *England's Historic Seascapes* – is directly concerned with part of the SEA 6 area. Two other projects – *England's Shipping* and Bournemouth University's Navigational Hazards – will also be of direct relevance to the SEA 6 area. Further ALSF projects are addressing methodological developments associated with geophysical, diver-based and ROV-based investigations of wreck sites.

England's Historic Seascapes

5.5.2. England's Historic Seascapes is a pilot project in Liverpool Bay that is being carried out by Wessex Archaeology on behalf of English Heritage. The project is developing a methodology for applying Historic Landscape Characterisation (HLC) techniques – which are increasingly important to the management of the historic environment in the context of development on land – to the intertidal and marine zone.

5.5.3. A GIS-based characterisation of Liverpool Bay, based on historical, archaeological and environmental data, is currently being prepared. It is anticipated that once developed, the characterisation methodology will be applied throughout England's territorial waters. The resulting characterisation will be used by heritage agencies, both at national and local levels, in advising on development proposals.

England's Shipping

5.5.4. England's Shipping is a Wessex Archaeology project commissioned by EH in 2002-2004 that may be extended in 2005-2007 (Wessex Archaeology 2004a). The project has developed a methodology for recording the huge amount of documentary evidence for shipping activity prior to 1730 which is currently rendered inaccessible by its format. The methodology links a database of individual ship movements to a GIS of shipping routes, enabling queries of areas of open sea to draw in details of the ships that once traversed them.

5.5.5. In 2002-2004 the project focussed on the Solent in the course of developing methodologies, but also developed an extensive network of shipping routes and records that included the SEA 6 area. It is intended that in 2005-2007 the project will focus on Liverpool Bay and the Bristol Channel, which are of direct relevance to shipping in the SEA 6 area.

Navigational Hazards

5.5.6. As noted above, Bournemouth University is carrying out a project funded by English Heritage to address the coincidence of navigational hazards with areas of seabed conducive to the survival of wreck material. The project is also GIS-based and will draw upon historic charts as a principal source. After initial pilot work in the Solent area, it is intended that the project will extend to the whole of England's territorial waters.

5.6. INVESTIGATIONS PROMPTED BY RESEARCH AND OUTREACH

5.6.1. Two examples are presented below of maritime archaeological investigations prompted by research and by outreach. Outreach continues to be a significant strand of archaeological endeavour because of the public character of the past and its study, but also because of the need to encourage recreational divers to behave responsibly and report discoveries in the marine environment. The projects provide examples of the types of maritime archaeological material that exist in the SEA 6 area, its historic context, and the means of its investigation.

The *Nimble*

5.6.2. The *Nimble* was a coastal trader that was on passage to Glasgow from Penzance when, on the 9th of February 1850, she caught fire and sank in Ballyhenry Bay in Strangford Lough, Co. Down. The wreck site was discovered in the 1970s and became one of Northern Ireland's most dived-upon wreck sites. The site was comprehensively stripped and it was realised that this destruction must be addressed.

5.6.3. The Irish Underwater Archaeological Research Team (IUART), a cross-border organisation that receives part-funding from the DoE(NI), undertook a survey field school on the site for recreational divers. This field school was intended to instruct and educate recreational divers in underwater archaeological techniques.

5.6.4. As a result of this co-operation, a detailed plan of the site, including photographic and ROV survey, was made possible (Breen 1996). Subsequent surveys on the site

by the Centre of Maritime Archaeology (CMA) from the University of Ulster have recorded sediment levels on and around the site.

The *Taymouth Castle*

5.6.5. The *Taymouth Castle*, one of the first composite sailing ships built with iron framing and wooden planking, sank in January 1867 shortly after having left Scotland for Singapore. She was carrying a cargo of brandy, wine and spirits, with pottery and iron materials. The pottery in particular was a focus of visiting recreational divers, with a large quantity having been reportedly taken from the site.

5.6.6. In 1993, DoE(NI) began the Maritime Archaeology Project (MAP) with the intention of creating an index of maritime sites. In the summer of 1995 divers from MAP were invited to the wreck site. The site was subsequently surveyed and excavated, with a surprising amount of the fragile pottery surviving in the highly dynamic environment of the north east coast of Antrim (Breen 1995).

6. POSSIBLE IMPACTS OF OIL AND GAS ACTIVITIES

6.1. INTRODUCTION

6.1.1. This section will set out the types of impacts that oil and gas activities may have on maritime archaeological remains. Activities of oil and gas companies have the potential to impact on the maritime archaeological resource from initial exploration stages through to production and de-commissioning. Impacts are addressed in terms of their physical consequences for maritime archaeological remains, and their possible archaeological effects.

6.1.2. *Marine Aggregate Dredging and the Historic Environment: guidance note* (BMAPA and English Heritage 2003) lists the possible impacts aggregate dredging may have on both known and unknown wrecks. Equivalent impacts can also be expected during oil and gas activities:

- Direct damage to wreck structure and contents;
- Disturbance to relationships between structures, artefacts and their surroundings;
- Destabilisation of sites prompting degradation;
- Loss of artefacts within general volumes of dredged material;
- Erosion leading to damage, disturbance and instability in the medium to long term.

6.2. EXPLORATION

6.2.1. Exploration by oil and gas companies to locate and quantify hydrocarbon resources utilises a number of different geophysical and site investigation techniques. During the exploration stage, many survey techniques are likely to have a limited or negligible impact on wrecks or artefact remains. Geophysical surveys in particular are more likely to be useful in highlighting potential wrecks and/or submerged sites that could subsequently be avoided. However, some forms of intrusive exploration may have more significant archaeological effects.

Magnetic and Gravimetric Surveys

6.2.2. The general location of regional scale geological structures can be detected by magnetic and gravimetric surveys. Magnetic surveys measure variations of intensity of the magnetic field which reflects the character of different rocks contained within the subsea geological stratigraphy. Gravimetric surveys measure small variations in the gravitational field normally due to density changes within different geological strata. Both of these survey methods can be deployed from aircraft and survey vessels and can be expected to have little or no impact on maritime archaeological remains.

Hydrocarbon Seeps

6.2.3. Sub-aerial and seafloor oil and gas seeps are commonly associated within petroleum deposits. Analysis of hydrocarbon seepage plays an important exploration role world-wide. Seeps within the Irish Sea have been extensively investigated.

6.2.4. Hydrocarbon leaks can be detected on the seafloor and within the water column by using ship-based techniques such as side-scan sonar and swath bathymetry – which can map the physical geometry of gas-related pockmarks on the seafloor – and by Water Column Geochemical Sniffer (WaSi). WaSi provides detailed, real-time mapping of the hydrocarbon concentrations within the water column. Sub-aerial leaks can be detected using tools such as satellite-based Synthetic Aperture Radar (SAR), which indirectly detects oil seeps via the calming effect that the hydrocarbons have on the roughness of the sea's surface, and Airborne Laser Fluoresensor (ALF). ALF detects aromatic hydrocarbons by firing an aircraft-mounted laser vertically at the sea surface (Cowley, and O'Brien 2000). Given the non-intrusive nature of these exploration techniques they can be expected to have little or no impact on maritime archaeological remains.

Seismic Survey

6.2.5. Seismic surveys are used to identify geological structures within different rock strata that may indicate the presence of hydrocarbons. Using either explosives or an airgun device a shockwave is created by the survey vessel that penetrates the water column and submerged geological strata at different rates.

6.2.6. The returning shockwave is recorded by hydrophones that are towed by the survey vessel and a detailed image of the geological stratigraphy can then be produced. This is commonly known as 3d seismic survey and can generally be considered to have little or no impact on the maritime archaeological resource.

6.2.7. There is, however, one type of 3d seismic survey that could possibly impact on maritime archaeological remains. This method consists of the towed hydrophone array being trailed along the seafloor, allowing a more detailed image of the geological stratigraphy to be produced. This system is usually deployed in deep water but can also be used in shallower seas. This towed array could impact directly on wreck sites upstanding from the seafloor.

6.2.8. Impacts on maritime archaeological remains may also arise from 4d seismic surveys. These surveys produce the same record of geological stratigraphy as recovered from 3d seismic surveys but are collected over time from fixed hydrophone arrays. During the development and production phase of the Foinaven reservoir in the North Sea a hydrophone array was installed just below the seafloor surface with data being recorded at fixed intervals. The data recovered can be used to monitor small changes within the reservoir over time (Kiristeniansen and Christie 1999). As the subsea hydrophone array is installed in trenches that have been excavated in the seafloor and reburied, this survey method may have an impacts on maritime archaeological remains.

Bathymetric Survey

6.2.9. Bathymetric surveys enable the production of detailed seabed topographical maps. These can be used to locate possible hydrocarbon reserves by mapping the physical geometry of gas-related pockmarks on the seafloor. Bathymetric surveys are also used to plan the position of subsea structures, well heads and pipeline routes by highlighting obstructions on the seafloor, either artificial or geological.

6.2.10. Swath bathymetric surveys are conducted using a transducer which transmits a sound pulse from the water surface and records the time taken for the signal to return from the seafloor. An echosounder attached to the transducer filters and records the travel time of the pulse, and a detailed image of the seafloor topography is then possible after the data has been processed. This type of survey is unlikely to have an impact on maritime archaeological remains on the seafloor. Rather, swath bathymetric surveys – if carried out at sufficient resolution – are likely to generate data that can be used to identifiy and avoid impacts on maritime archaeological remains.

Sub-bottom Profiling

6.2.11. Sub-bottom surveys, like seismic surveys, produce detailed images of the geological stratigraphy. Sub-bottom profiling is deployed either on or towed behind the survey vessel with the 'fish' containing the instruments staying relatively high in the water column. The technique is likely to have no impact on maritime archaeological remains. Again, the resulting data may be useful in gauging or avoiding impacts on maritime archaeological remains.

Magnetometer Survey

6.2.12. Cesium or Proton Overhauser magnetometer surveys are undertaken prior to oil and gas developments and can identify metallic or ferrous material such as previous pipelines, cables, anchors, unexploded ordinance and shipwrecks. Magnetometer surveys also have the capability of locating metallic/ferrous material that lies on or just below the seafloor.

6.2.13. Again, the main instruments are towed behind the survey vessel, in this instance to avoid contamination from metal/ferrous components contained within the vessel. As the main instrument or 'fish' stays within the water column, little or no impact on maritime archaeological remains can normally be expected. Magnetometer surveys are an important source of data in seeking to avoid impacts to maritime archaeological remains.

Borehole and Vibrocore Survey

6.2.14. Borehole and vibrocore surveys are generally conducted to ground truth geophysical results obtained using the techniques described above. The subsea sediment or rock strata is drilled and a core is taken to characterise the exact physical nature of the sediment or rock.

6.2.15. As this survey technique directly impacts on the seafloor, and penetrates to some depth, there will be a potential impact on archaeological remains. While vibrocores generally do not penetrate deeper than five metres into the seabed, other borehole

techniques can penetrate up to fifty metres. Coring can penetrate directly through wreck sites or discrete elements of wreck structure. Such impacts may only become apparent when the coring equipment is recovered and either shows signs of damage or there are elements of wreck contained within the core sample.

6.2.16. While target areas for borehole and vibrocore sampling are carefully chosen so as to avoid obstructions there is always the possibility for coring to impact on previously unrecorded sites.

6.2.17. Impacts on maritime archaeological remains may also result from borehole and vibrocore surveys if the anchors of survey vessels are dropped or drawn into wreck material.

Grab Survey

6.2.18. Grab surveys are also conducted to ground truth geophysical surveys and to gather data on benthic ecology. Grab surveys consists of the sampling of surface sediments and generally do not penetrate deeper than two metres. It is possible that maritime archaeological remains will be impacted, and possibly recovered, by grab sampling.

Diving Operations and Inspections

6.2.19. Diving teams can be used at all stages of oil and gas developments, from the pre-development stage (e.g. diver ground truthing of obstructions located from geophysical surveys), construction (e.g. diver involvement in subsea construction and installation), production (e.g. routine diver inspection of subsea structures), to the post production and decommissioning stage (divers involved in the removal of subsea structures).

6.2.20. Diving operations will generally have limited impact on maritime archaeological remains. However, anchoring procedures for dive support vessels may have some impact.

Remotely Operated Vehicles (ROVs)

6.2.21. ROVs generally undertake similar tasks as divers but are not constrained by depth or time. They will normally not impact directly upon maritime archaeological remains but it is possible that accidental interference might occur. In limited visibility or strong currents, ROVs may be piloted into or near a wreck site and cause damage by direct impact or by fouling the ROV umbilical on wreck structure.

6.2.22. Tractor ROVs can be used for trenching operations with a typical system deploying high and low pressure jets to cut into and fluidise the seabed sediment to create the trench, followed by the re-burial of the pipeline after it has been laid in the trench. As with free swimming ROVs, entanglement of umbilical with wreck structure may result in a direct impact. Other impacts from tractor ROVs may occur where the machine itself tracks over archaeological remains or where the water jet cuts through wreck elements. The system of trenching and reburial of the pipeline without spoil being recovered to the surface reduces the scope for archaeological remains to be identified by onboard monitoring.

6.3. EXPLORATORY AND APPRAISAL WELLS

6.3.1. After a potential hydrocarbon reservoir has been located the next stage will be to drill an exploratory well. This will seek to confirm the existence of hydrocarbons and inform on their extent. The exploratory well head will either be used as a production well, capped with a subsea structure for possible future use as a production well, or permanently capped if results indicate an unproductive well. A number of these wells may need to be drilled to quantify the extent of the reservoir prior to the production phase.

6.3.2. During the production phase of a reservoir it may also be necessary to drill appraisal wells to determine the volume and movement of hydrocarbons within the reservoir through time.

6.3.3. As a number of both exploration and appraisal wells may need to be drilled at selected locations over the reservoir a moderate to high level of potential impact on maritime archaeological remains might be expected. Careful archaeological investigation in and around the proposed footprint of the well may mitigate against possible impacts on archaeological remains.

6.4. CONSTRUCTION

6.4.1. During the construction phase for hydrocarbon development a wide range of subsea structures may be erected. Well heads have to be constructed prior to test drilling and larger structures are required for production phases. Well heads and production and storage platforms will be interconnected by a network of subsea pipelines.

6.4.2. Changing the topography of the seafloor can have a profound effect on sediment transportation dynamics and/or currents, and could therefore have a secondary impact on maritime archaeological remains. By changing these dynamics, the rate of scouring around a wreck may be increased allowing the wreck to become more exposed and in danger of decay. Conversely, the rate of deposition of sediment upon a site could increase and, if unstable, damage the site.

6.5. ONSHORE WORKS

6.5.1. Most existing hydrocarbon developments within the Irish Sea have some form of associated onshore footprint. Gas pipelines will require a landfall site for the pipeline itself and a reception facility will normally be required to reduce the pressure of the transported gas. Oil will likewise require transport to terrestrial refineries.

6.5.2. Prior to construction of these landfall sites, boreholes will normally be obtained from the proposed footprint. The purpose of these boreholes is to inform on the local geology at the landfall site. This sampling procedure may impact upon maritime archaeological remains at the coast, within intertidal deposits, or in former marine areas that have been reclaimed.

6.5.3. In some cases boreholes can actually penetrate archaeological remains, and it is only when the sample has been recovered that any impact will be realised. For example, during the preparation of the landfall site for the Ormen Lange gas pipeline and associated reception facilities at Easington on the east coast of England, a series of

boreholes were taken on the foreshore. One of the cores encountered a concrete obstruction that may have been the remains of a WWII Royal Observer Corps post known to have eroded from the adjacent cliff. (Betts *et al.* 2003; Wessex Archaeology 2004b).

6.5.4. For landfall sites, pipeline trenching may be required on the foreshore, to connect with the subsea pipeline trench. The cutting of the trench itself will have an impact on archaeological remains. Consideration must also be given to impacts from associated activities. For examples, works will normally be required for the construction of compounds, access roads, offices and so on which, while usually temporary, may impact on archaeological remains as a result of topsoil stripping, levelling and trenching for services, drainage and foundations.

6.6. DECOMMISSIONING

6.6.1. After the production phase and depletion of a particular hydrocarbon reservoir the government grants a Cessation of Production Permit (COP). The developer will then normally be required to decommission the facility in an approved manner. This may involve carrying out a number of defined tasks such as removing all subsea structures and installations, or ensuring that anything left behind does not adversely affect the marine environment or other users of the sea (UKOOA 2002).

6.6.2. As part of the decommissioning process the seabed is likely to be disturbed in a number of ways. Anchoring procedures for work vessels or platforms may directly impact on known or previously unknown archaeological remains. All wellheads, casings, pilings and other obstructions may be removed to a defined depth, also impacting on archaeological remains, known or unknown. Finally, a post development survey of the site will normally be required, but as this is likely to consist of sidescan and/or swath bathymetric surveys little or no impact might be expected.

7. METHODS OF INVESTIGATION

7.1. OUTLINE

7.1.1. This section outlines the means of investigating maritime archaeological remains likely to be available in the course of planning, assessing, designing, constructing and operating oil and gas facilities. The section addresses desk-based, geophysical and seabed methods of investigation, encompassing investigations whose principal objectives are not archaeological but which may generate data of archaeological interest, together with archaeologically-purposive investigations commissioned to meet archaeological objectives.

7.1.2. Current methods of investigation of maritime archaeological remains draw heavily from techniques developed for other forms of seabed survey, including surveys commonly conducted in the course of developing oil and gas proposals. There is considerable scope for examining existing geophysical data from an archaeological perspective, or for introducing archaeological objectives when commissioning new surveys.

Desk Based Assessment

7.1.3. The Institute of Field Archaeologist s (IFA) defines a DBA as:

> … *a programme of assessment of the known or potential archaeological resource within a specified area or site on land, inter-tidal zone or underwater. It consists of a collation of existing written, graphic, photographic and electronic information in order to identify the likely character, extent, quality and worth of the known archaeological potential archaeological resource in a local, regional, national of international context as appropriate.* (IFA 1999)

7.1.4. A desk-based assessment of the known maritime archaeological resource, as part of an EIA prior to oil and gas developments in the SEA 6 area, would be expected to draw upon a number or sources. These would include:

- **UK Hydrographic Office (UKHO) Wreck Index:** Has been responsible for charting shipwrecks since 1913. Also holds records of uncharted wrecks where general locations of loss are known but precise positions are not. Data now made available via SeaZone.
- **National Monuments Records (NMRs):** Maintained by EH, Wales and Scotland. Include maritime sections that contain records of wrecks, obstructions, casualties, aircraft and other archaeological material. Cannot be considered a comprehensive record of losses at sea as the majority of records date from between the mid-eighteenth century to the mid-twentieth century.
- **Sites and Monuments Records (SMRs) / Historic Environment Records (HERs):** Maintained by local authorities. Essentially an archive of archaeological sites of various types and periods. An increasing number of SMRs/HERs contain details of marine sites.

- **The Receiver of Wreck (UK) (Maritime and Coastguard Agency):** Holds details of all recovered wreck material that has been reported to the Receiver.
- **The Receiver of Wreck (IOM) (Department of Transport):** As is the case in the UK, it is a legal requirement to report all wreck material to the IOM Receiver, who may therefore be a source of information on previously investigated sites.
- **Shipwreck Database of Northern Ireland:** A computerised database of underwater archaeological sites in Northern Ireland coastal waters consisting of over 3000 entries.
- **Shipwreck Database for Ireland:** The Underwater Unit of the Department of the Environment, Heritage and Local Government, is currently compiling a National Shipwreck Inventory for the Republic of Ireland.
- **Existing geophysical and geotechnical survey data:** Often the client commissioning the EIA will hold a series of existing geophysical data for the study area in question. This is likely to include bathymetric, sidescan survey, magnetometer survey, borehole survey, grab survey, benthic survey and/or diving/ROV inspection reports which, if acquired to a suitable specification, may provide direct evidence of the presence or absence of archaeological material within the survey footprint.
- **Historic charts:** Cartographic charts can inform on the presence of maritime archaeological remains that no longer appear on modern charts. **Figure 4** provides an example of shipwreck that was recorded and then lost, before being subsequently rediscovered and designated under the *Protection of Wrecks Act 1973.*

7.2. FIELD INVESTIGATIONS

Bathymetric Survey

7.2.1. Swath bathymetric (e.g. multibeam) surveys, when conducted at sufficiently high resolutions and with narrow survey lines can locate localised topographic anomalies. After interpretation of the processed data by qualified maritime archaeological geophysicists, it may be possible to identify these anomalies as wreck sites or other maritime archaeological remains.

Sidescan Survey

7.2.2. When sidescan surveys are conducted at sufficient resolution and coverage localised topographic anomalies, as with bathymetric surveys, can be identified. Again, analysis of results by suitable qualified archaeologist can identify wreck sites.

Sub-bottom Profiling

7.2.3. High resolution sub-bottom profiling can be used to investigate the detailed structure of sediment units beneath the seafloor and may be used to locate unknown buried wreck sites and quantify the buried extents of known wrecks.

Magnetometer Survey

7.2.4. Magnetometer surveys can locate substantial metal/ferrous wreck sites that are either on or below seafloor sediments.

Borehole and Vibrocore Survey

7.2.5. Borehole and vibrocore samples show the character and stratigraphy of seabed sediments. The results are usually used archaeologically to identify significant horizons such as Holocene or earlier alluvium. However, the samples may indicate the presence of wreck sites, either on the seafloor or buried in sediment, when recovered samples contain elements of wreck structure or other maritime archaeological remains.

Diver Inspection

7.2.6. When an anomaly has been identified by geophysical or other survey methods it may be necessary to conduct diver inspections. Diver inspection of possible wreck sites can inform on the extent and possible historical or archaeological importance of the site. As part of the diver inspection measured drawings, video and photographic surveys can be undertaken of the exposed elements of the site.

7.2.7. If required as part of the mitigation strategy full excavation and recovery of the archaeological remains will then be conducted. This will normally involve the deployment of an archaeological diving team who will establish the position and extent of the site or remains, produce a pre-disturbance plan and then excavate and recover artefacts to the surface. After recovery all finds must be recorded and conserved and a full excavation report compiled.

7.2.8. However, divers are constrained by depth and time, and in certain cases it may be necessary to deploy ROVs.

Remotely Operated Vehicles (ROVs)

7.2.9. ROVs, as with divers, can undertake visual inspection and recording, but only under the direction of a suitably qualified archaeologist.

7.2.10. It may be possible to use ROVs to conduct underwater excavation when diving becomes impracticable. The Ormen Lange Marine Archaeology Project is an example of how effective ROVs can be in excavating historic wrecks at depth. Prior to the installation of a subsea gas pipeline, part of the gas transportation network from the Ormen Lange gas field off the north west coast of Norway, an historic wreck was discovered during a marine archaeology survey by the Norwegian University of Science and Technology (Jasinski 2004).

7.2.11. In 2004 the site and surrounding areas were surveyed by ROV- mounted video, sub-bottom profiling and magnetometery. The stern section of the wreck was also partially excavated by ROV (**Plate 7**). This excavation illustrates the possibilities open to oil and gas industries when dealing with deep water maritime archaeological remains.

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APPENDIX I: PROTECTION OF WRECKS ACT 1973

Designations under Section One of the Protection of Wrecks Act 1973

Site name	Location WGS 84 DDM	Description
The Smalls	51°43.202N 05°40.1937W	The findspot of a brass guard of a Viking Sword dating to the 11th century AD. Discovered in 1991 by sports divers the site was protected initially by a 600m diameter designated circle, which was subsequently reduced. Protected Area: 100m
Tal-y-Bont/ Bronze Bell	52 46.7472N 04 07.6045W	A 18th century shipwreck. No substantial hull structure remains though the cargo of Carrara marble, the ships anchors and cannon are prominent on the seabed, and can even be seen from the surface at low water. Discovered in 1978 by divers who recovered some artefacts, including a bronze bell which had the date 1677 clearly depicted on its surface. Protected Area: 300m radius
The*'Diamond'*	52 46.531N 04 11.025W	A 19th century composite wreck built of wood with copper sheathing, but with iron strengthening to the frame, with two large water tanks. The ship remains unexcavated, so her cargo and form and even her identity is uncertain. Survey and research into this vessel continues. Protected Area: 200m radius
Pwll Fanog	53 12.7813N 04 11.7915W	A slate carrying cargo vessel from around 14th or 15th century. The slates were from the Llanberis area, split with a gouge and stacked into the wooden vessel which survives beneath its heavy cargo. This gives important information about the North Wales slate industry in late medieval periods (Cadw) Protected Area: 150m radius
Resurgam	53 23.7940N 03 33.2590W	The world's earliest extant powered submarine, *Resurgam* was designed by Rev Garrett in 1879 and built by J T Cochrane in Birkenhead. She sank 15 miles off Rhyl on the way to Portsmouth for naval trials. Protected Area: 300m radius
Mary	53 25.2798N 04 36.7393W	The 'first British yacht', built by the Dutch East India Company and given to King Charles II on his restoration. The vessel was used for official journeys and for royal leisure trips for about a year and was then used to transport officials between Dublin and Britain. Sunk in 1675, she has been partially excavated and artefacts are now held in Liverpool Museum. Protected Area: 100m radius

Source: Cadw, Wessex Archaeology.

Designations under Section Two of the Protection of Wrecks Act 1973

Site name	Location	Description
SS *Castillian*	53 25.0107N 004 35.9176W	Wrecked while waiting to join a southbound convoy on the night of 12/02/1943. She was carrying a cargo of copper ore, 'bogie' wheels, aircraft propeller blades and A/A timing heads. There is also a large quantity of live 4.5" A/A shells and 40mm shells on the wreck. Protected Area: 500m radius

Source: Maritime and Coastguard Agency

Designations under the Protection of Wrecks Act 1982 (IOM)

Site name	Location	Description
HMS *Racehorse*	South east coast of the Isle of Man	The 18-gun brig wrecked after striking the 'Skerranes' rocks while under order to escort the crippled cutter *Vigilant* back to England. 100 crew rescued, 6 drowned; 3 Castletown rescuers drowned..

APPENDIX II:PROTECTION OF MILITARY REMAINS ACT 1986

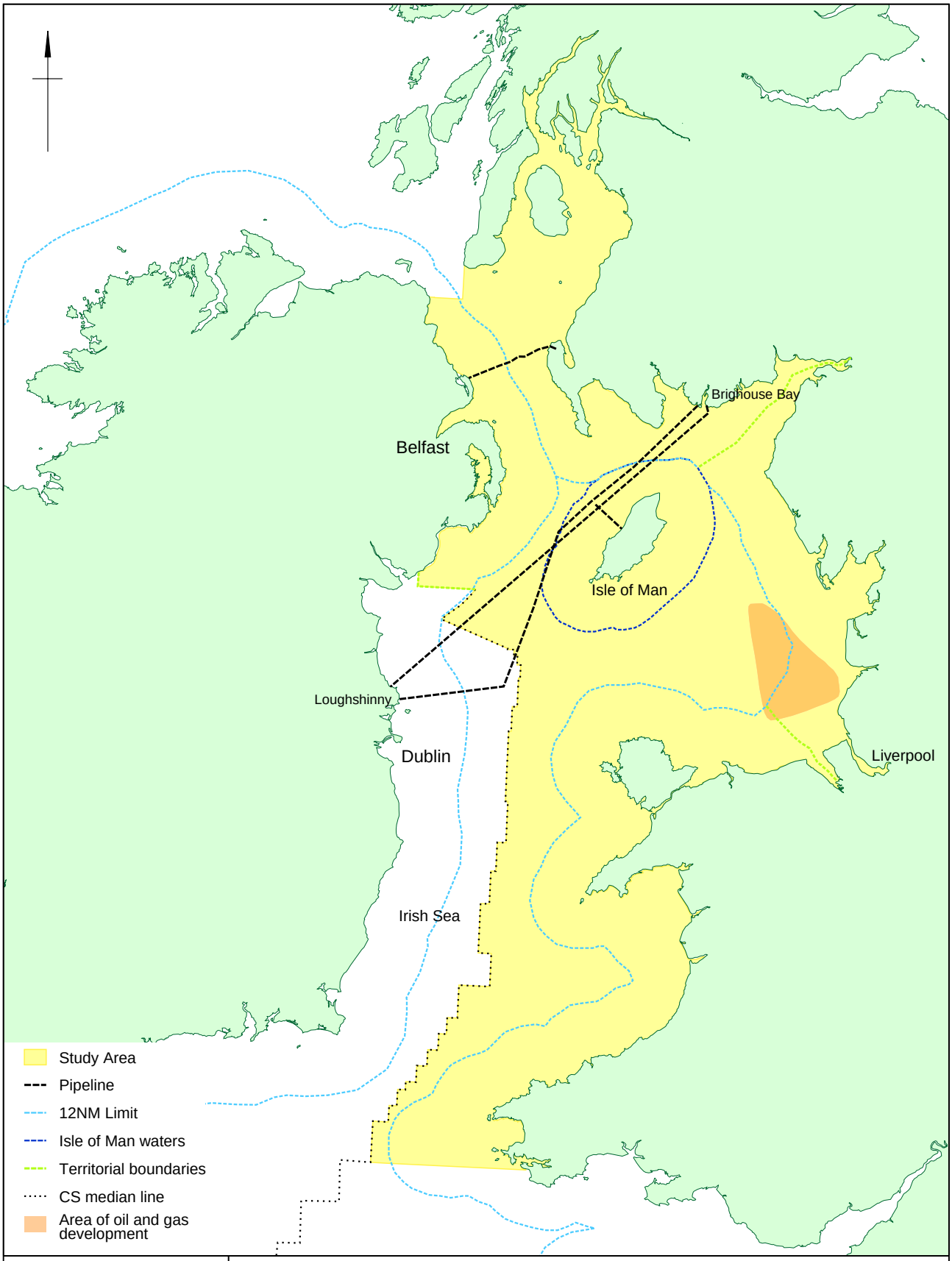
Site name	Location	Description
HMS*Dasher*	Firth of Clyde	The escort aircraft carrier HMS *Dasher* was destroyed by internal explosion in the Firth of Clyde on 27/03/1943. While engaged in deck/ landing operation training the *Dasher* suffered an aviation/gasoline explosion as a result of which she sank within 3 minutes. No absolute cause was determined at the time. The vessel's normal complement was 520. She sank with the loss of 379 lives.
HMS *H5*	Off Anglesey	On 06/03/1918 the submarine HMS *H5* was sunk in collision with British Cargo Ship SS *Rutherglen*. All perished including a United States Naval Officer.

Source: Ministry of Defence, UK.

APPENDIX III: U-BOAT LOSSES

Vessel name	Type	Location	Description
U-1051	VIIC	South of the Isle of Man	Sunk 26/01/1945 by ramming and depth charges from the British Frigates: HMS *Aylmer*, HMS *Calder*, HMS *Bentinck* and HMS *Manners*, 47 dead, all hands lost.
U-33	VIIA	Firth of Clyde	Sunk 25/07/1940 by depth charges from the British minesweeper HMS *Gleaner*, 25 dead, 17 survivors.
U-246	VIIC	South of the Isle of Man	Lost during April 1945. Listed as missing on 05/04/1945. No known reason for loss, 48 dead, all hands lost.
U-1024	VIIC/	South of the Isle of Man	Captured 12/04/1945 by the British frigates HMS *Loch Glendhu* and HMS *Loch More.* Sank while under tow on 13/04/1945, 9 dead, 37 survivors.
U-1172	VIIC/	St George's Channel	Sunk 27/01/1945 by depth charges from the British frigates HMS *Tyler*, HMS *Keats*, and HMS *Bligh*, 52 dead, all hands lost.
U-1302	VIIC/	St George's Channel	Sunk 07/03/1945 by depth charges from the Canadian Frigates HMCS *La Hulloise*, HMCS *Strathadam* and HMCS *Thetford Mines*, 48 dead, all hands lost.
U-242	VIIC	St George's Channel	Sunk on 05/04/1945 by a mine in the mine barrage QZX, 44 dead, all hands lost.

Source: http://uboat.net/maps/irish_sea.htm



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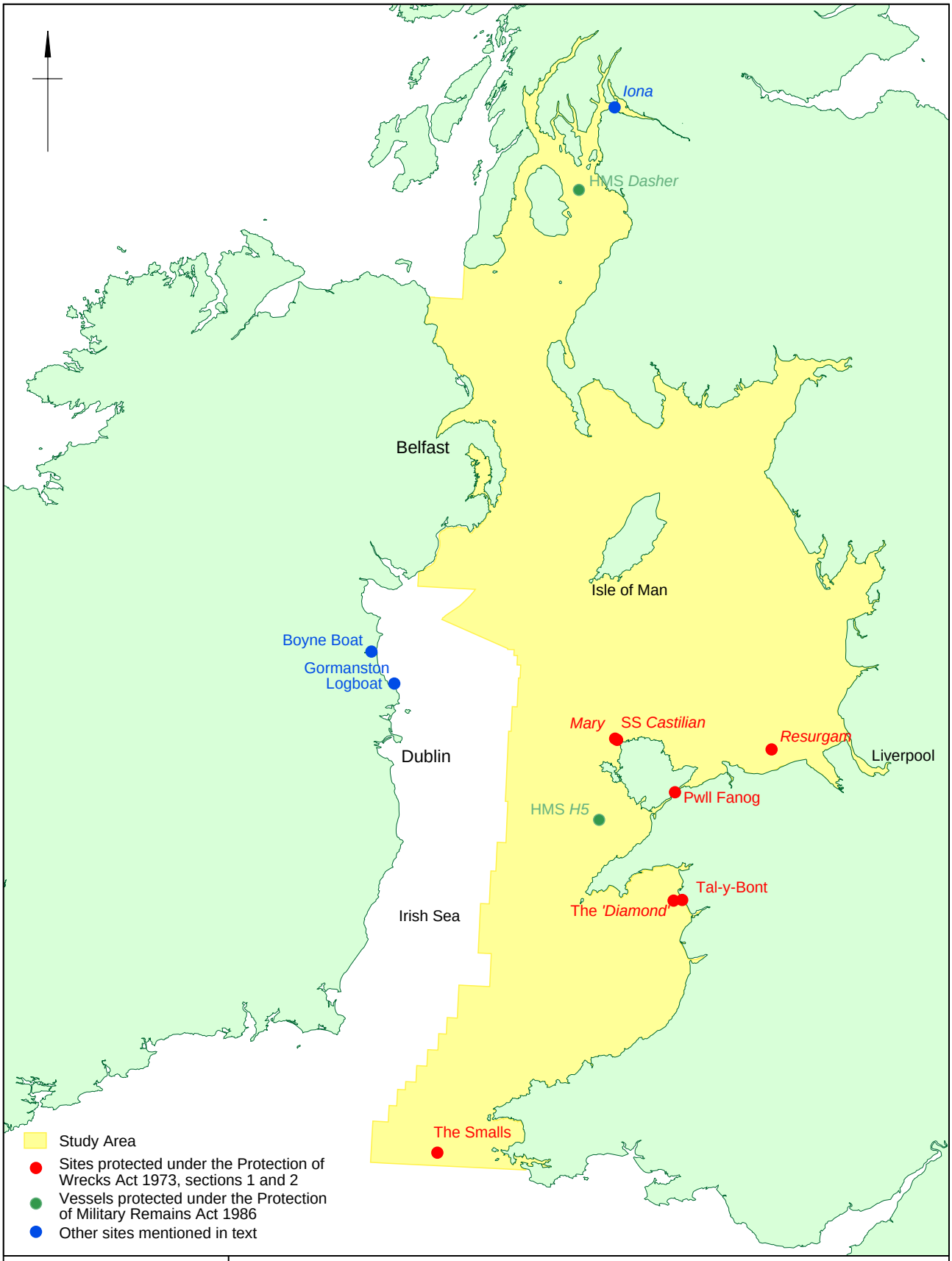
Wessex Archaeology

Study Area

Figure 1



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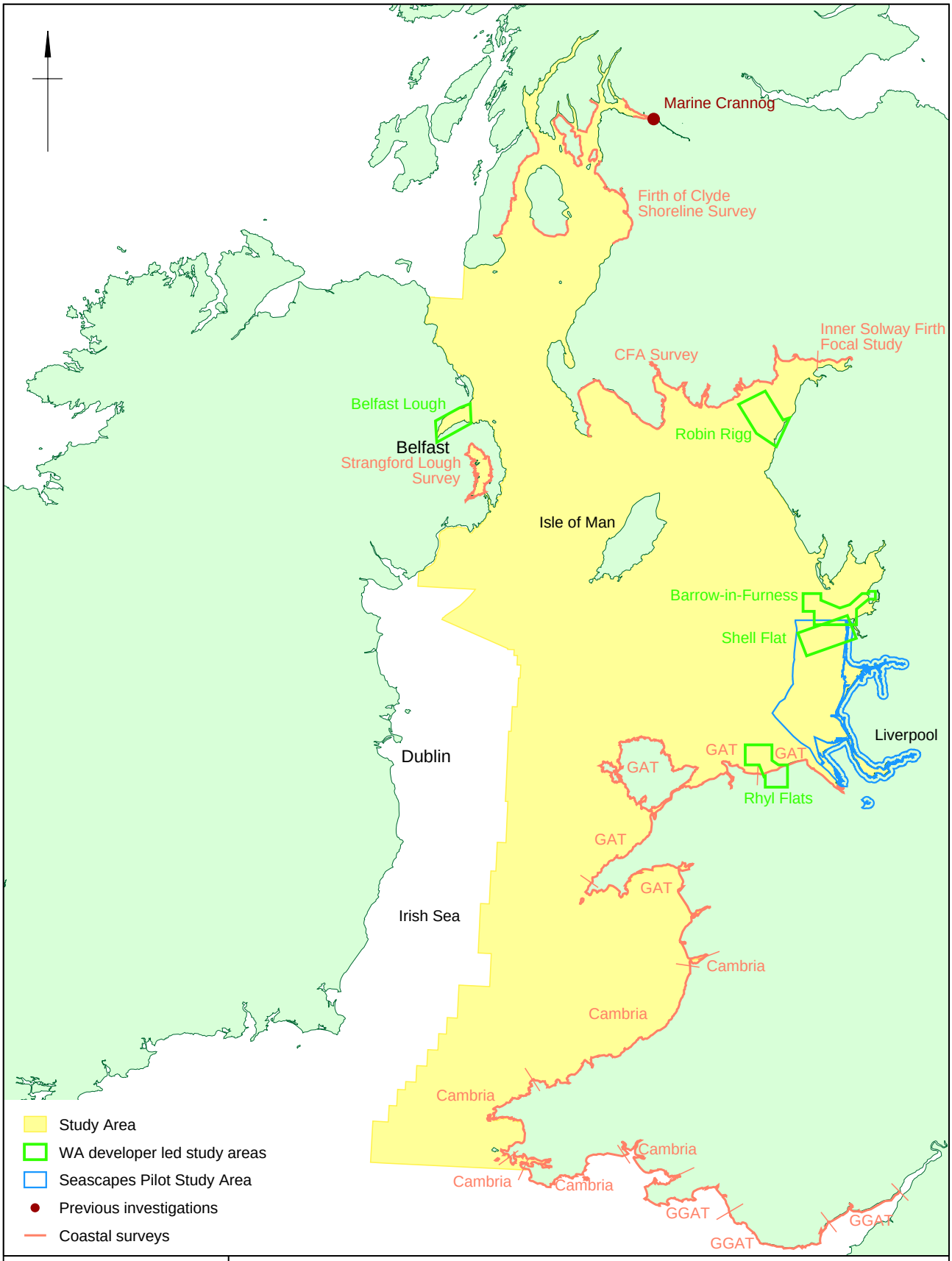
Wessex Archaeology

Archaeological sites

Figure 2



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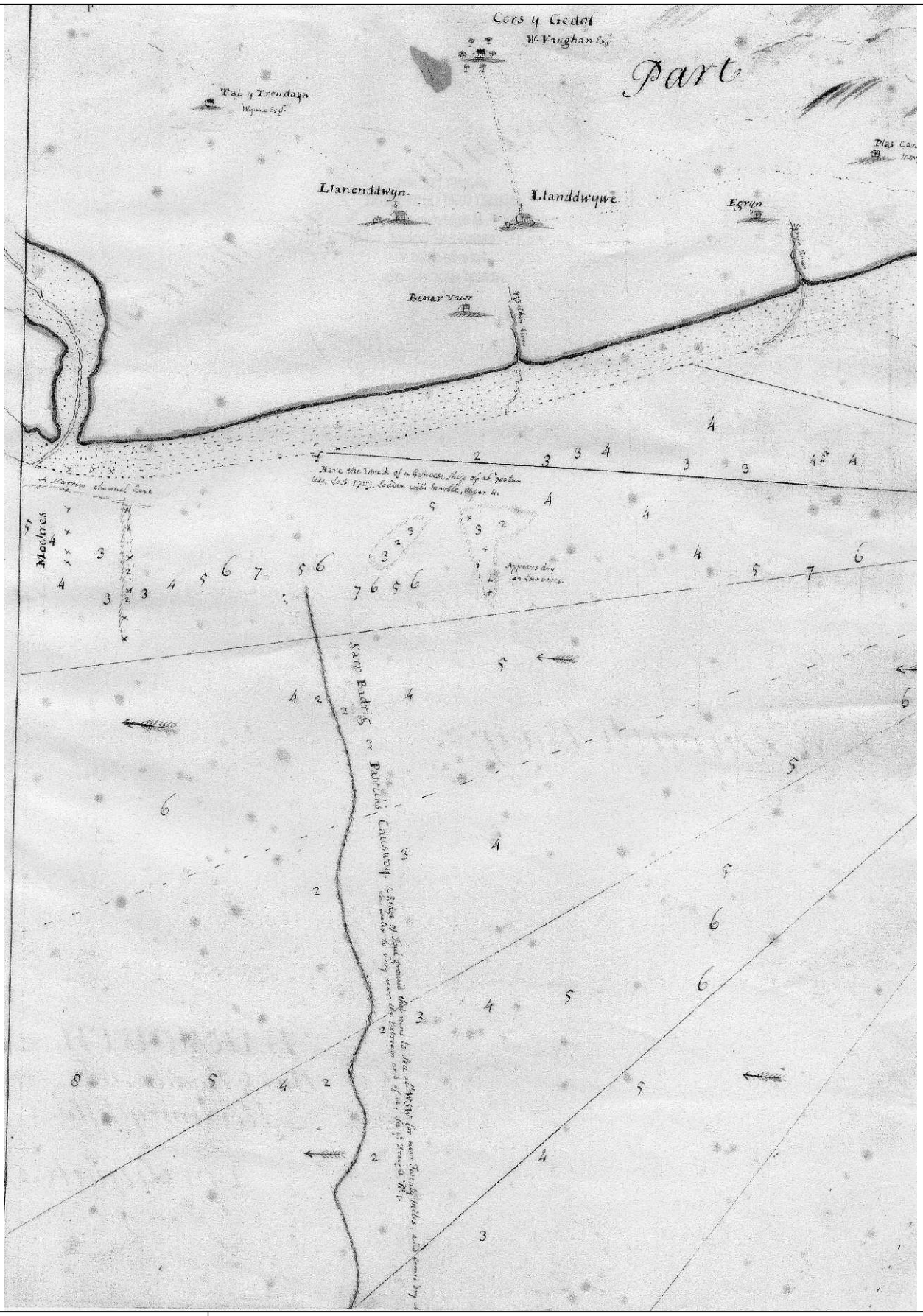
Wessex Archaeology

Previous investigations

Figure 3



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Wessex Archaeology

Admiralty Map showing Sarn Badrig reef and the protected wreck Tal-y-Bont

Figure 4

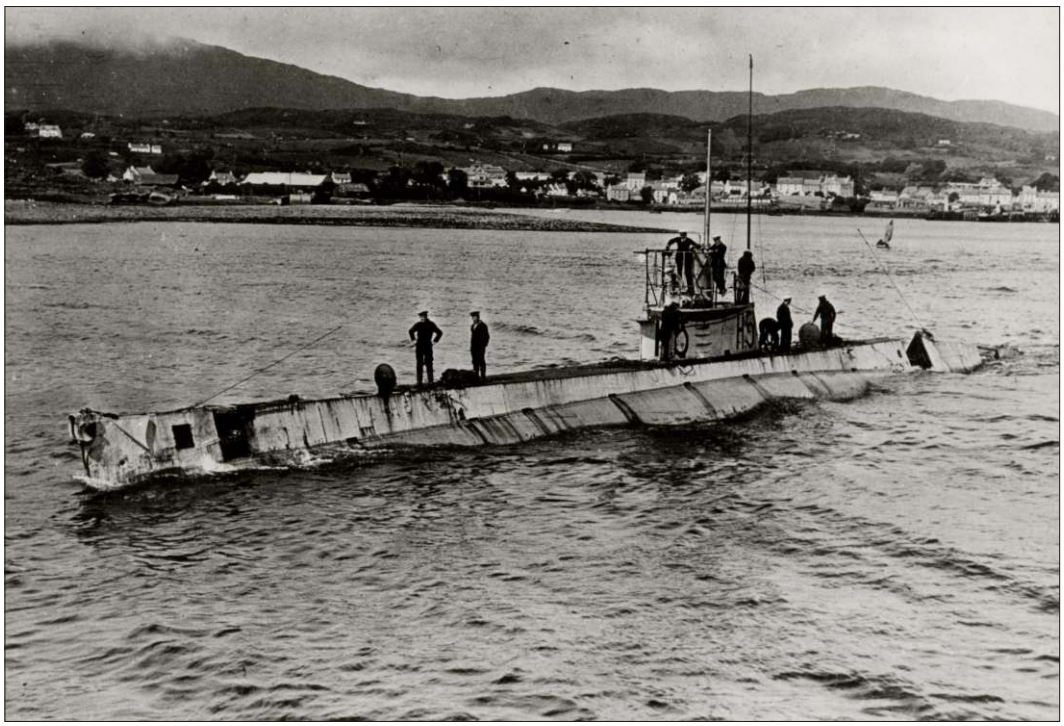

Plate 1: HMS H5, protected wreck (reproduced with the kind permission of the Royal Naval Submarine Museum, Gosport)

Plate 2: Gormanstown logboat (reproduced with the kind permission of ADCO Ltd)

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	Path:	W:\PROJECTS\58890\DO\Report Figures\Assessment\05-03-09\plates.cdr		

Plate 3: Marble cargo mound on Tal-y-Bont, protected wreck

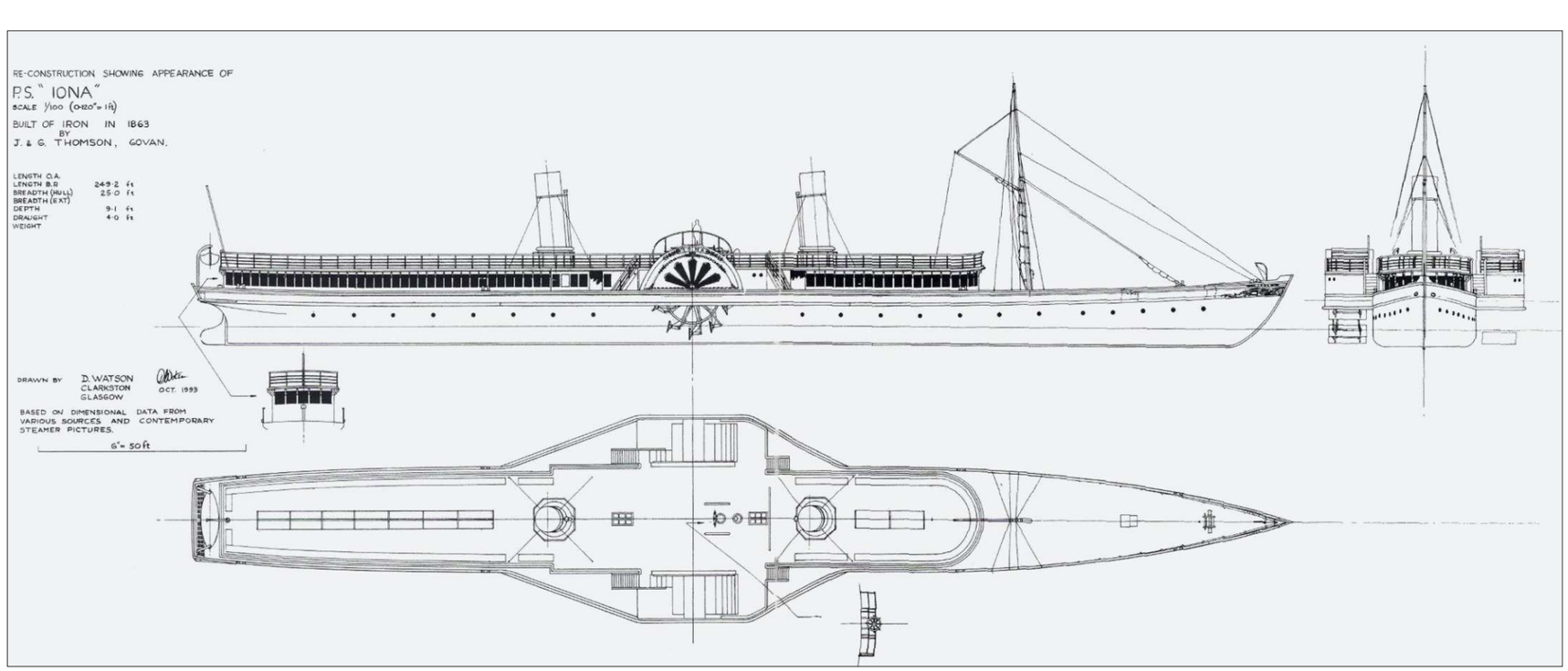

Plate 4: Iona side paddle steamship

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Report figures\Assessment\05-03-09\Plates_A3.cdr	

Plate 5: Iron knees on The '*Diamond*', protected wreck

Plate 6: Gaspipeline IC2, trenching near Gormanstown (reproduced with the kind permission of ADCO Ltd)

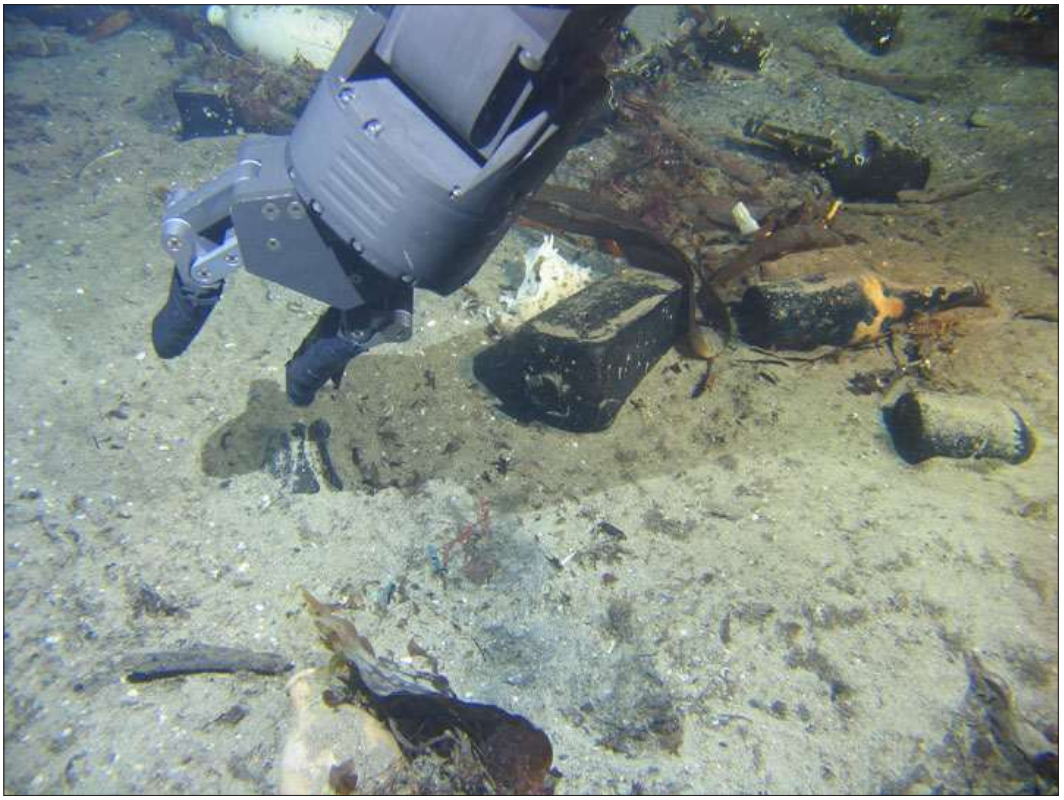

Plate 7: Excavation by ROV, Ormen Lange gas pipeline development (reproduced with the kind permission of the Norwegian University of Science and Technology)

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