PROJECT:

Ringaskiddy Basin and Berths, Port of Cork Navigation Maintenance Dredging, 2023-2030

SCOPE:

Underwater Archaeological Impact Assessment

PREPARED BY:

[redacted]

DATE:

August 2023

CLIENT:

Port of Cork

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Underwater & Land Based Archaeological Services

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Abstract

While there are no recorded wrecking events within the proposed dredge pockets at Ringaskiddy, the silts of the riverbed have to the potential to preserve unrecorded archaeological material. The intensity of maritime activity in and around Cork Harbour throughout history also increases the likelihood of a wrecking event having occurred within the dredge pockets. Although the main portion of the proposed Port of Cork dredging works will be maintenance dredging, occasional dredging may have to go through virgin areas to maintain appropriate levels. The highest potential for encountering archaeological material will be in these virgin areas.

The disposal site has been subject to repeated investigations since the late 1990s. Geophysical surveys have indicated that, despite the significant amounts of material dumped on the site, it has been largely unchanged. Header Controller

National Monuments Service's Wreck Viewer includes two wrecks sites on the northwest corner of the disposal site, though these have been interpreted as natural features. Notably, a geophysical anomaly has been identified just over 100m outside the northern boundary of the site.

1. Introduction

1.1 General

This report relays the results of an underwater archaeological impact assessment (UAIA) of proposed Port of Cork maintenance dredging in the Ringaskiddy basin and berths, Co. Cork. The AIA was undertaken by *Mizen Archaeology* on behalf of *Port of Cork*.

2. Receiving Environment

2.1 Location

Ringaskiddy Port is situated on the western side of Cork Harbour, 15km from Cork City. Ringaskiddy is a major ferry port for Ireland. Two dredge pockets are proposed within Ringaskiddy Basin, bordering the northwest and the southeast of the entrance (Figures 1 & 2).

The licensed dredge disposal site (Figure 1) is located approximately 4.5km south of Power Head and the mouth of Cork Harbour. From 1978 to 1996, the current licence area formed the eastern half of the full dumpsite, which was reduced to its current size in 1996, and has been in operation within those boundaries since. The dumpsite has received considerable amounts of dredge spoil since 1996.

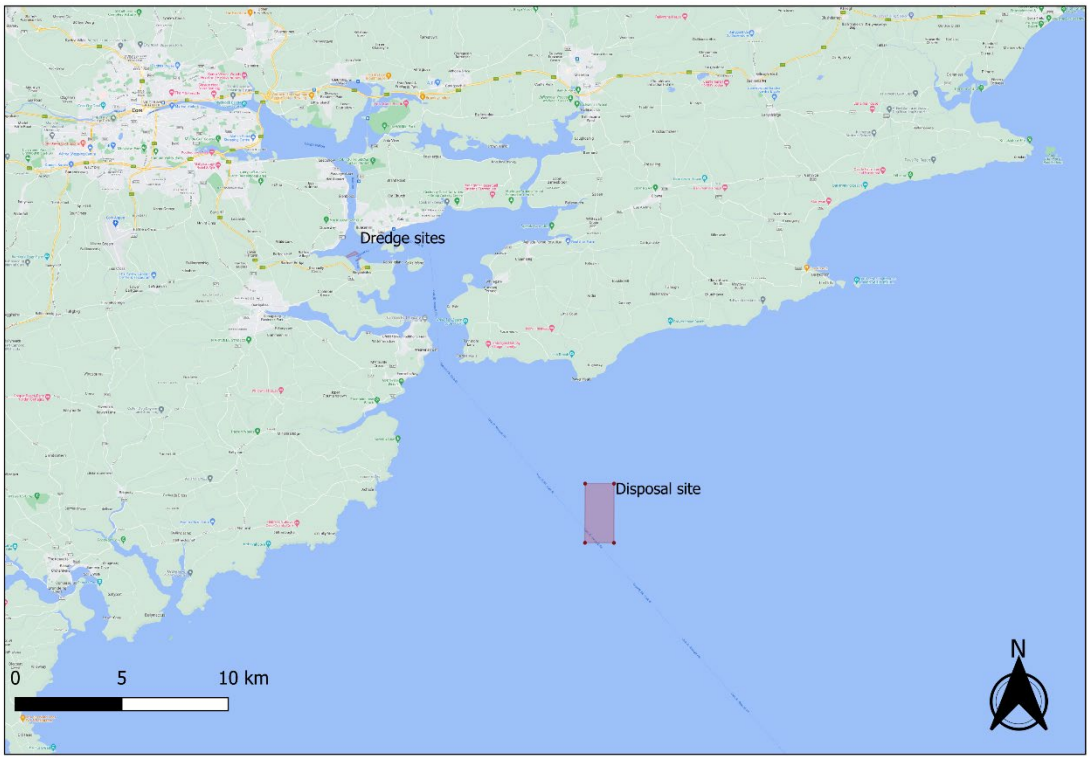

Figure 1: Location of proposed dredge sites and disposal site.

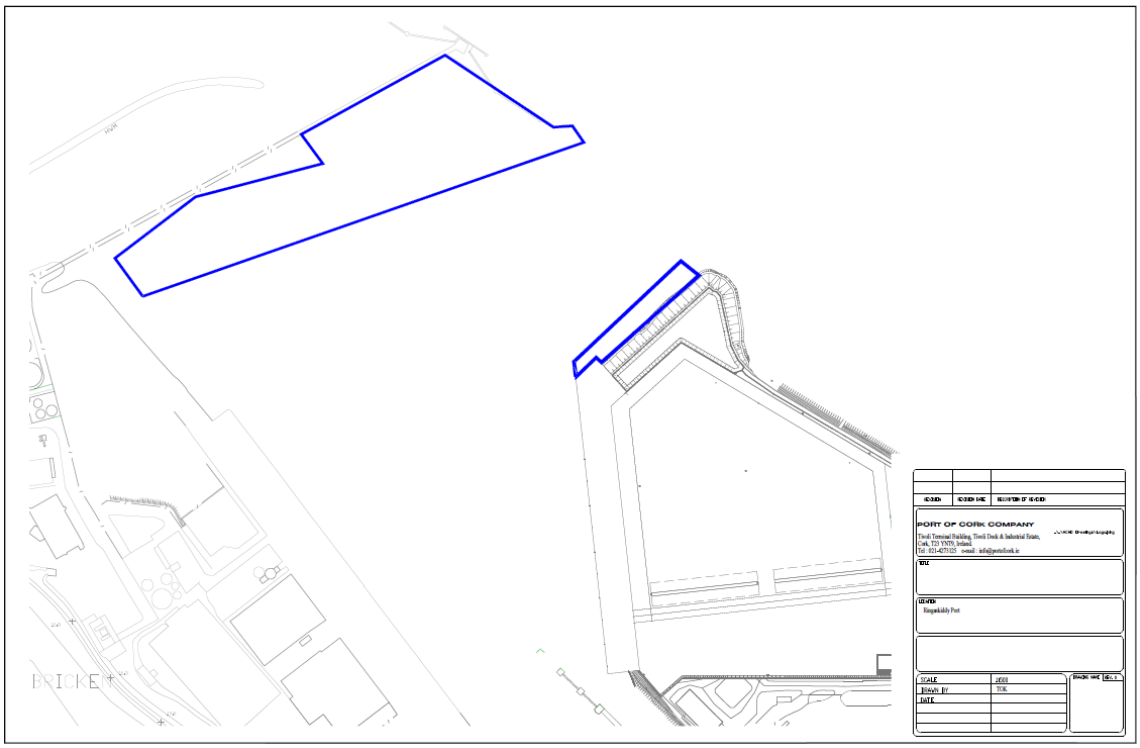

Figure 2: Outline of proposed dredge sites for assessment.

2.2 Soils, Geology and Hydrology

As part of the foreshore application process, the Port of Cork collected and analysed sediment samples to determine potential contamination and the physical nature of the sediment to be dredged. The physical composition of the material is relatively consistent throughout the harbour, being predominately sand silt (13% sand and 87% silt) (Anthony D. Bates Partnership LLP and Port of Cork 2021).

The environmental assessment report describes the soils, geology and hydrology of Cork Harbour as follows:

Cork Harbour is a large natural harbour located on the southern coast of Ireland and exerts a considerable influence on the City of Cork. The topography of the landscape is gently undulating, with a mixed coastline consisting of built infrastructure, shallow cliffs, intertidal mudflats, reed beds, single and rocky foreshores.

The proposed disposal site has been confirmed to be dominated by exposed bedrock and cobble, with interspersed areas of finer sediments such as bedrock and gravels. Sediment has been recorded as generally 1m deep, occasionally reaching 2m. Geophysical surveys carried out in 1999, 2008 and 2013 indicated that historic dumping of dredged material made little to no change to the site composition.

3. Scope of Works

Dredging in Ringaskiddy Basin and Berths is proposed, in the initial primary works, to remove 140,000 tonnes of material through Trailing Suction Hopper Dredger (TSHD) supported by WID/bed-leveller.

3.1 Trailing Suction Hopper Dredger (TSHD)

TSHDs can fill their own holds by sucking material from the seabed using pipes that trail over the bed as the ship moves forward. TSHDs can operate independently of any other equipment and are able to transport the dredged material over long distances if necessary. Internationally, these are the most commonly used dredger for maintenance dredging.

A TSHD operates as follows:

To start the dredging operations, the TSHD sails to the area to be dredged. Once in the vicinity of its dredging area, the TSHD lowers its draghead(s) to the bed and dredging can commence. The draghead loosens the bed material, if required, by ripping (with teeth) and/or high-pressure water jets. The centrifugal dredge pump, installed inside the dredger, sucks up a mixture of water and sediment through the draghead and suction pipe and pumps the mixture into its hold, known as a hopper. The sediment settles in the hopper and the excess transport water can be discharged through and overflow system. When the draught of the vessel reaches the dredging loading mark or when circumstances do not allow for further loading, the dredging is ceased and the draghead and suction pipe are hoisted back on deck. The dredger fills the hopper as efficiently as possible prior to sailing to the disposal site to deposit the material.

Discharge from the TSHD can be undertaken in several ways. The primary method is release from the bottom of the dredger. Upon arriving at the disposal site, the dredger slows to approximately one to two knots. The dredger then opens bottom doors or splits along its hull to allow the release of its contents over several minutes. The sediments contained within the hopper will then either settle in the immediate area or be dispersed. The dispersion characteristics will depend on the particle size distribution of the material being disposed of and environmental characteristics of the disposal site (retentive or dispersive). Other discharge methods include rainbowing (spraying) of material onto a designated location or pumping through a pipeline to an area which may be inaccessible to the dredger.

The size of TSHD is generally stated by their hopper capacity and can range from 400m³ up to 48,000m³. The larger dredgers are generally used for large land reclamation projects where material dredged has to be transported over long distances that are not suitable for pipeline transportation. For maintenance dredging small to medium sized dredgers are generally used as draught limitation of the site being dredged must be taken into account. TSHD are generally the most efficient form of bulk dredging over a large area. However, they do have restrictions in terms of accessibility due to their limited manoeuvrability relative to their size and can also find stiffer materials such as consolidated clays and rock difficult to remove.

3.2 Water Injection Dredging (WID)

Although Water Injection Dredging (WID) is generally described as a method of dredging it does not ‘dredge’ in the conventional sense. To dredge is defined as; to bring up or clear away, but WID does not ‘bring up’ and only ‘clears away’ and that to a rather limited extent. With WID the sediment is mobilised using water jets. A pipe, with water nozzles arranged at small separations

perpendicular to the sea bed is lowered close to the seabed (See Figure 7). A large flow of water at relatively low pressure is then pumped into the bottom sediment.

The water breaks the cohesion in the seabed sediments and fluidises the material into a dense near-bed suspension. This produces near seabed layer of higher density than that of the surrounding water. This high-density layer of fluidised material can then move down gradient under gravity, perhaps aided by local currents, or be instilled with a directional flow produced by the advancing WID unit. The potential transport distance of the suspended material depends largely on its grain size, composition and density as well as the local hydrological and bathymetric conditions. However, as the material is only displaced the final settling location is difficult to ascertain.

The use of WID for dredging purposes is generally limited to the movement of fine grained loose or low-density sediments down gradient to locally deeper areas, where they may settle and consolidate at a level too low to cause restriction, or they may be removed by conventional dredging plant and disposed off-site. Generally, WID methods are not very effective in purely granular sediments, because these quickly fall out of suspension and hence do not readily form into a dense fluid.

3.3 Bed-levelling/ploughing

Ploughing is a method of moving bottom sediments over short distances to level an irregular bed; to move sediment from a location where it causes a restriction or obstruction; or to move sediment from an area that is inaccessible to other larger dredging plant to a location where it can be accessed dredged and removed. Sediment movement is achieved by towing a bottomless rectangular box shaped steel implement behind a powered vessel, usually a small workboat or tug.

If used correctly, the plough is suspended at a controlled height from an A-frame mounted over the stern of the towing vessel. The height of the plough, or depth of submergence, is controlled by a deck mounted winch. The cutting blade at the leading edge of the plough slices the surface sediment which is then contained within the sides and rear of the plough box until reaching an area where the bed level is lower than the level of the plough, whereupon the contained sediment falls from the open bottom of the plough. The plough is then raised above the general seabed level and the towing vessel returns to the area from which sediment is to be moved and repeats the cycle. The greatest merits of ploughing are simplicity, ease of deployment, low cost

and minimal environmental impact. One of the most common uses is as a support vessel to a TSHD. The plough can level an area previously dredged, allowing the TSHD to focus on bulk dredging.

The production of a plough is proportional to the width and volume of the plough, the bollard pull of the towing vessel and the distance over which soil is to be moved. It is also dependant on the characteristics of the sea bed soils, but not to the same extent as is the WID. The increased versatility is because, whereas the WID relies on fluidising the soil, the action of a plough is mechanical. Subject to the bollard pull of the towing vessel, it is possible to move materials with significant internal strength including weak clay and sand, but in each case the production rate declines sharply with increasing strength or density of the soil.

4. Methodology

4.1 Desktop Study

The following sources were consulted as part of the desktop study:

- The Record of Monuments and Places (RMP) compiled by the Archaeological Survey of Ireland, which 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 from the National Monuments Section (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 Ireland (OSI) and contemporary maps were examined to measure the changing landscape.
- The Excavations Bulletin online database (www.excavations.ie) which contains summaries of all archaeological excavations in Ireland, was consulted to review archaeological investigations done previously in the area.
- Cartography: Several historic maps and charts were examined (see references below for a full list).
- Aerial photography: A variety of low and high-altitude aerial photography was examined (see references below for full list).
- Documentary sources: Several sources were examined. For a full list of all sources examined see Bibliography below.

5. Desktop Study

5.1 Historical and Archaeological Overview

5.1.1 Prehistoric Period

The earliest evidence of archaeological activity in Ireland dates to the Mesolithic period. Shell middens are often associated with this period, however several of the middens occurring within Cork Harbour have not returned such early dates. Over 300 Late Mesolithic lithics were recovered close to Roches Point at the mouth of the harbour. Other scatters were found at Gyleen, Fota Island, Inch and Power Head (Rynne 1993, 2; Monk 2005, 45; O'Brien 2012, 36).

The Neolithic Period is represented in Cork Harbour by Rostellan dolmen, a port tomb on the east side of the harbour. Today, the megalith is submerged underwater at high tide, suggesting that other Neolithic activity may be submerged. Artefactually, the Neolithic is represented in the broader study area by the discovery of at least six polished stone axes, including two from Ravenswood near Carrigaline, three from Mahon Peninsula and one from Ballinaspig More.

Evidence of Bronze Age activity in the harbour is best represented by numerous fulacht fiadh, thought to be used to heat water for cooking or other purposes. Artefactually, this period is visible in the wider area in the discovery of an early flat copper axe, along with amber beads, and an amber ball at Carrigaline West to name one example.

The Iron Age in Cork Harbour is exemplified by a set of three bronze horns, known as 'the Cork Horns' that were found in mud dredged from the River Lee in 1909 (O'Brien 2012, 233) and are characteristic of *La Téne*-style art. Other artefacts from this period include a horse-bit from Tracton Abbey near Carrigaline.

5.1.2 Early and High Medieval Periods

The archaeology of the Early Medieval period in Cork Harbour is represented by over 80 ringforts, of which seven are recorded in the Ringaskiddy area, including three on the grounds of the Novartis manufacturing facility.

In the Medieval period, the cantred of Kerrycurrihy was first attested as the 'Cantred' of the Ostmen' or Viking in 1177 (MacCotter 2008, 155). It contained all the lands extending south of the north channel of the River Lee on the west side of Cork Harbour and extended as far south as Minane/Ringabella Bay and included Kilpatrick and Tracton. Castle Warren (CO087-052) constructed by the De Cogan family- reputedly by Richard de Cogan, Lord of the manor in 1536-

is situated *c.* 600m to the south of Ringaskiddy. De Cogans occupied the site until 1642 when the garrison surrendered to Lord Inchiquin after a 'piece of ordnance' was discharged at the castle (Coleman 1915, 4-7; O Murchadha 1985, 81).

5.1.3 Late-Medieval and Post-Medieval Periods (1700 AD- 1800s AD)

The remains of Barnahely Castle, to the southwest of the port, provide evidence from the 16th century for castle-building in the area. However, its foundations may have dated back to the High Medieval period when the Anglo-Norman Lord Milo de Cogan may have built the original fortification on the site. The name of the peninsula the castle stands on- located between Ringaskiddy and Lough Beg- possibly refers to such an earlier fort, being called 'Longa-Gowgan' or 'Ships of Cogan'. De Cogan came to the area in the 1100s and is reputedly buried in the nearby Barnahely graveyard (Healy 1988, 103-4). A member of the De Cogan family was still in residence in the 16th century at the castle, but during the fall of the Gaelic Order later that century, De Cogan is said to have fled to Spain. It is thereafter recorded that a merchant family called Terry were in residence. Later, in 1796, ownership passed to the Warren family, who incorporated their own substantial, sub-rectangular mansion into the remains of the castle (*ibid.*). It has since taken on the name Warren Castle, with the remains of the mansion now the most prominent. Lewis (1837) noted that the grounds of the castle were well-planted.

The Post-Medieval period saw the French Revolutionary wars (1793-1802) and the Napoleonic Wars (1803-1815), which provided the impetus for an extensive number of defensive works to protect Cork Harbour and the newly created naval dockyard on Haulbowline Island. In the same period, a small fort was constructed on Spike Island, the inner core of Fort Carlisle was built, Rams Head (later Camden) Fort was remodelled, and five Martello towers were built (Stevenson 1998). The largest of these towers was constructed between 1813 and 1815 on the highest point of Ringaskiddy promontory, overlooking Cork Harbour. It is a circular tower, enclosed by a dry fosse within a circular enclosure marked by ordnance stones.

The name 'Martello' derives from Mortella Point in Corsica where, during the war with France in 1794, the British naval ships HMS *Juno* and HMS *Fortitude* were driven back by bombardment from a round tower at the entrance to the harbour there. The effectiveness of the design was noted and the British subsequently began building similar towers around the coast of Ireland from about 1803 (Pochin Mould 1991, 223).

5.1.4 Maritime and Underwater Cultural Heritage

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, it is most likely that the early Mesolithic colonists of the island reached it by 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 BC), similarly has archaeological evidence which implies the use of seaworthy vessels to introduce cattle and ship to Ireland. Distributions of stone axes across Ireland and Britain also indicate trade links across the Irish Sea. Archaeological evidence for maritime activity during this period is limited to logboats, which have generally been found in sheltered waters. The discovery of a logboat 1km offshore from Gormanstown, Co. Meath during pipeline construction indicates that these vessels were not limited to inland waterways (Breen and Forsythe 2004, 33). The Bronze Age (*c.* 2400-600 BC) saw an increase in trade links, with tin imported from Cornwall or Iberia and bronze items exported in return. The Iron Age (*c.* 600- 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, noted that, "the interior parts [of Ireland] are little known, but through commercial intercourse and merchants there is better knowledge of the harbour and approaches" (*ibid.,* 39). 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" (*ibid.*). This is supported by the archaeological record, 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 (*ibid.*). The fragment is believed to date no later than the 2nd century AD.

In the early Medieval Period (*c.* 400-1169 AD), 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 Illuanloughan, 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 AD. 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 population.

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 (*ibid.*, 71). Trade networks expanded in the 12th century, leading to the formation of trading confederations in the 13th century, which

in turn further increased merchant shipping in northern Europe. During this period, 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 (*ibid.*, 77). Archaeological remains of the period include a possible medieval ship's timber trawled from Dublin Bay in the late 1980s and a large timber retrieved from the Suir estuary, near Waterford (*ibid.*, 81).

The Late Medieval period (*c.* AD 1400-1600) was a time of varied fortune for Irish ports. The arrival of huge herring shoals off the south-west and west coats was a hugely important economic event for coastal communities. In 1588, as many as 26 vessels from the ill-fated Spanish Armada were lost along the north and west Irish coasts.

In the Post Medieval period (*c.* 1600-1750), 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 (Brady *et al.* 2012, 21). Large trading companies, such as the Dutch East India Trading Company (VOC), developed in order to facilitate international trade. A number of ships belonging to such companies were wrecked on the Irish coast. Around this time, a number of slave ships, belonging to companies such as the Royal African Company or the South Sea Company, utilised the Channel and Irish ports. Evidence of their presence along the coast is recorded where the slave trader *Amity* was lost in 1700 in Dunworley, Co. Cork (*ibid.*, 22). However, less than 2% of the wrecks listed on the Shipwreck Inventory of Ireland date to this period, reflecting more on the paucity of records than the actual number of wrecking events (*ibid.*, 21).

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 that nation declared independence in 1776, although the intensity lasted for a relatively short time. The British responded to these attacks with naval actions 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 (Brady *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 suppress (Breen and Forsythe 2004, 125).

Systematic recording of ship losses began in the mid-18th century, providing comprehensive records from around the Irish coast from this point onwards (Brady et al. 2012, 21).

The 19th century saw developments in steam navigation, which was closely linked with the large-scale emigration sparked by the Great Famine (1845-1852). 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; Brady et al. 2012, 23). As a direct result of the increase in maritime activity, the 19th century holds 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 the 19th century (Brady et al. 2012, 23). In the mid-19th century, an average of one wreck was reported every three days (ibid.), a figure which remained relatively constant up to the outbreak of World War I.

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 (ibid., 44). An estimated 1,800 shipwrecks around Ireland belong to this period.

Generally, the Cork coastline is a rural and rugged landscape that has served that has, over millennia, facilitated trade, shipping and settlement, as well as giving stage to shipwreck and tragedy. The intensity of maritime activity and traffic between Cork and Europe is reflected in the shipwreck record. Over 3000 wrecks are recorded in Cork coastal waters, of which only *c.* 600 have identified locations. The true number of vessels wrecked off of the Cork coast, and lives lost on them, can only be estimated (WIID). These ships claim origins internationally, though the majority were coming or going from Europe. These vessels were utilising the North Atlantic for a variety of purposes and, as they stopped off in Cork, it became one of the primary North Atlantic havens, particularly in modern historic times (Kelleher 2018, 45).

Cork's connection with the sea and wider Atlantic has influenced its social, political and economic development through time (*ibid.*). The fortification of the harbour is protected it from threats, but also facilitated control of shipping, both militarily and commercially. The depth of the harbour has made it a focus of strategic importance, particular during the World Wars. For example, the fortification on Spike Island served as a bastioned military installation for the British Navy prior to 1938. It also functioned as a convict prison in the 1850s and again reverted to serving as a jail in the 1980s.

Located on the southwest side of Cork Harbour, Ringaskiddy forms part of the maritime landscape of the second deepest harbour in the world behind Sydney Harbour in Australia. As one of the numerous haves and inlets skirting the harbour, Ringaskiddy, under the auspices of Cork Port Authority, has expanded as a port facility in recent times. Ringaskiddy is also home to the National Maritime college, which provides both Naval and merchant training. The Irish Navy's main base of operations and naval dockyards are situated a short distance away, on the adjacent Haulbowline Island. Ringaskiddy, therefore, has been the focus of maritime activity spanning several centuries. Cork Harbour and Port have played host to all manner of maritime activity over time; both influenced and impacted by national and international events.

5.2 Cartographic Information

A survey carried out by Murdoch Mackenzie in 1775 charted the coast of Ireland, including the proposed disposal site and dredge sites (Figure 3). This survey shows a large house at 'Ballybrickan' and a small settlement at 'Grinaskedy'. It does not show any improvements along the foreshore. This map does not record any features within the proposed disposal site.

The OS 6-inch map (1841-2) (Figure 4) shows a landing place extending out from the foreshore adjacent to Ballybricken House. This landing place extends almost to the southwestern limit of the proposed southeast dredge pocket. The footprint of the proposed northwest dredge pocket does not contain any features. Much of the reclaimed land that now makes up Ringaskiddy Port was not yet in existence, and 'Ring Island' is clearly shown to the southeast, with causeways connecting it to the mainland.

The OS 25-inch map (1928-9) (Figure 5) also shows the landing place, though it appears to extend out further, reaching all the way to the proposed southeast dredge pocket, and it is annotated 'Ballybricken Hard'. An arm is shown jutting out from Ballybricken Point, close to the proposed northwest dredge pocket, though this arcs to the northwest, outside of the proposed works area. The only feature shown within the proposed northwest dredge pocket is a buoy, near the southeast corner. 'Ringaskiddy Island' is also shown, with a windmill visible on the western portion of it.

The disposal site is not depicted on the historic Ordnance Survey maps.

Figure 3: Extract from a 'The South Coast of Ireland from Cable Island to Gally Head' (Mackenzie, 1775).

Figure 4: Extract from OS 6-inch map (1841-2), showing the general proposed dredge locations.

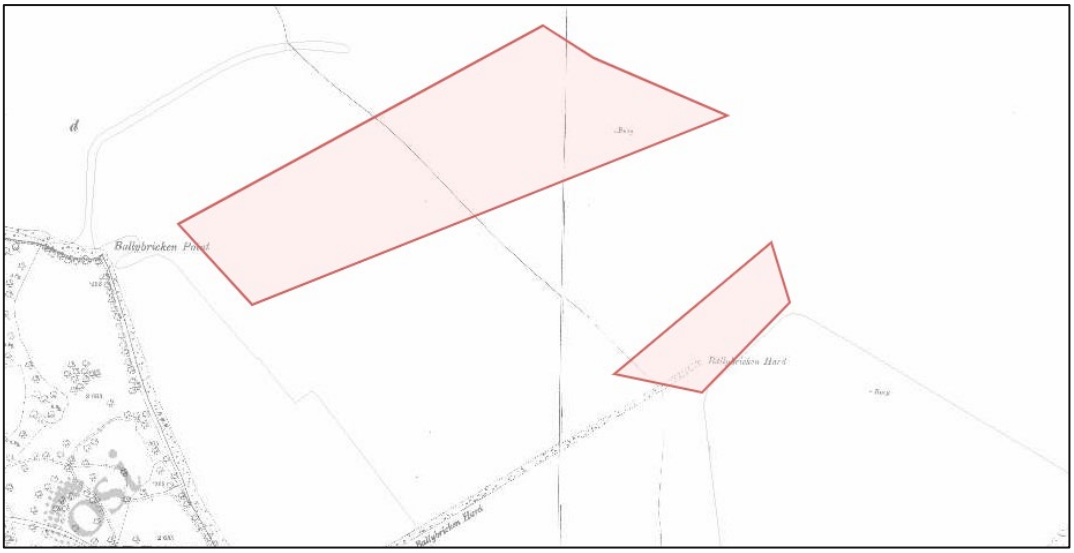

Figure 5: Extract from the 25-inch OS map (1928-9), showing the general proposed dredge locations.

5.3 Recorded Monuments and known sites: RMPs and SMRs

There are no SMR/RMP listings within the proposed dredge pockets. There are six listings within a 1km radius (Appendix 9.3). The closest of these was an ecclesiastical site, located c. 550m to the west of the proposed northwest dredge pocket, which was recorded to date back to c. 1100 AD, although it now lies in an industrial complex with no surface traces recorded.

There are no listings within the vicinity of the proposed disposal site.

Figure 6: Locations of RMPs and SMRs surrounding proposed dredge pockets.

5.4 Previous Archaeological Investigations

Five previous archaeological investigations (Appendix 9.1) have been recorded in Ringaskiddy Port and its immediate surrounds on the Excavations Bulletin. Of these, four specifically focused on the intertidal area or seabed, none of which identified archaeological material.

In advance of the Ringaskiddy Port Redevelopment, a cultural heritage assessment was carried out as a component of the Environmental Impact Statement. The assessment included a geophysical survey, conducted (2005-06), dive truthing of geophysical anomalies, intertidal survey, and dive surveys (12D016, 12R073). These surveys covered the entirety of the proposed dredge pockets, and did not identify any archaeological material.

A previously-identified anomaly is located c. 122m outside the northern edge of the disposal site (ITM E 588674m, N 554504m) (Figure 7).

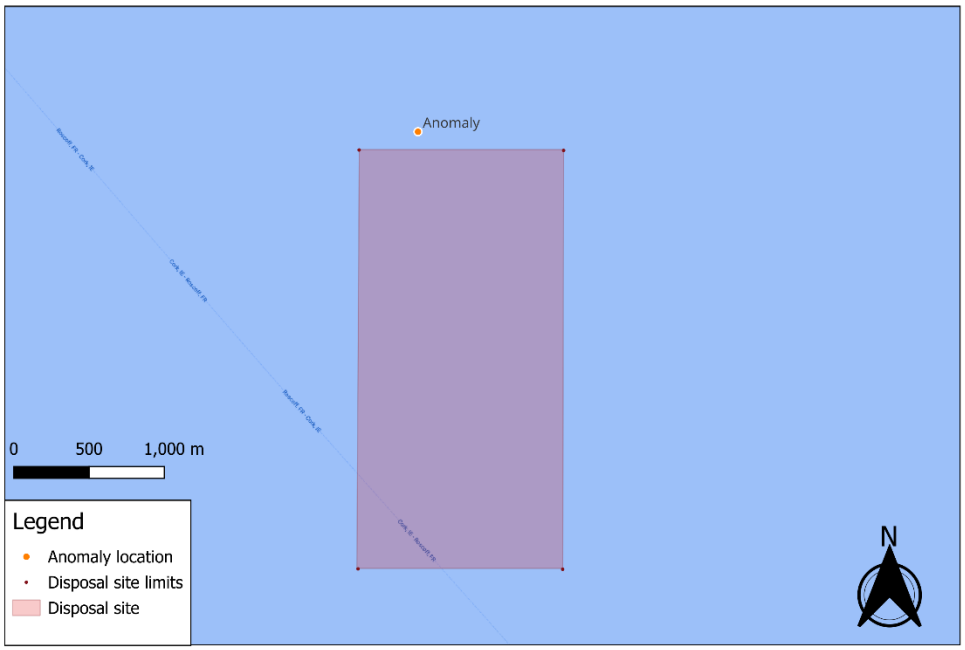

Figure 7: Location of previously identified anomaly in relation to the proposed disposal site.

Archaeological monitoring of dredging operations was undertaken during 2018 and 2019. The dredged material was exceptionally sterile, and overall there was very little debris noted. The material varied between silty clay, silty sand, and gravels. Two timbers were retrieved for close inspection, one during dredging works and the other during rock breaking activities.

5.5 Shipwrecks

56 ships are recorded as lost within or in proximity to Cork Harbour. No wreck is listed specific to 'Ringaskiddy' in the National Monuments Service's Wreck Inventory Database of Ireland (WIID). However, as many of the recorded losses are approximate, giving location details as general as 'Cork Harbour' or 'near Cork Harbour', it is not possible to say with certainty the no vessels were wrecked in Ringaskiddy or its immediate surrounds (Figure 8). What can be said is that the figures for ship loss high, as a result of the intense maritime activity in the Lower Harbour. Notably, many of the wrecks occurred in the Lower Harbour. Therefore, there is high potential for evidence of these losses, either as sites, residual wreck material or artefactual material, to be found in the deep waters of Cork Harbour.

Two unknown wrecks, W10714 and W10715, are located in reclaimed land of the port. No details are provided as to the probable date of either of these wrecks.

A full list is provided in Appendix 9.2 of the recorded wrecks for Cork Harbour.

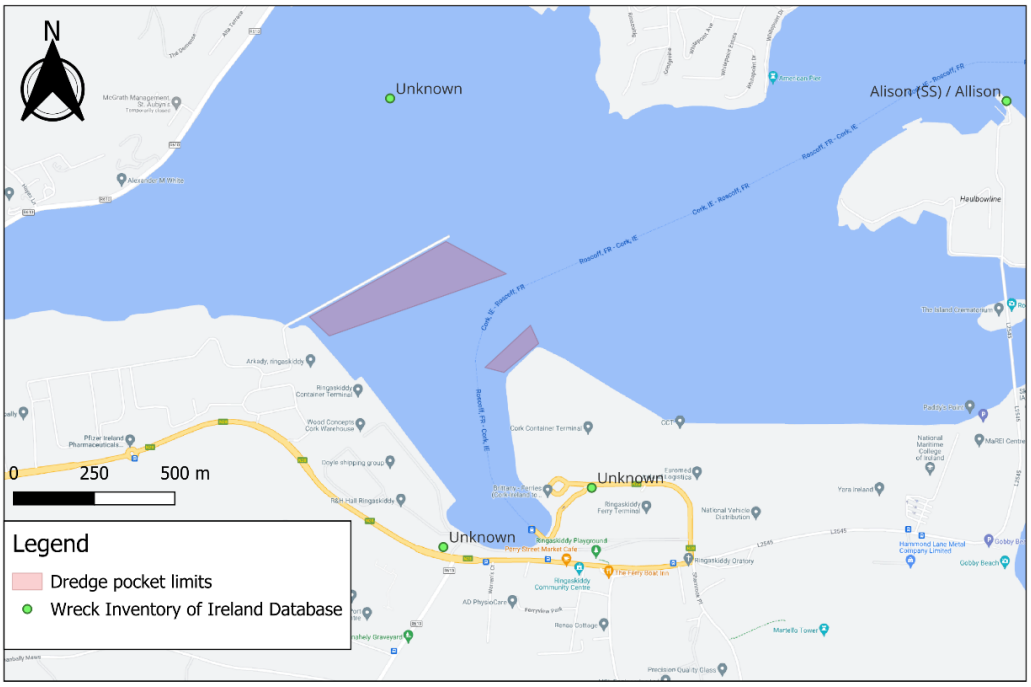

Figure 8: Recorded wreck sites (green) in the vicinity of proposed general dredge areas (red).

Two underwater obstructions fall within the northwest limit of the proposed disposal site (Table 1; Figure 9). Admiralty charts noted an 'obstruction' in the area, which was confirmed by the UK Hydrographic Office (UKHO) survey, and it appears that these two separate records refer to the same anomaly. The UKHO records it as an anomaly, measuring 35m long x 20m wide and rising

1.6m from the seabed. The record also states that it is a probable natural feature (Port of Cork 2015, Section 6.6.3). Multiple geophysical surveys have been carried out at the disposal site (Irish Hydrodata, 1999; INFOMAR 2008; and Irish Hydrodata 2013), which confirm the obstruction as a natural feature, possible a high-relief exposure of bedrock.

In addition, the Santo (SS) is located c. 350m northwest of the disposal site. The Santo (SS) was a 205-ton steel steam dredger from Glasgow, which encountered bad gales and foundered on the 26th December 1900. Of the 17 crew onboard, 12 were lost, and the dredger itself was a total loss (WreckViewer).

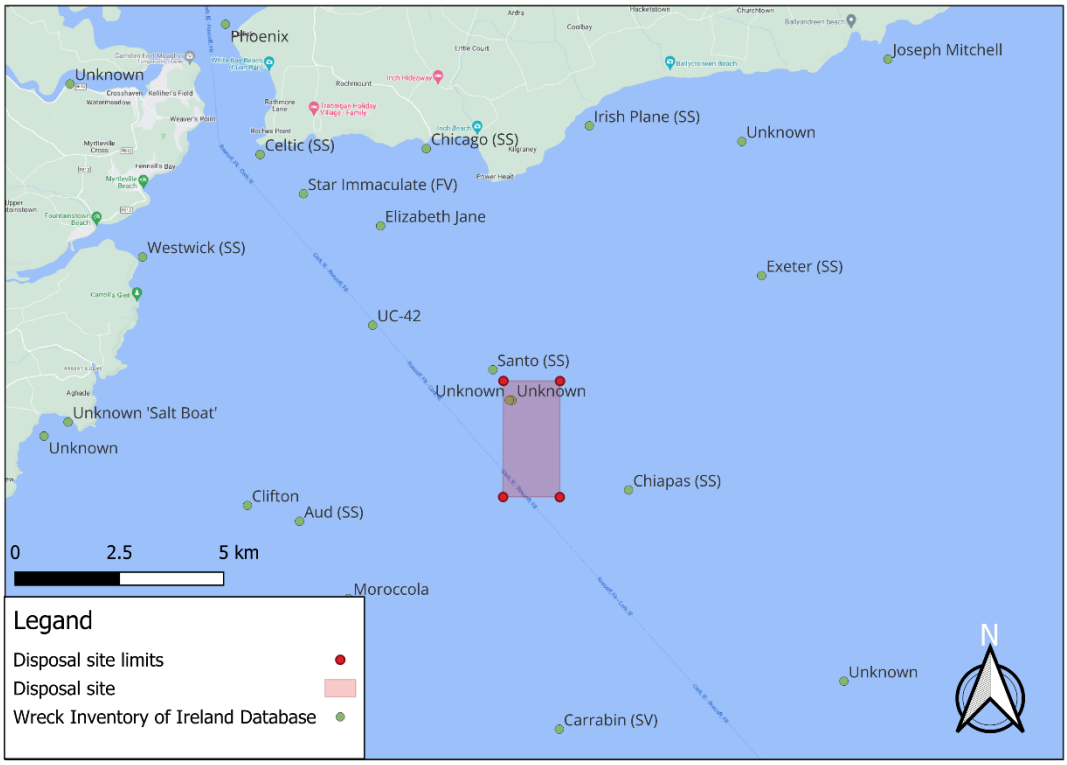

Figure 9: Recorded wreck sites (green) within and surrounding the disposal site.

Table 1: Locations of unknown wrecks within northwest corner of disposal site.

Wreck No.	Wreck Name	Location (ITM)
W09127	Unknown	E 588488m, N 553919m
W10422	Unknown	E 588422m, N 553923m

6. Discussion

There is evidence of coastal settlement around Cork Harbour from as early as the late Mesolithic period onwards. While we have no evidence for boats of this period, the initial settlers of the island would have had to arrive by means of such. Later, in the Neolithic period, sheep and cattle were also brought over water. As such, it can be assumed that early prehistoric societies had access to seaworthy vessels, some of which may have been in use in and around Cork Harbour. In addition, Rostellan tomb, located on the eastern shore of the Harbour now stands in the foreshore, likely indicating a change in sea levels and the coastal landscape between the Neolithic and the present. Other coastal sites may also have become partially or fully submerged in that time.

The historic period saw a steady intensification of maritime activity in and around Cork Harbour. This activity has been reflected by the shipwreck record, with over 3000 known wrecks recorded along the coast of Cork, only c. 600 of which have confirmed locations.

While there are no recorded wrecking events within the proposed dredge pockets at Ringaskiddy, the silts of the seabed have to the potential to preserve unrecorded archaeological material. The intensity of maritime activity in and around Cork Harbour throughout history also increases the likelihood of a wrecking event having occurred within the dredge pockets. Although much of the Ringaksiddy area has been subject to previous dredging, the proposed dredge pockets are within virgin ground, where there is a higher potential for encountering archaeological material.

However, the entirety of the proposed dredge pockets have been subject to previous archaeological survey- whether geophysical, intertidal, dive, or a combination of these. No archaeological material has been identified within the proposed dredge pockets by these surveys.

The historic disposal site has been subject to repeated investigations since the late 1990s. Geophysical surveys have indicated that, despite the significant amounts of material dumped on the site, it has been largely unchanged. Notably, two records on the WreckViewer are located in the northwest corner of the disposal site, though repeated geophysical survey has indicated that these anomalies are likely natural in origin. Another geophysical anomaly has been identified just over 100m outside the northern boundary of the site.

7. Impacts and Mitigation Measures

While there are no recorded wrecking events within the dredge pockets and the only feature shown on the mapping within the boundaries is 'Ballybricken Hard', on the early 20th century OS map, there is still potential for any of the wrecking events generally recorded as being in 'Cork Harbour' to have occurred there. As such, there is moderate potential for significant negative impact to buried archaeological material within any virgin ground areas in the dredge pockets. Where dredging is only being carried out as maintenance, or to restore an earlier level of virgin ground rather than deepening it, there is low potential for any negative impacts on archaeological material. Potential negative impacts on virgin ground where the level is to be dredged lower than historic levels, remains low, as a range of previous archaeological survey has covered the entirety of the proposed dredge pockets.

It is recommended that all dredging works associated with the development are monitored by an underwater archaeologist under licence from the National Monuments Service. An archaeological dive team shall remain on stand-by during the dredging operations.

At the historic dumping site, there is one anomaly (188723.5, 54463.1) with potential archaeological value located outside the northern border. Dumping material directly onto this anomaly has a high potential for significant negative impact. As such, it is recommended that an exclusion zone with a c. 250m radius be employed around the anomaly.

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.

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National Inventory of Architectural Heritage (NIAH): http://www.buildingsofireland.ie/niah/

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9. Appendices

9.1 Previous Excavations

2016:500- Ringaskiddy Basin East, Cork

SMR No.: N/A

Licence No.: 14D0004 Ext. and 14R0003 Ext.

Author: Rex Bangerter, ADCO

Site type: Seabed, no archaeology found

Period/Dating: ---

ITM: E 577635m, N 564526m

Underwater Archaeological Impact Assessment (UAIA) took place of a section of seabed adjacent to the Ferry Terminal at Ringaskiddy Basin East. This work was undertaken as part of the EIS for the Port of Cork Ringaskiddy Development project, to which ADCO was appointed Project Archaeologists. As part of the Ringaskiddy development it is proposed to insert three new dolphin structures within the ferry terminal at Ringaskiddy Basin East. These structures will extend the existing line of dolphin structures c. 97.5m to the north-west, terminating at ITM: 577584E, 564575E. The proposed dolphins are to be positioned at the following coordinates: ITM: 577635E, 564526N, ITM: 577611E, 564550N, and ITM: 577587E, 564572N. In addition, two disused dolphins, located 20m to the east of proposed dolphins, will be subject to removal. These structures are located at ITM: 577652E, 564545N and ITM: 577633E, 564562N.

The UAIA comprised the systematic, non-disturbance, visual assessment of the seabed surrounding the above development components. The on-site work was carried out on 20 November 2016. No material, deposits, or structures of archaeological significance were encountered as part of the assessment.

2016:228- Ringaskiddy, Cork

SMR No.: N/A

Licence No.: 16E0090

Author: Julianna O'Donoghue

Site type: No archaeology found

Period/Dating: ---

ITM: E 577614m, N 564347m

Monitoring was undertaken of enabling works for Ringaskiddy Harbour Redevelopment. The works involve reclamation on the foreshore using imported quarry material and protected with rock amour. All seabed disturbance associated with the enabling works were monitored and an archaeological dive team remained on standby for the duration of the works.

Sediment was reduced using a mechanical excavator with a long reach arm under supervision. The material consisted of silty clay. Several timber logs were retrieved; these were examined and found to be in a natural state. A sample of the sediment was spread for physical examination and metal detected to maximise artefact retrieval. No archaeological features, stratigraphy or artefacts were recovered from the sediment.

2012:095- Ringaskiddy Port, Barnahely, Cork

SMR No.: N/A

Licence No.: ----

Author: Niall Brady

Site type: No archaeological significance

Period/Dating: ---

ITM: E 577528m, N 564348m

Intertidal and marine inspection of proposed development area at Ringaskiddy, Co. Cork, focused on Ballybricken Point, where reclamation is proposed, in the East Basin, and the area behind the Dolphin Ramps. No material of archaeological significance was observed exposed on the seabed or on the foreshore.

2006:384- Ringaskiddy, Cork Harbour, Cork

SMR No.: N/A

Licence No.: 06D064

Author: Rex Bangerter, The Archaeological Diving Co. Ltd.

Site type: Seabed and intertidal foreshore

Period/Dating: ---

ITM: E 577810m, N 564293m

Non-disturbance visual inspection was employed to assess the archaeological potential of the seabed along two cable-lay routes (Routes 1 and 4) identified for the proposed Aghada to Cuskinny Cable Lay Project. In addition, a number of side-scan sonar and magnetometer anomalies, located within the vicinity of each cable route, were investigated. The shallow

inshore sections of the survey were undertaken as a snorkel survey. The underwater survey area constituted a 3.2km by 10m search area for Cable Route 1 and a 1.04km by 10m search area for Cable Route 4. The survey was conducted in a series of stages, with a 600m length of seabed being surveyed in each stage. The shoreline at each location was inspected to ascertain its archaeological potential and a 200m section (east–west) of foreshore was field-walked at Cuskinny Bay and a 50m (east–west) section at Aghada.

The assessment was comprehensive and extended beyond the immediate impact zone for each of the cable routes. The placement of coastal protection measures along Cuskinny Bay and the land reclamation at Aghada has limited the archaeological potential at both foreshore locations. No material/deposits of archaeological significance were observed exposed on the seabed as part of the survey. The seabed was largely clear of man-made surface debris, with only occasional fragments of metal being encountered (jetsam from fishing vessels). However, the potential for archaeological debris to lie within the buried levels remains, as attested to by the magnetometer anomalies identified in the pre-dive survey, the diver survey confirming that these remain buried.

2001:230- Ringaskiddy, Cork

SMR No.: N/A

Licence No.: 01E0552

Author: Sheila Lane, Sheila Lane & Associates, Consulting Archaeologists

Site type: No archaeological significance

Period/Dating: ---

ITM: E 577810m, N 564293m

Following an assessment of this site in advance of a proposed industrial development, an area of potential archaeological interest was identified. The feature comprised an elongated grass-covered mound, 36m east-west by 9m and 1m high. It was at the top of a steep escarpment, overlooking a quarried area. A test-trench was excavated across the mound using a mechanical digger. The mound was found to be of recent origin and of no archaeological importance.

9.2 Wreck Inventory- Cork Harbour

Name	Number	Type	Place of loss	Date of loss	Coordinates
Unknown	W11313	Unknown	Passage West, Co Cork/ Cobh, near	Unknown	51.84333 -8.32944
Unknown	W10715	Unknown	Ringaskiddy Terminal	Unknown	51.83250 -8.32028
Unknown	W10714	Unknown	Ringaskiddy	Unknown	51.83083 -8.32695
Alison (SS)/ Allison	W05372	Steamship	Cork, Haulbowline Pier, mud to E. of.	22/10/1928	51.84333 -8.30167
Trident	W13086	Unknown	Cork Harbour	04/02/1804	
Unknown	W13439	Unknown	Cork Harbour	17/01/1825	
Joseph	W13626	Unknown	Cork Harbour	15/02/1838	
Alert	W13634	Unknown	Cork Harbour	16/02/1838	
Unknown	W13971	Unknown	Cork Harbour	05/12/1830	
Eglinton	W14001	Unknown	Cork Harbour	10/02/1840	
Clio	W14126	Unknown	Cork Harbour	20/03/1844	
Welcome Return	W14138	Unknown	Cork Harbour	16/09/1844	
Favourite	W14237	Unknown	Cork Harbour	26/12/1844	
Clifton	W14252	Unknown	Cork Harbour	24/03/1845	
Unknown	W14333	Schooner	Cork Harbour	03/10/1846	
Mary Elliot	W14367	Schooner	Cork Harbour	19/11/1846	
Eneas	W14369	Schooner	Cork Harbour	19/11/1846	
Unknown	W14401	Motor Boat	Cork Harbour	19/11/1934	
Unknown	W15581	Yacht	Cork Harbour	03/08/1923	
Unknown	W15582	Yacht	Cork Harbour	03/08/1923	
Unknown	W15584	Yacht	Cork Harbour	Unknown	
Unknown	W15585	Yacht	Cork Harbour	03/08/1923	
Unknown	W15586	Yacht	Cork Harbour	03/08/1923	
Unknown	W15587	Motor Boat	Cork Harbour	03/08/1923	
Unknown	W15589	Motor Boat	Cork Harbour	03/08/1923	
Lightfoot	W16254	Hooker	Cork Harbour	08/12/1817	
Unknown	W17136	Fishing boat	Cork Harbour	06/03/1875	
Unknown	W17367	Boat	Cork Harbour	15/12/1772	
Unknown	W17372	Boat	Cork Harbour	29/04/1777	
Happy Returns	W17609	Lighter	Cork Harbour	16/10/1886	
Alicia (SS)	W17647	Steamship	Cork River/Cork Harbour	21/08/1888	
Unknown	W18463	Barque	Cork Harbour, western side	05/02/1847	
Britannia	W05389	Brig	Cork Harbour	31/05/1791	
J. L. Nelson	W05433	Schooner	Cork Harbour	14/02/1916	
Jane	W05435	Vessel	Cork Harbour	20/03/1818	

Britannia	W08020	Yacht	Cork harbour	31/05/1791	
Charlotte	W08073	Brig	Cork Harbour	28/12/1798	
Charming Sally	W08074	Unknown	Cork Harbour	03/10/1775	
City of Cork (SS)	W08088	Steamship	Cork Harbour	28/12/1821	
Derrymore (SS)	W08148	Steamship	Cork Harbour	May 1917 ?	
Druid	W08169	Unknown	Cork harbour	06/01/1819	
Examination Boat No. 3	W08239	Cruiser	Cork Harbour	12/12/1942	
Inisfail (SS)	W08418	Paddler Steamer	Cork Harbour	1834-1835	
Juno	W08479	Unknown	Cork Harbour	24/09/1782	
Lydia	W08563	Unknown	Cork Harbour	04/03/1846	
Magnificent	W08569	Schooner	Cork coast, (Cork Harbour)	Summer 1835	
Mary Ann Henderson	W08616	Unknown	Cork Harbour	Between 7/2/1846 and 10/2/1846	
Mercury	W08634	Unknown	Cork Harbour, Near/in	15/09/1758	
Nostra Senora de la Conception	W08697	Unknown	Cork Harbour, near / in	14/11/1758	
Prince William	W08775	Unknown	Cork Harbour	26/11/1784	
Rose	W08814	Cutter	Cork Harbour	15/12/1848	
Sovereign	W08881	Unknown	Cork Harbour	07/01/1846	
Sumatra	W08922	Unknown	Cork Harbour	26/01/1846	
True Love	W08980	Unknown	Cork Harbour	08/11/1770	
Unknown	W09199	Boat	Cork Harbour	25/01/1776	
Unknown	W09206	Boat	Cork Harbour	Unknown	

9.3 RMPs and SMRs

SMR No.	Type	Location (ITM)	Distance from proposed works	Description
CO087-026-----	Kiln- lime	E 576225m N 565394m	c. 895m	Built against natural slope. Front S-facing; heavily overgrown with arched recess (Wth 2.6m; D 2.7m), front of recess partially infilled with rubble, stoking hole evident. Funnel infilled; rear of kiln collapsed.
CO087-061-----	Ecclesiastical site	E 576559m N 564831m	c. 550m	O Murchadha (1960, 19-20) records Rosbeg as a parish from c. 1100 AD until the end of the 18th century, sometimes called Teampall Breacáin (modern townland of Ballybricken). The site of Rosbeg church (CO087-049----) was noted by Bishop Dive Downes in October 1700 as 'a heap of rubbish in Mr. Abraham Dicksons orchard at Ballbricken' (Lunham 1909, 176). The 1842 OS 6-inch map shows a walled garden NW of Ballybricken House, but in Ballintaggart townland which may be the location referred to above. This is also likely to be the site of the 'early Irish church and graveyard which O'Leary (1918, 159) describes as being in Ballintaggart townland 'on the lawn before Mr. Birds house'. Listed by Hurley (1982, 302-3) as one of the 'principal sites' of the early church in the south-west of Ireland. Area now occupied by industrial complex; no visible surface trace.
CO087-111-----	Country house	E 577376m N 564239m	c. 690m	House demolished in 1981. Old photograph shows house as 2-storey, weatherslated with hipped roof; of late 18th century appearance. Entrance front of 6-bays; central round-headed door ope; classical

				surround with broken pediment. Remains of ornate gate lodge (overgrown) survive to S on either side of entrance gate; one storey, appears to be hexagonal in plan; built of cut stone.
CO087-132-----	Burnt pit	E 577168m N 564161m	c. 855m	In 1996 a circular, shallow, fire-reddened pit (diam. 0.75m) was discovered during archaeological test-trenching in advance of the construction of a factory. The pit was filled with charcoal and ash. A millstone and two incomplete fragments of millstones were also discovered in the vicinity but no archaeological structures that could be associated with the millstones were revealed. Subsequent archaeological monitoring did not reveal any further archaeological features. (O'Donovan 1996; 1997, 10)
CO087-051001-	Graveyard	E 577323m N 563963m	c. 955m	On E side of road, 500m N of Ringaskiddy village; rectangular graveyard (c. 100m NE-SW; c. 30m NW-SE) enclosed by stone wall; still in use, many headstones, the earliest dating from 1720 (Coleman 1904-6f). Contained parish church (CO087-051002-) of Barnahely, marked 'site of' on all eds of OS 6-inch map; In 1700 described as 'built with stone, lime and clay, the walls are above half down. It was about 18 foot long and 17 broad' (Lunham 1909, 175); no visible trace of church.
CO087-051002-	Church	E 577317m N 563962m		In graveyard (CO087-051001-). The parish church of Barnahely, marked 'site of' on all eds of OS 6-inch map; In 1700 described as 'built with stone, lime and clay, the walls are above half down. It was

				about 18 foot long and 17 broad' (Lunham 1909, 175); no visible trace of church.