Dublin Array Offshore Wind Farm Supporting Information Report- Annex D

Marine Archaeology Assessment

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Glossary

Term	Definition
Archaeological Exclusion Zone (AEZ)	Areas where archaeological receptors are present, and which must be avoided during project works
BCE	Before Common Era
BIIS	British-Irish Ice Sheet
BP	Before Present
BSB	Below Seabed
CD	Chart Datum
CIfA	Chartered Institute for Archaeologists
CPT	Cone Penetration Test
DAU	Development Applications Unit
DCCAE	Department of Communications, Climate Action and Environment
DCHG	Department for Culture, Heritage and the Gaeltacht
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FLA	Foreshore Licence application for the Preliminary Site Investigation works in 2021 on the Dublin Array Offshore Windfarm
IAI	Institute of Archaeologists of Ireland
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
innogy	innogy Renewables Ireland Ltd now RWE Renewables Ireland Ltd
ISIS	Irish Sea Ice Stream
LGM	Last Glacial Maximum
MA	Maritime Archaeology Limited
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MS	Method Statement
NMI	National Museum of Ireland

NMS	National Monuments Service
OD	Ordnance Datum
PAD	Protocol for Archaeological Discoveries; detailing how unexpected archaeological discoveries should be reported during the lifetime of the project
RWE	RWE Renewables Ltd (a wholly owned subsidiary of RWE AG)
SAM	Static Acoustic Monitoring devices for recording trains of echo-location clicks made by porpoises, dolphins and other toothed whales
SI	Site Investigation
UAU	Underwater Archaeology Unit
UHR / 2DUHR	Ultra High Resolution Seismic Survey / 2 Dimensional Ultra High Resolution Seismic Survey
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WIID	Wreck Inventory of Ireland Database
WSI	Project specific Written Scheme of Investigation document forming the agreement between the client, the appointed archaeologists, contractors and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential archaeological receptors within the development area.
WTG	Wind Turbine Generator

1. Introduction

1.1. Overview

1.1.1. Maritime Archaeology (MA) have been commissioned by RWE Renewables Ireland Ltd (previously innogy) (the Applicant) to undertake a marine archaeological assessment, in support of the Foreshore Licence application for geophysical and geotechnical Site Investigation (SI) works in addition to ecological and wind, wave and current monitoring on the Dublin Array Offshore Windfarm (Dublin Array).

1.1.2. The purpose of this document is to provide a characterisation of the baseline environment to understand the potential impact of the SI works, including geophysical survey, geotechnical survey and the deployment of monitoring equipment, together referred to as the proposed licenced works, in order to inform and support the application for the Foreshore Licence relating to the proposed works.

1.1.3. This document outlines the methodology used to characterise the marine archaeology baseline and to undertake the impact assessment (**Section 2**). **Section 3** contains the baseline characterisation of marine archaeology within the Foreshore Licence area and includes a description of the previous archaeological work undertaken in the immediate area, the environmental context, and maritime activity in relation to known and unknown marine archaeology receptors. **Section 4** outlines the proposed mitigation measures that will be used during the proposed licenced works. The results of the impact assessment are presented in **Section 5**.

1.2. Scope of Works

Project summary

1.2.1. RWE Renewables Ireland Limited (RWE) are applying for authorisation to undertake site investigations for the proposed Dublin Array offshore wind farm development, in addition to ecological, wind, wave and current monitoring. The site is located immediately south of Dublin City in the foreshore adjoining the functional areas of Dublin City Council, Fingal County Council. Dun Laoghaire and Rathdown County Council and WIcklow County Council and extends approximately 17 km offshore and includes the vicinity of the Kish and Bray banks (Figure 1).

Proposed works

1.2.2. The proposed licenced works within the Foreshore Licence area are composed of a geotechnical survey scope, a geophysical survey scope, ecological surveys, wind, wave and current measurement monitoring as detailed below.

Geotechnical survey

1.2.3. The geotechnical survey will consist of:

- Up to 61 subtidal boreholes to a geologically shallow depth of approximately 80 m below seafloor are proposed within the array area to target proposed foundation locations. A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string with an outside diameter of up to 254 mm and stabilised using a seabed frame.;
- Up to 61 Deep Push seafloor Cone Penetration Tests (CPT) of approximately 40 mm in diameter and to an approximate depth of 80 m BSF within the proposed array area;
- Up to 31 Seafloor CPTs of approximately 40 mm in diameter and to a target depth of 6 m BSF along the proposed export cable routes, five of the 31 cable route CPTs may be located within the intertidal areas;
- Up to 12 nearshore Geotechnical Boreholes, approximately 254 mm diameter, with wireline logging and Rotary Cored Drilling to target depth of 45 m BSF within the proposed intertidal and shallow water in water depths varying from 0 m to a maximum water depth of 7 m (four at each landfall option);
- 48 vibrocores, approximately 150 mm diameter and with a penetration depth of up to 6 m along the export cable routes, five of the 48 vibrocores may be located within the intertidal areas;

1.2.4. Indicative geotechnical sampling locations are shown in Figure 2. It should be noted that the sampling locations along the export cable routes extend into the WTG area at their offshore extent.

Geophysical survey

1.2.5. The geophysical survey will include:

- A 2D Ultra High Resolution Seismic (2DUHRS) survey and full suite of geophysical surveys for the array area (including a bathymetric survey, Side Scan Sonar (SSS), Shallow Reflection Seismic (Sub-bottom Profiling [SBP] and Marine Magnetometer [MAG]);
- A full suite of geophysical surveys for the Offshore EEC (including a bathymetric survey, SSS, Shallow Reflection Seismic (SBP and MAG survey); and
- Refraction survey at proposed intertidal locations including shallow water and intertidal area.

1.2.6. The proposed techniques and equipment are outlined in **Table 1**.

Table 1 Geophysical survey equipment specification

Survey technique	Operating frequency (kHZ)	Est sound level at 1m over frequency band 10 Hz to 10kHZ Sound Exposure Level (dB re1µPa^{2}s)	Est sound level at 1m over frequency band 10 Hz to 10kHZ Sound Pressure Level (dB re1µPa$_{Peak}$)	Shot interval (s)	Typical length of towed equipment (m)
Side-scan Sonar (SSS)	300-500 (low) 500-900 (high)		228		<300
Multi-beam Echosounder (MBES)	190 -420		200-235	50	Hull- or Pole-mounted
Magnetometer (MAG)	passive	passive	passive	passive	300
Single-beam Echosounder (SBES)	200		200		Hull- or Pole-mounted
Sub Bottom Profiler (pinger)	2-200		200-225		Hull- or Pole-mounted, or 150
Sub Bottom Profiler (boomer)	5	222	200-225	0.333	150
UHR Seismic Sparker	4	190	200-225	0.250	150
Refraction	5-150Hz	225dB	230dB	5s to 60s	50 – 100 A sensor string of length 100m to 235m will be laid on the seabed to record the response.

1.2.7. The above outlined geophysical surveys are non-intrusive in that they do not cause any disturbance of the sea-bed and they will comply with the requirements as set out in "Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters" (Department of Arts, Heritage and the Gaeltacht, 2014) and with the general requirements of the Underwater Archaeology Unit of the Department of Culture, Heritage & the Gaeltacht for a geophysical survey for archaeological purposes.

Ecological monitoring and surveys

The ecological monitoring programme and surveys will include:

- Deployment of up to 10 static acoustic monitoring devices (SAM) for the purpose of marine mammal monitoring;
- Up to three annual subtidal benthic ecology surveys comprising drop down video, grab sampling at up to 90 locations and up to 90 epibenthic trawls;
- Up to three annual intertidal ecology surveys comprising up to 24 shallow hand cores, typically 90mm in diameter and up to 500mm in depth will be taken to be analysed for infauna, sediment granulometry and organic carbon content;
- Up to three annual potting surveys and seasonal trawl surveys, up to 4 per year for up to 3 years, within the array and along the cable corridor to survey fish and shellfish.

Wind, wave and current measurement

1.2.8. The climate monitoring devices will include:

- Up to two buoys carrying FLiDAR units for wind measurement; and
- Up to two buoys with wave and current measurement devices.

1.2.9. The proposed locations of the above listed geotechnical sampling locations and SAM and wind wave and current measurement buoys are illustrated in **Figure 2**. These locations may be subject to revision following the review of the most up to date available geophysical survey data by a suitably qualified marine archaeologist.

Marine archaeology study area

1.2.10. The marine archaeology study area encompasses the whole Foreshore Licence area and incorporates the geophysical data collection and the geotechnical data areas (**Figure 1**). Within the Foreshore Licence area all known wrecks and sites, as well as reported losses, have been included in the baseline assessment utilising the datasets outlined in **Table 2** . Where the Foreshore Licence Area follows the east coast of Ireland all previous archaeological investigations and reported finds within 500m of the shoreline have been included in the study.

1.3. Aims and objectives

1.3.1. The aim of this report is to identify known or potential marine archaeological receptors within the Foreshore Licence area and provide an assessment of the effects on the receptors likely to be impacted by the proposed Licenced works as outlined above.

1.3.2. The key objectives for this assessment are to:

- Undertake a review of known and potential archaeological receptors within the Foreshore Licence area;
- Summarise the environmental context and identify deposits of archaeological potential; and
- Assess potential impacts on marine archaeology receptors and outline mitigation measures to protect the underwater cultural heritage resource during the proposed licenced works.

1.4. Legislation and guidance

1.4.1. MA is a Registered Organisation with the international Chartered Institute for Archaeologists (CIfA); all work conducted by MA is in accordance with the guidance and principles set out in CIfA's *Code of Conduct* (2019a) and *Code of Professional Conduct* (2019b). The following Irish legislation, guidance and best practice has been consulted as part of this assessment:

- Foreshore Acts 1933 to 2014;
- National Monuments Acts 1930-2014;
- Heritage Acts 1995 and 2018;
- Dumping at Sea Acts 1996 to 2009 (and various amendments);
- Planning and Development Act 2000 (as amended);
- Minerals Development Acts 1979 and 2017;
- Annex III (3) of the EIA Directive 2014/52/EU;
- Annex IV (5) of the EIA Directive 2014/52/EU;
- Frameworks and Principles for the Protection of the Archaeological Heritage (Department of Culture, Heritage and the Gaeltacht [DCHG], 1999);
- *Data and Information Sources for Offshore Renewable Energy Developments* (Department of Communications, Climate Action and Environment [DCCAE] and Sustainable Energy Authority of Ireland, 2016)
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency [EPA], 2017);
- Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects (DCCAE and Sustainable Energy Authority of Ireland, 2017);
- Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects, Part 1 (DCCAE, 2018a); and

- Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects, Part 2 (DCCAE, 2018b).

1.4.2. It should be noted that wrecks over 100 years old (from date of loss) and archaeological objects found underwater are protected under the National Monuments (Amendment) Acts 1987 and 1994. Significant wrecks and the potential location of wrecks or archaeological objects less than 100 years old can be designated by Underwater Heritage Order on account of their historical, archaeological or artistic importance under Section 3 of the National Monuments (Amendment) Acts 1987 Act.

2. Methodology

2.1. Baseline assessment methodology

2.1.1. This assessment includes data from the sources detailed in **Table 2**, as well as various publications and grey literature.

Table 2 Sources used for the marine archaeology assessment.

Data source	Details
Archaeological Excavations Bulletin https://excavations.ie/ [17/06/2021]	Irish database compiled from the published Excavations Bulletin from the year 1970-2010 and includes additional online-only material from 2011 onwards. The map search was used to find relevant reports.
Brooks and Edwards Seal-level Database for Ireland (2006)	This data was consulted to inform the palaeoenvironmental potential of the area.
Heritage Maps Viewer https://www.heritagemaps.ie/ [17/06/2021]	The Heritage Maps Viewer is run by the Heritage Council (HC). It was used primarily to access archaeological reports from assessments and excavations in the area.
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Shipwreck Database	INFOMAR aims to map the physical, chemical, and biological features of Ireland's seabed. The shipwreck data was downloaded in vector form and contained all Irish shipwrecks, their known location and associated information.
INFOMAR Geophysical Data	The geophysical data (5m grided bathy and 2m gridded bathy, where available) from INFOMAR was assessed in ArcGIS.
National Museum of Ireland (NMI) Dublin and https://www.heritagemaps.ie/ [17/06/2021]	The topographical files relating to the townlands along the coast from Dublin Bay, Co. Dublin to Bray, Co. Wicklow were consulted at the NMI in Dublin in January 2020. Although the archives of twenty townlands were investigated, only five returned relevant records, including: Blackrock, Bray, Dalkey Island, Killiney and Sandymount. The online NMI finds database for the FLA Area was also consulted in June 2021.
Sites and Monuments Records (SMR), held by the National Monuments Service (NMS)	The SMR onshore and intertidal data was made available through the online Historic Environment Viewer database. A polygon was created to include the townlands along the coastline from Howth, Co. Dublin to Bray, Co. Wicklow and extended from MHWS to approximately 1km inland.
United Kingdom Hydrographic Office (UKHO) via INFOMAR	UKHO wrecks are included in the INFOMAR data and are categorised as;

Data source	Details
	• Obstruction; or • Wreck and classified as: • LIVE, detected in recent surveys; • DEAD, not detected in recent surveys; and • LIFT, removed from the seafloor.
Wrecksite.eu	Database used to find additional information and wreck reports for identified shipwrecks in both the UKHO and INFOMAR datasets.
Wreck Inventory of Ireland Database (WIID), held by the National Monument Service (NMS)	Data from the WIID was downloaded from the NMS online Wreck Viewer. The known locations of wrecks are represented, however, these only account for c. 22% of the total number of records held by the NMS. The coordinates given represent the known approximate centre of the wreck and is not indicative of its geographic extent.

2.1.2. Further to the above outlined sources, the archaeological reports produced for the Dublin Array Environmental Impact Statement (EIS) (Saorgus Energy Limited, 2012; 2013a; 2013b) were also used where data remains relevant.

2.1.3. For the marine zone, the two databases used, the Wreck Inventory of Ireland Database (WIID) and the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) databases, were cross-referenced to remove duplicated entries. Where relevant the Wrecksite.eu database, including the UKHO data was used to provide more detail on the known wrecks identified within the marine study area.

2.2. Impact assessment methodology

2.2.1. Potential impacts on marine archaeology receptors during the planned SI works have been assessed in line with the:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017);
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission [EC], 1999);
- Annex III (3) of EIA Directive 2014/52/EU; and
- Annex IV (5) of EIA Directive 2014/52/EU.

2.2.2. The quality of effects on marine archaeology receptors as result of impacts can either be classed as one of the following (as per EPA guidelines 2017):

- **Positive Impact**: A change that improves the quality of the environment, for example a change that enhances the setting of or increases the knowledge of archaeological sites, features, deposits or context of deposits;
- **Neutral Impact**: A change that has no effect or imperceptible effect on the quality of the environment; or
- **Negative/adverse Impact**: A change that reduces the quality of the environment, for example a change that results in the partial or total loss of the setting of archaeological sites, features, deposits or context of deposits.

2.2.3. Further, receptors can either be directly or indirectly impacted, which are defined as:

- **Direct Impact**: Where archaeological sites, features, deposits or context of deposits are physically located in the footprint of the survey works and can result in the partial or total loss of the same. For example, the destruction of a wreck site as a result of jack-up legs from a survey vessel; or
- **Indirect Impact (or Secondary Impact)**: Where archaeological sites, features, deposits or context of deposits are located in proximity to the survey footprint and are indirectly affected by survey activities. For example, disturbance of sediment protecting a wreck site as a result of the survey vessel movement.

2.2.4. The following tables (**Table 3** and **Table 4**) outline the method used to assess the significance of effect on the marine archaeological resource and marine archaeological receptors within the Foreshore Licence Area. The criteria for determining this significance are based on both the sensitivity level of those receptors and the magnitude of change as a result of potential impacts, as well as professional judgement based on the guidance set out by the Environmental Protection Agency's Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (2017). The identified impacts are outlined in **Table 7,** mitigation measures are presented in **Section 4** and outlined in **Table 6**.

Table 3 Criteria for magnitude of impact

Magnitude of impact	Criteria
High	Substantial or irreversible change of archaeological sites, materials or the context of archaeological materials or features resulting in significant alteration of archaeological sites, features, or materials, inhibiting interpretation of characteristics, sub-features, or components.
Medium	Moderate changes to archaeological sites, materials or the context of archaeological materials or features resulting in clear alteration, inhibiting interpretation of several key characteristics, sub-features, or components.
Low	Minor changes to archaeological sites, materials or contexts of archaeological materials or features resulting in clear alteration, inhibiting interpretation of several key characteristics, sub-features or components.
Negligible	Changes that are indistinguishable from natural variation, do not change archaeological sites or materials, and do not affect key characteristics, sub-features, or components or their environment or context.

Table 4 Criteria for establishing the level of marine archaeological receptor sensitivity

Sensitivity	Criteria	Marine archaeological receptor type
High	High importance and rarity of an international / national scale. Unique with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and / or archaeological potential.	Designated heritage assets, protected wreck sites, aviation remains palaeoenvironmental features or deposits with evidence of *in situ* finds.
Medium	High or medium importance and rarity of a regional scale with limited potential for substitution. Regionally rare with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and / or archaeological potential.	Non-designated live wreck sites, geophysical anomalies of high potential, recorded wrecks not confirmed by survey, palaeoenvironmental features or deposits.
Low	Low importance and rarity, local scale. Low or no recognised value with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and / or archaeological potential.	Fouls and obstructions, geophysical anomalies of low potential.
Negligible	Very low to no archaeological importance and rarity, local scale. The nature of the receptor is in very poor condition and survival and is therefore not considered a receptor.	Dead wrecks, dead fouls or obstructions, geophysical anomalies of negligible potential such as cables.

2.2.5. The significance of the effect on marine archaeological receptors is determined by correlating the sensitivity of the receptor and the magnitude of the impact as outlined in **Table 5** below.

Table 5 Significance assessment matrix

			Existing Environment - Sensitivity			
			High	Medium	Low	Negligible
Description of Impact - Magnitude	Adverse impact	High	Profound or very significant (significant)	Significant	Moderate	Imperceptible
		Medium	Significant	Moderate	Slight	Imperceptible
		Low	Moderate	Slight	Slight	Imperceptible
	Neutral impact	Negligible	Not significant	Not significant	Not significant	Imperceptible
		Negligible	Not significant	Not significant	Not significant	Imperceptible
	Positive impact	Low	Moderate	Slight	Slight	Imperceptible
		Medium	Significant	Moderate	Slight	Imperceptible
		High	Profound or very significant (significant)	Significant	Moderate	Imperceptible

3. Baseline characterisation

3.1. Introduction to section

3.1.1. The following section begins by outlining previous archaeological investigations that were carried out within the Foreshore Licence area, followed by the environmental context of the wider area. This informs the baseline review of potential maritime activity and known wrecks within the Foreshore Licence area.

3.2. Previous archaeological investigations

3.2.1. There were three archaeological assessments carried out within the Foreshore Licence area in preparation for the Dublin Array EIS documentation (Saorgus Energy Limited, 2012; 2013a; 2013 b). These included the baseline assessment of the onshore and offshore components of Dublin Array and the archaeological assessment of geophysical data, in which 23 targets were detected on the Kish Bank and 11 targets detected along the original cable route (Headland Archaeology, 2009). Geotechnical investigations were also carried out at three locations on the Kish Bank by Glover Site Investigations in 2008 (Glover Site Investigations, 2008; (Figure 3) and these were assessed by MA for geoarchaeological potential (Maritime Archaeology, 2020a). It was concluded that the three boreholes had not recovered deposits of archaeological potential and no further work was recommended on the deposits within these boreholes (Maritime Archaeology, 2020a).

3.2.2. 72 previous investigations were undertaken within the Foreshore Licence Area including a 500 m buffer as illustrated in Figure 3 and summarised in **Appendix A**. However, only 15 of these investigations produced archaeological finds and are outlined below. Two of these were wrecks and are discussed in **Section 3.6**.

- In 2015, Magnus Archaeology monitored ground investigation (borehole) works on the Great South Wall, an 18th century marine structure. Five boreholes were drilled along the length of the wall, one of which (BH 3) appears to have struck timber 0.5 m below the base of the wall (-2.46 m Ordnance Datum [OD]). Although nothing was recovered, the location and depth suggest a possible wreck buried in the sand beneath the wall (SMR no. DU019-029002).

- Two of the investigations that produced archaeological finds were carried out within the Pigeon House Fort, an 18th and 19th century artillery fort, on Pigeon House Road, Dublin. In 2009, an archaeological and architectural survey was undertaken, and the existing extent of the complex was defined and its constituent features, along with potential subsurface remains, were identified (SMR no. DU019-027). Further investigations in 2013 saw 23 test trenches excavated. Although the majority of the trenches contained deposits associated with the land reclamation for the modern Pigeon House Road, two trenches contained the partially truncated remains of a metalled surface and walling. These are considered to be part of the causeway that led to the fortifications in the 19th century (Licence no. 13E0066; https://excavations.ie/report/2013/Dublin/0023776/).

- One other investigation along Pigeon House Road revealed subsurface concrete walls measuring 0.4m wide by *c.* 1.2 m high. These structures are within an area of land that was reclaimed in the late 19th century and are therefore likely to date from the late 19th to early 20th century (SMR no. DU019-029).

- An excavation at Seapoint Terrace in Ringsend (licence no. 96E0269) revealed a small oyster shell midden with fragments of late 17th century pottery.

- An area related to Merrion Castle was investigated in 2000, licence no. 00E0886. While trenches did not reveal any artefacts of archaeological significance, fragments of post-medieval pottery were noted in the spoil heaps, which may relate to the latest occupation of the castle.

- In St Patrick's Road, Dalkey, testing was undertaken ahead of development (licence no. 00E0633) and substantial stone walls were uncovered. Well-made from random rubble, they appear to correlate with the position of a probable 19th century structure, likely constructed earlier in the 18th century. The presence of a single medieval pottery sherd in the backfill of a foundation trench suggest some limited medieval activity on site.

- In 1992-3, excavations took place (licence no. 92E0077) at 26-29 Castle Street in Dalkey. Evidence from the site suggests this street was developed during the 10th century. Site features include a 10th century ditch filled with ritual material and human skulls; the majority of the skulls show traumatic injury, some with signs of decapitation. The foundations of numerous structures were also unearthed, dating from the 10th to 13th centuries. Cesspits and rubbish pits were found across the site and produced a large range of faunal remains. Three silver hoards from the earliest phase of activity were also found and included torques and coins.

- At Ravenswell and Bray commons, archaeological testing ahead of proposed development (licence no. 20E0482) discovered a late 19th/early 20th century ditch with glass and ceramic sherds in its fill. Another ditch was found in the vicinity of the medieval Abbey at Bray (licence no. 01E0220) though no dating material was found.

- Raheenacluig Church at Newcourt, Wicklow, saw two investigations in 2017 and 2019 (licence no. 17E0356). Artefacts recovered ranged from prehistoric lithics to modern ceramics, as well as a concentration of post-medieval material. The 2017 excavations confirmed the existence of previously unrecorded structural elements close to the church, while the 2019 season identified a possible Neolithic or Early Bronze Age tool production site. Ditch features were also recorded in this later season, as well as 17th century activity at the church which may have involved its re-roofing.

- More prehistoric material was discovered at Rathdown Lower, Wicklow (licence no. 97E0075). A Beaker settlement was found close to the northern boundary of the site, including a series of pits, posts, and a hearth, with sherds of Beaker pottery and struck flint throughout the fills; it is a complex and important site, with many features. A corn-drying kiln was found close to the southern boundary, and a filled-in ditch used as a routeway was also identified. There was also medieval activity on the site, as evidenced by glazed medieval pottery and ditch and furrow features.

- At Rathdown Upper, investigations took place in 1994 ahead of the Greystones Sewerage Scheme (licence no. 94E0048). The site is in a known area of archaeological interest which includes extensive remains of medieval settlement and numerous features. Excavations in the pipeline corridor identified further medieval features including the ephemeral remains of masonry structures, and several ditches.

- A detailed survey of Greystones Pier was conducted (licence no. 08D011); though of no significant archaeological interest, the harbour is of historic interest, with its first phase of activity occurring from 1847-1888.

- Also in Greystones, investigations were carried out along the route of the Wicklow Port access town relief road: a total of 12,984 linear meters of trench were excavated (licence no. 06E0091). Three main sites were discovered: a Bronze Age cooking place with associated hut; an early medieval church, graveyard and burials, field system and settlement activity; and an 18th century brick manufacturing site.

- At Hillview, Delgany, Wicklow, testing was undertaken ahead of development in 2002 (licence no. 02E0390). The area was known to have been a centre of medieval settlement; though no surviving medieval features were found, the site indicated several periods of reconstruction and demolition.

- Within the Foreshore Licence boundary five uncharted wrecks were identified during geophysical survey (Fugro 2021 unpublished) and reported to UAU, the wrecks are further detailed in **Section 3.8** and will be assessed in the context of their archaeological significance in a stand alone marine archaeology report produced ahead of the EIAR application.

- At both cable route landfalls an archaeological walkover and metal detector survey was undertaken in 2021 (Dive Licence no. 21D0045 & 21D0046 & Detection Device Licence no. 21R0070 & 21R0071), nothing of archaeological importance was recorded at either location.

- During benthic survey within the Foreshore Licence an archaeological watching brief of grab samples was undertaken in 2021 (Excavation Licence no. 21E0082). no material of archaeological importance was recorded.

3.3. Environmental context

3.3.1. The FLA area is located in the western Irish Sea Basin (ISB), approximately 10 km off the Dublin and Wicklow coast.

3.3.2. During the Quaternary, much of Northern Europe experienced extensive ice-sheet cover during a number of glaciation events. The most recent of these glacial events was in the Last Glacial Maximum (LGM), *c.* 34,000 BP to 12,000 BP (Clark *et al*. 2012; Chiverrell *et al*. 2013). During this event, an ice-sheet, known as the British-Irish Ice Sheet (BIIS) merged across much of Britain and Ireland. The BIIS began forming in the northern and upland area before advancing across the landscape, both marine and terrestrial, creating various glacial environments where sediments were deposited or eroded depending on the stage of ice sheet advance or retreat (Scourse *et al*. 2019).

3.3.3. The BIIS extended into the Celtic Sea to reach its maximum limits *c.* 25,300-24,500 BP before collapsing with rapid marginal retreat to the northern ISB (Chiverrell *et al*. 2018). This retreat was largely a result of the Irish Sea Ice Stream (ISIS), the largest marine terminating ice stream draining the former BIIS. The main axis of the ISIS flowed from north to south through the ISB, with catchment areas in southern Scotland, northern England, Ireland and Wales (Scourse *et al*. 2019).

3.3.4. The retreat of the ISIS is the single agent responsible for the glacial stratigraphy and geomorphology of the current ISB (Chiverrell *et al*. 2013). Significant amounts of sediment were eroded and reworked with variable thicknesses of glaciogenic deposits formed, referred to as 'Irish Sea Till', (Eyles and McCabe, 1989). These deposits are composed of shelly, grey and muddy unsorted sediments with some angular clasts. By approximately 22,500 – 21,200 years BP ice had retreated to a line just south of the Foreshore Licence area. Ice sheet decay slowed thereafter with episodic meltwater discharge (Chiverrell *et al*. 2013).

3.3.5. Following the retreat of the BIIS, relative sea-level rose *c.* 120 m globally and the climate warmed at the beginning of the Holocene period, approximately 11,200 BP. Large areas of habitable land emerged and palaeogeographic and relative sea-level (RSL) models have indicated that the Foreshore Licence area could have been terrestrial landscape as early as 11,000 BP (Sturt *et al*. 2013) through to 7500 BP (Shennan *et al*. 2008).

3.3.6. These expanses of land exploited by humans and animals were subsequently inundated and the palaeolandscapes were preserved beneath the Irish Sea. These landscapes are believed to be similar to those in the North Sea, which have been extensively researched (Gaffney *et al.* 2007, Gaffney *et al.* 2009; Lost Frontiers Project 2015-2020). Until recently, only areas of the eastern Irish Sea had been surveyed as part of the West Coast Palaeolandscapes Project (Fitch *et al*. 2011). In 2018, the Irish Sea was surveyed by the Lost Frontiers Project, although data and subsequent interpretations are yet to be published.

3.3.7. Within the Foreshore Licence area, intertidal mud deposits have been recorded buried beneath the Kish Bank, c. -30m to -35 m below Chart Datum (CD), indicating the presence of palaeoshorelines (Westley and Edwards 2017: 265). Evidence for *in situ* intertidal peat beds and a submerged forest have been recorded within the Foreshore Licence area, near Bray Harbour, Co. Wicklow (Figure 3). The remains of the submerged forest were first discussed by Praegar (1896), in which he describes 'some stumps and boughs of trees […] embedded in a compact layer of peat' (Praegar, 1896: 155). Bolton re-surveyed this submerged forest in 1999, however only three trees were partially exposed. Samples obtained from the trees returned a radiocarbon date of 6,180 (+/- 80) years BP (early Neolithic). By 2001, the beach levels had dropped by an average of 1m and this time 35 trees were exposed at low tide. However, no samples were taken. This site was also listed in Brooks and Edwards (2006) Irish sea-level database, with samples taken dated to 7,432-7,832 cal. BP (late Mesolithic) and the palaeoshore mean sea level listed as -3.6 m (Mitchell, 1976).

3.3.8. Further to this, a Side Scan Sonar and magnetometer survey carried out in 2009 in preparation for the Dublin Array EIS (Saorgus Energy Limited, 2012; 2013a; 2013b) indicated a dark area that may represent a relict submerged landscape within the original Dublin Array EIS study area (Headland Archaeology, 2009: Appendix 11). This site is over 4 km from the submerged landscapes referred to above. Based on the above mentioned RSL models, this is possibly dated to the mid to late Mesolithic period.

3.3.9. The maximum marine transgression occurred around 6,000 BP, at the onset of the Neolithic period, with sea level rising to as much as 4 m above the current sea level in many coastal areas (Waddell, 1998).

3.4. Maritime activity: baseline review

3.4.1. The following section provides a broad overview of human activity within the Foreshore Licence area and the context of the wider area. This is used to indicate the potential archaeological receptor types that may be encountered within the Foreshore Licence area. Relevant records located onshore are also included in this assessment and are detailed in Appendix A and presented in Figure 4.

Palaeolithic (800,000-8,000 BC)

3.4.2. The colonisation of Ireland during the Palaeolithic has been the subject of considerable debate in recent decades and within multiple scientific disciplines, giving a greater understanding of the landscape and use at the time and the changes it underwent. During the Palaeolithic, Ireland had several periods of warmer temperate climates and there is substantial evidence of recolonisation of mammalian species, but there is a paucity of definitive evidence of human colonisation of Ireland during this time (Monaghan, 2017). The limited evidence of Palaeolithic tools in Ireland have been recovered from redeposited contexts as opposed to *in situ* contexts. This absence of *in situ* evidence for early settlement in Ireland may be associated with the Last Glacial Maximum (LGM) ice cover. Ice sheets may have scoured archaeological deposits, removing all evidence of human activity and re-depositing it deep within gravel beds or till deposits (Warren, 2017). It is also possible that Ireland was not colonised during the Palaeolithic. More recently, however, evidence for human presence was found in the south-west of Ireland in the Alice and Gwendoline Cave; a brown bear patella containing butchery marks was dated to 12,810-12,590 cal. BP (Dowd and Carden, 2016). To date there have been no finds of Palaeolithic remains reported within the marine zone of Irish waters.

3.4.3. Following the LGM, Britain was recolonised by *c.* 14,600 cal BP. At this time Britain was connected to continental Europe, although Ireland was already an island. Travel to Ireland at this time would have required crossing the Irish Sea.

Mesolithic (8,000 - 4,000 BC)

3.4.4. Ireland was mostly ice-free by 16,000 cal BP, however it is not until the Mesolithic period that the earliest definitive evidence of human activity in Ireland is present, with colonisation thought to have begun along the north-eastern coast. In this post-glacial phase, the climate was warmer, dense woodland covered the landscape and fauna populations increased. The people that populated these landscapes hunted, fished and foraged for food in mainly coastal, riverine and lacustrine environments. The Mesolithic period is typically marked by a more mobile lifestyle than observed in later periods, however, there has been increasing evidence of permanent housing structures in both Britain and Ireland (Robertson *et al.* 2013; Woodman, 1985; Waddington *et al*. 2007; Waddington and Wicks, 2017).

3.4.5. Large swathes of land along the Irish coastline were submerged during the last marine transgression, *c.* 8,000 years ago. Waterborne travel during the Mesolithic was likely undertaken in logboats or skin/hide boats (as summarised in McGrail, 2001: 172-183). Such watercraft were able to operate in sheltered inshore waters, estuaries and rivers but the extent to which they were capable of making repeated open sea voyages is less clear.

3.4.6. As discussed in the previous **Section 3.3.7**, a Mesolithic submerged forest is located within the Foreshore Licence area (Figure 3). Samples taken dated parts of the forest to the Late Mesolithic (7,432-7,832 cal. BP), indicating that the mean sea-level at this time was -3.6 m (Mitchell, 1976). A possible relict palaeochannel was also noted in the geophysical surveys conducted for the 2012/2013 Dublin Array EIS Chapter (Saorgus Energy Limited, 2012; 2013a; 2013b).

3.4.7. During works associated with the development of the North Wall Quay in 2004, the remains of five Mesolithic fish traps, dating between *c.* 6,100-5,720 BC, were discovered (McQuade and Donnell, 2007). The traps indicate significant human engagement with maritime activities during a considerable period of time. Four of the traps were located close to the Mesolithic shoreline, some 6 m below current OD. The other trap was located close by, between 5 m and 4.66 m below OD. A Neolithic period wattle fence was also found here (*c.* 5980-5760 BC) suggesting the duration of these activities over time (McQuade and Donnell, 2007).

3.4.8. Excavations of Dalkey Island, approximately 2 km from the Foreshore Licence area to the southeast of Dublin Bay, have produced substantial evidence of Mesolithic occupation. Shell middens containing Mesolithic artefactual evidence, such as 'bann' flakes, were found in two sites (Sites V and II). Both sites are located within the lower, western area of the promontory, on the platform that lies below and west of the cliff face that separates the upper and lower levels of the island (Liversage, 1968; SMR no. DU023-029002). A Mesolithic shell midden was also excavated north of Dublin Bay at Sutton (Mitchell, 1956; 1972).

Neolithic (4,000 - 2,500BC)

3.4.9. During the Neolithic, communities seemingly became less mobile than those of the Mesolithic and agriculture, the cultivation of cereals and the rearing of stock, became the main source of subsistence. The demands of agriculture led to a physical alteration of the landscape with evidence of forest clearing and the construction of territorial boundaries. Such boundaries were exacted through the creation of monumental constructions such as megalithic tombs and stone circles, that have become characteristic of the Neolithic. The current available evidence suggests that Neolithic watercraft, much like those in the Mesolithic, are likely to comprise skin/hide boats or logboats (summary in McGrail, 2001: 172-183). Because of the highly ephemeral nature of skin/hide the potential for material remains to survive is more limited. Lack of evidence of Neolithic craft in offshore environments does not necessarily indicate lack of use.

3.4.10. There are no known Neolithic sites within the Foreshore Licence area. However, to the north of the Foreshore Licence area, a Neolithic logboat, possibly modified with outriggers to aid long-distance sea travel was uncovered, 1 km offshore under two metres of sand, during trenching for a pipeline making landfall at Gormanstown, Co. Meath (Brady 2002). Although not located in proximity to the Foreshore Licence area, this find demonstrates the potential for early craft to survive offshore.

3.4.11. Three polished stone axe heads, typologically attributed to the Neolithic, were acquired by the NMI, including: one found in Blackrock (NMI 1978:283); one found near a tumulus on Killiney Hill (NMI 1448: W117); and the other found at Sandymount (NMI 1976). The axe head found at Sandymount was confirmed as manufactured of porcellanite from Tievebulliagh, Co. Antrim and of a Neolithic date. Further south of the Foreshore Licence area, at Bray Beach, a flint struck pebble with two flakes removed, was also found (NMI 2012:271).

3.4.12. A flint javelin head, with part of a cortex on one side, was found on Dalkey Island in 1988. It was found on the surface of a small mound, possibly burrowed by rabbits. The soil also contained various seashell types, some flint waste flakes, blades with possible secondary working and some bone (NMI 1988:11). During the Liversage excavations (1968), evidence for Neolithic occupation was also found on Dalkey Island. Finds included polished stone axe heads, grinding stones, postholes and middens.

3.4.13. A Neolithic 'dolmen' tomb enclosed by a circle of stones was located at Dalkey Commons (SMR DU023-038). The dolmen was destroyed in the 18th century during the construction of a Martello tower (SMR no. DU023-052003). Two more dolmen tombs were found in Ballybrack (SMR no. DU026-030) and in Howth (SMR no. DU015-032) as well as a megalithic structure in Killiney (SMR no. DU026-010).

Bronze Age (2,500 - 800 BC)

3.4.14. The Bronze Age is defined by significant technological change with the introduction of metalworking technology to Ireland that coincided with substantial social change. There was a marked increase in sedentary populations, and this was reflected in terms of the material culture as well as the nature of the sites and monuments, although there was a level of continuity from the Neolithic. Burial sites were not as monumental as those observed in the Neolithic, but there were new types of burials, including cist burials, wedge tombs, barrows and cairns. Barrows became more popular in the latter part of the Bronze Age. The most common Bronze Age sites are burnt mounds known as *fulacht fia*, with over 4,500 known in Ireland (Waddell, 1998). *Fulacht fia* are interpreted as open-air cooking places.

3.4.15. The Bronze Age population used routes of communication along the coasts and waterways of the region. Tin is essential in the creation of bronze materials and the closest source of tin was in Devon and Cornwall. Boats were essential for the movement of this resource across the Irish Sea to Ireland. Skin boats and logboats were still used throughout the Bronze Age in Ireland, however, there is evidence that logboats, such as the Lurgan boat (*c.* 3,900 BP), were adapted and equipped with outriggers to allow for more stability, possibly for open water journeys (Robinson *et al.* 1999). Despite evidence for sewn-plank boats in the British Isles, no such evidence has yet been found in Ireland (McGrail, 2001).

3.4.16. There are no known Bronze Age sites within the Foreshore Licence area, however, sites within the wider area include two *fulacht fia* that were excavated in Castle Farm, Shanganagh in 1990 in advance of a housing development (SMR no. DU026-116). Further to this, the remains of seven skeletons with associated bronze fibulae were recovered, however the date of this material is not clear (SMR no. DU026-067).

Iron Age (800 BC- AD 400)

3.4.17. The Iron Age is defined by the transition to the widespread use of iron instead of bronze. The transition from the Late Bronze Age to Early Iron Age is one of the least understood periods in Irish prehistory as there is comparatively less evidence of settlement from this period than previous periods (Garstki, 2019). There is a paucity of Early Iron Age sites in Ireland until the appearance of La Tène material in the third century BP.

3.4.18. The archaeological evidence for Iron Age boats in Ireland is poor. There are also no extant remains of larger sea-going vessels within Irish waters. However, evidence that they did exist in Ireland during this time comes from a gold boat model, known as the Broighter boat, found in 1896 on farmland near Limavady, Northern Ireland. The model measures 18.4 cm in length and 7.6 cm in width and is generally assumed to represent a hide-built boat from the 1st century BC. The boat model is outfitted with nine benches for rowers, 18 oars with rowlocks, a steering oar at the stern, three forked barge poles, a grappling anchor and a mast with a yard arm (Waddell, 1998).

3.4.19. Several Iron Age logboats / dugouts have been found in Ireland, but they are rarely found in coastal or marine contexts. The construction of logboats during this time was slightly more complex than those observed in previous periods. An example of this more complex construction can be seen on the Lees Island 5 logboat, dated to 754-409 BC, found in Lough Corrib, Co. Galway (Brady, 2014). The boat was fitted with seats and was found with a well-preserved paddle and axe lying inside the boat.

3.4.20. In Britain, we see the continuation and adaptation of the sewn-plank boats from the Bronze Age, however there is no recorded evidence of this type of shipbuilding in Ireland. That being said, a smaller plank-built craft was found in 1968 in Lough Lene, Co. Westmeath. The boat has been interpreted as representing a Roman style, which indicates either the presence or knowledge of Mediterranean or northern European boat-building traditions in Ireland in the Iron Age (O'Sullivan and Breen, 2007).

3.4.21. Although there are no Iron Age finds or sites within the Foreshore Licence area, there are three Iron Age promontory forts, constructed as defensive settlements recorded in the wider area: one at Howth (SMR no. DU016-003001); one on Dalkey Island, (SMR no. DU023-029001); and one in Dun Laoghaire (SMR no. DU023-052001).

3.4.22. The NMI held a record of a tanged iron blade (NMI 1946: 421), that was found among the rocks at Sandycove. This was interpreted as out of context and cannot be positively dated to the Iron Age.

Early Medieval (AD 500 - 1100)

3.4.23. Through the early medieval period, population and demographic changes in Ireland saw the expansion and intensification of settlement landscapes alongside innovations in agricultural technology and crop production, livestock management (dairying) and in craft and industry (O'Sullivan and Breen, 2007). There was also a transition from a society based on tribal chiefdoms and kin-based social groups to one, by the 9th and 10th century, based on dynastic lordships whereby a lord would oversee the urban markets and international trade and exchange. The shift to Christianity also saw an increase in monastic centres and church estates (O'Sullivan and Breen, 2007).

3.4.24. The Dublin Bay area was of increasing maritime importance in the early medieval period as it became more involved in the wider trading networks of northwest Europe. Monastic settlements are evidenced at Dalkey Island, Howth and Ireland's Eye and indicate the prominence of trading posts within the Dublin Bay area (Cunliffe, 2001). The bay provided a natural advantage of sheltered waters, allowing safe passage for vessels, whilst also allowing access to inland waters.

3.4.25. The archaeological finds from Dalkey Island indicate long-distance maritime activity, with Mediterranean amphorae found, as well as a large amount of E-ware pottery, a grey ware thought to originate from Western Gaul (Doyle 1998; Loveluck and O'Sullivan, 2016). There is little archaeological evidence in Ireland of the varying types of watercraft that were built and in use in the early medieval period when compared to other parts of northwestern Europe. Historical sources, such as *Adomnan's Life of St. Columba*, reference multiple Irish vessel types including the early constructions of the currach and a long boat made from pine and oak timbers, but also vessels from other international traders such as the Gaulish *barca* or Nordic style boats (Wooding, 2002).

3.4.26. From the 10th century onwards, the Hiberno-Norse developed many ports and harbours in Ireland, including Dublin. This enabled the expansion of maritime trade to this area and Ireland was drawn into other maritime trading networks, this time with a focus in the North Atlantic (O'Sullivan and Breen, 2007). There was also an increased focus on fishing along the Irish coastline with an increase in evidence of early medieval fish traps. Although no fish traps have been recorded in the Foreshore Licence area, there are examples within the onshore data (3.4.7) as well as notable underwater finds in the northeast at Strangford Lough and on the western coast in the Shannon Estuary. Further, lead line-weights, wooden net-floats and stone sinkers have been found during excavations in Dublin indicating the use of nets and lines from both the shoreline and offshore in boats (O'Sullivan and Breen, 2007).

3.4.27. Land reclamation for Dublin's waterfront is evident from *c.* 900 AD, with the reuse of ship timbers in the revetments of the bank at Wood Quay, the original site of the port which is now further upstream. The timbers found represent Nordic, clinker-built traditions but the timber was of Irish origin suggesting that boats were being built in Dublin (Wallace, 1981; McGrail, 1993).

Medieval (1100 - 1550)

3.4.28. During the Medieval period, the arrival of Anglo-Normans in 1169 saw the further development of Dublin Port and it began to take on a more official role; under the new Anglo-Norman laws, the waterfront became property of the Crown and Charter of King John (1167-1216). Through this, came a large increase in the amount of trade and mercantile activity along the coast and an investment in the waterfront facilities and building of boats and ships (O'Sullivan and Breen, 2007).

3.4.29. With the Anglo-Norman colonisation and development of maritime ports and harbours came a concerted effort to fortify and protect the coast through the construction of castles and mottes. Such examples within the wider area include: Howth Castle and motte (SMR no. DU016-002001 / DU015-025 / DU015-027001); Bullock Castle (SMR no. DU023-020001); and Dalkey Castle (SMR no. DU023-023010).

3.4.30. Coastal and fishing communities continued to thrive along this coastline and although there is no archaeological evidence within the Foreshore Licence area itself, examples of this fishing activity can be seen in the wider area, with the discovery of a 14th century fish weir (SMR no. DU023-035) associated with the castle at Bullock (SMR no. DU023-020001)

3.4.31. In wider northern Europe a range of ship and boat types had developed during the medieval period, including cogs, hulks and galleys. However, the paucity of material remains of shipwrecks in Ireland is still evident in the Medieval period. While no finds of cogs or hulks have been recovered in Irish waters, there are multiple documentary references to their usage (O'Sullivan and Breen 2007).

3.4.32. Land reclamation and revetments of the banks of the River Liffey continued through the medieval period and by the 14th century Dublin Port began silting up and close approach by larger ships was made increasingly difficult. Larger ships were therefore forced to anchor at places away from the city, such as Dalkey (Wallace, 1981). There was also further evidence that timbers from ships were used in the revetments in the 13th century, again these were of Irish origin.

Post-medieval (1550 onwards)

3.4.33. In the 16th century Dublin experienced an increase in trade with northern European ports. This gave rise to the city leasing its slips and piers to individuals and the installation of equipment aiding ship steerage, such as buoys and marks at the bar near the mouth of the Liffey. During the reign of Elizabeth I (1533-1603) the use of the first regular Packet ships and boats carrying official correspondence between Dublin and Liverpool or Chester was instigated (Gilligan, 1988).

3.4.34. The 17th century saw the redevelopment and modernisation of the major ports around the coast, including Dublin. Dublin Bay presented major dangers for the increasing shipping trade and in 1674 it was even described as wild, open and exposed to every wind and as a result shipwrecks were common (Dublin Port, 2019). In order to combat these dangers substantial stone quays were built; the Great South Wall (1715-1730) and the North Bull Wall (1815-1823). This resulted in the development of a safe harbour and dramatic changes to the bay with the formation of Bull Island (Dublin City Council, 2007). To further increase the safety of the port, Dublin Bay was mapped in 1685 and 1686 by Thomas Phillips and Captain Greville Collins respectively and a number of lighthouses were constructed, including Poolbeg Lighthouse in 1768 (O'Donoghue, 2004).

3.4.35. By 1804 a series of Martello towers were built down the east coast from Dublin to Wexford as a line of defences (O'Sullivan and Breen, 2007). There are 18 Martello towers along the coastline near the Foreshore Licence area. Two of these towers are situated along the coast of the southerly landfall options: one is at Killiney (DU026-014001) and is associated with an earthwork (DU026-014002); the other is at Shanganagh (DU026-055001) and is associated with a defensive redoubt (DU026-055002) that has since been removed by coastal erosion. Further defensive structures within the Foreshore Licence area include gun batteries in Dublin South City (SMR no. DU019-028), Dalkey Island (SMR no. DU023-029011) and Killiney (SMR no. DU026-012).

3.4.36. The shipping industry and traffic into Dublin Port increased significantly throughout the 19th and 20th centuries, with linen being one of the major exports (Friel, 2003). The increased shipping traffic resulted in higher numbers of wrecks, detailed further in **Section 3.5** below.

3.5. Wrecks, obstructions and documented losses

3.5.1. Multiple datasets were used in the compilation of this baseline assessment. Where entries are included in multiple datasets, the reference for each source is provided in **Appendix B**. The reference number for each entry is written in bold (e.g. **W10597** or **GSI 289**) for ease of identification. Where there were duplicate entries, the INFOMAR data point was used as these represent surveys of higher resolution. One wreck did not have a reference number, so has been assigned as **MA1** for the purposes of this report. Five unidentified and uncharted wrecks were located during geophysical investigation in 2021, these have also been given **MA** id numbers.

3.5.2. There are 24 known wrecks records, 120 unknown, and five uncharted wrecks within the Foreshore Licence area as described below. All wrecks discussed here are also detailed in **Appendix B**.

3.5.3. There are over 3000 wrecks off the coastal waters of Dublin, listed in the WIID, however only a small percentage have been located. West of Dublin stretching ca 60 km south towards Wicklow there are over 200 wrecks listed as lost, but only a small number have been discovered to date. Because of the known use of this area prior to official records being kept there is potential for earlier, undocumented wrecks to have occurred in this area. The unknown wrecks discussed below could potentially be associated with historical documented losses within the Foreshore Licence area and wider area. However, there is not enough information at present to positively identify them.

3.6. Known wrecks

3.6.1. There are 24 known wreck records within the Foreshore Licence area as described below.

3.6.2. The Loch Fergus (W01828; see Figure 4) was an iron barque, built at Glasgow by Henderson D. and W. & Co. Ltd., Meadowside and owned by J. Sproat & Co., Liverpool, the master was T. Williams. The vessel had a gross tonnage of 847 and measured 61.6 x 10.1 x 5.7 m. On 6 February 1899, *Loch Fergus* was sailing from Glasgow to Brisbane with general cargo when strong gales forced the vessel to run aground in Killiney Bay, Co. Dublin. All crew survived. The vessel is listed as LIVE by the UKHO.

3.6.3. The Fern (SS) was a 444-ton steamship built in 1900 in Glasgow by the Ailsa Shipbuilding Company, and owned by the Laird Line (W02012; see Figure 4). On 22 April 1918, while en route from Dublin to Heysham with a load of general cargo, it was torpedoed by the German submarine U-104 and sank.

3.6.4. The Fisher Lass was a 13 ton 25-year-old Irish motor fishing boat (D166) owned by John O'Byrne of Ringsend. It was lost on the 1 October 1929 after catching fire off Howth Head the vessel sank 7 miles east of Ireland's Eye. One of the three crew was lost (W02014; see Figure 4).

3.6.5. The Hare (SS) was a 774 ton, 31-year-old British steam ship owned by George Lowen of Manchester. Built by Barclay Curle & Co., measuring 66 x 8.8 x 4.6 m. On 14 December 1917 it was torpedoed and sunk by German submarine U-62 en route from Manchester (W02024; see Figure 4).

3.6.6. The RMS Leinster was a 2,646 ton, 22 year old steel twin screw steamer built in Birkenhead, Liverpool, by Lairds. Owned by the City of Dublin Steam Packet Company and captained by William Birch, the ship measured 110 x 13 x 8.2 m. Leinster was lost en route from Dun Laoghaire to Holyhead on 10 October 1918 (W02039; see Figure 4).

3.6.7. HMS Vanguard was one of four Audacious class, ironclad battleships built by Cammel Laird & Co. Birkenhead, England, at a cost of £355,000 in 1909. The 6,034-ton vessel was powered by steam and sail and was capable of attaining speeds up to 14 knots. The ship's loss, on 9 July 1917, was considered to be caused by the deterioration of high explosives (W02099; see Figure 4).he SS Flying Dart (W00883) was an iron paddle steamer tug built in 1882 by J.T. Eltringham of South Shields. In 1890, the vessel was en route to Dublin Bay when it collided with a cattle steamship, the North Wall of Dublin. It sank within 20 minutes, but its six crew were rescued. The wreck measures 27.7m long, 4m wide, and is on an E-W orientation at a general depth of 28m.

3.6.8. The Trustful is the only known wreck recorded on the Bray Bank (W01593; see Figure 4). The Trustful was a steam-powered fishing drifter built in 1906 by Carnegie, Peterhead. The vessel had a gross tonnage of 87 and measured 25.6 x 5.8 x 2.9 m. It was fitted with a cylinder compound engine by Hall A. & Sons Ltd. On 29 December 1924, Trustful was fishing off Bray Head, Co. Wicklow when, during a south-westerly gale, the vessel took on a lot of water. The engine room was flooded and at approximately 17:00 pm the vessel anchored and set off flares. The crew took to a lifeboat and abandoned the vessel. The boiler then exploded and the Trustful foundered. After several hours, the lifeboat was picked up by Kingstown pilot boat, landed and the crew taken to Dublin. The wreck's status is DEAD.

3.6.9. The Glenorchy (W01572; see Figure 4) was a fully rigged sailing ship built in 1868 by McMillan A. & Son Ltd. and owned by Gow A. C. & Co., Glasgow. The vessel's gross tonnage was 1348 and it measured 60 x 20 x 5 m. The vessel wrecked after striking the Kish Bank on 1 January 1869 on its maiden voyage from Glasgow to Bombay with a cargo of iron, coal and spirits.

3.6.10. The Sir Charles Napier (W01588; see Figure 4) was a merchant vessel built in 1841 by Miramichi, New Brunswick, Canada and was owned by Locketts of London. The vessel's gross tonnage is 638 and measured 30 x 7.5 x 1.2 m. On 19 November 1875, the Sir Charles Napier ran aground on the Kish Bank due to a navigation error. One man was lost. The wreck is listed as LIVE. Another wreck on the Kish Bank has been recorded as the possible remains of the Sir Charles Napier (W01629).

3.6.11. The Vesper (SS) (W01594; see Figure 4) was an iron merchant steamer of Hartlepool, built in Dundee by Barclay Curle and Company, with a nominal horse power of 60. One of the ship's owners was Huntley Burne & Co. The vessel had a gross tonnage of 478 and measured 54.8 x 7.8 x 3 m. During a voyage from Glasgow to Dunkirk the Vesper wrecked on the Kish Bank on 13 January 1876 and broke into two. The wreck has been listed as LIVE.

3.6.12. The HMD Deliverer (W01561) was a 79-ton steam drifter sunk by a submarine in 1917 with no survivors. An explosion at the bridge separated the vessel, with the forward hold and bow lying 10m from the main wreck. It lies on a NW/SE orientation in a general depth of 23m.

3.6.13. The SS Lanarkshire (W01575) was a 929-ton steamship en route from Glasgow to Lisbon in 1882 with a cargo of coal when it ran aground on the Codling Bank in bad weather. It was built by Blackwood & Gordon of Glasgow and measured 64m long, 8.5m wide and 6.4m tall. The wreck remains in good condition. The wreck is listed as LIVE.

3.6.14. The SS Flying Hawk (W01790) was a 61-ton iron steam tug built in Glasgow. It was en route from Kingstown to tow a vessel in 1887 when it struck a rock in bad weather and sank. The wreck is now broken up and scattered in 5-10m of water, with metal sheeting, propeller, and engine still visible. The wreck is listed as LIVE.

3.6.15. The SS Marlay (W02049) was a 789-ton steel steam collier, built in 1890 by Workman Clarke & Co. of Belfast. In 1902 it was bound for Dublin with a cargo of coal when it ran into bad weather and sank quickly with 15 men lost and one survivor. This incident led to the foundation of a Widows and Orphans fund to help their families. The wreck measures 61m long, 10.5m wide and stands 7.14m high on an NE-SW orientation. The hull is largely intact, with coal scattered around the wreck and is listed as LIVE by the UKHO.

3.6.16. The SS John Morrison (W02367) is a 202-ton steam barquentine which measured 32m long by 7.6 m wide, with a draft of 12.4ft. Whilst en route from Waterford to Liverpool in 1925 with a cargo of pit props and timber, it struck bolts projecting from the pier while leaving Wicklow Harbour, damaging it, and causing it to sink. The wreck was dispersed.

3.6.17. W09785 represents cargo debris from the Kilkenny, which sank in 1991. The wreck itself was lifted in 1992.

3.6.18. W09505 is a fishing boat named the Bydand which sank in 1989 after it collided with another fishing vessel, the Dietier.

3.6.19. The Privet (W09962) is a fishing vessel which sank while trawling 1.7km SE of Poolbeg Lighthouse in 1988.

3.6.20. HMS Guide Me II (W01482) was an anti-submarine drifter built in 1907. It was converted to an armed patrol vessel in 1915. It sank in a collision with the SS Glengarriff of Cork in 1918 and now lies at a general depth of 32-35m. It lies on an WNW-ESE orientation and the wreck measures 28.5m long, 5.5.m wide, and has a maximum height of 3m. Its forward gun and bell have been recovered by divers.

3.6.21. PSS Queen Victoria (W00910) sank in 1853, 230m south of Howth Head. It was a 337-ton, 150ft long paddle steamer built in 1837. It was en route to Dublin with general cargo when it ran into a snowstorm and in the poor visibility the vessel ran aground on Howth Head. It then tried to reverse away, but the manoeuvre caused it to sink rapidly with the loss of between 50 and 83 lives. It now lies in 18m of water on a NW-SE orientation below Baily Lighthouse. The wreck measures 17.5m long and 7.5m wide, with a maximum height of 3.4m. It is largely broken up but the paddle wheels and boiler are still clearly visible. Numerous artefacts from the wreck have been recovered.

3.6.22. The last two identified wrecks are the bow and stern sections from the same vessel, the MV Bolivar (W09480 and W09846; see Figure 4), a Norwegian motor vessel cargo ship built in 1946 by Akers Mekaniske Verksted A/S, Oslo. The vessel was owned by Olsen Fred, had a gross tonnage of 5320 and measured 135.7 x 17.5 x 8.3 m. On 4 March 1947, MV Bolivar was on its maiden voyage to South America, via Dublin and Liverpool, however it ran aground in a snowstorm off the Kish Bank and sank. The vessel's extant remains are laden with explosives. The status of the wreck is LIVE.

3.7. Unknown wrecks

3.7.1. There are 120 unknown wrecks within the Foreshore Licence area.

3.7.2. One unknown wreck (W10597; see Figure 4) is recorded offshore, approximately 6 km east of Shankill, Co. Dublin. No further information is known. The status of the wreck is unknown.

3.7.3. Five unknown wrecks have been recorded on the Codling Bank (W11360, W11361, W11365, W11366 and W11367; see Figure 4). Their locations are approximate and their status' unknown.

3.7.4. Also off Codling Bank, with only approximate location and status and no further details, are W11342, W11343, W11344, W11345, W11346, W11347, W11348, W11349, W11350, W11351, W11352, W11353, W11354, W11355, W11356, W11357, W11358, W11359, W11362, W11363, W11364, W11368, and W11369.

3.7.5. An unknown wreck (W01544; see Figure 4), with wooden frames, was discovered by a Dutch dredging company in June 1989 near Poolbeg Lighthouse while excavating for a new sewer pipe. The wreck measured c. 4.5 m in width and was evidently carrying a cargo of tightly packed, uncut slates. The vessel lies in 3-5 m of water, buried 0.5 m beneath sand. It was reburied following the completion of the sewer works.

3.7.6. An unknown wooden wreck, known as the 'Ringsend Wreck' (W01734; see Figure 4), became exposed during dredging operations for the Dublin Bay pipeline in April 2001. The wreck was a composite build of wood and iron, with several structural pieces revealed during excavation, including: three timbers that could form part of a keelson; carvel planking, with evidence for iron and wooden fastenings in the form of treenails and dowels; an iron knee with bronze fastenings; and a number of iron concretions, musket balls and bullets (it is not clear if these were related to the wreck or were stray finds).

3.7.7. A second wreck (W01142) known at the 'Sutton Wreck' was also discovered during dredging operations. It is orientated to the N-S and consists of the remains of a mostly intact carvel-built vessel, partially buried. A large section of the hull, measuring 3m x 3.5m, floated free of the wreck but resettled nearby. Iron staining suggested some iron fittings were used in the construction of the vessel, alongside futtocks and treenails. Another wreck (W11645) is also known as the 'Sutton Wreck' but no further information is available on this vessel.

3.7.8. A third wreck, W01141, lies near the dredge channel for the Dublin Bay pipeline, which became exposed in 2002. It measures 18m long, 5m wide, and stands 1m tall. Hull planking and internal framing are still present, with remains of a possible mast collapsed inside the wreck.

3.7.9. W18522 was also discovered during the pipeline project and is a wooden wreck lying 420m SE of Poolbeg Lighthouse. It measures 16.4m long, 5.5.m wide and stands 20cm proud of the seabed.

3.7.10. An unknown carvel-built wreck, licence numbers 08E0497, 08D038, 08R109, was surveyed as part of the proposed Dublin Gateway Project. It lies partially exposed within a sandbar approximately 450m east of the current extent of the North Port. It is orientated NE-SW and measures 18m long by 6.9m wide, though is disarticulated into three sections. Though exposed timbers were heavily eroded, buried timbers were in a good state of preservation. The construction and presence of wooden sheathing suggest that the wreck is 18th to early 19th century.

3.7.11. W01543 is a sunken yacht first reported in 1946 as dangerous to navigation. It was dispersed later that year.

3.7.12. W11566, W11567, W11568, W11569 all represent ship timbers that were redeposited from 2008-2011 near the 'Ringsend Wreck' in Dublin Bay (see Figure 4)..

3.7.13. Two more records of the 'Ringsend wreck' are also recorded in the NMS (W11570 and W11571; see Figure 4). Based on the limited information from the excavations.ie website, these refer to the same wreck above (W01734) (https://excavations.ie/report/2001/Dublin/0006399/).

3.7.14. Two wrecks are marked on the Admiralty chart 1415 of Dublin (W01532 and W01533; see Figure 4). They are described as remains of wrecks and are located in Dublin Bay, approximately 1.5 km NE of the eastern pier head in Dun Laoghaire Harbour.

3.7.15. One of the five wrecks plotted on William Bligh's 1803 map of Dublin Bay is recorded just outside of the ECC. It is located in the shallow water at the entrance to 'Cock Lake' (W01731; see Figure 4). It was also plotted on John Taylor's 1816 map of Dublin. A second wreck from the chart and the most northerly, W01109, is located at the low water mark.

3.7.16. A third wreck from Blight's 1803 map is W01445; it is the most southerly wreck off the North Bull. The fourth, W01526, is located in shallow water just off the South Bull.

3.7.17. An 1821 map of Dublin, produced by William Duncan, plots three shipwrecks. W01120 is the most northerly of these wrecks, located at the north end of the Bull near Sutton Creek. The middle of the three is W01121, located halfway up the shore near a small creek, while the most southerly of the wrecks is W01122, located at the middle of the Bull near the low water mark.

3.7.18. A later 1874 map, compiled by J.H. Kerr, charts another three wrecks. The first, W01125, is located approximately 200m from the low spring water mark in approximately 1m of water. The second, W01126, is 700m out in 1.5m water.

3.7.19. W01132 is one of ten wrecks marked on John Vernon's estate map of the North Bull. This is the most northerly wreck. Another, W01133, an unknown sloop that was en route from Dublin to Cork, is locally known as the 'Galligees Wreck' and lies midway up the shore. Three more wrecks marked on this map lie in a row: W01134, W01135, and W01136. A further five wrecks are also charted on this map and are within the Foreshore Licence area: W01137, W01138, W01139, W11623, and W01466.

3.7.20. Also on the North Bull is the unknown wreck W01143; there are no further details available for this vessel. Nearby, off the Bull, an unknown wooden wreck (W01548) was discovered during a survey for the Ringsend to Sutton pipeline. It measures 40m long by 10m wide, with two parallel rows of framing protruding through the seabed.

3.7.21. Another wreck (W11629) is known locally as 'North Bull' but has no further information available.

3.7.22. An admiralty/decoy ship (W01540), lost in 1931, also lies off the North Bull. It is listed as a 'dangerous wreck' by the UKHO and lies in 2m of water.

3.7.23. Off the South Bull is another wreck (W11474) with no further details available.

3.7.24. W01130 marks two timber frames of a wreck lying side by side, which are occasionally exposed on the beach when sand levels are low.

3.7.25. W01465 is the remains of a wooden wreck protruding through the mud.

3.7.26. W11481 is an unknown wreck in Dun Laoghaire Harbour, near the north end of the East Pier. It was recorded in 1932 as being in two different sections.

3.7.27. W11539 is east of Doldrum Bay but no further information is available on this wreck.

3.7.28. W18574 is a wreck visible on the mudflats of Clontarf Strand at low tide. It lies on a WNW-ESE orientation and measures 14.68m long and 3.92m wide.

3.7.29. An unknown wooden wreck (W01131) became exposed in 2004-2006. It was orientated N-S and measured 9.3m long and 3.35m wide. The exposed oak futtocks were badly worn, though treenails and dowel holes were still evident on most, and hull planking was still visible on the NE and SE sides of the wreck.

3.7.30. An unknown wreck (W02219; see Figure 4) is the possible wreck (INSS No. G154) identified during the National Seabed Survey. The wreck measures 37 x 13 x of 1 m and lies in a general sea depth of 58m.

3.7.31. There are several unknown wrecks which were identified as part of the Irish National Seabed Survey in 2008. The first, known by divers as the North Wreck, appears to be the remains of a barge or hopper (W11630) and measures 25 x 7.3 m. The second measures 26 x 8 m and lies at a depth of 42 m (W17989;see Figure 4.)

3.7.32. A third and fourth possible wrecks were also identified; W01550 measures 24m long by 9m wide, with a height of 1m and lying at a general depth of 28m, while W01551 measures 3m long, 3m wide, 3m high and lies at a general depth of 9m. Another wreck, W01967, lies just inside the Dun Laoghaire Harbour entrance in 8m of water and measures 27m long by 5m wide, with a height of 1m off the seabed.

3.7.33. W01552 is one of three anomalies also highlighted during the National seabed Survey indicating a possible wreck, and measures 3m long, 3m wide, and 2m high at a general depth of 8m. The second anomaly, W01553, measures 3m long, 3m wide, and 1m high at the same depth. The last, W01554, measures 2m long, 2m wide, and 1m high, and is also at a depth of 8m.

3.7.34. The are several further wrecks with scant details available: W10400 is an unknown wreck near the Grand Canal Harbour. W10595 is a sailing ship lost approximately 130m SW of Muglins, close to W10596, listed as anchor and cable. W10598 is 2.3km east of Bray Head.

3.7.35. An unknown wooden wreck (W01630) was discovered on the Kish Bank by Marlin Sub Aqua Club in 2003. The vessel is partially exposed and upside down on the seabed. The hull of the vessel is copper sheathed and stands 1 m proud of the seabed, it measures 17 m in length.

3.7.36. Six unknown wrecks on the Kish Bank were detected in 2010 as part of the INFOMAR seabed mapping programme. Although the wrecks are unknown, dates of loss have been ascribed to two wrecks, however it is not clear where this information originated from. These wrecks are as follows:

- W08691, measuring 4 m in length and 1.8 m in maximum width and is recorded as being lost on 15 January 1802;
- W09300, measuring 21.2 m in length and 3.7 m in maximum width and is recorded as being lost on 4 June 1800;
- W11332, a wooden wreck first identified in a geophysical survey carried out in 2008 by Browne and Stokes. It measures 26.5 m in length by 4.3 m in maximum width;
- W11626, a wooden wreck, known as the 'Iron Pipe Wreck', first located in a geophysical survey carried out in 2008 by Browne and Stokes. It measures 19 m in length by 5 m in maximum width;
- W18562, measuring 13.5 m in length and 3.5 m in maximum width; and
- W11610, measuring 18.3 m in length and 4.5 m in width.

3.7.37. A further eleven wrecks were located on the Kish Bank, however these either have limited or no further information provided (e.g., measurements) (W10276, W10297, W11331, W11333, W11334, W11337, W11338, W11339, W11340, W11341 and W11581 [known as the '9.5 fathom wreck']).

3.7.38. There are an additional four wrecks further north within the Foreshore Licence area with no information currently available on them (W10291, W10292, W10332 and W11542).

3.7.39. There are four locations (CON04/GIS 163) simply listed as wreck/object without further details.

3.7.40. One wreck, excavation licence no. 01E0718, was discovered during marine dredging works associated with the excavation of a submarine trench across Dublin Bay. The wreck is located below the low-water mark and consists of a large coherent hull section, separated from the body of the wreck, and a curvilinear hull section. A tentative date of late 17th century has been suggested.

3.7.41. Another undated wreck was identified during pipeline works in the intertidal zone (licence no. 01E0402). This wood and metal shipwreck incorporated wooden dowels. A number of spent bullets and musket balls were recovered from two sump trenches close to the wreck site.

3.7.42. GIS 281 is a wreck measuring approximately 17m long, 3m wide, and lying in 10m of water. GIS 285 is a wreck measuring 4.8m long by 1m wide, in a depth of 10.8m water. COV8_03 / GIS 304 is a wreck measuring 26.4m long, 8m wide, and in a depth of 42m of water. None of these vessels have any further information.

3.7.43. Two additional unique wrecks were listed in the INFOMAR database, located on the Kish Bank; the first of these wrecks measures 13 x 4 m (GSI 278) and the second wreck measures 21.2 x 3.7 m (MA2).

3.7.44. The Development Applications Unit (DAU) highlighted the presence of further wreck sites that had not yet been logged in the WIID. One wreck site was detailed in the letter as a new wreck site centred on 53 16.200N, 05 56.500W, with a recommended exclusion zone of 300m (MA2; see Figure 4) (letter to innogy Renewables Ireland Ltd, 2019). Subsequently, a request has been made to acquire location and descriptive details for new wreck information held by the UAU with the aim of including the information in all forthcoming archaeological reports and documents regarding Dublin Array.

3.8. Uncharted wrecks

3.8.1. Five uncharted wrecks were identified during geophysical survey (Fugro 2021 unpublished) Foreshore Licence (FS007029) and reported to UAU.

3.8.2. MA03/GM814_contact0028: A unknown possible wreck was located by the Survey Vessel Fugro Mercator 1/03/2021. The wreck was identified by Side Scan Sonar. Linear and circular reflectors are clearly visible as well as an area that seems to indicate a snagged net. The area measures 16x9m and height above seabed was measured as 0.5m. There is also a smaller anomaly (3x3m) located 46m west of the main target represented by semi-circular hard reflectors. If the anomaly is a wreck or anthropogenic debris the material is well buried within the sandy sediments of Kish Bank.

3.8.3. MA04/GM771_contact0102: The possible wreck is lying in a SW- NE position and is mostly buried within the sandy sediments. There are several objects on the seafloor around the wreck associated with the vessel which might represent part of the broken hull, propulsion mechanism and a bowsprit and/or mast. The Side Scan Sonar image suggests that the wreck might be a wooden schooner. The main part of the visible hull measures 16m, the hard reflector anomaly W of the main site is 5m long, the linear anomaly N of the main site measures 6m and the linear anomaly S of the main site measures 5m.

3.8.4. MA05: Substantial reflector approximately 15m long and 5-6m wide. Scour north and south at each end shows it stands proud of the seabed. This could be a 20th century vessel. The site was marked with a buoy and suggested to be a lost container. Also measured as: Length: 12, Width: 4m, Height above seabed: 2m.

3.8.5. MA07: Substantial anomaly in two parts measuring 21x6m and 7x7m. Debris on the sea floor is clearly visible on the Side Scan Sonar. Reported by the survey vessel as “Possible Uncharted Wreck (seen in mag data). Clearly a large target - wreck shaped but probably broken in two associated with a large magnetic response”. The wreck location 410m from the unknown shipwreck (MA1/ GSI 278) and 916m from unknown wreck reported to UAU by a previous survey campaign (letter to innogy Renewables Ireland Ltd, 2019), referred to in our reports as MA2 and 440m from SS Vesper (W01594).

3.8.6. MA08: Oval shaped depression 12x7m with linear hard reflectors, could possibly be wreck material or outcropping geology. Reported as “A Possible Buried Wreck (NOT seen in mag data). Possibly wood due to the absence of a magnetic response. Overall, about 8m in length and can be seen on sonar and MBES records”. Not associated with any known wrecks.

4. Mitigation

4.1.1. Mitigation measures have been formulated to avoid and reduce impact on the known and potential marine archaeological receptors within the Foreshore Licence area as outlined on Figure 4 and **Appendix A and B.** The mitigation measures are set out in **Table 6** and are expected to be agreed with the Department of Housing, Local Government and Heritage and the Underwater Archaeology Unit (UAU) as well as set out in a detailed Marine Archaeology Written Scheme of Investigation (WSI) that will be submitted as part of the Foreshore Licence Application.

Table 6 Proposed mitigation measures.

Mitigation measure	Summary
Mitigation Measure 1: Relevant Licences	All planned site investigation works under the Foreshore Licence must be licensed under the National Monuments Act 1930-2014. It is the responsibility of Dublin Array to ensure that the NMS 2-06 Detection Device Licence Application Form is submitted and approved ahead of any surveys utilising detection equipment and that NMS 3-06 Dive / Survey Licence Application Form is submitted and approved ahead of foreshore works or surveys on known wreck sites. It is also the responsibility of Dublin Array to ensure that all commitments as per approved licence are adhered to. This includes reporting any wrecks or areas of archaeological potential to UAU within 3 days of discovery and a final report submitted to the Archaeological Department of Housing, Local Government and Heritage, UAU and The National Museum of Ireland.
Mitigation Measure 2: Assessment of baseline and geophysical data ahead of deployment	All geotechnical and ecological core and sample locations will be assessed against 2021 survey data (SSS, Bathy, MAG, SBP) as well as INFOMAR 5m and 2m Bathy and identified cultural heritage sites.
Mitigation Measure 3: Assessment of geophysical and geotechnical data following survey	The geophysical and geotechnical datasets will be assessed by a qualified marine archaeologist with a final report submitted to Archaeological Department of Housing, Local Government and Heritage, UAU and The National Museum of Ireland.
Mitigation Measure 4: Archaeological Exclusion Zones	Recommendations for establishing Archaeological Exclusion Zones (AEZ) are based on the established practice of developing exclusion zones around known wreck sites, receptors, or anomalies with archaeological potential. Archaeological Curators (Department of Housing, Local Government and Heritage) must be consulted regarding the establishment and agreement of AEZs. The design, alteration, and removal of AEZs will be subject to agreement with Archaeological Curators.

Mitigation Measure 5: Onboard archaeological monitoring	Where impact on unknown archaeological receptors is expected or cannot be avoided an archaeologist will be present to ensure that all potential archaeological observations are assessed and reported.
Mitigation Measure 6: Protocols for training and PAD	A protocol for training to allow for any staff onboard to follow a clear and comprehensive chain of communication and recording in the case of any objects with archaeological potential being located during site investigations works deployment should be implemented as outlined in the Project Specific Protocol for Reporting Finds of Archaeological Potential (PAD). Crew on board the vessels and onshore staff will receive training and familiarise themselves with the Protocol and the reporting procedures it describes.

4.1.2. Ahead of the geophysical and geotechnical surveys the licences required under the National Monuments Act 1930-2014 will be obtained (**Mitigation Measure 1**).

4.1.3. Geophysical data from Dublin Array 2021 campaign, as well any available data for the areas outside the geophysical survey area (Figure 1) will be assessed ahead of any seabed impact at geotechnical, ecological sample and buoy deployment locations (**Mitigation Measure 2**) and following the site investigations the geophysical data collected will be assessed for archaeological potential (**Mitigation Measure 3**).

4.1.4. The establishment of Archaeological Exclusion Zones (AEZs) around known wrecks and potential receptors, as identified in the archaeological assessment of baseline. AEZs have been established as a 100 m or 300 m radius from a centre point of the site, or the extent of the site where needed to protect associated material and scour. Within the Foreshore Licence area there are 149 locations that require an AEZ (Mitigation Measure 4) as per Figure 4 and **Appendix C**.

4.1.5. Where assessment of geophysical data is not possible, or data is not available and impact on the sea floor is expected, or material is being recovered from the seabed an archaeologist might be required onboard vessels undertaking geotechnical or ecological sampling (**Mitigation Measure 5**).

4.1.6. Site-specific training covered in the Protocol for Archaeological Discoveries (PAD) facilitating dialogue between the on-site offshore development contractors, Dublin Array, the Archaeological Curator and the retained archaeologist mitigating the impact on unexpected archaeological discoveries. The PAD will be utilised when/if an archaeologist is not onboard, for example on vessels deploying buoys, anchors or undertaking non-intrusive surveys (**Mitigation Measure 6**).

5. Impact assessment

5.1. Introduction to section

5.1.1. A range of potential impacts on marine archaeology receptors have been identified which may occur during the proposed licenced works.

5.1.2. The impact on archaeological receptors has been assessed as per the methodology outlined in **Section 2.2**). The identification of impacts (**Table 7**) and their significance as presented in **Table 5** Significance assessment matrix recognises the aspects of the scheme that could be detrimental to the preservation of archaeological remains or other marine archaeological receptors.

Table 7 Identified impacts on marine archaeology receptors.

Project activity	SI area	Description of activity	Potential impact on marine archaeological receptors
Geophysical investigations	Geophysical survey area (Figure 1)	Seismic refraction survey, 2D UHR (Array area only) and geophysical surveys, including Bathymetric Survey, Side Scan Sonar, Shallow Reflection Seismic (Sub-bottom Profiling) and Marine Magnetometer within the nearshore area, in the WTG area and within the export cable corridor.	The geophysical surveys are non-intrusive in that they do not cause any disturbance of the seabed and will comply with the general requirements of the Underwater Archaeology Unit of the Department of Housing, Local Government and Heritage for a geophysical survey for archaeological purposes.
Geotechnical investigations	Geotechnical survey area (Figure 1)	• Up to 61 Geotechnical Boreholes, 80 m BSF; • Up to 61 Deep Push seafloor CPT nominal depth 80 m BSF within the proposed WTG; • Up to 31 seafloor CPTs at a target depth of 6 m BSF; • Up to 48 vibrocores to target depth of approximately 6 m below seafloor, 5 of each type may be located within the intertidal area • Up to 12 nearshore Geotechnical Boreholes	Penetration, compression, disturbance or draw down effect on known and unknown receptors caused by coring equipment, vessel jack-up legs and vessel anchors during operations. Loss of material of archaeological potential during and following coring.

		with wireline logging and Rotary Cored Drilling to target depth of 25 m BSF	
Ecological monitoring and surveys	Foreshore Licence application area (Figure 1)	• Up to 10 static acoustic monitoring devices (SAM); • Three annual subtidal benthic ecology samples at up to 90 locations and up to 90 epibenthic trawls; • Three annual intertidal ecology surveys comprising up to 48 shallow hand cores; and Three annual potting surveys and 12 seasonal trawl surveys;	Penetration, compression, disturbance or draw down effect on known and unknown receptors caused by sampling and trawling techniques as well as vessel anchors during operations.
Wind, wave and current measurement	Foreshore Licence application area (Figure 1)	• Up to two buoys carrying FLiDAR units for wind measurement; and • Up to two buoys with wave and current measurement devices.	Penetration, compression, scour, disturbance or draw down effect on known and unknown receptors caused by buoy instalment and presence of buoy anchors as well as vessel anchors during instalment.
Mooring chain movement	Foreshore Licence application area (Figure 1)	The length of the mooring chains to compensate for monitoring buoy movement and tide range means a length of chain will sit on the seafloor.	Penetration, scour or disturbance on unknown and known receptors caused by chain movement on the seafloor.
Removal of monitoring buoys	Foreshore Licence application area (Figure 1)	Decommissioning of the buoys and monitoring material.	Disturbance or draw down effect on known and unknown receptors caused by mooring removal and vessel anchoring.

5.2. Assessment of the impacts of proposed licenced works

5.2.1. The impact of the planned geophysical investigations, on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (**Appendix A and B**) is of neutral impact and negligible magnitude (**Table 3**) and therefore **Not Significant** as per **Table 5**. However, mitigation as per **Mitigation Measures 1, 3 and 6** will apply to all site investigative works.

5.2.2. The impact of penetration, compression, disturbance or draw down effect on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (Appendix A and B) caused by coring equipment, jack-up legs, anchoring and loss of material during the geotechnical survey is expected to be limited to the immediate area around the planned locations. Should direct or indirect impact occur, it would result in a high magnitude of impact (Table 3) on negligible to high sensitivity receptors (Table 4) causing a high significance impact. However, mitigation as per Mitigation Measures 1, 2, 4 and 6 will apply to all site investigative works, ensuring that impact will be avoided, reducing the significance of impact to Not Significant as per Table 5.

5.2.3. The impact of penetration, compression, disturbance or draw down effect caused by ecological monitoring and surveys on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (Appendix A and B.) is expected to be limited to the immediate area around the planned locations. Should direct or indirect impact occur, it would result in a high magnitude of impact (Table 3) on negligible to high sensitivity receptors (Table 4) causing a high significance impact. However, mitigation as Mitigation Measures 2, 4 and 6 will apply to all geotechnical survey and ecological monitoring works, ensuring that impact will be avoided, reducing the significance of impact to Not Significant (Table 5).

5.2.4. The impact of penetration, compression, scour disturbance or draw down effect caused by wind, wave and current measurement buoys on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (Appendix A and B.) is expected to be limited to the immediate area around the planned locations. Should direct or indirect impact occur, it would result in a high magnitude of impact (Table 3) on negligible to high sensitivity receptors (Table 4) causing a high significance impact. However, Mitigation Measures 2, 4 and 6 will apply during wind, wave and current measurement survey works, ensuring that impact will be avoided, reducing the significance of impact to Not Significant (Table 5).

5.2.5. The impact of disturbance or draw down effect on unknown and known receptors caused by chain movement on the seafloor on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (Appendix A and B) caused by mooring chain movement is expected to be limited to the immediate area around the planned locations. Should direct or indirect impact occur, it would result in a high magnitude of impact (Table 3) on negligible to high sensitivity receptors (Table 4) causing a high significance impact. However, mitigation as per Mitigation Measures 1 and 2 will apply during mooring chain presence ensuring that impact will be avoided, reducing the significance of impact to Not Significant (Table 5).

5.2.6. The impact of penetration, compression, disturbance or draw down effect on known wrecks, unknown wrecks, deposits of archaeological potential or onshore archaeological receptors (**Appendix A and B**) caused by the removal of monitoring buoys is expected to be limited to the immediate area around the planned locations. Should direct or indirect impact occur, it would result in a high magnitude of impact (**Table 3**) on negligible to high sensitivity receptors (**Table 4**) causing a high significance impact. However, mitigation as per **Mitigation Measures 2, 4 and 6** will apply during the removal of monitoring buoys, ensuring that impact will be avoided, reducing the significance of impact to **Not Significant** (**Table 5**).

5.3. Cumulative assessment

5.3.1. Cumulative effects can be defined as effects upon a single receptor from the proposed works under this Foreshore Licence when considered alongside other proposed and reasonably foreseeable projects and developments. This includes all projects that result in a comparative effect that is not considered as part of the existing environment.

5.3.2. In assessing the potential cumulative impacts for the SI works under this Foreshore Licence, it is important to bear in mind that some projects, predominantly those 'proposed' or identified in development plans, may not actually be taken forward, or fully built out as described within their initial design proposals. There is therefore a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals.

5.3.3. A list of all projects that are proposed or currently underway and that have a spatial overlap with the proposed Foreshore Licence area can be found in **Appendix C**. The projects screened in have been included as cumulative changes to sand movement may result in positive, neutral or negative/adverse impact, however as the impacts of the proposed Foreshore Licence activities alone are considered to be localised and **Not Significant** any cumulative impacts considered will be indistinguishable from natural variation and therefore **Negligible**.

6. Figures

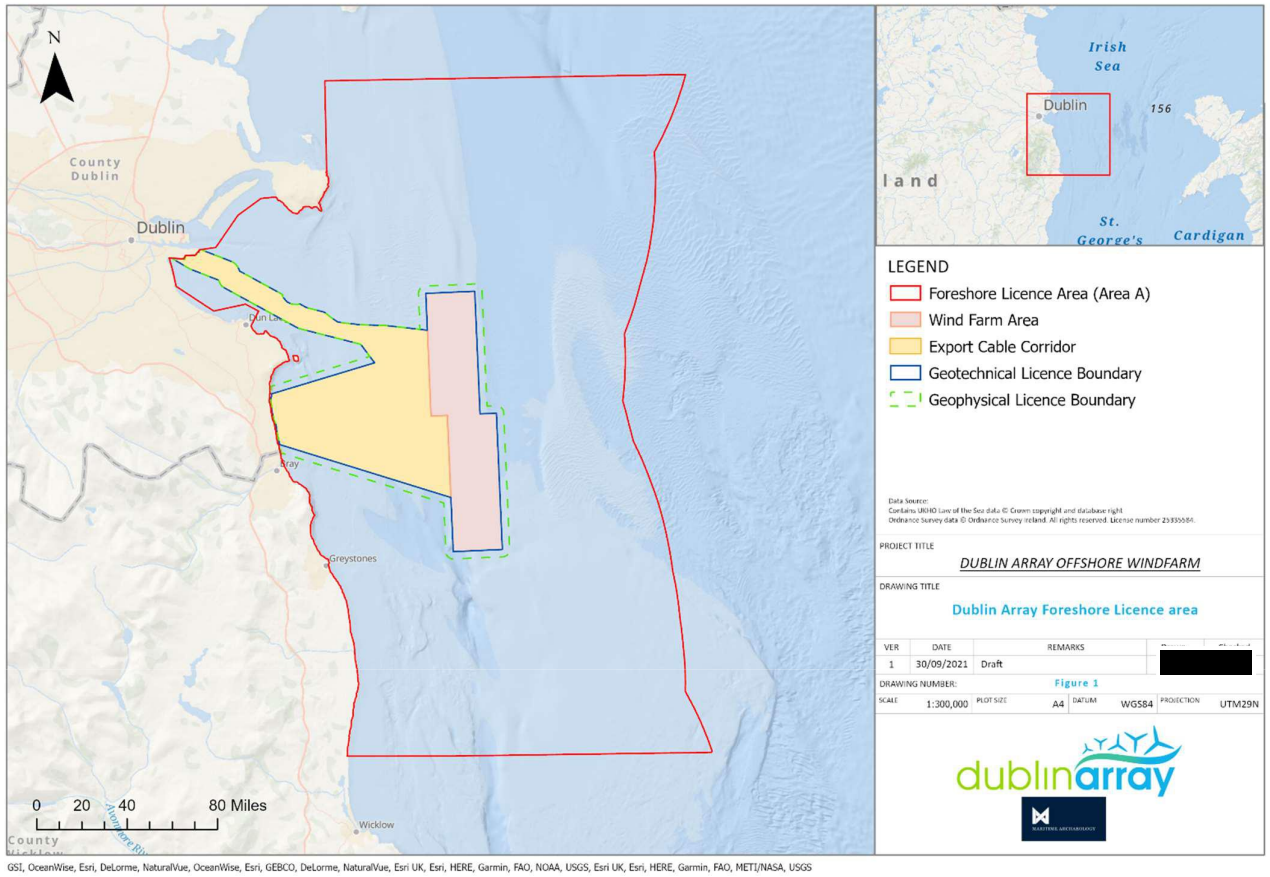


Figure 1 Dublin Array Foreshore Licence areas

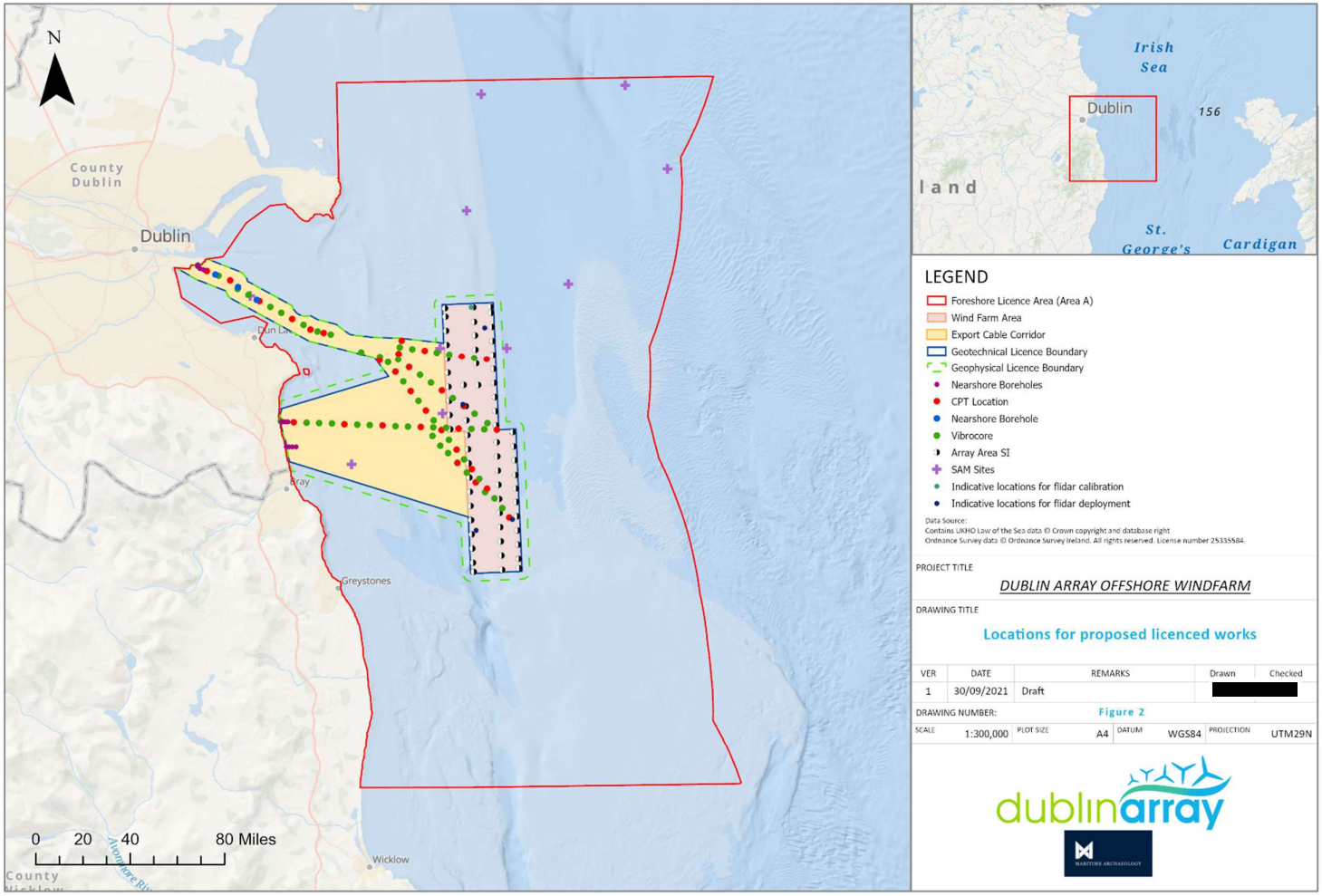
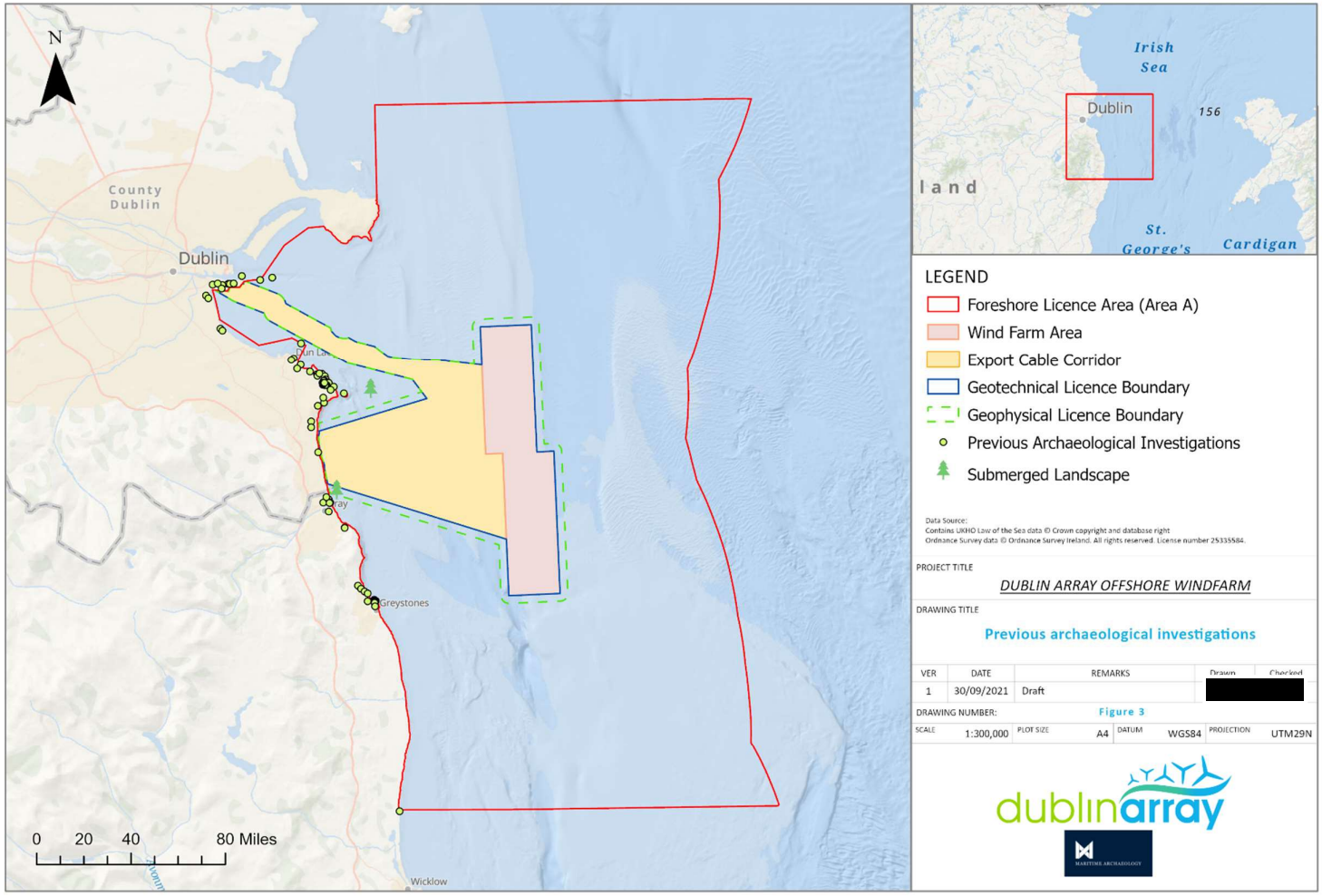


Figure 2 Locations for the proposed licenced works



OceanWise, Esri, GEBCO, DeLorme, NaturalVue, Esri UK, Esri, HERE, Garmin, FAO, NOAA, USGS, Esri UK, Esri, HERE, Garmin, FAO, METI/NASA, USGS

Figure 3 Previous archaeological investigations

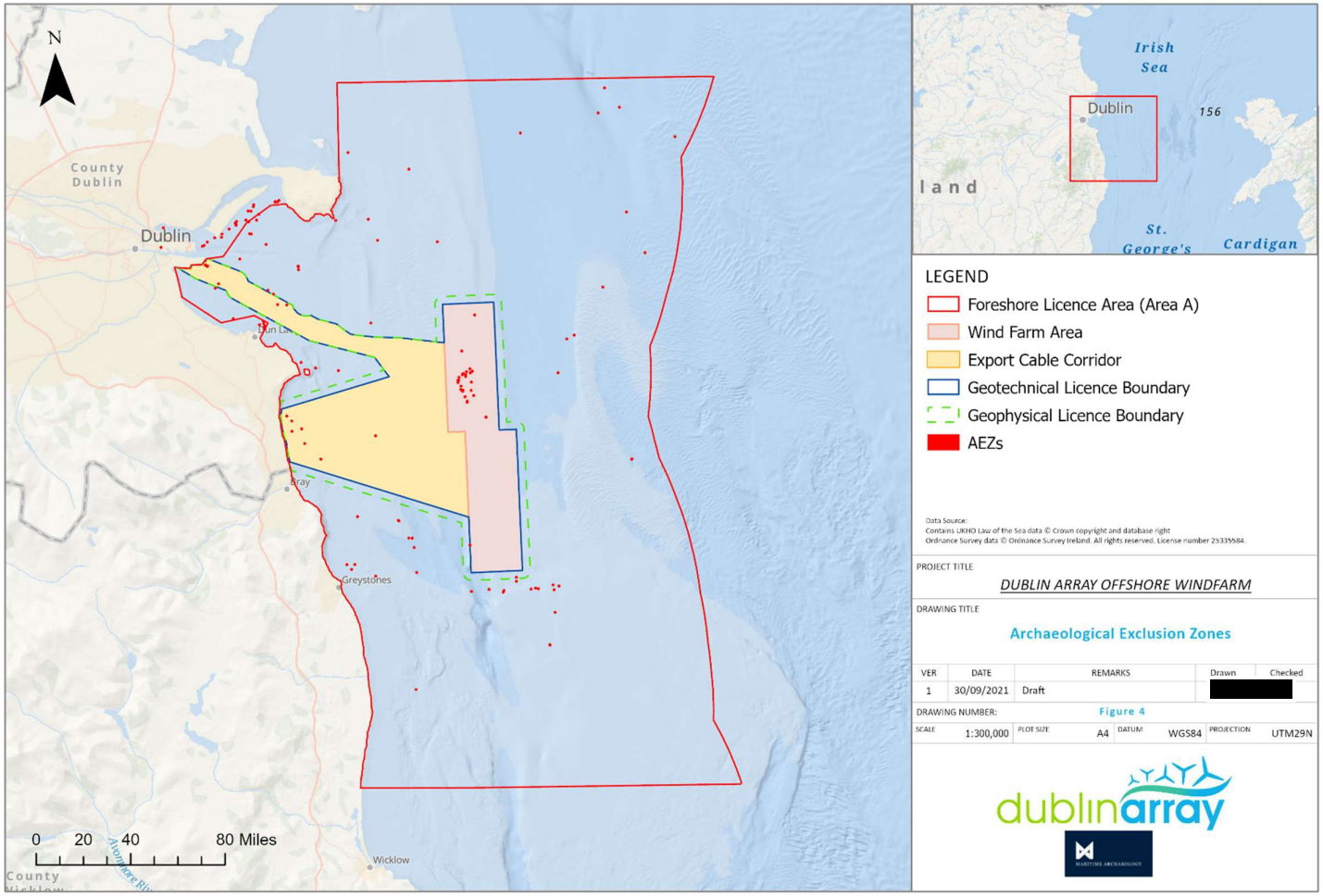


Figure 4 Wrecks and AEZs within the Foreshore Licence Area

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Appendix A Summary of previous archaeological investigations

SMR no.	Licence no.	Site name	Summary	Date	Latitude	Longitude
DU019-029002	15E0454	Great South Wall	Monitoring of ground investigation (borehole) works on the Great South Wall, an 18th-century marine structure. Five boreholes were drilled along the length of the wall, one of which (BH 3) appears to have struck timber 0.5m below the base of the wall (-2	2015	53.341179	-6.1634
DU019-027	. 09E0259	Pigeon House Fort, Ringsend	An archaeological and architectural survey was carried out on the Pigeon House Fort Complex. The existing extent of monument on the ground was defined and its constituent features along with potential subsurface remains were identified. 18th and 19th-century.	2009	53.339604	-6.19484
DU019-029	09E0022 ext	Pigeon House Road, Poolbeg	Site investigations revealed no features or finds of archaeological significance.	2010	53.339016	-6.20054
26:124	02E717 ext	Corke Great and Ravenswell	Monitoring carried out along section of the Shanganagh Bray main drainage scheme. No features of archaeological signficance were encountered	2005	53.209005	-6.110284
2001:358	01E1004	Dublin Port, Docks and Shipping Fairway, Dublin,	Dredging was conducted eastwards from the EastLink toll-bridge for c. 10km All material recovered was of definite modern date.	2001	53.343665	-6.18177
2008:484	08D067	River Liffey, Harbour Quay, Poolbeg Riverine	A non-disturbance underwater assessment of a 40m by 10m area of the River Liffe, No archaeologically significant material, structures, or deposits were encountered.	2008	53.342167	-6.151306

1997:185	96E0269	Seapoint Terrace, Irishtown Road, Ringsend	Small oyster shell midden, c. 0.2m thick, yielded fragments of late 17th-century pottery.	1997	53.339421	-6.209532
2001:459	01E0402	Dublin Bay, Ringsend, Dublin	No archaeological stratigraphy was identified but a number of spent bullets and musket balls were recovered.	2001	53.339863	-6.204935
2013:282	13E0066	Dublin Waste to Energy Project, Poolbeg, Dublin 4	Nothing of archaeological significance was recovered.	2013	53.33708	-6.20142
2009:356	09E0054	St Assam's Church, Howth Road, Raheny, Dublin	No archaeological features were revealed.	2009	53.339628	-6.193458
2002:0646	02E1132	Poolbeg, Dublin	Nothing of archaeological significance was encountered.	2002	53.339745	-6.188723
2004:0579	04E0740	Poolbeg Yacht and Boata Club, Pigeon House Road, Dublin	No archaeological stratigraphy or finds were uncovered during monitoring	2004	53.333327	-6.216663
1999:270	99E0490	Sandymount Strand, Sandymount, Dublin	No archaeology was encountered during the monitoring of the works.	1999	53.33172	-6.214809
2000:0279	00E0886	185–203 Merrio Road, Dublin	Some fragments of post-medieval pottery were noted in the spoilheaps.	2000	53.314098	-6.2048
2019:373	19E0043	Tara Towers, Merrion Road, Dublin 4	No archaeology found.	2019	53.312432	-6.2022
2014:328	14D0441	Dun Laoghaire Harbour, Dublin	Wreck remains at two locations, which represented scattered remains with only sections of wreckage visible on the surface was located (W01966, W01967)	2014	53.302883	-6.125977
2005:484	05E1053	Pottery Road 110KV, GSI Station, Dun Laoghaire, Dublin	No finds or features of archaeological interest were found during monitoring.	2005	53.294396	-6.133867
2021:031	20E0125	Eblana Avenue, Dun Laoghaire, Dublin	No features, layers, structures or deposits of archaeological significance were noted during the course of monitoring	2021	53.29385	-6.135818
2020:047	18E0390	Dun Laoghaire Baths, Glasthule, Dublin	No archaeological features or finds, nor any significant historical features were found	2020	53.291052	-6.127629

2012:228	12E210	Glenageary Road Lower District Metered Area (DMA), Glasthule, Dublin	No archaeological features, in situ deposits or artefacts were uncovered during the monitoring of these ground works.	2012	53.288047	-6.13055
2008:389		13 Sandycove Road, Dalkey, Dublin	Nothing of archaeological significance was uncovered during the monitored groundworks.	2008	53.286077	-6.118193
2016:438	16E0290	Bullock Harbour, Dalkey, Dublin	Nothing of archaeological significance was recorded during the testing	2016	53.284705	-6.106474
2008:388	08E0035	Castlepark Road, Dalkey, Dublin	No features of archaeological significance were recorded and no artefacts were recovered.	2008	53.284102	-6.111169
2019:673	19E0806	Castlepark Road, Bullock, Dalkey, Dublin	No features or finds of archaeological significance were identified during excavation	2019	53.283179	-6.110591
2005:412	05E1039	Martello Tower, Bartra, Dalkey, Dublin	No features or artefacts of archaeological interest were noted in either of the test-trenches	2005	53.282974	-6.104081
2020:419	19E0059	Harbour Road, Bullock, Dalkey, Dublin	Testing revealed no areas of archaeological potential.	2020	53.28103	-6.103157
2005:413	05E0176	Carysfort Road, Dalkey, Dublin	Nothing of archaeological significance was recorded during the testing.	2005	53.28028	-6.1042
2018:570	18E0288	15 Corrig Road, Dalkey, Dublin	The ground had been disturbed previously. No archaeology was identified.	2018	53.279439	-6.102642
2018:018	18E0117	8 Church Road, Dalkey, Dublin	No archaeological features were present.	2018	53.280083	-6.105253
2003:482	03E0783	11A Leslie Avenue, Dalkey, Dublin	No archaeological finds or features came to light.	2003	53.278806	-6.101927
2013:047	13E0448	Loreto Abbey Secondary School, Loreto Avenue, Dalkey, Dublin	Other than the 19th-century features described above, no other features or deposits of archaeological significance were identified on the site	2013	53.278884	-6.100493
2006:590	06E0676	Coliemore Harbour/Bullock Harbour, Dalkey, Dublin	Nothing of archaeological merit was noted.	2006	53.276544	-6.09537
2002:0506	02E0309	2 Coliemore Road, Dalkey, Dublin	Excavation of the trenches failed to produce any material of archaeological significance	2002	53.27758	-6.102236
1998:133	98E0002	21/22 St.Patrick's Road, Dalkey, Dublin	No features or finds of an archaeological nature were revealed on the site.	1998	53.277562	-6.102821

1999:175	99E0102	Courtyard, St. Partrick's Road, Dalkey, Dublin	The site was of no archaeological significance.	1999	53.277586	-6.10432
2005:414	04E1399	20 Castle Street, Dalkey, Dublin	No archaeological significance	2005	53.27754	-6.10426
2000:0233	00E0633	2A St. Patrick's Road, Dalkey, Dublin	Stone walls, post-medieval pottery and one sherd of medieval pottery were located.	2000	53.277633	-6.103913
1993:057	92E0077	26-29 Castle St./Adjoining 19 Lord Edward St., Dublin	A ditch was excavated with a wealth of artifactual material, including three Anglo-Saxon silver hoards	1993	53.277773	-6.105331
2004:0494	04E1529	19 White's Villas, Dalkey, Dublin	Nothing of archaeological significance was revealed during the excavation of the foundations.	2004	53.278328	-6.105786
2006:589	06E0541	43 Carysfort Road, Dalkey, Dublin	No material of archaeological significance was uncovered at this site.	2006	53.279021	-6.106415
2007:455	07E0309	31 Carysfort Road, Dalkey, Dublin	No archaeological material was noted.	2007	53.27902	-6.105354
2006:588	06E0842	27 Carysfort Road, Dalkey, Dublin	Nothing of archaeological significance was discovered as a result of this phase of the works.	2006	53.279011	-6.10515
2008:387	08E0600	19 Carysfort Road, Dalkey, Dublin	Nothing of archaeological significance was discovered during the course of the monitoring.	2008	53.278992	-6.104742
2006:591	06E0414	Cunningham Road, Dalkey, Dublin	Nothing of archaeological significance was found at this site.	2006	53.274796	-6.098446
2000:0234		Vico Road, Dalkey, Dublin	The survey revealed nothing of archaeological significance.	2000	53.267419	-6.105834
1995:054	95E0203	Castle St., Dalkey, Dublin	No archaeological soils were encountered and the ground level had been built up to a depth of approximately 1m in relatively recent times.	1995	53.270425	-6.106136
2013:206	13E0047	Contract 7 Additional Works of the DLRCC, Killiney Avenue and Seapoint Road	Nothing of archaeological significance was identified during the course of these works.	2013	53.25321	-6.119
2011:228	11E0304	Ravenswell/Cork Great/ Cork Little/Shanganagh, Dublin	No features of archaeological potential were discovered during the course of the works.	2011	53.238641	-6.113532
2010:835	05E0392	Bray, Wicklow	No archaeology was observed.	2010	53.208957	-6.103849

2020:193	20E0482	Ravenswell, Bray Commons (Co. Wicklow), Cork Great (Co. Dublin)	Linear earthwork constructed in the late 19th early 20th century was identified.	2020	53.210858	-6.106064
2001:1342	01E0220	Corke Great, Bray, Wicklow	No artefacts were recovered from it to suggest a date.	2021	53.21203	-6.107216
2004:1854	04E0163	Quinsboro Road/Main Street/Florenece Road, Bray, Wicklow	No significant archaeology was unearthed anywhere on the site.	2004	53.203604	-6.105294
2017:325	17E0356	Raheenacluig Church, Newport, Wicklow	Prehistoric and post-medieval in the immediate environs of Raheenacluig Church were located.	2017	53.193837	-6.090485
2019:171	17E0356	Raheenacluig Church, Newcourt, Wicklow	The excavations at Raheenacluig revealed three new facets to the historical and archaeological development of the church and its immediate environs.	2019	53.193757	-6.090549
2001:1379	01E0616	Rathdown Upper/Templecarrig Lower, Wicklow	No substantial archaeological structures or monuments were uncovered by the test excavation, although a probable prehistoric pit and a burnt flint flake were identified	2001	53.159466	-6.079627
1997:612	97E0075	Rathdown Lower, Greystones, Wicklow	Prehistoric and medieval material.	2001	53.157622	-6.076719
2007:2018	07E0985	D'Arcy's Field, Rathdown Upper	No significant archaeological features or in situ artefacts.	2007	53.156141	-6.073541
2008:1317	08E0472	Rathdown Lower, Greystones, Wicklow	No features or artefacts of archaeological significance	2008	53.154942	-6.0705
2008:1313	08D010	Foreshore, Greystones, Wicklow	Assessment and systematic recording of the Gap Bridge and surrounding environment.	2008	53.151224	-6.064597
2008:1315	08D011	Greystones Harbour, Greystones, Wicklow	A detailed survey of Greystones Pier and elements of the surrounding harbour area.	2008	53.150588	-6.06358
2008:1316	08E0457	Rathdown Lower, Greystones, Wicklow	Greystones Harbour Development Scheme, ongoing and has yet to yield any features or artefacts of archaeological significance.	2008	53.150293	-6.063159
2006:2194	06E0091	Wicklow Port Access Town Relief Road, Wicklow,	Test excavation and subsequent full excavations were carried out along the route of the Wicklow Port.	2006	53.149967	-6.063969

2010:845	08E0457	Greystones Harbour, Rathdown Lower and Rathdown Upper, Wicklow	Monitoring the harbour development construction works, no significant discoveries were made.	2010	53.149623	-6.06452
2000:1087	00D060	Greystones Harbour, Wicklow	Intertidal survey, underwater inspection and metal-detector survey, no objects or features of archaeological interest were observed.	2000	53.149405	-6.064365
1994:233	94E0048	Rathdown Castle, Rathdown Upper, Wicklow	Test trenching along a portion of a proposed sewage pipeline, the pipeline crosses a relatively marginal area of archaeological activity, with some features dating back to the medieval period and some of obviously more recent date	1994	53.150341	-6.071065
2002:1965	02E0390	Hillview, Delgany, Wicklow	No surviving medieval features were found, although the stratigraphy of that site indicated several periods of renovation and reconstruction.	2002	53.147193	-6.06456
1989:100		Ballyla and Clonmannon	Finds recovered during the current expedition included large copper nails, rope, a pulley etc. No evidence of the timbers discovered in 1985 was found.	1989	53.026825	-6.046771
	03D0027	South Link Bridge, Ringsend, Dublin	Nothing of archaeological significance.	0	0	0
	06D0054	Shanganagh, Bray, Dublin	Nothing of archaeological significance.	0	0	0
	12R0146	Dalkey Island, Dalkey, Dublin	Nothing of archaeological significance.	0	0	0
	06R0107	Shanganagh Bray Drainage Scheme, Dublin	Nothing of archaeological significance.	0	0	0

Appendix B Gazetteer of wrecks, obstructions and documented losses

WIID/ INFOMAR / Other ID	Name	Description	Date of loss	Latitude	Longitude	AEZs (m)
MA1 / KRY10_01	Unknown	Unknown wreck on the Kish Bank measuring 21.2 x 3.7m at a depth of 15.1m	-	53.251082662	-5.92994656399998	100
MA2	Unknown	New unknown wreck on the Kish Bank	-	53.16	-5.56	300
MA3	Unknown	Unknown possible wreck was located by the Survey Vessel Mercator 1/03/2021	-	706923.47 (UTM 1984 29) N	5903493.98 (UTM 1984 29) N	100
MA4	Unknown	Unknown possible wreck mostly buried within the sandy sediments	-	703194 (UTM 1984 29) N	5909676 (UTM 1984 29) N	100
MA5	Unknown	Unknown possible wreck, substantial reflector approximately 15m long and 5-6m wide	-	698254.74 (UTM 1984 29) N	5900476.03 (UTM 1984 29) N	100
MA7	Unknown	Unknown possible wreck, substantial anomaly in two parts measuring 21x6m and 7x7m	-	704759.674 (UTM 1984 29) N	5907048.602 (UTM 1984 29) N	100
MA8	Unknown	Oval shaped depression 12x7m with linear hard reflectors, could possibly be wreck material or outcropping geology	-	704136.393 (UTM 1984 29) N	5908535.577 (UTM 1984 29) N	100
W00883	*Flying Dart* (SS)	Paddler Steamer	1890	53.34743	-6.01086	100
W01109	Unknown	Unknown	1803	53.36244	-6.13876	100
W01120	Unknown	Unknown	1821	53.37316	-6.1057	100
W01121	Unknown	Unknown	1821	53.37119	-6.13055	100

W01122	Unknown	Unknown	1821	53.36189	-6.148	100
W01125	Unknown	Unknown	1874	53.36214	-6.12834	100
W01126	Unknown	Unknown	1874	53.35436	-6.13562	100
W01130	Unknown	Unknown	-	53.3677	-6.13628	100
W01131	Unknown	Unknown	-	53.36754	-6.13357	100
W01132	Unknown	Unknown	-	53.37258	-6.10934	100
W01133	Unknown	Sloop	-	53.37006	-6.13106	100
W01134	Unknown	Unknown	-	53.35958	-6.14868	100
W01135	Unknown	Unknown	-	53.36026	-6.14866	100
W01136	Unknown	Unknown	-	53.36089	-6.14933	100
W01137	Unknown	Unknown	-	53.35762	-6.15557	100
W01138	Unknown	Unknown	-	53.35294	-6.16325	100
W01139	Unknown	Unknown	-	53.3548	-6.16269	100
W01141	Unknown	Unknown	-	53.37233	-6.10731	100
W01142	Unknown (Sutton Wreck)	Carvel	-	53.37228	-6.10969	100
W01143	Unknown	Vessel	-	53.36139	-6.13611	100
W01445	Unknown	Unknown	1803	53.35278	-6.17011	100
W01465	Unknown	Unknown	-	53.34806	-6.18241	100
W01466	Unknown	Unknown	-	53.35044	-6.17739	100
W01526	Unknown	Unknown	1803	53.31846	-6.11471	100
W01532	Unknown	One of 4 wrecks marked on a chart (Admiralty Chart 1415) of Dublin, described as “remains of wrecks” and is located in about 10m of water	1869	53.31217	-6.11119	100
W01533	Unknown	One of four wrecks marked on a chart (Admiralty Chart 1415) of Dublin, described as “remains	1869	53.3118	-6.10214	100

		of wrecks" and is located in about 10m of water				
W01540	Unknown	Admiralty/ Decoy Ship	1931	53.35417	-6.13417	100
W01543	Unknown	Yacht	1946	53.29917	-6.02083	100
W01544	Unknown	Wooden wreck found near Poolbeg lighthouse, *c.* 4.5m in width	-	53.32575	-6.16793	100
W01548	Unknown	Unknown	-	53.36553	-6.12597	100
W01550	Unknown	Unknown	-	53.36002	-6.01904	100
W01551	Unknown	Unknown	-	53.33208	-6.0893	100
W01552	Unknown	Unknown	-	53.33377	-6.08944	100
W01553	Unknown	Unknown	-	53.33401	-6.08959	100
W01554	Unknown	Unknown	-	53.33432	-6.08945	100
W01561	*Deliverer* (HMD)	Steam Drifter	1917	53.34513	-5.9525	100
W01572 / GSI 277	*Glenorchy*	Fully rigged sailing ship, which struck the Kish Bank and became a wreck. Crew saved. Four tugs saved materials off the wreck. Measured 25.6 x 5.8 x 2.9m.	1/1/1869	53.28058	-5.93317	100
W01575	*Lanarkshire* (SS)	Steamship	1882	53.106	-5.85983	100
W01588 / GSI 280	*Sir Charles Napier*	Merchant sailing ship carrying a cargo that included 6,000 iron pots and iron hoops, measured 30 x 7.5 x 1.2m	19/11/1857	53.26208	-5.92511	100
W01593	*Trustful*	Steam-powered fishing drifter, sprang a leak during a SW gale while fishing off Bray Head	29/12/1924	53.16667	-5.93333	100
W01594 / GSI 284	*Vesper* (SS)	Iron merchant steamer wrecked on the Kish Bank and broke into two,	13/1/1876	53.26824	-5.92951	100
W01629	Unknown	Remains of a wooden wreck discovered on the Kish Bank by Marlin Sub Aqua Club in 2003. The vessel is	-	53.2621	-5.92517	100

		partially exposed on the seabed in 8-10m of water. Pottery, clay pipes, iron pots, a number of anchors, a capstan and a winch were recorded. Possible *Sir Charles Napier* as in same location. 54.8 x 7.8m at 8.65m depth.				
W01630 / GSI 281	Unknown	Wooden wreck discovered by Marlin Sub Aqua Club in 2003. The wreck is partially exposed on the seabed in 8–10m of water and is upside down. Hull is copper-sheathed. The wreck rises approximately 1m in height off the seabed and measures 17 x 3m at 10.1m depth.	-	53.26722	-5.9325	100
W01731	Unknown	One of five wrecks plotted on William Bligh's 1803 map of Dublin Bay. It is located in shallow water, just off the South Bull, at the entrance to 'Cock Lake'. It also appears to feature on John Taylor's 1816 map of Dublin.	1803	53.32326	-6.17133	100
W01734	Unknown	Wooden wreck with iron features, known as the 'Ringsend Wreck', became exposed during dredging operations for the Dublin Bay pipeline in April 2001.		53.33625	-6.17844	100
W01790	*Flying Hawk* (SS)	Iron steam tug	1887	53.27778	-6.09056	100
W01828	*Loch Fergus*	Iron barque carrying general cargo. Sunk after running aground in Killiney Bay. Measures 61.6 x 10.1 x 5.7m.	06/02/1899	53.24667	-6.10667	100
W01967	Unknown	Unknown	-	53.30086	-6.12961	100

W02014	*Fisher Lass* (MFV)	A 13 ton 25 year old Irish motor fishing boat (D166) owned by John O'Byrne of Ringsend. Caught fire off Howth Head, burnt to the water's edge and sank. 7 miles east of Ireland's Eye. One of three crew lost.	10/01/1929	53.40667	-5.86667	100
W02049	*Marlay* (SS)	Steamship	1902	53.38835	-5.97727	100
W02099	*Vanguard* (HMS)	One of four Audacious class, ironclad battleships built by Cammel Laird & Co. Birkenhead, England, at a cost of £355,000 in 1909. The 6,034-ton vessel was powered by steam and sail and was capable of attaining speeds up to 14 knots. The loss was considered to be caused by the deterioration of high explosives in 1917.	9/1/1875	53.21296	-5.77187	100
W02219	Unknown	Possible wreck (INSS No. G154) identified during the National Seabed Survey. The wreck measures 37 x 13 x of 1 m, and lies in a general sea depth of 58m.	-	53.35768	-5.76637	100
W02367	*John Morrison* (SS)	Barquentine	1925	53.08333	-5.99167	100
W08691	Unknown	Unknown	1802	53.2655	-5.9305	100
W09300 / GSI 288	Unknown	Wreck surveyed by the RV *Keery* in 2010 as part of the INFOMAR seabed mapping programme. Wreck measures 21m long, 3.7m in maximum width and lies in 15m of water.	04/06/1800	53.251	-5.93	100
W09480 / GSI 279	*Bolivar* (MV) (bow)	The bow section of MV *Bolivar*, a Norwegian motor vessel cargo ship.	06/03/1947	53.2683	-5.92383	100

		Ran aground on Kish Bank and sunk. Measures 6 x 2m at 7.51m depth.				
W09785	*Kilkenny* (cargo debris)	Unknown	1991	53.3477	-6.12005	100
W09846 / GSI 283	*Bolivar* (MV) (stern)	The stern section of MV *Bolivar*, a Norwegian motor vessel cargo ship. Ran aground on Kish Bank and sunk.	06/03/1947	53.2675	-5.92583	100
W10276	Unknown	Unknown wreck on the Kish Bank. 84 x 17m at 9.13m depth.	-	53.25417	-5.92347	100
W10291	Unknown	Unknown	-	53.41639	-5.78972	100
W10292	Unknown	Unknown	-	53.41917	-5.76861	100
W10297	Unknown	Unknown wreck on the Kish Bank	-	53.25722	-5.92583	100
W10332	Unknown	Unknown	-	53.33333	-5.75	100
W10400	Unknown	Unknown	-	53.3484	-6.22285	100
W10595	Unknown	Sailing Ship	-	53.27417	-6.07667	100
W10596	Unknown	Unknown	-	53.32083	-6.12	100
W10597	Unknown	Unknown wreck, wrecked 6km east of Shankill, Dublin	-	53.23305	-6.02083	100
W10598	Unknown	Unknown	-	53.18612	-6.04167	100
W11331	Unknown	Unknown wreck on the Kish Bank	-	53.2666	-5.93355	100
W11332 / GSI 287	Unknown	Wooden wreck identified by Browne & Stokes during a geophysical survey in 2008. The wreck was surveyed by the RV *Keery* in 2010 as part of the INFOMAR seabed mapping programme. Wreck measures 26.5m long, 4.3m in maximum width and lies in 15m of water.	-	53.25367	-5.93183	100
W11333	Unknown	Unknown wreck on the Kish Bank	-	53.26	-5.93542	100
W11334	Unknown	Unknown wreck on the Kish Bank	-	53.30132	-5.9191	100

W11337	Unknown	Unknown wreck on the Kish Bank	-	53.26226	-5.93818	100
W11338	Unknown	Unknown wreck on the Kish Bank	-	53.26346	-5.93812	100
W11339	Unknown	Unknown wreck on the Kish Bank	-	53.25694	-5.9342	100
W11340	Unknown	Unknown wreck on the Kish Bank	-	53.258	-5.93581	100
W11341	Unknown	Unknown wreck on the Kish Bank	-	53.26349	-5.93744	100
W11342	Unknown	Unknown	-	53.13993	-5.84835	100
W11343	Unknown	Unknown	-	53.14007	-5.84853	100
W11344	Unknown	Unknown	-	53.13899	-5.86873	100
W11345	Unknown	Unknown	-	53.13937	-5.87141	100
W11346	Unknown	Unknown	-	53.13894	-5.87579	100
W11347	Unknown	Unknown	-	53.13982	-5.91662	100
W11348	Unknown	Unknown	-	53.14081	-5.85421	100
W11349	Unknown	Unknown	-	53.14387	-5.88975	100
W11350	Unknown	Unknown	-	53.14619	-5.88965	100
W11351	Unknown	Unknown	-	53.13795	-5.85347	100
W11352	Unknown	Unknown	-	53.1388	-5.9022	100
W11353	Unknown	Unknown	-	53.13785	-5.90297	100
W11354	Unknown	Unknown	-	53.13902	-5.93386	100
W11355	Unknown	Unknown	-	53.15035	-6.02639	100
W11356	Unknown	Unknown	-	53.15482	-6.04957	100
W11357	Unknown	Unknown	-	53.15775	-6.05398	100
W11358	Unknown	Unknown	-	53.15765	-6.04628	100
W11359	Unknown	Unknown	-	53.15143	-5.98631	100
W11360	Unknown	Unknown	-	53.24372	-6.10193	100
W11361	Unknown	Unknown wreck on Codling Bank	-	53.23887	-6.09263	100
W11362	Unknown	Unknown	-	53.18252	-6.00147	100
W11363	Unknown	Unknown	-	53.18295	-6.00218	100
W11364	Unknown	Unknown	-	53.17231	-5.99255	100

W11365	Unknown	Unknown wreck on Codling Bank	-	53.22067	-6.07505	100
W11366	Unknown	Unknown wreck on Codling Bank	-	53.23766	-6.10212	100
W11367	Unknown	Unknown wreck on Codling Bank	-	53.23018	-6.0902	100
W11368	Unknown	Unknown	-	53.17222	-5.98933	100
W11369	Unknown	Unknown	-	53.16663	-5.98783	100
W11474	Unknown	Unknown	-	53.305	-6.155	100
W11481	Unknown	Unknown	-	53.30143	-6.1255	100
W11539	Unknown (GSI_137)	Unknown	-	53.36002	-6.01904	100
W11542 / GSI 154	Unknown	Unknown	-	53.35768	-5.76637	100
W11566	Unknown	Re-deposited ship timbers	-	53.33704	-6.1798	100
W11567	Unknown	Re-deposited ship timbers	-	53.33705	-6.18	100
W11568	Unknown	Re-deposited ship timbers	-	53.33704	-6.18016	100
W11569	Unknown	Re-deposited ship timbers	-	53.33703	-6.18041	100
W11570	Unknown (Ringsend Wreck)	Wooden wreck	-	53.33625	-6.17844	100
W11571	Unknown (Ringsend Wreck)	Wooden wreck	-	53.33646	-6.17801	100
W11581	Unknown	Unknown wooden wreck, known as the '9.5 fathom wreck', on the Kish Bank	-	53.25038	-5.93005	100
W11610 / GSI 286	Unknown	Unknown wreck on Kish Bank. Measures 18.3m x 4.5m.	-	53.25767	-5.93365	100
W11623	Unknown	Unknown	-	53.37006	-6.13106	100
W11626 / GSI 282	Unknown	Wooden wreck known as the 'Iron Pipe Wreck' located by Browne and Stokes in 2008. The wreck was surveyed by the RV *Keery* in 2010 as part of the INFOMAR seabed mapping programme. Wreck	-	53.26517	-5.93708	100

		measures 19m long, 5m in maximum width and lies in 14m of water.				
W11629	Unknown 'North Bull'	Unknown	-	53.36754	-6.13357	100
W11630	Unknown	Surveyed by the Geological Survey of Ireland in 2008 as part of the Irish National Seabed Survey. Known by divers as the North Wreck, it appears to be the remains of a barge or hopper and measures 25 x 7.3 m.	-	53.28694	-5.82278	100
W11645	Unknown 'Sutton Wreck'	Unknown	-	53.37228	-6.10969	100
W17989	Unknown	Surveyed by the Geological Survey of Ireland in 2008 as part of the Irish National Seabed Survey. Measures 26 x 8 m and lies at a depth of 42 m.	-	53.2849	-5.83017	100
W18522	Unknown	Unknown	-	53.33976	-6.1463	100
W18562 / GSI 829	Unknown	Wreck surveyed by the *Celtic Voyager* in 2010 as part of the INFOMAR seabed mapping programme. Wreck measures 13.5m long, 3.5m in maximum width and lies in 10m of water.	-	53.2411	-5.91233	100
W18574	Unknown	Unknown	-	53.35982	-6.21983	100
CON04	Unknown	Unknown	-	53.2980000000001	-6.12506999999994	100
CON04	Unknown	Unknown	-	53.29927	-6.12530999999996	100
W06963	*Bydand*	Motor Fishing Vessel, sank following collision with Irish fishing vessel *Dietier*	01/02/1989	53.3995400000001	-6.03623999999996	100
GSI 278 / KRY10_01	Unknown	Unknown	-	53.269885507	-5.92600247799993	100
CON04	Unknown	Unknown	-	53.2984500000001	-6.12514999999996	100

CON04	Unknown	Unknown	-	53.29997	-6.12482999999997	100
KRY10_01	Unknown	Unknown	-	53.2665134970001	-5.93038700499994	100
W06965	*Privet*	Fishing vessel, sank while trawing	00/09/1988	53.3295200000001	-6.13602999999995	100
KRY10_01	Unknown	Unknown	-	53.2671421220001	-5.93321302099997	100
CV08_03	Unknown	Unknown	-	53.26531464	-5.84020686099996	100
W06943	HMS *Guide Me II*	Built in 1907 by Hall, Russel & co. Originally owned by J Mitchell & J Cow. Hired by the Admiralty in 1915 and converted to an armed patrol vessel. One boiler, compound expansion engine of 38 nhp, single shaft. Machinery by the builders. Sank following collision with SS *Glengarriff* of Cork. One man lost.	29/08/1918	53.27209	-6.05440999999996	100
W02039	RMS *Leinster*	A 2,646 ton, 22 year old steel twin screw steamer built in Birkenhead, Liverpool, by Lairds. Owned by the City of Dublin Steam Packet Company and captained by William Birch. Measured 360 x 42 x 27 feet. Lost en route from Dun Laoghaire to Holyhead.	10/10/1918	53.3143000000001	-5.79283999999996	100
W69620	*Queen Victoria*	Paddle steamer, 17.5m x 7.5m x 3.4m, possibly in two parts	-	53.36006	-6.05102999999997	100
08E0497, 08D038, 08R109	Unknown	An unknown carvel-built, 18th or early 19th century wreck off North Port	-	53.34806	-6.182409	100m
2001:472	Sutton Marine Wreck	Large coherent hull section visible at low tide	-	53.389517	-6.110306	100m
01E0402	Unknown	An unknown wood and metal wreck	-	53.33986	-6.20494	100m

Appendix C Cumulative Effects Assessment

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
Codling Wind Park (OWF)	Concept/Early Planning	2.9	7.7	Maybe	Construction and commissioning in the mid 2020's (source: https://codlingwindpark.ie/), possible site investigation overlap
Codling Wind Park Extension (OWF)	Concept/Early Planning	9.9	14.6	Maybe	Construction and commissioning in the mid 2020's (source: https://codlingwindpark.ie/), possible site investigation overlap
North Irish Sea Array (OWF)	Concept/Early Planning	21.3	22.1	Maybe	Foreshore licence applied for surveys from summer 2020, possible site investigation overlap
Sirius South (cables)	Constructed	17.5	10.8	n/a	
ESAT 2 (cables)	Constructed	7.0	0.0	n/a	
Hibernia C (cables)	Constructed	14.4	7.0	n/a	
Emerald Bridge (cables)	Constructed	16.8	10.8	n/a	
Celtix Connect (cables)	Constructed	8.3	1.7	n/a	
Hibernia D (cables)	Constructed	1.8	4.7	n/a	
BT-TE1 (cables)	Constructed	17.1	10.8	n/a	
Proposed Rockabill Telecoms Cable (cables)	Constructed	22.4	17.5	n/a	Was proposed to be installed Jun-August 2019

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
Havhingsten Telecomms Cable Dublin (cables)	Pending, application submitted January 2020			Maybe	Subject to the award of installation consents, the cable installation is scheduled to begin in the fourth quarter of 2019 and is expected to be operational by the end of 2019. Following installation, the cable is expected to be operational for at least 25-years.
S0024-01 (dumping at sea)	Approved 2016	5.5	2.3	No	Dumping of dredging up to 2021; release throughout the hull of the vessel to Burford Bank, Dublin Bay
S0004-02 (dumping at sea)	Granted 2020	0.0	2.3	No	Dumping of maintenance dredging from 2020 and 2021; release throughout the hull of the vessel to Burford Bank, Dublin Bay
DUBLIN (shipping ports)	Operational	20.5	3.8		
Dublin Port maintenance dredging	Determined May 2016	6.0	2.8	No	To be carried out in 2020/2021
Alexandra Basin Redevelopment Project	Determined May 2016	10.6	2.5	Maybe	Works were due to commence in 2016
Shanganagh Waste Water Treatment Plant	OPERATIONAL	11.0	0.2	No	Construction commenced 2008. Completed in 2013
Dublin Port maintenance dredging	Determined May 2016	14.6	0.8	Maybe	

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
Ringsend Wastewater Treatment Works Extension		16.7	0.4	No	Works commenced in 2018. Due to last 2 years
Gas pipeline trenchless crossing	Determined May 2013	16.8	9.5	Maybe	
New pontoon at Berth 50 for Tug boats	Determined Jan 2019	17.2	1.3	No	
Dublin City Council - Cycleway	Submitted 2015	16.1	3.7	Maybe	
Dublin Port Company MP2 Project	Submitted 1 October 2020	16.1	0.3	Yes	The EIA notes: Construction planned to commence in 2022 and complete in 2032
Dun Laoghaire Harbour Company	Submitted 2017	12.2	0.9	Maybe	
Dun Laoghaire Harbour Company	Submitted 2017	12.2	1.2	Maybe	
Dun Laoghaire Rathdown Co Co - Baths	Approved 2016	11.9	1.5	No	Completion date is spring 2021 (as of June 2020)
Dun Laoghaire Rathdown Co.Co. - Dalkey Island	Approved subject to conditions 2014	9.2	1.9	No	
Dun Laoghaire Rathdown County Council - Corbawn Lawn	Approved 2018	10.8	0.0	No	Works are of 3 months duration. It is not known if they have been completed.

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
Fingal County Council	Approved 2018. Assumed operational.	17.6	8.8	No	Works commenced in September 2018. Expected to be completed by now.
Foreshore licence application for the Installation of a 200mm welded steel pipeline under the Tolka River using trenchless techniques. The pipeline will be used to transport aviation fuel from Dublin Port to Dublin airport.	Granted 2017	19.7	3.5		Not known if it has been installed, but likely given that it was consented in 2017.
Irish Water - Swords	Determined 2016	24.5	14.1	No	Completed
Irish Water - Dun Laoghaire	Submitted 2015. Outcome not known	11.8	1.5	Maybe	
Irish Water - Lusk	Approved June 2016	24.9	20.5	Maybe	Not known if it is already completed.
Irish Water - Loughshinny	Approved 2017	27.9	23.8	Maybe	Not known if it is already completed.
Greater Dublin Drainage Outfall	Submitted April 2020	16.7	9.4	Maybe	Not known if it was granted consent. However, the GDD received planning permission in November 2019.

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
Malahide Marina Village Ltd	Determined January 2019	21.3	12.9	Yes	Lasts from 2018 for 7 years (i.e. to 2025)
Ravensburg Ltd	Submitted October 2015	20.0	3.2		Outcome of application not known.
Stena Line Linkspan removal	Approved November 2015	12.2	1.1		Not known if completed, but likely to be done so by now. Planned to commence in October 2015 and with a programme of up to 12 weeks.
America Europe Connect Ltd - Geophysical surveys and SI subsea fibre optic cable @ Loughshinny Beach	Approved June 2018	17	10	Maybe	FS006746
Bord Gais Network Foreshore licence gas pipeline trenchless crossing of River Tolka	Approved May 2013	16.8	9.5	Maybe	FS006104
Codling Wind Park Ltd Foreshore licence application for site investigation works off the coast of Wicklow	Submitted 2013	0	0	Maybe	FS006241
Codling Wind Park Ltd – Site Investigation Licence Application to	Approved March 2021	0	0	Maybe	FS007045

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
inform the design of a possible windfarm at this site					
Statkraft -North Irish Sea Array (NISA) Site Investigations	Submitted January 2020	13	14	Maybe	FS007031
Pre-installation survey, localised site investigations and installation of a subsea fibre optic cable.	Survey and installation had 5 month programme - planned to commence in April 2019.	15	7	No	FS006842
Geophysical surveys and SI subsea fibre optic cable @ Donabate	Approved May 2018	22	15	No	FS006631
Foreshore Licence application for geophysical and geotechnical marine based site investigation works, to support the design of new quay walls, jetties, land reclamations and	Approved April 2016	15	0	No	FS006497

Project	Status of Development	Distance to Dublin Array Wind Farm Area (km)	Distance to Dublin Array ECC Area (km)	Temporal Overlap with FL works	Additional Notes
capital dredging at Dublin Port, Co. Dublin					
Greater Dublin Drainage Project. Foreshore licence application for offshore investigations for designing a marine outfall for the Greater Dublin Drainage (GDD) project	Submitted 2014. Recommended for approval but outcome not known.	15	8	No	FS006292
Foreshore licence application for site investigation and exploratory well drilling	Approved 2012	0	0	No	FS006192