PROJECT

PISCES Subsea Telecoms Cable System

SCOPE

Underwater Archaeological Impact Assessment (UAIA)

CLIENT

McMahon Design

PREPARED BY

[redacted]

DATE

December 2023

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Summary

Mizen Archaeology were appointed by *McMahon Design & Management Ltd.* to undertake an Underwater Archaeological Impact Assessment (UAIA) for survey works proposed for the PISCES subsea telecoms cable system. This system is planned to have an Irish landfall at Ballyloughane Strand, Renmore, Co. Galway. The report covers the survey corridor of the cable within Irish territorial waters.

The archaeological data for recorded monuments and wreck sites suggest there is a high potential for archaeological remains for the general area of the cable corridor. Immediately onshore are RMPs and RPS sites which are sited to ensure control of the harbour and a focus on the sea. New discoveries on the foreshore at Ballyloughan in recent times following survey for storm damage also provides tangible evidence for archaeological features. The shipwreck records held by the National Monuments Service are voluminous for the coast of Galway; there are 51 wrecks with known locations listed within *c.* 5km of the proposed cable route survey corridor, with six wrecks within the corridor.

The following is offered as recommendations for mitigation specific to the PISCES System works**:**

- The proposed geophysical survey shall be carried out in advance of the geotechnical works to ensure that invasive works avoid impacting on any additional cultural heritage sites identified in the geophysical data.

- Areas of the seabed which shall be impacted by geotechnical /invasive works shall be included in the geophysical survey (sidescan/multi-beam and magnetometer) and be licenced by the National Monuments Service. The results of geophysical survey data shall be assessed by an underwater archaeologist experienced in the interpretation of archaeological geophysical data. Exclusions zones will be implemented around any potential sites of archaeological significance identified in the geophysical survey to ensure that geotechnical works avoid impacting on any additional cultural heritage sites identified in the geophysical data.

- Taking into consideration the results of the desktop study a 100m exclusion zone shall be implemented around Wreck no. W17455 and a 250m exclusion zone should be implemented around Wrecks no. 05621, W09545, W12423, W12671, W14648, and W17455. No geotechnical/invasive surveys shall be undertaken within these exclusion zones.

- All marine sediment samples retrieved during site investigation works shall be physically inspected and assessed by an archaeologist in order to identify any potential evidence of archaeological significance. Where potential archaeological material including submerged palaeo-landscape deposits are identified they shall be, where suitable samples are available, radiocarbon-

dated following agreement with the National Monuments Service and licenced by the National Museum of Ireland.

- The excavation of trial pits on the foreshore at Ballyloughan shall be monitored by an underwater archaeologist under licence from the National Monuments Service. The plant and machinery required to carry out the work will utilize the established access route along the northern edge of the strand.

- Following the completion of all site investigation works a report detailing the results will be submitted to the National Monuments Service.

It should be noted that all mitigation measures are recommendations only. The ultimate decision rests with the National Monument Service of the Department of Housing, Local Government and Heritage in collaboration with the National Museum of Ireland.

1 Introduction

1.1 General

This report relays the results of an Underwater Archaeological Impact Assessment (UAIA) of a proposed subsea telecoms cable system from Ireland to Portugal with branches to Spain and France (Figure 1). The proposed Irish landfall is located at Ballyloughane Strand, Renmore, Co. Galway. *Mizen Archaeology* were appointed by *McMahon Design & Management Ltd.* to undertake the assessment, including desktop study. The UAIA covers the section of cable within Irish territorial waters.

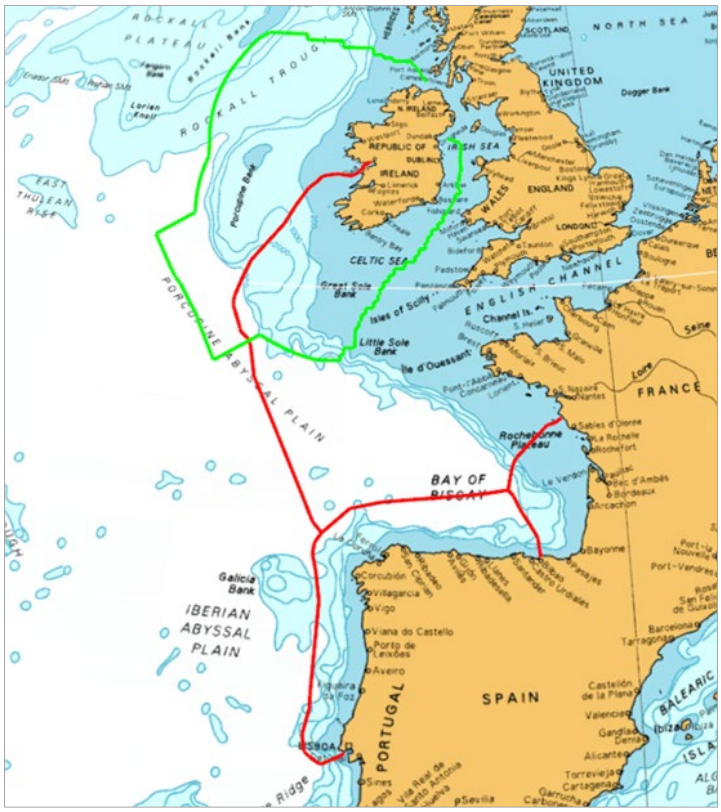

Figure 1: The PISCES System proposed route from Ireland to Portugal with branches to Spain and France.

1.2 Conventions, Legislations, and Guidelines

The assessment was undertaken with due regard to the following national and international protective conventions, guidelines and legislation:

- Historic and Archaeological Heritage and Miscellaneous Provisions Bill 2023
- Heritage Act, 1995
- National Cultural Institutions Act, 1997

- The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous) Provisions Act, 1999
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, Department of Arts, Heritage, Gaeltacht and the Islands
- Local Government (Planning and Development) Act, 2000
- European Convention on the Protection of the Archaeological Heritage (the 'Valletta Convention') ratified by Ireland in 1997
- Council of Europe Convention on the Protection of Architectural Heritage of Europe (the 'Granada Convention') ratified by Ireland in 1997
- International Council on Monuments and Sites (ICOMOS), advisory body to UNESCO concerning protection of sties and recommendation of World Heritage sites ratified by Ireland in 1992.

2 Receiving Environment

2.1 Location

The License Application Area begins at a landfall at Ballyloughane Strand in Galway Bay, traverses Galway Bay and through the South Sound to the 12nm limit, continuing to the west offshore of the County Clare coast and onwards in a southwest to south direction until it crosses the continental shelf and leaves the Irish Maritime Area (Figure 2). The survey corridor has total length of approx. 710km and a total area of 3,607km2 within the Maritime Area. A cable route corridor of between 250m to 12,000m in width will be surveyed within the licence application area.

The licence application area covers the landfall at Ballyloughane, with a survey corridor traversing Galway Bay. The landfall location is shown in Figure 3 and the general inshore location is shown in Figures 4 on an admiralty chart base. The route heads southwest from the landfall, parallel to the existing IRIS cable, before turning south and then south westerly again to the north of Black Head before turning to the south and leaving the bay through the South Sound as shown in Figure 5.

The offshore survey corridor continues in a southwestern direction entering the deep waters of the Porcupine Seabight and traversing the continental shelf before leaving the Irish Maritime Area and continuing in a southern direction towards a subsea Branching Unit which will bring system legs to France, Spain and Portugal respectively. The width of the seabed covered by a single survey line

increases as a function of water depth. Therefore, in deep water the survey corridor width increases as the survey progresses into deeper waters.

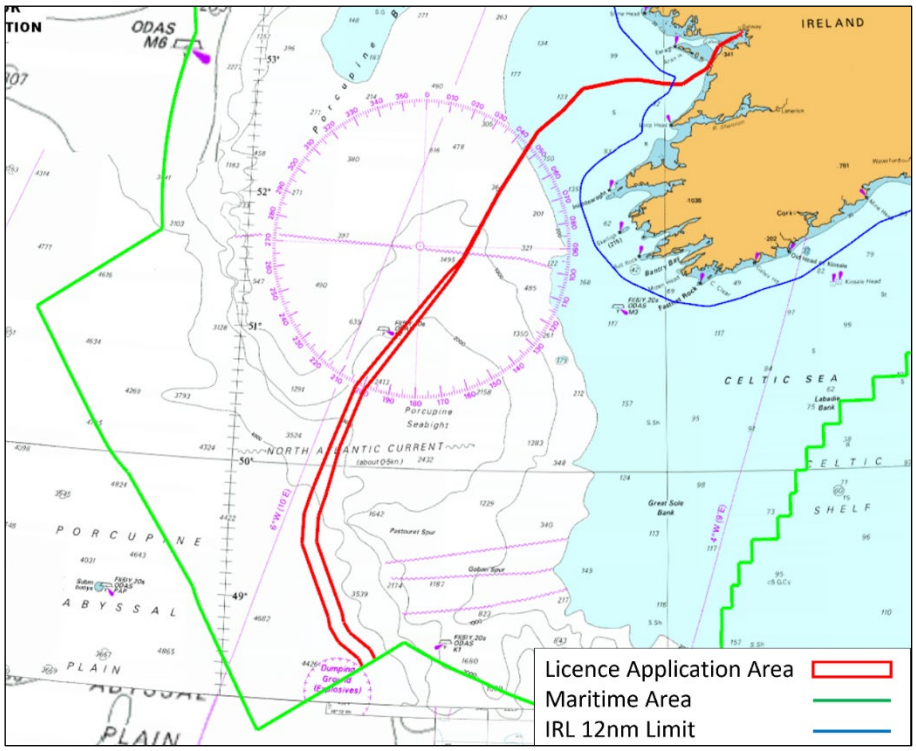

Figure 2: Survey Licence Application Area

Figure 3: Landfall at Ballyloughane Strand, Renmore, Co. Galway.

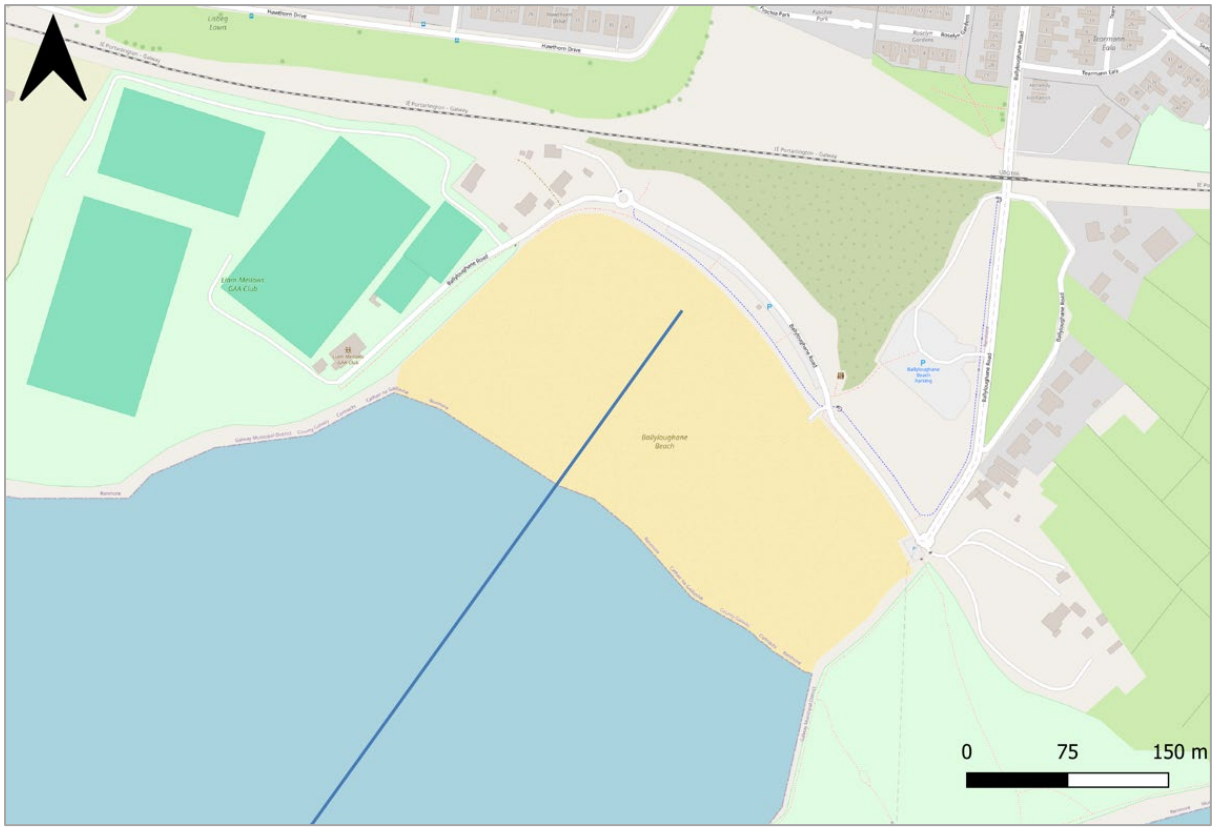

Figure 4: Landfall at Ballyloughane Strand, Renmore, Co. Galway.

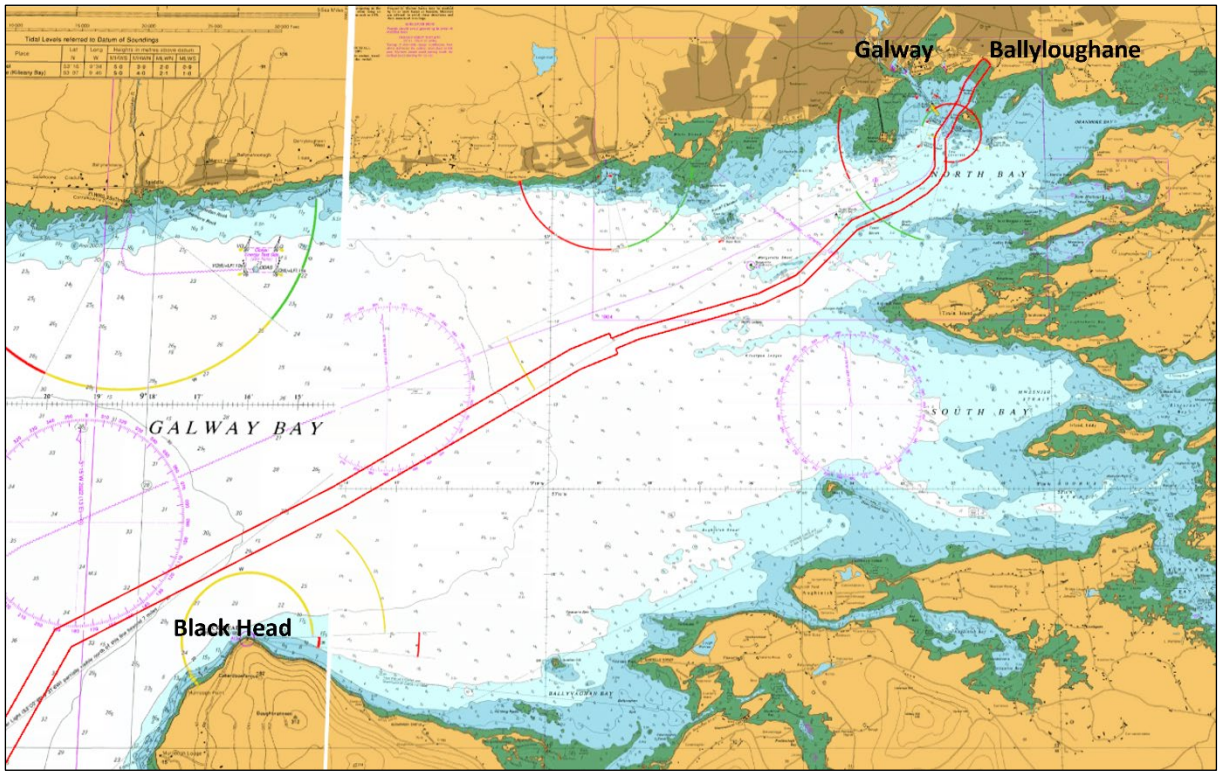

Figure 5: Landfall & Inshore Survey Licence Application Area in Galway Bay.

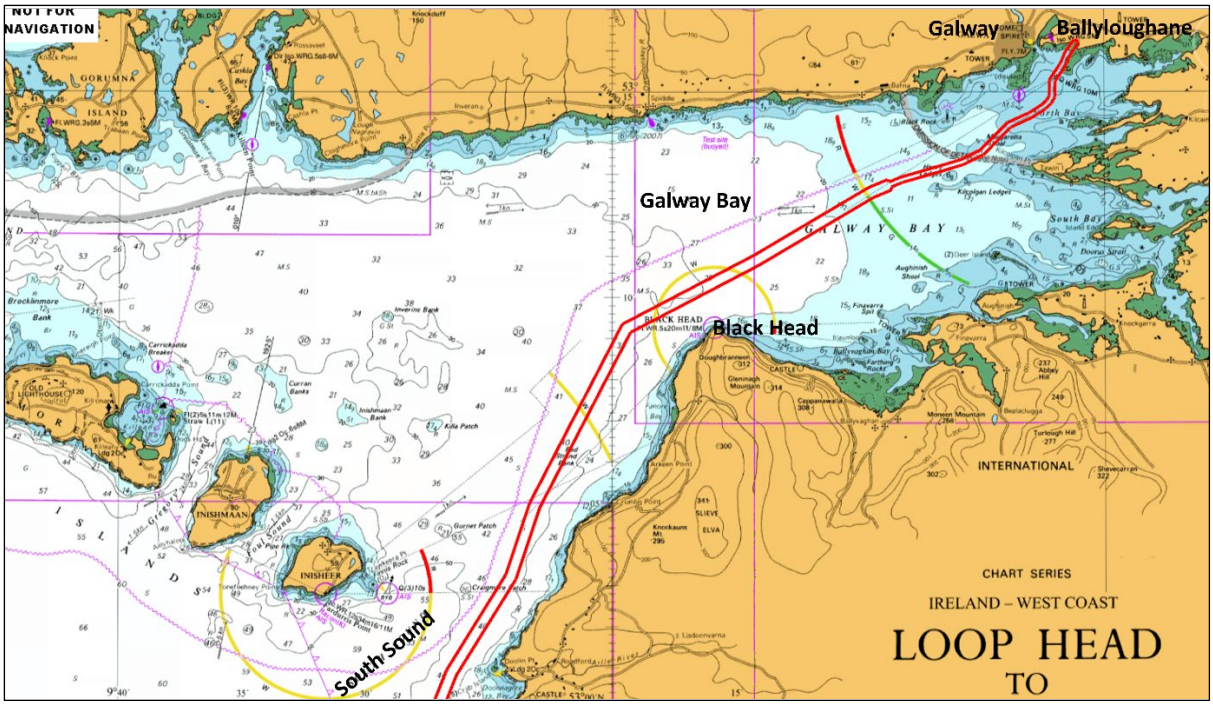

Figure 6: Survey Licence Application Area in Galway Bay.

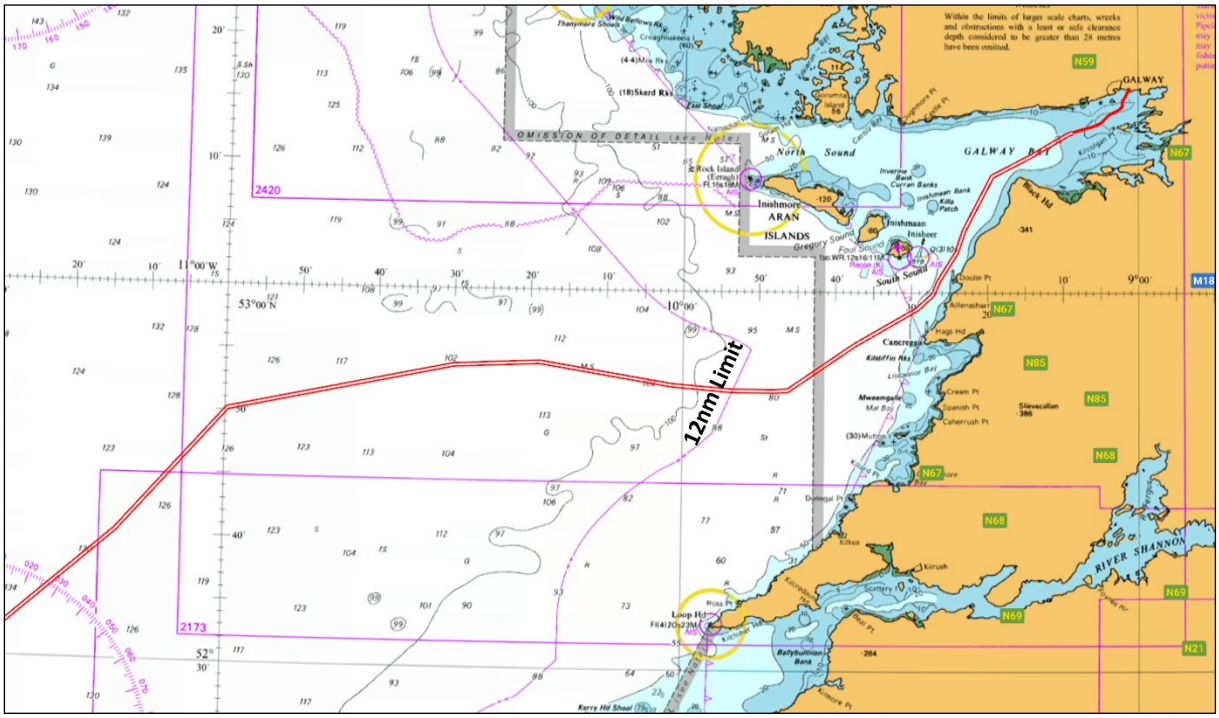

Figure 7: Survey Licence Application Area Offshore of Galway including 12nm limit.

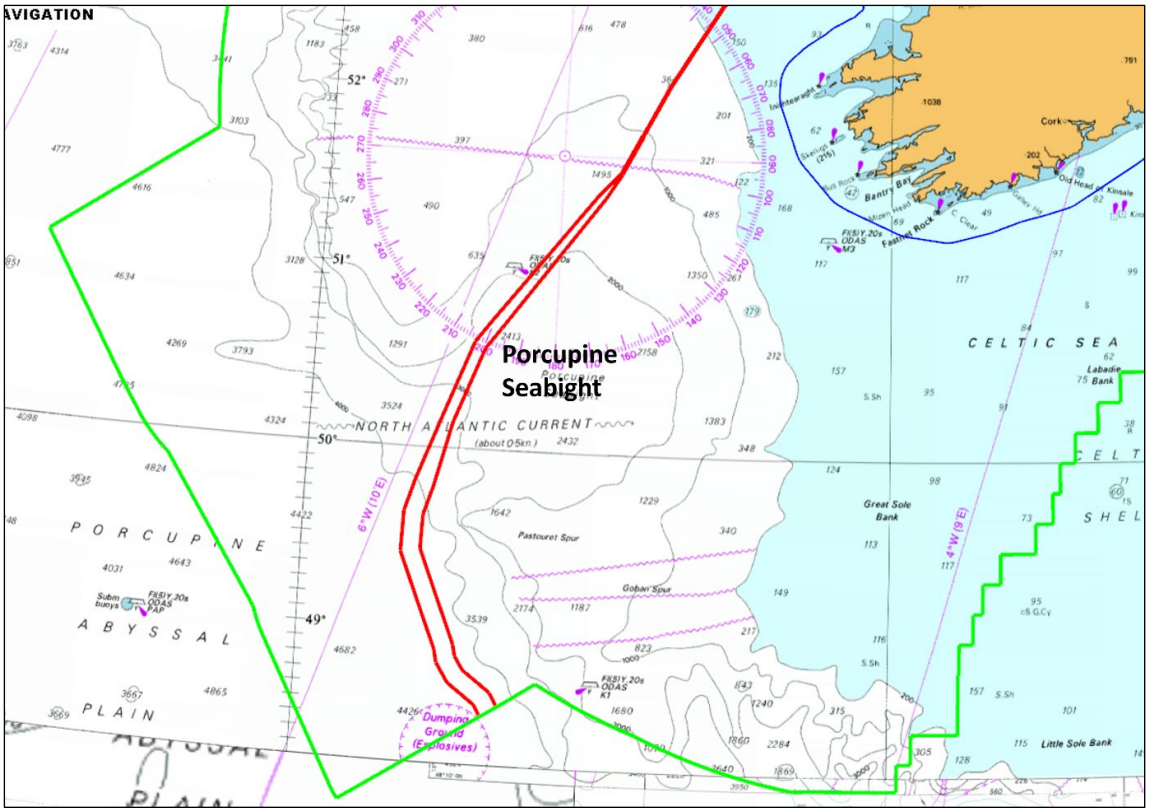

Figure 8: Survey Licence Application Area in Deep Water.

The Route Position List for the Licence Application Area is presented in Table 1 below.

Table 1: Survey Licence Application Area Route Position List.

Idx	Longitude	Latitude	Idx	Longitude	Latitude
1	13° 15' 40.6602" W	48° 35' 05.9241" N	41	9° 06' 55.2641" W	53° 13' 00.7071" N
2	13° 19' 28.3570" W	48° 39' 46.3066" N	42	9° 06' 37.1111" W	53° 13' 03.8033" N
3	13° 33' 36.5808" W	48° 46' 46.0106" N	43	9° 05' 44.8350" W	53° 13' 13.1578" N
4	13° 37' 55.4916" W	48° 51' 13.7382" N	44	9° 04' 55.9719" W	53° 13' 27.4651" N
5	13° 39' 10.1792" W	48° 55' 08.1926" N	45	9° 03' 49.1407" W	53° 14' 07.6656" N
6	13° 49' 38.1849" W	49° 11' 54.9773" N	46	9° 02' 56.5110" W	53° 14' 21.8296" N
7	13° 58' 33.7124" W	49° 26' 13.6475" N	47	9° 02' 23.6463" W	53° 14' 34.4860" N
8	13° 58' 04.5249" W	49° 37' 29.0694" N	48	9° 02' 10.2903" W	53° 14' 42.0380" N
9	13° 53' 35.6169" W	49° 47' 07.3325" N	49	9° 02' 01.1462" W	53° 14' 51.2711" N
10	13° 45' 27.8725" W	50° 08' 37.1570" N	50	9° 02' 00.5431" W	53° 15' 14.3059" N
11	13° 30' 47.9275" W	50° 33' 39.6285" N	51	9° 01' 59.6009" W	53° 15' 15.6754" N
12	13° 22' 49.4965" W	50° 40' 30.5128" N	52	9° 01' 53.2766" W	53° 15' 20.8228" N
13	12° 31' 26.0974" W	51° 25' 00.4497" N	53	9° 01' 38.5897" W	53° 15' 34.1200" N
14	12° 23' 30.6015" W	51° 33' 04.1614" N	54	9° 01' 31.8507" W	53° 15' 41.2755" N
15	12° 13' 05.0465" W	51° 45' 52.6812" N	55	9° 01' 23.7643" W	53° 15' 53.3603" N
16	12° 13' 16.6686" W	51° 45' 56.3420" N	56	9° 01' 03.3247" W	53° 16' 10.3606" N
17	11° 59' 17.1772" W	52° 02' 55.3974" N	57	9° 01' 03.9036" W	53° 16' 10.6626" N
18	11° 31' 58.2790" W	52° 30' 36.0315" N	58	9° 01' 04.9116" W	53° 16' 12.3204" N
19	11° 13' 50.1244" W	52° 40' 12.8647" N	59	9° 01' 10.4214" W	53° 16' 15.4272" N

20	10° 59' 33.0179" W	52° 49' 59.5201" N	60	9° 01' 13.5984" W	53° 16' 15.2256" N
21	10° 30' 00.7955" W	52° 53' 45.4284" N	61	9° 01' 14.8793" W	53° 16' 14.5864" N
22	10° 18' 51.0571" W	52° 54' 05.0846" N	62	9° 01' 35.6743" W	53° 15' 57.2892" N
23	10° 01' 26.4248" W	52° 52' 22.8686" N	63	9° 01' 44.0398" W	53° 15' 44.7860" N
24	9° 59' 58.0369" W	52° 52' 18.6471" N	64	9° 01' 50.1025" W	53° 15' 38.3479" N
25	9° 53' 38.0336" W	52° 52' 00.2869" N	65	9° 02' 04.3380" W	53° 15' 25.4587" N
26	9° 48' 09.9457" W	52° 51' 58.6803" N	66	9° 02' 11.4416" W	53° 15' 19.6765" N
27	9° 46' 08.5261" W	52° 52' 03.0793" N	67	9° 02' 13.9914" W	53° 15' 15.9700" N
28	9° 37' 24.9826" W	52° 55' 41.3048" N	68	9° 02' 14.5764" W	53° 14' 53.5512" N
29	9° 29' 08.4352" W	52° 58' 35.3813" N	69	9° 02' 20.9194" W	53° 14' 47.1460" N
30	9° 27' 12.6426" W	52° 59' 39.1394" N	70	9° 02' 31.9860" W	53° 14' 40.8883" N
31	9° 26' 50.5369" W	52° 59' 58.7339" N	71	9° 03' 02.9491" W	53° 14' 28.9640" N
32	9° 26' 17.6225" W	53° 00' 48.7213" N	72	9° 03' 56.9299" W	53° 14' 14.4360" N
33	9° 23' 53.8215" W	53° 03' 08.6062" N	73	9° 05' 03.9179" W	53° 13' 34.1404" N
34	9° 22' 56.1031" W	53° 04' 53.2502" N	74	9° 05' 49.7491" W	53° 13' 20.7206" N
35	9° 19' 15.7727" W	53° 09' 08.8661" N	75	9° 06' 40.8795" W	53° 13' 11.5711" N
36	9° 14' 03.1758" W	53° 10' 46.8008" N	76	9° 06' 58.9490" W	53° 13' 08.4890" N
37	9° 09' 24.0033" W	53° 12' 25.4751" N	77	9° 08' 18.1355" W	53° 12' 54.9721" N
38	9° 08' 38.8823" W	53° 12' 36.6865" N	78	9° 08' 46.6116" W	53° 12' 47.8997" N
39	9° 08' 41.4586" W	53° 12' 40.4243" N	79	9° 08' 49.1883" W	53° 12' 51.6374" N
40	9° 08' 13.7006" W	53° 12' 47.3183" N	80	9° 09' 36.0453" W	53° 12' 39.9944" N
81	9° 14' 16.2409" W	53° 11' 00.9566" N	100	11° 59' 40.1258" W	52° 03' 03.2559" N
82	9° 19' 35.7536" W	53° 09' 20.8481" N	101	12° 13' 39.9142" W	51° 46' 03.6626" N
83	9° 23' 20.9374" W	53° 04' 59.5614" N	102	12° 13' 51.5378" W	51° 46' 07.3224" N
84	9° 24' 18.3111" W	53° 03' 15.5134" N	103	12° 24' 14.7705" W	51° 33' 21.3975" N
85	9° 26' 41.6821" W	53° 00' 56.0239" N	104	12° 34' 31.5841" W	51° 26' 28.4427" N
86	9° 27' 14.3740" W	53° 00' 06.3634" N	105	13° 27' 56.2484" W	50° 42' 54.9242" N
87	9° 27' 33.0421" W	52° 59' 49.8140" N	106	13° 36' 25.7921" W	50° 35' 36.5216" N
88	9° 29' 24.3735" W	52° 58' 48.5082" N	107	13° 51' 25.6644" W	50° 09' 54.6815" N
89	9° 37' 39.3236" W	52° 55' 54.9831" N	108	14° 03' 09.5703" W	49° 48' 59.1051" N
90	9° 46' 17.5769" W	52° 52' 18.9622" N	109	14° 07' 59.4399" W	49° 38' 31.1007" N
91	9° 48' 10.6320" W	52° 52' 14.8653" N	110	14° 08' 31.6508" W	49° 25' 02.2185" N
92	9° 53' 36.8583" W	52° 52' 16.4627" N	111	13° 58' 45.7494" W	49° 09' 27.7664" N
93	9° 59' 55.9279" W	52° 52' 34.7772" N	112	13° 48' 35.0613" W	48° 53' 13.6017" N
94	10° 01' 23.2071" W	52° 52' 38.9458" N	113	13° 47' 08.4353" W	48° 48' 44.1665" N
95	10° 18' 49.5627" W	52° 54' 21.3250" N	114	13° 40' 53.1282" W	48° 42' 17.1260" N

96	10° 30' 04.1943" W	52° 54' 01.5252" N	115	13° 27' 02.4693" W	48° 35' 26.8473" N
97	10° 59' 47.1668" W	52° 50' 14.2294" N	116	13° 23' 52.6522" W	48° 31' 34.0455" N
98	11° 14' 08.8948" W	52° 40' 24.3831" N	117	13° 15' 40.6602" W	48° 35' 05.9241" N
99	11° 32' 18.7977" W	52° 30' 46.5738" N			

The cable route follows a similar route to previous works on the Far North Fibre cable and the IRIS Fibre-optic Cable (Foreshore Licence Ref: FS007246) (Figure 9). The proposed landfall connection is the same and the proposed route roughly follows just east of the previous work with an offset of *c.* 250m–1.5km until it reaches point between Inisheer and Doolin Pier, Co. Clare *c.* 80km from the landfall. From here, the PISCES cable diverges to continue generally southwest. The archaeological works for both the IRIS and Far North cables were also undertaken by *Mizen Archaeology.*

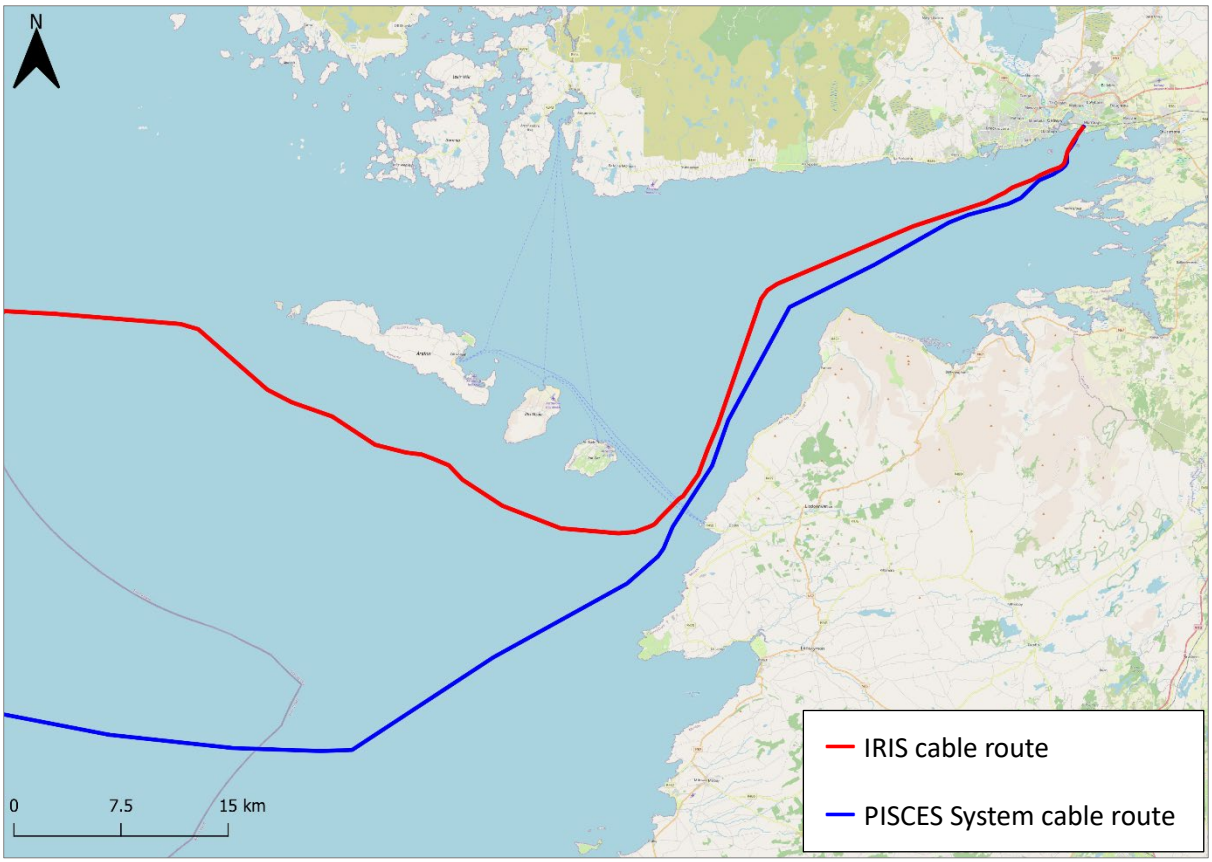

Figure 9: PISCES System cable route compared to previous cable routes investigated by Mizen Archaeology in Galway Bay.

2.2 Geology, Hydrology, and Soils

Galway Bay is a designated Special Area of Conservation (Site 000268) due to its varied habitats including intertidal mud and sandflats, coastal lagoons, saltmarshes, turloughs, vegetated cliffs, calcareous grasslands, and limestone pavements (npws.ie). The Bay opens out to the Atlantic Ocean to the west. Storms commonly reach the west coast of Ireland from both polar and tropical sources along this ocean (met.ie). Tides here are semidiurnal with Galway having some of the highest tides in Ireland.

The shoreline of Ballyloughane Strand comprises a shaley, sandy beach. There is a low stub wall protecting the footway that defines the land-sea boundary. The bedrock and geological parent material of the area is limestone till. Shallow brown earths and rendzinas make up 60% of the soil, while grey brown pozolics compose 25%, gleys compose 10%, and peat composes 5% (National Soil Survey 1980).

3 Scope of Works

It is planned to construct a new subsea telecoms cable system, PISCES, linking Ireland to EU member states, from a landfall at Ballyloughane, Co. Galway to landfalls in France, Spain, and Portugal. The PISCES cable will be installed at the Ballyloughane landfall using existing infrastructure, a duct installed by horizontal directional drilling for the IRIS system installation in 2022. This infrastructure was installed under Foreshore Licence FS007246. The use of the existing infrastructure will avoid any excavation or damage to the shoreline and will ensure that nothing is done which would impact on the stability of the shoreline. The duct extends to 60m beyond the shoreline and so there will be no works on the foreshore inshore of this point.

3.1 Landfall Survey and Site Investigations

A non-intrusive topographic survey and intertidal and beach walkover surveys will take place at the site to low water mark. The topographical survey will include the use of GPS Rover, Total Station or UAV Aerial Drone using photogrammetry or LiDAR techniques, Ground Penetrating Radar or Electrical Resistivity Tomography, and magnetometer or handheld marine metal detector.

Bar probes and trial pits may also be utilised. It is estimated that 8–10 probes at 10m spacing would cover the intertidal zone and another 8–10 probes at 30m spacing would cover the area between the

low water line and 3m depth contour. The probes will reach a maximum depth of 2m. Three trial pits along the beach are proposed targeting a depth of 2.5m.

Trial pits will be excavated stratigraphically to separate sand from substrate. The pits will then be measured, logged, and photographs. The sediments will be backfilled in their original sequence and compacted with the bucket of a backhoe.

3.2 Inshore Marine Survey

The area extending seaward from the low water mark at the landfall at Ballyloughane and inshore of the safe working draft limits of the primary vessel utilised during this project will be surveyed using a smaller craft or an Unmanned Survey Vessl (USV). The survey will include the use of Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer, and sub-bottom profile equipment. This survey would aid in identifying shallow goehazards as well as man-made hazards such as wrecks and other archaeological remains. They will also allow identification of magnetic anomalies within the upper 3m of seabed, which may give further insights into any buried archaeological remains. A minimum of seven survey lines will be quired for the area. The depth range of the surveys is 0–15m. Further data reconnaissance outside of the planned survey lines and tie-lines of the survey corridor may be required in order to better understand the seabed.

3.3 Offshore and Deep-Water Marine Survey

The area extending from the outer limits of the inshore survey water depth of 1500m will be surveyed by the primary vessel using Multibeam Echosounder (MBES), sidescan sonar, marine magnetometer, and sub-bottom profiler equipment. This will allow the creation of a continuous bathymetric overview of the area along with side scan sonar imagery and sub-bottom traces. The preliminary route and all wing lines will be covered using a minimum of 19 survey lines: 7 within the depth range of 15–100m, 5 within the depth range of 100–1000m, and 7 within the depth range of 1000–1500m. Sub-bottom profile equipment will be able to discern the nature and density of the upper 3 metres of seabed and will be used on a non-interfering basis with other sounding systems.

Seabed sampling will also take place up to a depth of 1500m. These will include up to 85 CPTs, up to 35 gravity cores/vibrocores, and up to 11 grab samples. These samples will focus on the upper 3m of sediment to allow better understanding of the physical properties of the superficial seabed sediments along the proposed cable route. The final locations of these samples will be determined after the

geophysical survey and archaeological features identified in this UAIA will be avoided along with any sensitive habitats.

The area extending seaward from 1500m water depth to the Maritime Area limits will be surveyed by the primary vessel using Multibeam Echosounder (MBES). This will allow the creation of a continuous bathymetric overview of the area. Only one survey line is required as the width of the seabed covered increases as a function of water depth. Survey corridor width at the maximum water depth of 4000m is approximately 12000m at the Maritime Area extents.

For all of the survey area from the outer limits of the inshore survey out to the Maritime Area limits, an underwater video camera survey may also be utilised. This would be later georeferenced in GIS. This would allow further inspection of obstructions, benthic habitats, and marine archaeology.

4 Methodology

A detailed desktop study was undertaken to ensure all available literature and background information was considered to inform the underwater archaeological potential of the cable route within Ireland's territorial waters, up to and including the high-water mark/foreshore. The following sources were consulted as part of the desktop survey:

- The Record of Monuments and Places (RMP) compiled by the Archaeological Survey of Ireland comprises lists, classifications of monuments and maps of all recorded monuments with known locations and zones of archaeological significance. The monument records are accessible online form the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage at www.archaeology.ie. These were used to establish the wider archaeological context of the site.

- Ordnance Survey of Ireland (OSI) historic and contemporary maps were examined to measure the changing landscape.

- The Register of Protected Structures (RPS) is a list of all protected buildings in a given area, as designated by the Local Authority. This may be due to a structure's architectural, historical, archaeological, artistic, cultural, social, scientific, technical, or industrial importance.

- The Excavations Bulletin online database, known as the Database of Irish Excavation Reports (www.excavation.ie) was consulted to review archaeological investigations done previously in the area.

- The Wreck Inventory of Ireland Database (WIID) and the Wreck Viewer include a broad range of cartographic, archaeological, and documentary sources concerning wreck data. Each entry in the inventory gives information on the ship's name, type of vessel, port of origin, owner's name, cargo, date of loss, and other relevant information where available. While the WIID contains information on approximately 18,000 shipwreck records (both those with known and unknown loecations), the Wreck Viewer contains the same information for those wrecks but only those with known locations.

- The Inventory of Piers and Harbours is as an unpublished draft document by the DHLGH which has drawn primarily from information contained in the Office of Public Works' (OPW) own documents reporting on works to piers and harbours from the 18th–mid 20th century. It draws on a select few other historical sources that deal with historical piers and harbour development in Ireland.

- National Museum of Ireland Topographical Files hold details of any artefactual material recovered in Ireland from the 18th century to the present. These are categorised according to County and Townland.

- Cartography: Several historic maps and charts were examined (see references below for a full list). These maps provide insight into the changes to the coastline over time along with changes in structure locations and navigational routes that may inform ship traffic and ship losses.

- Aerial Photography: A variety of low and high-altitude aerial photography was examined (see references below for a full list).

- Documentary sources: Several historical and archaeological sources were examined (see references below for a full list).

5 Results

5.1 Maritime Heritage Overview

The earliest archaeological evidence of human habitation in Ireland dates to around c. 7000 BC. As there is little evidence of a land bridge at the time, the early Mesolithic colonists of the island must have reached it travelling over water. However, aside from their very presence on the island, there is no evidence for continued use of long-range seaworthy vessels at the time. The Neolithic (c. 4000-2500) similarly implies the use of seaworthy vessels, which would have been needed to introduce cattle and sheep to Ireland. Distribution of stone axes across Ireland and Britain indicate trade links

across the Irish Sea. Archaeological evidence for maritime activity for that time in Ireland is limited to logboats, which are generally found in sheltered waters. The discovery of a logboat 1km offshore of Gormanston, Co. Meath during pipeline construction indicates that these vessels were not limited to inland waterways (Breen and Forsythe 2004, 33; Brady 2021, 509-510). A Neolithic pine logboat was discovered in the Barna area *c*. 10km from the proposed landfall Ballyloughane.

The Bronze Age (*c*. 2500–700 BC) saw an increase in trade links, with tin imported from Cornwall or Iberia and bronze items exported in return. Logboats, like that of the Gormanston Boat mentioned above, dating to this period, continued to be used both in marine and freshwater contexts. The Iron Age (*c*. 700 BC– AD 400) saw the continuation and expansion of trade. Documentary evidence indicates the use of skin-covered boats in Ireland and England at the time. Tacitus, writing in the early 2nd century AD, notes that, 'the interior parts [of Ireland] are little known, but through commercial intercourse and the merchants there is better knowledge of the harbour and approaches.' Even as early as the late 4th century, the dangers of the Irish coast were known to foreigners. In Argonautica, Orpheus states, '… the ship Argo fears passing Ierne …but sails pass safely.' This is supported archaeologically as a fragment of a Roman olla- a storage jar- was brought up by a trawler 150 miles off the west coast, in 274m of water in 1934 and is now housed in the museum in Wales (Breen and Forsythe 2004, 39). The fragment is believed to date no later than the second century AD. Accounts and charts from returning mariners were collected by Ptolemy in Alexandria who created a map of Ireland from about 150 BC. In it, he records several tribes, rivers, settlements and islands. Four of which are in the Galway area including the Gangani and Autini tribes. Ptolemy also records Ausoba that several scholars have identified as the River Corrib while Regia may be Turoe (Darcy and Flynn 2008, 56–8).

In the Early Medieval Period (*c*. 400–1169), the Lives of Saints texts make several references to maritime activities. It is clear that deep sea fishing took place at the time, with bones of deep-water species, such as cod and wrasse, found during excavations at Church Island and Illaunloughlan, Co. Kerry (ibid. 46). The Vikings began raiding Ireland as early as AD 795, and were establishing permanent bases in Ireland by the mid-9th century. Some of these bases - such as Dublin, Waterford, Wexford, Cork and Limerick - developed into trading towns by the early 10th century, with the Vikings integrating with the local communities. An early monastic site was reputedly founded by St. Odran in the 6th century at Roscam in the inner waters of Galway Bay (GA094:072). This early ecclesiastic monastery, including a round tower, was attacked by Viking raiders in 807AD who also burned Inishmurray off Sligo the same year (Ó Corráin 1998, 430; 436). The annals record a fleet of Vikings on Lough Corrib in 928AD, 'The foreigners of Luimneach went upon Loch Oirbsen (Corrib), and the islands of the lake were plundered by them' (O'Donovan 1856, 623-AFM).

The High Medieval Period (*c*. AD 1169–1400) began in Ireland with the arrival of the Anglo-Normans. Confined mostly to the east, their urban centres became successful ports with important links across to England. Merchants from France, Iberia, and Italy traded wine, salt and luxury goods for hides, wool, fish, flax and furs in Irish ports (Breen and Forsythe 2004, 71). Galway City was granted the status of a borough sometime before the early 1270's and an area of approximately 11ha was enclosed by a wall (Walsh 2004, 273). Trade networks expanded in the twelfth century, leading to the formation of trading confederations in the 13th century, which in turn increased merchant shipping in northern Europe further. At the time, English shipping around Ireland was continually under attack. The King responded to this threat in 1222 by commanding the ports of Ireland to build galleys for the defence of the King's realm in Ireland (Breen and Forsythe 2004, 77).

The Late-Medieval period (*c*. AD 1400–1600) was a time of varied fortune for Irish ports. The arrival of intense herring shoals off the south-west and west coasts was a hugely important economic event for coastal communities. In Mayo, an important maritime figure emerged during the Late Medieval Period - 'Granuaile' or Grace O'Malley, who was Gaelic leader of her clan, which was unusual for that time and was also commander of the O'Malley's fleet of ships. Due to her seafaring prowess, including her stringent control of her territorial waters, she became known far and wide. Her notoriety was enhanced by her attacks on passing trading ships from both other nations and other clans, earning her the name as a pirate queen. She was based for a time on Clare Island, off the west coast (ibid. 91). In 1588, a ship from the Spanish Armada - El Gran Grin - was driven ashore on the same island (ibid. 99). It was one of as many as 26 vessels from that ill-fated Armada to be lost along the Irish coastline. The Falcon Blanco Mediano, another one of the Spanish Armada ships, was wrecked in Ballynakill Harbour off the Galway coast.

In the Post-Medieval Period (*c*. 1534–1750), Ireland's economic development was largely dictated by England, with cattle, butter, and wool becoming the most prominent exports. The 17th century saw an increase in maritime activity in Irish waters, including intensification of the fishing industry, ships stopping over along transatlantic voyages, and growth in local and international trade (Kelleher *et al*. 2012, 21). Large trading companies, such as the Dutch East India Trading Company (VOC), developed to facilitate international trade. A number of ships belonging to these companies were wrecked on the Irish coast. Anchors, cables, and other artefactual material found at Poulatomish, Co. Mayo is believed to be from a VOC vessel, the Zeepard, lost in December 1665 (Breen and Forsythe 2004, 113).

Irish waters were frequented by French, Spanish, Dutch, American and English privateers in the late 18th century. These were state-sanctioned vessels, allowed to keep the greater part of their spoils, while giving the state one-tenth of them (Breen and Forsythe 2004, 118). American privateer activity

increased after they declared independence in 1776, although the intensity only lasted a relatively short time. The British responded to these attacks with naval action and employment of their own privateers.

After attacks in the 1790s and the Napoleonic Wars in the early 19th century, Ireland's strategic position in the North Atlantic was recognised. Control of its ports, harbour, and naval bases became of greater importance to the English authorities (Kelleher *et al*. 2012, 21). The end of the Napoleonic Wars also saw a spike in smuggling activity along the Irish coast, which the English sought to repress (Breen and Forsythe 2004, 125). Systematic recording of ship losses began in 1750, providing comprehensive records from around the Irish coast from this point onwards.

The 19th century saw developments in steam navigation, which was closely linked with the large-scale emigration sparked by the Great Famine (1845–52). This emigration led to the development of a system of routes across the Irish Sea and, when considered along with trade and naval patrols, made the Irish Sea one of the busiest waterways in the world (Pearsall 1990, 845). Several shipping companies operated out of Galway at this time such as the British and Irish Transatlantic Steam Packet Company and the Atlantic Steam Navigation Company known the Galway Line facilitating the exodus of the Galway population.

As a direct result of the increase in maritime activity, the 19th century has the highest number of wrecks recorded for any period in Irish history, with an estimation of up to 60% of all wrecks in Irish waters dating to the 19th century. In the mid-19th century, an average of one wreck was reported every three days, a figure which remained relatively constant up to the outbreak of World War I (Kelleher *et al*. 2012, 23).

During World War I, the Imperial German Navy focused submarine activity in the waters to the north and south of Ireland, in an attempt to hinder Britain's international trade and ship losses, including military, civilian and merchant increased exponentially due the unrestricted submarine campaign. Over 1,000 vessels were lost as a direct result in what is now generally referred to as the First Battle of the Atlantic (Kelleher *et al*. 2012, 44; Brady 2021, 515–8). Of all these losses at the time perhaps the most famous is that to the Cunard liner RMS Lusitania, lost off the southwest coast in May 1915, with over 1,000 passengers and crew, including three German stowaways, perishing as a result (Moore *et al.* 2019).

Specific to the landing location and the marine area in general regarding the cable route, the recorded wrecks and recorded onshore monuments for the counties of Galway and Clare attest to the long and diverse intense human activity that was in place along this stretch of coast over the millennia. Such

activity has the potential to retain significant archaeological remains in the form of structures, artefacts, wrecks and other maritime infrastructure in the study area. The known sites, both wrecks and archaeological sites onshore (RMPs) are listed below in Appendices 9.2. & 9.3 and described in more detail in sections 4.5 and section 6.

5.2 Place Names and Townlands

Ireland is known for its many defining place names, whether seen in its large cities and towns or within the smallest of villages; roads, fields, bays, inlets, streams and even rocks had their own particular place names. Much of these place names are now forgotten but can be gathered from a variety of sources, including oral tradition, historic sources (e.g. 19th-century or earlier charts), documentary sources (e.g. School's Folklore Collections), *etc*. Many of these are taken from long forgotten events or ship losses, or names referring to individuals who have left no trace. Translations of place names in Irish can be found online, in the dedicated website 'logainm' (www.logainm.ie). Within the proposed landfall areas place names are evident on the 1830s and 1880s OS maps. Those most relevant are listed in the table below.

Townlands were the smallest units of land established in the Irish administrative system in the first half of the 19th century, though most were in existence before that as part of a much earlier 'Tuath' or tribal boundary set up (www.logainm.ie). This explains their origin names in Irish, many of which are based on the early tribes in a particular area or on actions/events that took place within a given location.

Table 2 provides a list of the townlands within the desktop study area. As the cable route is offshore, with just a discrete shore landing, there are no townlands that cross the route, but those that skirt the shorelines adjacent on either side are included. It can be seen that while the Galway area has townlands across several areas, including on Inis Óirr, the townlands on the Clare side are all adjacent to each other and run perpendicular to the coastal edge for the most part akin to large burgage plots, apart from Ballyryan that run parallel. Translations are given where available.

Table 2: Place name and Townland name list:

Townland	**Translation**
Ballaghaline, Co. Clare	*Béal atha line* (Mouth of the line of fords)
Ballycahan, Co. Clare	*Baile Cathán* (Cahan's town)
Ballyloughane, Co. Galway	*Baile an Locháin* (Town of the pond)
Ballyryan, Co. Clare	*Baile Úi Rinn* (Town of the cape or point)
Ballyvoe, Co. Clare	*Baile Úi Bhuaigh* (Town of the victory)
Cahermaclanchy, Co. Clare	*Cathair Mac Clancy* (MacClancy's city/fort)
Doolin, Co. Clare	*Dhúlainn* (Black land)
Doonmacfelim, Co. Clare	*Dún Mac Felim* (MacPhelim's fort)

Glashabeg, Co. Clare	*An Ghlaise Bheag* (The small stream)
Glashamore, Co. Clare	*An Ghlaise Mór* (The big stream)
Hare Island, Co. Galway	*Oileán Rois Mhóir* (Big wooded island)
Inisheer Inis Óirr, Co. Galway	*Inis Thiar* (South Island)
Killilagh, Co. Clare	*Cill Aidhleach* (Church of St Faile)
Mutton Island, Co. Galway	*Inis Caorach* (Sheep island)
Rinmore, Co. Galway	*Rinn Mór* (Large Headland),
Teergonean, Co. Clare	*Thír Ghamhainín* (Land of little calf)
Townparks, Galway City	

5.3 Cartographic Information

Mackenzie's map of *Galway Bay on the West Coast of Ireland* (1776) and Pelham's *The County of Clare* (1787) both indicate Mutton Island and Hare Island on either side of the PISCES System route southwest from Ballyloughane Strand (Figures 10 & 11). They show a castle on Mutton Island and an obstruction to the southwest near Ilaanirclog Rocks. Mackenzie's map also shows the populated area above the strand and anchorage points between the islands. Mackenzie also notes that 'the steam of tide here [in Galway Bay] runs not above one mile an hours when strongest.

Figure 10: Excerpts from Mackenzie's map of Galway Bay on the West Coast of Ireland (1776).

Figure 11: Excerpt from Pelham's The County of Clare (1787).

The First Edition 6-inch Ordnance Survey map (1841–2) shows the fortification at the entrance to the harbour, marked as 'Renmore or Cromwellian Fort' (Figure 12). It is shown southwest of Ballyloughane Strand. Just above the strand is shown the well populated settlement of Ballyloughane next to the lake that the village is named after, Loughane. Mutton Island is now depicted with a lighthouse (Figure13). Inis Óirr is also shown in detail on the map with the medieval field systems covering the small south island and with dispersed recorded monuments and placenames, though none of the coastal sites discussed in section 5.1.4 below are indicated (Figure 14).

On the Last Edition 25-inch Ordnance Survey map (1893–9), the landscape has changed with both Loughane and Ballyloughane bisected by the railway line (Figure 15). This eventually led to the drying out of the lake, to form the marshland that it is today. Ballyloughane village shows a marked decrease in settlement due most probably to interruption and depopulation. Renmore Fort is still shown, but now too is Renmore Barracks to the top of the map, and with the use of the earlier fortification by the later barracks for target practice, and military training as denoted by features on the map in the early fort including 'targets' and 'marker's sheds'.

Figure 12: Excerpt from the OSI First Edition 6-inch map (1841–2) showing Ballyloughaun and approximate survey route.

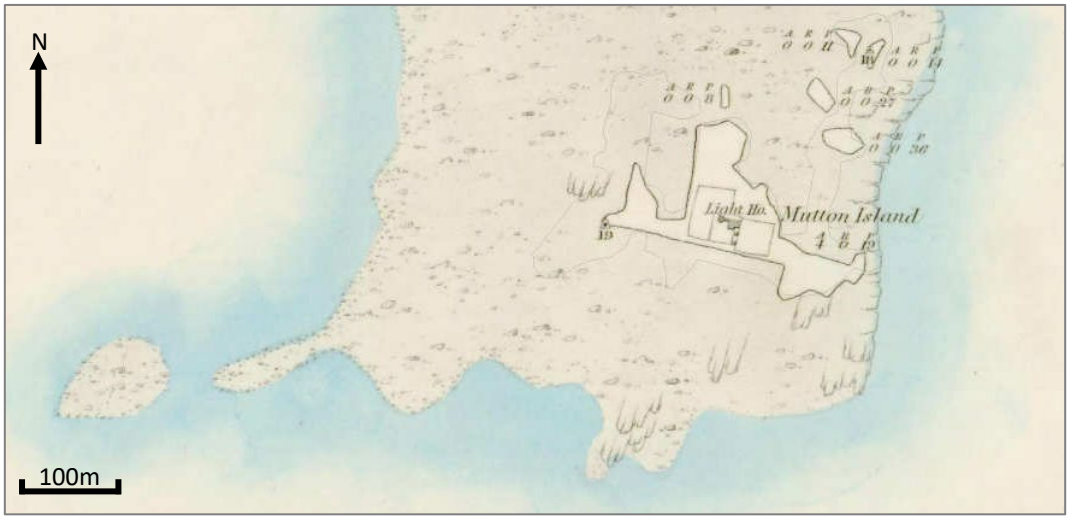

Figure 13: Excerpt from the OSI First Edition 6-inch map (1841–2) showing Mutton Island.

Figure 14: Excerpt from the Ordnance Survey First Edition 6-inch map (1841–2) showing the east coast of Inis Oírr.

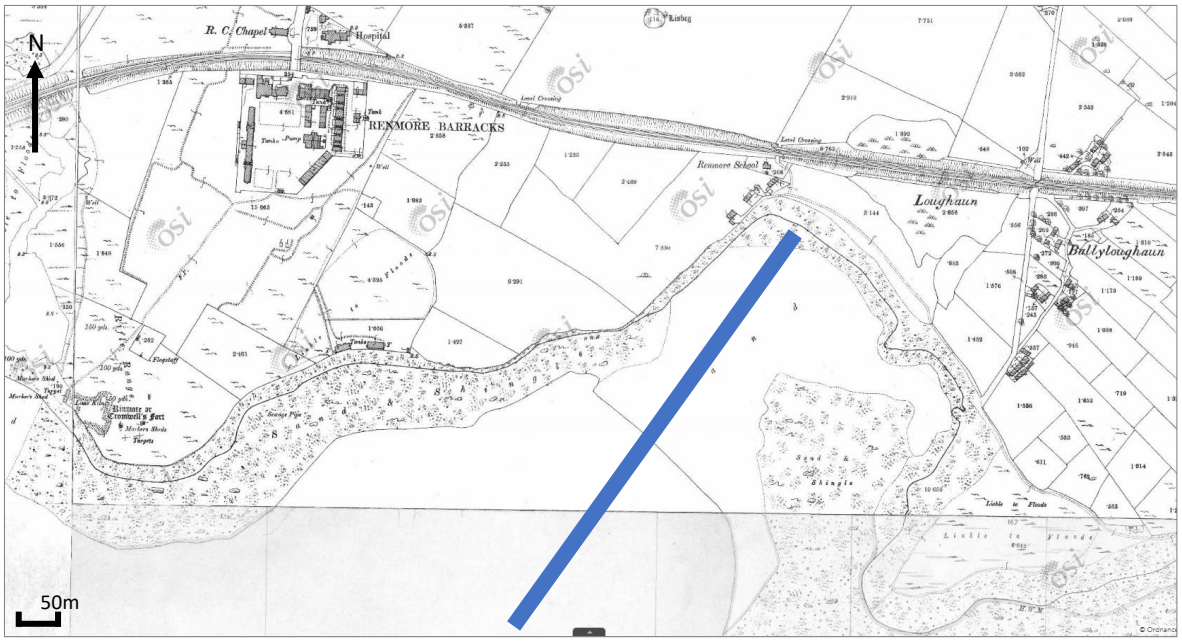

Figure 15: Excerpt from the Ordnance Survey Last Edition 25-inch map (1893–9) showing Ballyloughaun and approximate survey route.

5.4 Recorded Monuments and Architectural Heritage

Sources for both Site and Monuments Record/Record of Monuments and Places (SMR/RMP) and the National Inventory of Architectural Heritage/Record of Protected Structures (NIAH/RPS) sites were reviewed for the areas immediate to the coastal and offshore areas within the track of the proposed cable route. This covered Ballyloughane Strand, Galway Harbour, Galway Bay, parts of the coastline of Clare, and the Aran Islands. Within these coastal areas, 35 recorded archaeological monuments (SMRs) (Figure 10; Appendix 9.1) and 21 architectural heritage structures (NIAHs) (Figure 11; Appendix 9.2) were identified. Of the 21 NIAH sites, only five are protected structures (RPS) along with an additional two structures.

When the entirety of recorded monuments and sites are viewed in the Galway Bay area, the preponderance of such sites on both sides of the cable route is clear (see black marks on Figure 16). This is a rich cultural landscape and the recorded archaeological sites confirm the potential for further archaeological remains to exist along the coast fringe, washed into the subtidal area where erosion has taken place or remains associated with ship losses (discussed in section 5.1.5).

The RMP sites range from Mesolithic and Neolithic middens (CL001-019, CL001-021, providing evidence for early settlement on the north-western coast of Clare, to medieval hut sites (CL004-119, CL008A005002) and a post medieval signal tower (CL014-010002) along the same shoreline, showing the continuity of habitation and human interaction in the area. Within the inner harbour, as well as on Inis Óirr, are further sites dating to the post-medieval period – a bastioned fortification (GA094-057) and a battery site (GA094-032) marking the entrance to the inner harbour area. The fortifications were built specifically to fortify the harbour from the modern historic period to modern times, to control ships and shipping entering and leaving, as well as trade and transport of goods.

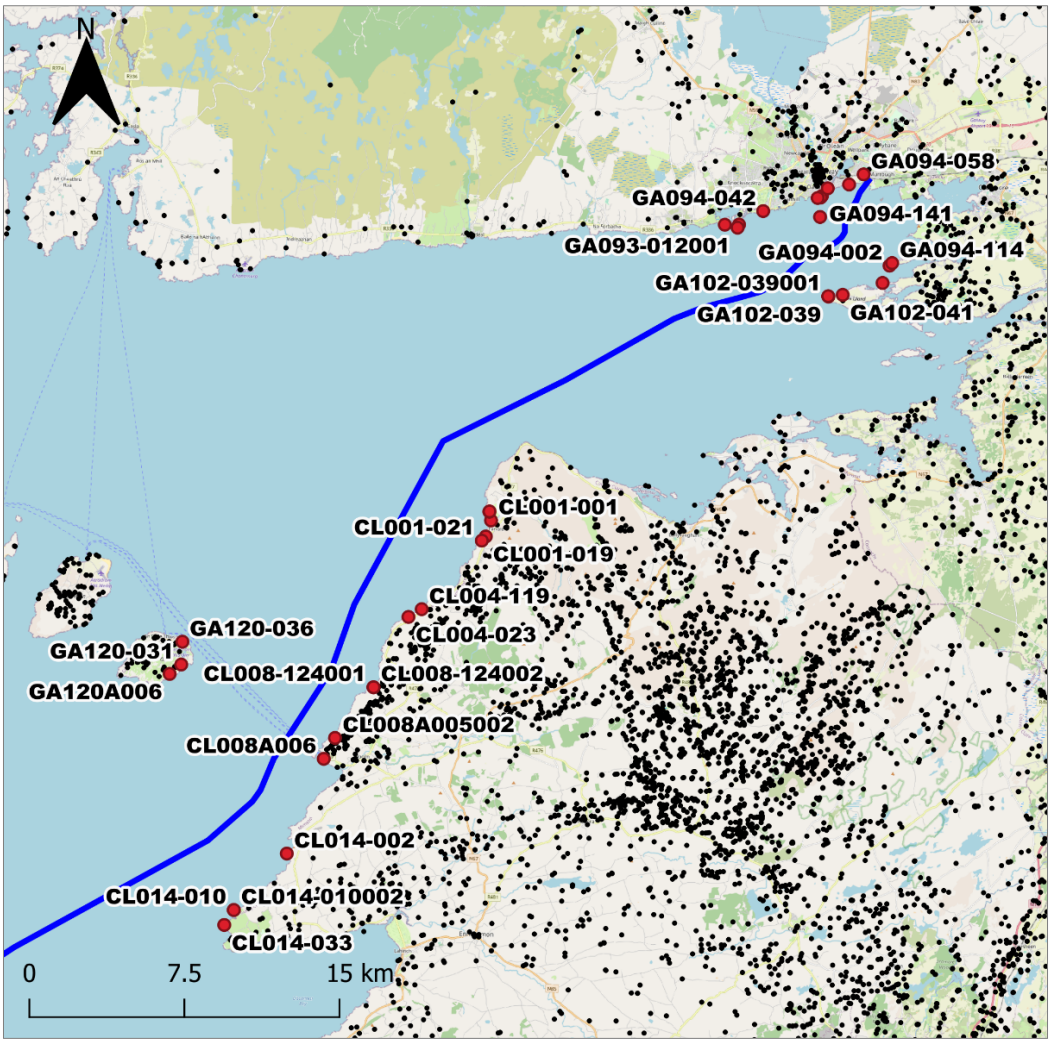

Figure 16: Monuments on the Sites and Monuments Record along the coast following the proposed PISCES system route.

Figure 17: Monuments on the Sites and Monuments Record in the inner harbour following the proposed PISCES system route.

On Inis Óirr, the recorded seaweed stand (GA120-031) provides physical evidence for the exploitation of resources in the area. Seaweed was both consumed as a staple food source and used as a fertiliser on the land, and is a site that also remains as a link to the past maritime traditions in the area.

The location of some of the recorded monuments, such as the hut site and enclosures along the Clare coast can indicate how the coastline has changed over time, being eroded and inundated, and which continues to progress with climate change impacts. Many such sites are now bordering the foreshore or cliff edges, but would have originally been located at a distance from the sea. Remains of sites that have been impacted may now lie underwater, washed offshore.

Architectural heritage sites within the study zone range in date from the late 18th to the mid-19th century and are both military and industrial in nature (Figure 18). The Renmore Barracks (NIAH 30409408–17), north of Ballyloughane Strand is a military complex (also called Dún Uí Mhaoilíosa Barracks) with ranges of buildings that include the main barracks, offices, officer's mess, magazine and storehouses. The lighthouses on Mutton Island (NIAH 30409406) and Inis Óirr (NIAH 30412012) were constructed in the early and mid-19th century. They are both fine examples of the lighthouse-building expertise of engineer George Halpin, who built many lighthouses during that period for the Harbour Commissioners. Both protected structures also have associated light keepers' houses (NIAH 30409407; NIAH 30412010–11).

Figure 18: Structures on the National Inventory of Architectural Heritage and Record of Protected Structures along the coast following the proposed PISCES system route. The RPS sites not listed on the NIAH are indicated with Clare Co. identifying numbers.

5.5 Wreck Inventory

The National Monuments Service (NMS), Department of Housing, Local Government and Heritage has compiled a database of shipwrecks from around the coast of Ireland – the Wreck Inventory of Ireland Database (WIID). The inventory lists some 18,000 wrecks comprising both known and unknown losses, and with both known and uncharted locations, from within Ireland's territorial water and beyond out to the edge of Ireland's Continental Shelf. Wrecks with known locations, nearly 4,000 of them, are mapped and can be viewed on the NMS' online Wreck Viewer.

All wrecks in Ireland's territorial waters and Contiguous Zone (up to 24 nm limit offshore) are protected under the 100-year rule under the National Monuments Amendment Act 1987-2014.

The NMS' Wreck Inventory Database contains six wrecks recorded within the proposed survey corridor and an additional 45 within *c.* 5km of the survey corridor. There are an additional 63 within the database which have been recorded as lost near the corridor that have no known coordinates. This is not an exhaustive list as only certain landmarks, islands, strands, coves, *etc.* were entered within the database to look for geographically relevant losses; hundreds of wrecks on the database are listed as 'off Galway' or 'off the West Coast' or 'off Galway Bay' and therefore there could be many more located within the vicinity of the route whose location is no known. Though not all of the recorded wrecking events have a known date, most appear to date to the 18th to 20th centuries. A full list of the wrecks is given in Appendix 9.3.

Figure 19 shows the distribution of the wrecks as recorded in the WIID. The six wrecks within the survey corridor are W05621, W09545, W12423, W12671, W14648, and W17455. These were all lost between 1891 and 1994 and include three steamships and a barque.

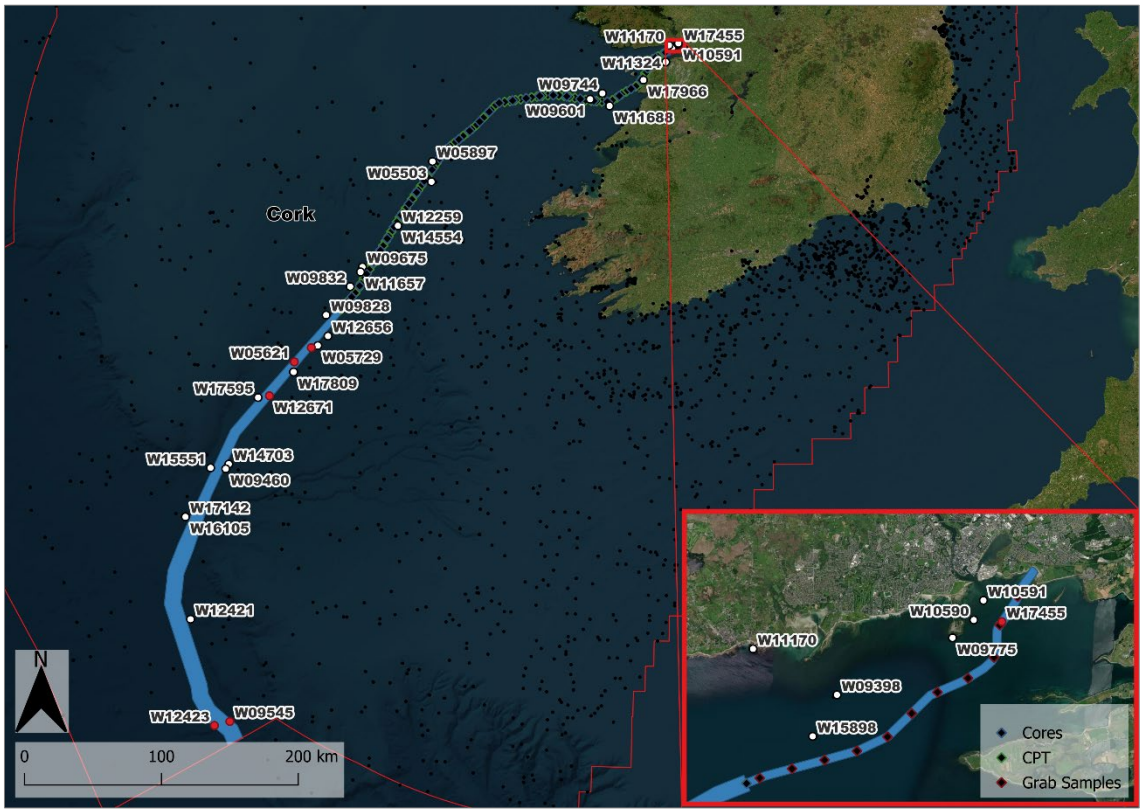

Figure 19: Wrecks within c. 5km of the PISCES survey corridor. The wrecks located within the corridor are marked in red.

The wooden wreck W17455, located in the inner harbour area just south of Ballyloughane Strand (Figure 19), is the closest known wreck to the proposed cable route. The remains of this wooden wreck were discovered by divers in Galway Harbour during excavation works to uncover and free the keel of a modern yacht which had become embedded in the seabed. Mizen Archaeology inspected the site 2014 and identified timber wreckage buried 1m below the seabed level. A possible framing timber,

several sods of turf and some animal bone (adult cow's left scapula) were recorded. The was heavily eroded, terredo infested and amorphous in shape measuring 48cm by 12cm by 9cm. None of its original surfaces survive but there was evidence that one of its fixings was originally iron. The proposed site investigation works include taking a grab sample from the seabed 120m southwest of this wreck.

5.6 Topographical Files

Consultation with the Topographical Files of the National Museum of Ireland, which hold details of any artefactual material recovered from the 18th century to present, are a valuable source for information on what has been recovered in the past from locations. When consulted, the Topographical Files did not indicate any artefacts recorded from the foreshore, inshore or offshore areas relevant to the proposed cable route.

5.7 Previous Archaeological Investigations

IRIS Fibre-optic Cable

An underwater archaeological impact assessment was carried out by *Geomara* prior to the IRIS cable laying project which also included a marine geophysical survey. Though mapping a different cable route, the overall track assessed does inform on the general area as the IRIS cable is in close proximity to the proposed PISCES cable. We can therefore draw on some of the results to inform this assessment.

Geomara Ltd. in their assessment refer to a Storm Damage Report undertaken by Galway City Council. As part of that areas of the coastline around the city from Silver Strand to Roscam, was surveyed and during the course of that 43 new sites and finds were made, with 7 archaeological features and various finds being identified at or near Ballyloughane Strand, as detailed in the Storm Damage Report (Figure 20). The remains of an old quay and several ship timbers were discovered washed onto the foreshore, thus suggesting that a possible wreck sites was being impacted offshore with wreckage being washed ashore during the storm event.

The marine geophysical survey did not identify any specific wrecks or other features but did identify anomalies with potential, particularly in the inshore area; the report states:

The results of the bathymetric and geophysical surveys and the reports arising from the geotechnical investigations did not reveal any features, finds or deposits associated with shipwrecks or other marine cultural heritage assets. The seismic surveys did not reveal traces of any submerged relic landscapes. The sidescan and magnetometer contact reports from either the EGS or Geomara surveys did not reveal any potential archaeological anomalies and all the contacts have been avoided by the preferred route. Four targets with no surface expression were identified from the metal detector survey target 1

was 11m east of the proposed RRPL on the beach and target 2 was 8m east of the proposed RPL (Geomara 2021, 55).

The cable-laying operations for the IRIS Cable were monitored by *Mizen Archaeology*. The final selected route avoided all know sites and features of cultural heritage significance.

Offshore operations including- the pre-lay grapnel run, cable-laying (ploughing), and the post-lay inspection burial- were archaeologically monitored within the Irish 12-mile limit. This included three plough inspections, when the plough was brought on board. No archaeological material was identified during the monitoring or the inspections (Mizen Archaeology 2022).

Inshore cable laying was carried out in June 2022. The cable was buried by waterjet, beginning from the low water mark on the foreshore to 11km from the landfall, where it was then picked up by the main lay vessel to be spliced to the main cable. Archaeological monitoring was carried out by means of a screen, displaying visuals from a camera mounted to the front of the waterjet. No archaeological material was encountered during the inshore cable laying.

A trench was excavated from the end of the HDD to the low water mark using tracked machines. The trench was between c. 1.5m-4m wide. The material was entirely light greyish brown sand with inclusions of shell and small sub-round stones. No archaeological material was uncovered.

Legend

- No. 20 medieval pot sherd
- No. 21 Site of stone wall in peat
- No. 22 Site of possible Midden
- No. 23 Ship timbers
- No. 24 possible quay
- No. 25 Ship timbers
- No. 26 Ballast fields

Figure 20: New sites and finds (red dots) on Ballyloughane Strand located during storm damage survey.

Far North Fibre Subsea Telecoms Cable

The landfall site at Ballyloughane Strand was inspected by Mizen Archaeology in June 2022.

The foreshore is bounded from the adjacent carpark by a concrete-clad retaining wall. The upper reaches of the inter-tidal zone comprise a coarse gravel and cobble surface measuring *c*. 20m in width. The remainder of the foreshore consists of sand. The route of the proposed cable was inspected to the low water mark and no evidence of archaeological significance was uncovered. Several amorphous iron pipes and iron concretions were noted in the stones at the south-eastern end of the strand, *c*. 200m from the cable route. There was no evidence of the ships timbers that has been exposed on the foreshore in the aftermath of a storm in 2013 (features 23 & 25 in Geomara report discussed above).

Other Archaeological Work Close to the Survey Corridor

The *Excavations Bulletin* is published annually and provides summary accounts of archaeological excavations in Ireland from the years 1969–2018. It can also contain summaries of surveys (both terrestrial and underwater) and of archaeological monitoring work (Bennett, annual publications). A number of archaeological investigations have been carried out in locations directly relevant to the current cable crossing, specifically at Ballyloughlan and also on Inisheer. The archaeological works in the area of Ballyloughan comprised archaeological testing, monitoring and archaeological assessment (marine survey by *Geomara Ltd.* as detailed in this study) as well as various other works to do with Galway Sewerage Scheme, etc. *Mizen Archaeology* monitoring site investigation works in 2022. The testing and monitoring did not reveal anything of archaeological significance. There were two archaeological projects carried out in Inis Óirr but none in the area along the southern boundary that may have informed this assessment. Summaries of all of these are given in Appendix 9.4.

6 Discussion and Potential Impacts

The archaeological data for recorded monuments and wreck sites suggest there is a high potential for archaeological remains for the general area of the cable corridor. Immediately onshore are RMPs and RPS sites which were sited to ensure control of the harbour and a focus on the sea. New discoveries on the foreshore at Ballyloughan in recent times following survey for storm damage also provides tangible evidence for archaeological activity, including possible remains of a quay, midden and ship timbers, that can lie buried only to be revealed again through direct impacts from disturbances like storm events. The identification of magnetic anomalies in the geophysical survey lying just offshore of the strand may also prove to be archaeological in nature.

The shipwreck records held by the National Monuments Service are voluminous for the coast of Galway; there are 51 wrecks with known locations listed within *c.* 5km of the proposed cable route survey corridor, with six wrecks within the corridor. A wooden wreck W17455, is located in the inner harbour 120m northeast of a grab sample location. Given that the exact locations for many more wrecks remain approximate or unknown, there is the possibility that more are closer to the route or buried within the survey corridor (Figure 19). The laying of the cable, including S.I. works, have the potential to impact on archaeological sites like wrecks, as well as wreck material or artefacts.

The use of the existing ducting infrastructure will avoid any excavation or damage to the shoreline. The duct extends to 60m beyond the shoreline and so there will be no works on the foreshore inshore of this point.

Three of six palaeo-coastlines recorded in the EMODnet Geology project date to confirmed periods of Irish occupation in early prehistory. Earlier evidence may also still survive associated with older coastlines. The oldest of the three palaeo-coastlines with confirmed contemporaneity with human occupation dates to *c.* 10,000 years BP, expanding the Galway Bay up to *c.* 20km west of its present position. By *c.* 8,000 years BP, the coastline moved inland up to *c.* 12km west of the present coast, and by *c.* 6,000 years BP, it was located up to *c.* 8km away from the present coast. Recent archaeological assessment work at Arklow Bank Wind Park offshore of Arklow, Co. Wicklow resulted in the recovery of two worked flints that may be associated with these submerged coastlines. This highlights the potential for submerged prehistoric landscapes along the Irish coast and the potential for evidence of this to be recovered from offshore wind farm projects.

7 Mitigation Measures

The following is offered as recommendations for mitigation specific to the PISCES System works**. It should be noted that all mitigation measures are recommendations only. The ultimate decision rests with the National Monument Service of the Department of Housing, Local Government and Heritage in collaboration with the National Museum of Ireland.**

- Areas of the seabed which shall be impacted by geotechnical /invasive works shall be included in the geophysical survey (sidescan/multi-beam and magnetometer) and be licenced by the National Monuments Service. The results of geophysical survey data shall be assessed by an underwater archaeologist experienced in the interpretation of archaeological geophysical data. Exclusions zones will be implemented around any potential sites of archaeological significance identified in the geophysical survey to ensure that geotechnical works avoid impacting on any additional cultural heritage sites identified in the geophysical data.

- Taking into consideration the results of the desktop study a 100m exclusion zone shall be implemented around Wreck no. W17455 and a 250m exclusion zone should be implemented around Wrecks no. 05621, W09545, W12423, W12671, W14648, and W17455. No geotechnical/invasive surveys shall be undertaken within these exclusion zones.

- All marine sediment samples retrieved during site investigation works shall be physically inspected and assessed by an archaeologist in order to identify any potential evidence of

archaeological significance. Where potential archaeological material including submerged palaeo-landscape deposits are identified they shall be, where suitable samples are available, radiocarbon-dated following agreement with the National Monuments Service and licenced by the National Museum of Ireland.

- The excavation of trial pits on the foreshore at Ballyloughan shall be monitored by an underwater archaeologist under licence from the National Monuments Service. The plant and machinery required to carry out the work will utilize the established access route along the northern edge of the strand.

- Following the completion of all site investigation works a report detailing the results will be submitted to the National Monuments Service.

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9 Appendices

9.1 Sites and Monuments Record for the Area

SMR	Townland	Site Type	ITM	Description (archaeology.ie)
CL001-001	Murrooghtoohy South	House - indeterminate date	513778E, 708490N	In sand dunes c. 250m E of the sea and c. 70m N of the Caher/Murrough River. Listed as 'Hut site' in the SMR (1992) and the RMP (1996). A rectangular stone structure exposed and excavated in 1968 (Rynne). On inspection in 1997 it was found to be no longer visible. It was recorded by the excavator as a roughly rectangular structure (8.6m NNW-SSE; 4m WSW-ESE; H 1-1.25m) of local limestone slabs, the lowest course of which was were set on edge and leaned outward. The exterior of the structure was not evenly faced, suggesting it was built into a depression in the sand. A stone-lined and paved entrance (L c. 2.6m; W 1.25m) extended out from the SSE wall. It was slightly deeper than the level of the internal floor, from which it was separated by a low sillstone (L 0.6m; T 0.08m) set on its edge. The sillstone projected 0.2m above the entranceway paving and 0.07m above the internal paving. The external, W side of the entrance was flanked by a large jambstone (H 0.85m; Wth 0.3m; T 0.25m) and a corresponding jambstone may have once stood on the E side. Internally, a transverse wall (H 0.45-0.55m) constructed of large slabs set on edge, extended from another jambstone (H 0.6m) near the centre of the structure to the NNE wall. It is likely that a corresponding jambstone flanked an entrance through the internal wall, which would have divided the interior in two and would have been broken by a gap directly opposite the entrance. The internal floor was partially paved and a sunken flue-like, stone-lined, trench (L 4.1m; Wth 1m; D 0.15-0.25m) ran under the paving, in the centre of and along the long axis of the structure. It exhibited red in-situ oxidisation on its S end and contained a black charcoal fill at its NNW end. A possible hearth noted within a stone setting in the SW quadrant did not survive to the time of the excavation. A perforated bone pin (NMI 1968:443) and needle (NMI 1968:444) recovered from the site prior to the excavation may be of early medieval date.
CL001-019	Fanore More	Midden	513525E, 707715N	Situated on the S side of a small W-facing beach at Trawvealacalaha, c. 0.5m S of the main beach at Fanore. Discovered in 2008 when a band of compacted sea shells (L 7m) and some heat-shattered stone became exposed by high tides during storm weather. Three seasons of excavation followed between 2009 and 2012 (Licence nos. 09E0400, 11E0124). Most of the shells were periwinkle, limpet and dog whelk. Abundant quantities of heat-shattered stone and c. 500 lithics including a stone axe were found in clay deposits to the E, S and W. The presence of shale axe roughouts and shale flakes are indicative of manufacture on site. Radiocarbon dates from the site range from 4453-4321 cal BC to 3980-3796 cal BC. Another midden (CL001-021----) and similar evidence of habitation was found in 2011 c. 280m to the SW. (Lynch 2010; 2011; 2012, 25; 2012a; 2014, 1-10)
CL001-021	Fanore More	Midden	513332E, 707512N	Situated at the edge of a storm beach some 800m S of the main beach at Fanore and c. 280m SW from another shell midden (CL001-019----). Discovered in 2011 during field walking. Deposits of seashells and heat-shattered stone had become eroded during high tides and material had dispersed over a 20m square area. The predominant shellfish were common periwinkle and limpet. Stone axes and roughouts, suggestive of manufacture, and similar to CL001-019---- were also found. A test excavation in August 2012 (Licence no. 12E0095) yielded radiocarbon dates from the Later Mesolithic and c. 900 years earlier than the midden to the N. (Lynch 2012; 2014, 1-10)
CL001-023	Murrooghtoohy South	Midden	513699E, 708914N	Exposed in section in sand dunes N of Fanore beach and c. 30m E of normal high tide. In 2019 a midden (total L 8.5m) with a thin layer of limpet shells was reported by Carolyn Howle Outlaw. A cluster of 39 intact shells were reported with others having fallen to the shore. Further limpet shells and 3 fire-cracked stones were noted in an erosional slump to the W of the

				midden. A stone cobble/possible hammer stone was recovered from the section face directly below the shell layer in 2019 (pers. comm. Liam McNamara) and was transferred to the National Museum in 2021. Storms during winter 2019/2020 severely eroded a large portion of N and W extent of the midden (pers. comm. Liam McNamara). On inspection in 2021 the visible remains were found to be scant, consisting of a thin layer (L 0.6m; D 0.05m) of limpet shells exposed in section in the eroding W-facing side of a low marram grass-covered sandy rise (L c. 10m N?S; c. 3m E?W; H c. 1m), probably the last remnant of a larger sand hill. The midden underlies a layer (D 0.35m) of sand topped with marram grass, and overlies sand. Two shell middens (CL001-019---- and CL001-021----) lie to the S of Fanore beach and were dated to the Mesolithic/Early Neolithic.
CL001-036	Murrooghtoohy South	Burial	513706E, 708927N	On a low sandy rise on the margin of high dunes on the SE side of Fanore beach. In the winter of 2019 twelve human teeth were found lying on hard-packed sand in a loose cluster covering a small area (0.25m x 0.3m), possibly representing a burial. A few loose seashells were also evident. A midden (CL001-023----) lay c. 7m to the SSW. The teeth comprised incisors, premolars and molars and exhibited considerable wear. They were collected and submitted to the National Museum (Ref. IA/171/2021). Osteological analysis determined that the teeth were from the lower jaw of an adult aged between 25 and 35 years of age at death. The teeth exhibited evidence of a pathological defect known as dental enamel hypoplasia. Radiocarbon analysis of a sample of one tooth returned a date of Cal AD 1491-1637 (UBA-49636, 2 ?), with a median probability of AD 1565. In the week following the initial discovery a storm removed the entire sandy layer on which the teeth were found. No archaeological material was evident on inspection in 2021.
CL004-023	Crumlin	Enclosure	509784E, 703818N	On a level pasture terrace at the NW foot of a steep limestone ridge, only c. 30m from the seashore to the W. Located at the SW-end of a series of relatively modern, improved pasture, roughly rectangular ladder-fields, which it may pre-date? Not recorded on the first edition of the OS 6-inch map but indicated on the later, Cassini edition (1915). An almost circular area (int. diams. 29m N-S; 28.8m WNW-ESE) is defined by a loosely constructed, single dry- stone wall (H c. 0.8-1m; T 0.3-0.6m; max. T c. 1m SSE-S). An entrance gap (Wth 3m) and associated scarp is visible at NNE. The enclosure is abutted by later field walls at N, SSE, SSW, WSW and WNW.
CL004-119	Crumlin	Hut site	510425E, 704193N	On a NW-facing slope in a field on the shoreline c. 50m from the rocky slope down to the sea. A subrectangular hut site (diam c. 12m) defined by a bank and visible on Ordnance Survey orthophotography (2013-2018).
CL008-124001	Ballyryan, Cahermaclanchy	Cliff-edge fort	508087E, 700412N	At the top of a cliff, with land immediately to NW falling steeply to the sea, at a prominent and widely visible location in an area of karstic outcrop and rough pasture within an extensive multiperiod field system (CL008-109001-). Partly indicated on the 1897 OS 25-inch plan and the 1920 ed. of the OS 6-inch map. This D-shaped cliff-edge fort (int. dims. 38.5m NW-SE; 24m NW-SE) is defined at the NW by the uneven cliff edge. From NE to SW the fort is enclosed by a double-faced stone wall (Wth 2.75-3.1m; Wth including tumble 6.5m; int. H 1.45-2m; ext. H 0.75-2m) with random coursing and a rubble core. At either end of this wall (i.e., where it meets the cliff edge) it peters out into rubble. The entrance (Wth 2.1m) lies at the E, its S jamb comprising a single large upright slab. The entrance is blocked by a later loose stone wall. The interior is level, strewn with rubble and sea-rocks. In the SE interior there is a house site (CL008-124002-), built against the inner wall-face. Further to the S against this wall are two heaps of rubble. Abutting the exterior at the SSW and SSE are several small irregular enclosures lined by grass-covered walls; these may be later sheepfolds. A later rectangular drystone animal pen (5m NW-SE; 2m NW-SE) is built against the outer wall-face at the SE. Grassed-covered field walls extend SE from the fort exterior at the SSW and E.
CL008-124002	Cahermaclanchy	House - indeterminate date	508097E, 700412N	In the SE quadrant of a cliff-edge fort (CL008-124001-). The foundations of a rectangular house (3.5m NE-SW; 2.1m NW-SE) defined by drystone walls (Wth 0.9m; max. H 0.25m).

CL008A005002	Doolin	Hut site	506231E, 697957N	Near the seashore on a NW-facing slope in rough pasture, at the edge of an escarpment overlooking a rocky beach (Poll Cnaimhín (Robinson 1977)). This circular hut site (diam. 4.8m) is defined by a stone wall (Wth 1m; max. H 0.2m). There are several large stones in the centre.
CL008A006	Ballaghaline	Midden	505685E, 696944N	On quite level ground on Ballaghaline Point, currently tarmacked as part of the Doolin ferry terminal car park, but formerly a location of thin soil cover (D 0.5-0.55m) over exposed limestone pavement. In the summer of 1996, what was described as 'a ring of small slabs set on edge, with earth and stone in the centre' was seen eroding into the sea. When inspected, this arrangement of stones was not apparent but a decorated cylindrical bone bead was recovered from soil eroding onto the foreshore, and bone fragments were also noted. An examination in December 1996 by Ann Lynch (Licence no. 96CE0372) found patches of dark, organic, friable clays with charcoal flecks at the bottom of the eroded face of the soil overlying the limestone pavement. Within the sediment which had washed down onto the adjacent limestone foreshore was a moderate amount of animal bone (possibly including human teeth), and tiny fragments of burnt bone. (Lynch 1997)In February 2012 a larger-scale excavation took place at this general location (Rubicon Heritage Services, Licence no. 11E0353). A site visit by Christine Grant (DAHG) and Billy Quinn (Moore Group) had uncovered a bronze pin in the approximate location of the monument and further site inspections by Christine Grant, Billy Quinn, Carleton Jones and Danny Bourke had noted archaeological material (animal bone, human bone, struck stone and copper/bronze) eroding from the exposed section face. The excavation revealed stratigraphic evidence for a number of heavily disturbed phases of activity, with radiocarbon dates ranging from the Iron Age to the post-medieval period. Middens and other deposits of animal bone, marine shell and charcoal fragments were recovered. There were smaller quantities of charred cereal grains, pea seeds, stone tools and debitage (some dating to the Late Neolithic/Early Bronze Age), as well as burnt sandstone (possibly transported to this location), two human teeth and one human bone, and a single hearth. It was concluded from these findings that this location at Ballaghaline Point was the focus of intermittent activity over thousands of years, most intensively during the medieval period (O'Hara 2012).Following severe storms in 2013/2014 and in advance of the construction of a new pier and carpark further archaeological excavation took place under an extension of the above licence (May 2014). Coastal erosion had revealed significant areas of midden just SW of the previous excavation area. Animal bone and shell fragments were found in an area of grass-covered soil eroded to form a mound of earth (7.2m x 5.5m). Medium to large stones E and S of the mound were interpreted as a possible structure. Two lithics from the Late Neolithic or possibly Early Bronze Age indicated prehistoric activity. Barley grains were radiocarbon dated to the Early Iron Age while small finds of pottery, glass and metal were indicative of later activity. Eight elements of human bone were found and along with the human remains from the previous excavation were deemed to represent one adult. It was noted that the deposition of human bone within a shell midden may have had a ritual function. The material overall was quite disturbed due to tidal action, erosion and modern disturbance. (O'Hara 2015)
CL014-002	Lislorkan North	Promontory fort - coastal	503898E, 692356N	
CL014-010	Ballylaan	Promontory fort - coastal	501330E, 689623N	
CL014-010002	Ballylaan	Signal tower	501337E, 689620N	Situated on a small promontory approximately 240m E of Hag's Head. Located on a narrow piece of flat ground with vertical cliffs to the N and steep cliffs to the W (124m OD). Located on the SW end of the Cliffs of Moher at the start of the clifftop walk. The surrounding area consists of partially enclosed rough pasture defined with rubble and drystone boundary walls. Signal tower located c. 100m S of the coastline at its nearest point. Adjacent signals towers in chain located on Inisheer\Inis Oírr (GA120-016----) on the Aran Islands, County Galway, located c. 13.5kms to the NNW, and to the W side of Mutton Island

				(CL038-071----), located c. 15.9kms to the SSW. This signal tower is c. 3.8 kms NW of a cashel (CL022-002----) located close to the coastline at Cloghaundine just to the W of the town of Liscannor. An early nineteenth-century (c. 1804-5) two-storey square-plan signal tower (approx. ext. dims. 5.85m NE-SW x 5.85m NW-SE), built with roughly coursed rubble with flush squared limestone block-and-start quoins to the corners. There is considerable damage to the corners of the tower at the ground floor level, which has likely significantly weakened the structure; the structure has recently (2020) been enclosed by a protective metal fence to protect the general public. The doorway is located at first floor level of the centre of the NE elevation, and would have been originally accessed via a retractable ladder. The doorway retains part of its cut limestone block-and-start surround and cut stone lintel with keystone; lower sections and stone threshold now removed\collapsed. The doorway is protected by a machicolation over supported by three cut stone corbels. Two small well-constructed windows are located on either side of the first floor doorway. Both these windows have flush cut stone surrounds but both windows are now blocked up with neat stonework. These windows appear to be original features, and represent unique variations to the standard design used at most signal towers. The NE and SW walls feature two square-headed window openings at both ground and first floor levels. On the SW wall the ground floor windows and the NW window on the first floor have been blocked with neat stonework, leaving only the SE first floor window open. A smaller off-centre window is located at the NW part of the attic level. The SE wall is plain and bulges slightly along its length to the centre to house the chimney flue. The E and S corners of the signal tower are protected by bartizans, each supported by three cut stone corbels. Kerrigan established that the signal mast here had been erected and the signal tower completed by 1805 (Kerrigan 1995, 278). Internally, there are square-headed fireplaces to the centre of the SE elevation at ground and first floor levels flanked to either side by square-headed alcoves. The signal tower is not located within an enclosure, but it is sited within a badly eroded promontory fort (CL014-010001-). Immediately SW of the signal tower is the poorly preserved base of a World War II-era lookout post (L.O.P. 47).The signal tower was part of a system of over 80 signal stations constructed by the British Board of Ordnance in the first decade of the nineteenth century to warn of the approach of a French invasion fleet. Signalling between sites was accomplished using a naval signal post. The system formed a continuous chain from Dublin Bay running clockwise all the way around the coast to Malin Head in County Donegal. It was abandoned by the mid-1810s when the threat of a French invasion diminished (Kerrigan 1995, 157-66).
CL014-033	Ballyherragh	Enclosure	500872E, 688898N	
GA093-007	Derryloney	Midden	525089E, 722814N	Close to SE end of a boulder clay cliff adjoining the Silver Strand, near Bearna. Exposed in section as a band of black material (L 4.6m, T c. 0.2m). It contains a large number of periwinkle shells with burnt stone and charcoal also in evidence. A much more extensive deposit, noted here by Keary (1965, 110-11) in the early 1960s, consisted mainly of oysters, but he considered that it might be of natural origin.
GA093-012	Knocknacarragh	Midden	525775E, 722821N	On Seaweed Point, a peninsula extending S from Gentian Hill. Immediately below the sod at the top of an eroding cliff face is a layer of shell, mainly oyster, with burnt stones and charcoal also in evidence. When first noted in 1951 (Topgr. Files, UCG), this layer could be traced for c. 60m, but Keary and Dunne (1973) mention only a 12m stretch, a sample from which produced an uncalibrated 14C determination of 2650 -110 BP.
GA093-012001	Knocknacarragh	Midden	525706E, 722671N	
GA094-002	Ardfry	Designed landscape - folly	533057E, 720830N	

GA094-032	Mutton Island	Battery	529696E, 723190N	On Mutton Island, a low irregular offshore island 2km S of Galway town (GA094-100----). No visible surface trace survives but the fortifications may have been quite extensive: the island's shape bears a remarkable resemblance to a star-shaped fort. An artillery battery was constructed here as early as 1611 and a report of 1691 considered Mutton Island, 'where the old castle stoud', as the best place for the construction of a fort (Walsh 1981, 70, 115). Whether it was ever built is unclear; in 1691 Goubet drew a plan of the (?proposed) fortifications (NLI MS 2742; pers. comm. P. Walsh). The island was subsequently re-fortified as a battery in 1702 and again in the mid-18th C (Walsh 1981, 118, 128). Demolished in 1815 to make way for the lighthouse. (Kerrigan 1980, 136; Hardiman 1820, 164-5, 167, 316-17)
GA094-037	Mweeloon	Midden	532720E, 719994N	
GA094-042	Pollnarooma West	Children's burial ground	526944E, 723476N	Just above storm beach between Blackrock and Seamount on W outskirts of Galway city. This CBG, correctly Cill na bPáistí, is indicated on 1st ed. of OS 6-inch map as a small rectangular building. All that remains today is a subrectangular area (17m by 10m) within which a number of boulders are visible (info. GBCAS Files). Not visited. The above description is derived from the published 'Archaeological Inventory of County Galway Vol. I - West Galway'.
GA094-057	Rinmore	Bastioned fort	531101E, 724763N	On seashore 1.5km ESE of Galway town (GA094-100----). A quadrangular earthen artillery fort (L/Wth 30m) with salient angle-bastions at each corner which is surrounded by an irregular fosse. The entrance, via a causeway, was midway along E side. The NE and SE bastions survive intact but NW is damaged by a 19th-C butt, and whole SW part of the fort has been eroded by the sea. Built in 1643, along with a sister fort near Nimmo's Pier (GA094-099002-), to command the sea approaches to the harbour. (Walsh 1988; Kerrigan 1980, 136; O'Dowd 1985, 28-9, 38-9) The above description is derived from the published 'Archaeological Inventory of County Galway Vol. I - West Galway'. Compiled by Paul Gosling (Dublin: Stationery Office, 1993). Date of upload: 05 August 2010
GA094-058	Rinmore	Designed landscape - tree-ring	531804E, 725253N	
GA094-112	Townparks	Fortification	530066E, 724576N	On the point of land, near the present Nimmo's Pier, which forms W bank of the River Corrib, 0.5km S of Galway town (GA094-100----). Built in 1643 along with a sister fort on E bank of the river (GA094-057----) which it may have closely resembled. Known as Rintinane fort after the 17th-C name for this point, it is shown on the pictorial map of Galway c. 1650. No visible surface trace of it survives and its exact position is uncertain. (Walsh 1988, 120-1)
GA094-114	Ardfry	Midden	533182E, 720957N	At the W end of the low-lying Ardfry peninsula in Galway Bay. An extensive 0.15m thick deposit, mainly of oyster shell with some periwinkle, is revealed in section along N shore of the peninsula and is treaceable for c. 800m at an average depth of c. 0.25m below present ground surface. Some shell is also visible to the W and SE of Loughaunascalia, where it has been exposed by burrowing rabbits, and along the S shoreline to the S of the folly (GA094-002----). The extent of the deposit suggests that the entire W end of this peninsula was once carpeted with shell. (Holt 1912, 250)
GA094-141	Galway Bay	Monumental structure	529784E, 724204N	This is one of three intertidal art installations (see also GA094-142---- and GA094-143----) that were constructed in the early 1990s along the shoreline in the inner reaches of Galway Bay, below the High Water Mark, c. 30m to the SE of the rock armour protecting the walkway around South Park in the Claddagh. It was designed by Martin Byrne and Padraig Conway as part of the 'Solas Atlantis Galway 1993' project (see www.carrowkeel.com/files/art/rubbings/index.html accessed 25 August 2015). The installation, clearly visible on aerial photographs (see http://binged.it/1LPr7Gj), is roughly subcircular in plan and is defined by two rings with a central core and various radial features between the rings. The inner ring (17.2m N-S; Wth 1.2m; H 0.05-0.3m) consists of large and small boulders arranged in a haphazard fashion. The larger boulders are embedded in the sand but the smaller ones are loose on the surface. No facing-stones are evident. The boulders are encrusted with barnacles and are completely obscured by seaweed. Immediately within the enclosing ring there is a clear band of sand

				varying in width from 2.8m at N to 6.5m at S. Roughly centrally placed is an amorphous scatter of boulders (5.5m N-S), similar to those in the enclosing ring and also covered with seaweed. The outer ring (c. 47m N-S) is visible from W to NNE as a spread of seaweed earthed to sandfast boulders. The radial features visible on the aerial photograph between the inner and outer rings are not clearly discernible on the ground.
GA094-142	Galway Bay	Monumental structure	529722E, 724129N	This is one of three intertidal art installations (see also GA094-141---- and GA094-143----) that were constructed in the early 1990s along the shoreline in the inner reaches of Galway Bay, below the High Water Mark, c. 75m to the SE of the rock armour protecting the walkway around South Park in the Claddagh. It was designed by Martin Byrne and Padraig Conway as part of the 'Solas Atlantis Galway 1993' project (http://www.carrowkeel.com/files/art/rubbings/index.html accessed 25 August 2015). The installation, clearly visible on aerial photographs (see http://binged.it/1LPr7Gj), is roughly subcircular in plan and is defined by a ring with a central core. The ring (24.2m N-S) consists of a spread of boulders (Wth 2.4m at N; 0.9m at S; H 0.1-0.2m) obscured by seaweed. It is most clearly visible from E to S to NNW and is visible intermittently from NNW to E. The central core (12.5m N-S) is also made up of boulders covered with seaweed.
GA094-143	Galway Bay	Monumental structure	529582E, 724110N	This is one of three intertidal art installations (see also GA094-141---- and GA094-142----) that were constructed in the early 1990s along the shoreline in the inner reaches of Galway Bay, below the High Water Mark, c. 50m to the E of the causeway leading out to Mutton Island. It was designed by Padraig Conway and Martin Byrne as part of the 'Solas Atlantis Galway 1993' project (http://www.carrowkeel.com/files/art/rubbings/index.htm accessed 25 August 2015) and it appeared on the 1995 Galway Arts Festival poster by Ted Turton. It represents the planet Jupiter. It is visible on the OSi Orthophoto 1995 as a conjoined feature made up of a series of rings: the E example has four rings, while the W example appears to have up to five rings. Only traces of the E half of the E example survive (see http://binged.it/1LPr7Gj). The W example was probably destroyed when the causeway out to Mutton Island was constructed. The extant remains (14.7m E-W) consist of a central core of boulders, four bands of sands and four rings of boulders, which are visible from N to E to SSW. The central core of boulders (Wth 4.7m; H 0.1-0.15m) is covered with seaweed. Moving westwards from it there is a band of sand (Wth 0.7m), a ring of boulders (Wth 1.4m), sand (Wth 1.1m); a second ring of boulders (Wth 1.4m), sand (Wth 0.6m), a third ring (Wth 2m), sand (Wth 1.1m) and a fourth ring (Wth 1.7m). All the rings of boulders are also covered with seaweed.
GA102-039	Tawin West	Enclosure	530098E, 719335N	On Tawin Island in an area of commonage. Holt (1911-12, 249, 151, no. 1) noted a curved wall made up of large flagstones set on edge. It was believed by local residents to be a cattle shelter that was erected in the 18th century. On inspection in May 2008 an oval area (dims. 32m N-S; 24m E-W) was visible. It was defined by the wall (H 1.2m; T 0.55m) noted by Holt (ibid.) from WSW to N (C 19m); from N to SE a low sod-covered wall (Wth 5.95m; int. H 0.2m; ext. H0.55m) was visible and from SE to WSW it was levelled. The wall was constructed of vertical upright boulders. A small enclosure abutted the inner face of the wall at NNW and the interior of the enclosed area sloped towards the NE. A field bank associated with a field system (GA102-040003-) abuts it at S. Possibly an 18th-century cattle pen.
GA102-039001	Tawin West	House - indeterminate date	530092E, 719352N	On Tawin Island in an area of commonage; storm waters collect in a natural depression visible c. 6-8m to the WNW, just behind shoreline. Coastal defences in the form of rock armour have been deposited along the shoreline. This D-shaped house (dims. 5m NE-SW; 4m NW-SE) abuts the inner wall-face of a possible enclosure (GA102-039----) at NNW. it is defined by the remains of a low wall (int. H 0.5m; ext. H 0.65m; T at top 0.5m; T overall 2.45m) from NE to SW. The upper portion of the wall appears to have been rebuilt in places. The interior contains collapsed stone from the wall of the enclosure. Possibly of 18th-century date.
GA102-041	Tawin West	Stone circle	530792E, 719418N	On Tawin Island, in grazing land close to the foreshore. Holt (1911-12, 249) recorded a slight elevation that was partly enclosed by the arms of a large shallow pool, and on which there were a number of granite boulders that may have formed part of an irregular stone circle. He was informed that 'the appearance of a circle was more marked, before other boulders

				of the series were broken up for building.' On inspection in May 1992, five irregularly shaped granite boulders (max. H 1.7m; Wth 2.4m; T 1.8m) enclosed a roughly oval area (30m NE-SW; 26m NW-SE); a slight depression in the interior at N may have marked the socket of a boulder that had been removed. Two of the boulders were recumbent but one of them was not set into the ground; one other boulder also did not appear to be set. On re-inspection in May 2008 no visible surface trace of the boulders survived. According to local information, large boulders were removed from this area in the late 1990s to build up coastal defences along the shoreline to the N. Not precisely located.
GA120-031	Inis Oírr	Seaweed stand	498791E, 701512N	
GA120-036	Inis Oírr	House - indeterminate date	498848E, 702617N	In sand-dunes close to seashore in NE part of island. Known locally as An Poirín Buí, it consisted of a small circular enclosure (D c. 10m), half-buried in sand and defined by a drystone wall. Used locally as a marker for the boundary between the subdivisions of Baile an Chasleáin and Baile Fhormina. Possibly equatable with (GA120-007006-), but now obliterated by the airstrip (info. T. Robinson).
GA120A006	Inis Oírr	Fulacht fia	498231E, 701057N	This possible fulacht fiadh came to light during the course of fieldwork on the AranLIFE Farming Project (2014-2018) (see www.aranlife.ie). It is located at the S tip of the island on level ground, in an area of rough grazing and exposed limestone pavement. It is defined by a horseshoe-shaped mound (12m by 6m) with a central depression (Wth 2.5m) facing N towards an existing water source. No burnt stone is evident.

9.2 National Inventory of Architectural Heritage and Record of Protected Structures

NIAH	RPS	Name	Townland	Site Type	Date	ITM
20400105	Clare Co. 335	Black Head Lighthouse	Murrooghtoohy North	lighthouse	1935-1940	515481E, 712258N
20401408	Clare Co. 292	O'Brien's Tower	Lislorkan North	folly	1830-1840	503872E, 692326N
20401409	Clare Co. 343	Hag's Head Signal Tower	Ballylaan	signal tower	1800-1820	501337E, 689620N
30319004	-	Nimmo's Pier	Ballintober	pier/jetty	1810-1850	529962E, 724587N
30409406	-	Mutton Island Lighthouse	Ballynalacka	lighthouse	1815-1820	529739E, 723138N
30409407	-	Mutton Island Lighthouse	Ballynalacka	lighthouse keeper's house	1815-1820	529711E, 723158N
30409408-17	-	Dún Uí Mhaoilíosa Complex	Ballinvoher	church/chapel, hospital/infirmary, barracks, officers' mess, magazine, office, building misc	1860-1900	531372E, 725132N
30409419	Galway Co. 3028	Bridge	Rinmore	Bridge	1820-1855	532289E, 725044N
30409420	-	Bridge Cottage	Rinmore	house	1780-1820	532372E, 724985N
30412010	-	South Island Lighthouse	Barnaboy	lighthouse keeper's house	1855-1860	497621E, 700618N
30412011	-	South Island Lighthouse	Barnaboy	lighthouse keeper's house	1855-1860	497635E, 700629N
30412012	Galway Co. 795	South Island Lighthouse	Barnaboy	lighthouse	1855-1860	497650E, 700613N
-	Clare Co. 546	Irish Coastguard Doolin Unit	Ballghaline	boathouse	1915-1930	505882E, 697125N
-	Clare Co. 613	Emergency Period Lookout Post	Ballylaan	lookout post	1941-1943	501188E, 689622N

9.3 Wreck Inventory of Ireland Database

Wreck No.	Wreck Name	Classification	Place of Loss	Date of Loss
W05503	*Siberier (SS)*	Steamship	52.30000, -11.66667 Cork, Mizen Head, 80M NW x N	05/04/1917
W05621	*Delamere (SS)*	Steamship	51.06667, -13.00000	30/04/1917
W05646	*Elizabeth*	Sloop	Hags Head, Doolin, 5 miles NE	13/10/1821
W05729	*Industry (SS)*	Steamship	51.18333, -12.76667 Cork, Fastnet, 120 miles W by N of	27/04/1916
W05881	*Robert*	Unknown	Crabs Bay, Doolin	30/04/1805
W05897	*San Onofre (SS)*	Steamship	52.43333, -11.66667 Kerry, Skelligs, 64 miles NW 1/2 N., 7 miles W. of Blous Head	12/05/1917
W05998	Unknown	Ship	Ballaghaline, near Doolin	13/10/1821
W06174	*Erin go Bragh*	Ship	Cregga, near Ballyvaughan/Black Head, Near	09/02/1861
W06246	*Neptune*	Collier	Mutton Island and Seafield, between	26/01/1854
W06258	*Rose*	Schooner	Mutton Island, Co Galway, Seafield Point, pier	13/12/1889
W06259	*Rose*	Schooner	Mutton Island, Co Galway, Seafield Point, pier	10/12/1890
W06266	*Skarass (SS)*	Steamship	Black Head, 1 mile SW of	23/05/1918
W06269	*Successor*	Sailing Ship	Mutton Island, Co Galway, Seafield Point, between	20/11/1850
W06277	*Two Catherines*	Sloop	Black Head, Near	21/09/1853
W06281	Unknown	Schooner	Black Head, 40 miles WSW of	26/08/1908
W06357	*Admiral Hawke*	Ship	Hare Island, Galway Bay / Horse Island	22/12/1769
W06359	*Albion*	Unknown	Hare Island	06/01/1839
W06374	*Beemah*	Barque	Mutton Island	1892
W06404	*Curbat*	Smack	Renmore Point, Galway Bay	01/10/1882
W06405	*Cyclops*	Sailing Ship	Mutton Island	22/12/1831
W06419	*Emma Prescott*	Unknown	Renmore Point, Co Galway	24/01/1847
W06425	*Fanny*	Vessel	Black Head, offfshore	11/04/1817
W06433	*Gladan*	Barque	Kilcolgan Point	24/02/1903
W06436	*Good Luck*	Glothogue	Mutton Island, Galway Bay, near	04/11/1896

W06441	*Heros*	Barque	Hare Island / Mutton Island	07/10/1889
W06475	*Lily*	Brigantine	Mutton Island, Co Galway, Rocks W. of	30/11/1889
W06483	*Magpie (HMS)*	Steamship	Aran Islands, Co Galway, S Sound of, between Inisheer and mainland	03/04/1864
W06484	*Majestic*	Ketch	Mutton Island Light, 0.25 / 0.5 mile NE of	20/12/1917
W06489	*Mary*	Smack	Renmore, Co Galway	26/11/1912
W06511	*Nordlyset*	Barque	Mutton Island	10/11/1914
W06512	*O'Connell*	Hooker	Kilcolgan Point, Galway Bay	17/11/1892
W06514	*Ocean Scout*	Steam Drifter	Inisheer Lighthouse, Off	21/12/1917
W06545	*San Spiridone*	Brig	Hare Island	5/1— 28/2/1850
W06552	*St. Patrick*	Pookaun	Mutton Island, Galway Bay, Off	21/11/1881
W06576	*Successor*	Unknown	Mutton Island, Co Galway, Seafield Point, near	20/11/1850
W06578	*Susan*	Unknown	Hare Island	24/12/1846
W06579	*The Lively*	Unknown	Hare Island	16/12/1841
W06584	*Thomas Gray*	Ketch	Mutton Island Lighthouse, Galway Bay, ½ mile SW of / W by S	02/10/1916
W06603	Unknown	Unknown	Mutton Island	Unknown
W06619	Unknown	West Indiaman	Ardfry	07/12/1833
W06638	Unknown	Lighter	Rinmore Point, Galway Bay	26/12/1873
W06666	*Alliance*	Lugger	Broadhaven Bay, Inver / near Kilcolgan Point	15/10/1902
W08744	*Petrel*	Schooner	Black Head	26/02/1897
W09058	Unknown	Yawl	Minnane Rock, off Black Head, N end Holeopen Bay E, Old Head Kinsale	Unknown
W09398	*Angmering (MV)*	Unknown	53.23617, -9.10617 Galway Bay, south side of Black Rock Shoal	29/01/1975
W09460	*Bengairn (SV)*	Barque	50.33440, -13.62742 Fastnet, 165 miles WSW/ W Approaches to the British Isles Admiralty Chart	01/04/1916
W09545	*Christinaki (MV)*	Unknown	48.68333, -13.40000 English Channel W approaches	03/02/1994
W09601	*Duthies*	Unknown	52.88250, -9.99139	21/04/1995
W09675	*Frederick Knight (SS)*	Steamship	51.71667, -12.35000 Fastnet, 115 miles NW by W / W appracohes to Ireland	03/05/1917
W09744	*Inch Bar*	Unknown	52.82317, -9.86000	01/12/2001

W09775	*June (MV)*	Cargo Ship	53.25183, -9.05517 Mutton Island, Soutside. Galway Bay	16/01/1962
W09828	*Llandovery Castle*	Steamship	51.38683, -12.70017 Fastnet, 116 miles W / W approaches to Ireland	27/06/1918
W09832	*Loch Rottidon*	Barque	51.58333, -12.46667	24/01/1915
W10590	Unknown	Unknown	53.25667, -9.04583	Unknown
W10591	Unknown	Unknown	53.26194, -9.04167	Unknown
W11170	Unknown	Logboat	53.24807, -9.14384 Knocknacarra, Bearna, Galway Bay	Unknown
W11324	Unknown	Unknown	53.13755, -9.17731 The Rinn, the sandspit about 2kmNW of Ballyvaghan on the N clare coast. 100 yards off the rocks at , off	Unknown
W11657	*Valetta (SS)*	Steamship	51.68333, -12.36667	08/07/1917
W11688	*Western Explorer*	Unknown	52.84167, -9.77833	23/03/2003
W11838	*Lively*	Unknown	Hare Island, Galway	15/12/1841
W12259	*Halcyon*	Brigantine	52.00000, -12.00000	19/01/1875
W12421	*Empire Toucan (SS)*	Steamship	49.33333, -13.86667	29/06/1940
W12423	*Aylsebury (SS)*	Steamship	48.65000, -13.55000	09/07/1940
W12503	*Ariane*	Schooner	Black Head, Co Clare, 40 miles WSW of	26/08/1909
W12539	*St. McDarra*	Smack	Black Head, 1 mile W of, Co. Galway	31/03/1912
W12656	*Bhdoswald*	Steamship	51.25000, -12.66667	13/12/1893
W12671	*Annet Lyle*	Barque	50.83333, -13.23333	03/10/1891
W12676	*Mary*	Pookaun	Inverin and Black Head, Galway Bay, Between	02/06/1892
W13449	*James & Archibald*	Unknown	Renmore Point	20/11/1830
W13450	*Provost*	Unknown	Renmore, near	20/11/1830
W13530	*Vine*	Unknown	Hare Island	10/05/1826
W13605	*Agnes*	Unknown	Kilcolgan Point	27/03/1827
W13799	*Leila*	Unknown	Renmore	10/01/1839
W14281	*Lara*	Unknown	Mutton Island	28/11/1845
W14310	*Girl Inez*	Unknown	Mutton Island, 12M SE of	23/12/1936

W14554	Unknown	Barque	52.00000, -12.00000 Blasket Islands, c. 60 miles W of	08/05/1847
W14648	Unknown	Steamship	51.16667, -12.83333	06/04/1917
W14703	Unknown	Unknown	50.36667, -13.60000	02/07/1910
W14878	*Susan*	Unknown	Hare Island/Heir Island	24/12/1848
W15108	Unknown	Unknown	50.00000, -14.00000	01/01/1893
W15125	Unknown	Barque	51.00000, -13.00000 Fastnet Rock, N 80 E, true, distnat about 115M	21/08/1893
W15316	*Jane*	Unknown	51.00000, -13.00000	25/04/1852
W15438	Unknown	Unknown	50.00000, -14.00000	09/09/1854
W15551	Unknown	Unknown	50.33333, -13.78333 Cape Clear, 200 miles SW of	14/04/1923
W15703	*Star of Cruit (MV)*	Motor Fishing Vessel	Renmore Point, Galway Bay	28/01/1925
W15876	*Mary & Caroline*	Brig	52.00000, -12.00000	11/04/1858
W15898	Unknown	Unknown	53.22500, -9.11667 Spiddall, Galway Bay, 1.2 miles S. of	11/11/1928
W16074	Unknown	Ship	50.00000, -14.00000	19/06/1858
W16102	Unknown	Unknown	50.00000, -14.00000	03/11/1859
W16105	Unknown	Unknown	50.00000, -14.00000	13/11/1859
W16111	Unknown	Unknown	51.00000, -13.00000	24/11/1859
W16428	Unknown	Unknown	Kilcolgan Point, Co Galway	08/05/1808
W16764	Unknown	Unknown	51.00000, -13.00000 Mizen Head, c. 140 miles WSW of	01/07/1901
W16914	Unknown	Barque	Hag's Head, Galway Bay, 3 miles W. of	13/11/1902
W16993	*Morning Star*	Schooner	Hare Island, Galway	27/02/1903
W16994	*Benjamin Bangs*	Barque	New Harbour/Ardfry, Galway Bay	27/02/1903
W17073	Unknown	Unknown	51.00000, -13.00000	02/01/1871
W17142	Unknown	Boat	50.00000, -14.00000	22/06/1875
W17317	*A. Myshrall/* *Mary A. Myshrall*	Barque	51.00000, -13.00000 Mizen Head, 140 miles WSW of	21/03/1880

W17320	Unknown	Unknown	50.00000, -14.00000 Mizen Head, c. 210 miles SW of	25/05/1880
W17455	Unknown	Unknown	53.25633, -9.03333 Galway Harbour Approaches, Galway Bay. 760m east of Mutton Island and 900m west of Hare Island	Unknown
W17508	*Bethel*	Dandy	Renmore Point, near	01/10/1882
W17595	*Mentor*	Brig	50.81667, -13.35000 Cape Clear, c. 170 miles WSW of	14/03/1886
W17599	Unknown	Boat	Hare Island to Baltimore, en route	19/07/1886
W17615	*William Vaile/ Wm. Vaile*	Unknown	50.00000, -14.00000 Cape Clear, c. 220 miles SW of	21/06/1857
W17637	*Pembury (SS)*	Screw Steamer	Mutton Island Light 1/3 of a mile W. of	07/01/1888
W17809	Unknown	Brig	51.00000, -13.00000 Cape Clear, c. 155 miles WSW of	31/08/1861
W17933	*Go Forward*	Schooner	50.00000, -14.00000 Cape Clear, c. 220 miles SW of	29/12/1862
W17934	*Free Trader*	Barque	51.00000, -13.00000 Cape Clear, c. 155 miles WSW of	09/11/1862
W17966	*Magpie (alternative location)*	Unknown	53.01667, -9.41667 Loop Head - Slyne Head	03/04/1864
W18152	*Baron Clyde*	Ship	Black Head, SW of	31/10/1866
W18290	*Henrietta*	Schooner	Mutton Island / Malbay	03/12/1867
W18432	Unknown	Unknown	50.00000, -14.00000 Cape Clear, c. 225 miles SW of	10/08/1869
W18433	*Beatrice*	Schooner	Mutton Island, inside	24/08/1869

9.4 Previous Archaeological Investigations

Location: Ballyloughan, Co. Galway

Licence: 08E0641

Date: 2008

Name: Billy Quinn

Locational Details: 53.269057N; -9.016496W

Summary:

Monitoring was undertaken of slit trenches at and around Ballyloughan strand as investigative works to do with Galway Main Drainage scheme. Nothing of archaeological significance was identified.

Location: Various townlands, including Ballyloughan

Licence: 11E0203

Date: 2011

Name: Finn Delaney

Locational Details: 53.273197N; -9.052091W

Summary:

Monitoring was undertaken as part of Galway Sewerage Scheme between January 2011 and 2012 across 6 areas and townlands. A number of features were revealed within the city centre but nothing with the Ballyloughan area.

Location: Ballyloughan, CO. Galway

Licence: 12E0252

Date: 2012

Name: Dominic Delaney

Locational Details: 53.269527N, -9.028643W

Summary:

Pre-development testing was carried out for a new playing pitch near the strand. Testing was recommended based on the results of geophysical survey which identified certain anomalies of archaeological potential. Nine trenches were opened but none were found to be of archaeological significance.

Location: Ballyloughan offshore

Licence: 20E0287

Date: 2020

Name: Finn Delaney

Locational Details: 53.270746N; -9.018343W

Summary:

As part of a marine archaeological assessment undertaken by Geomara Ltd. for the IRIS Fibre-Optic cable development from Iceland to Galway, monitoring of geotechnical samples was also carried out. Nothing of archaeological significance was identified.

Location: Ballyloughan strand

Licence: 22E356

Date: 2022

Name: Mizen Archaeology Ltd.

Locational Details: ITM 531979 724942

Summary:

As part of for the archaeological mitigation for the IRIS Fibre-Optic cable development from Iceland to Galway, monitoring was undertaken offshore and on the foreshore for site investigations works. Archaeologists were on board the dredger when offshore SI were being undertaken and 4 pits were monitored on the foreshore. Nothing of archaeological significance was identified.
