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13 MATERIAL ASSETS

13.2 ARCHAEOLOGICAL

13.2.1 Introduction

The chapter will assess the impacts of the proposed development site (PDS) on the known recorded and potential unknown terrestrial and underwater archaeology.

This archaeological section was undertaken by Laurence Dunne Archaeology (LDA) with due regard to the Guidelines on the Information to be contained in Environmental Impact Statements 2002 and Advice Notes on Current Practice 2003, published by the Environmental Protection Agency and the Regional Planning Guidelines for the West Region, 2010-2022. Furthermore, the undertaking of the geophysical surveys were undertaken with due regard to the unpublished specifications for the carrying out of geophysical surveys for archaeological purposes, compiled by the Underwater Archaeology Unit (UAU) of the National Monuments Service (NMS). As part of the preparation of this report, consultations took place with the Underwater Archaeology Unit (UAU) of the Department of Arts, Heritage and the Gaeltacht and the National Museum of Ireland.

The PDS is divided into three separate parts (Figure 13.2.1) with the vast majority of it, Area 1, extending from the Enterprise Park at Rinmore southwards into the Galway Bay. Area 2 of the PDS relates to roadwork upgrades within the existing Enterprise Park while proposed works in Area 3 comprises of traffic management upgrades in close proximity to Forthill Cemetery and also to the lowering of the roadway beneath Lough Atalia Bridge (Figure 13.2.1).

Forthill is a recorded archaeological complex (GA094-099001;002 and 003) while Lough Atalia Bridge is a Recorded Protected Structure (RPS 10002).

13.2.1.1 Scope of Assessment

The assessment will explore the archaeological context of the PDS. It will provide detailed descriptions of the character, significance and sensitivity of the archaeological heritage. A range of methodologies were utilised to assess the potential impacts by the proposed development. These include: research study, field walking, geophysical and dive surveys.

- Field walking: The entire PDS and its environs including shoreline was visited and examined by two licensed maritime archaeologists at optimum low tide on the 15 March 2010
- Geophysical Surveys: Side-scan sonar and magnetometer surveys were undertaken by Earthsound Archaeological Geophysics across the entirety of the underwater area of the proposed Galway Harbour Extension (see surveys section below and also Appendix 13.2.1). Furthermore, previous geophysical and dive truthing surveys, undertaken in 2004, were also examined.
- Dive Survey: Based on the results of the geophysical surveys the PDS was the subject of a licensed archaeological dive truthing survey (11D0017) and licensed metal detection survey (11R43) undertaken by LDA in June 2011 (see results below).
- 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 vertical and oblique was examined. Infra-red aerial photos undertaken by the Marine Institute were also examined as well as the aerial orthophotos from the National Monuments web site, www.archaeology (see references below for full list).
- Site survey photographs were undertaken with a digital SLR Canon EOS 30D, 45D and a Lumix 12 optical zoom digital camera.

- Documentary sources: Several sources were examined including annalistic publications and gazetteers. Of particular use was the 2004 publication of the results of excavations undertaken in Galway City between 1987 and 1998 by Elizabeth Fitzpatrick, Madeline O'Brien and Paul Walsh as was the online database of the summaries of excavations undertaken in Ireland, www.excavations.ie (Appendix 13.2.3). The unpublished Shipwreck Inventory of Ireland for County Galway by Underwater Archaeology Unit of the National Monuments Service in Dublin is also an essential baseline database for researching the maritime archaeology in the region (Appendix 13.2.4). For a full list of all sources examined see Bibliography below.

13.2.2 Archaeological and Historical Context

13.2.2.1 Preamble

The study area is encompassed within an extremely rich, diverse archaeological area - terrestrially and underwater. Geographically, the proposed development site abuts the south-easternmost limits of Galway City in the littoral zone. A little to the north of Galway is Lough Corrib, the largest lake in Ireland, from which the River Corrib issues to run its short distance of *circa* 6km to debouche into the sheltered inner waters of Galway Bay. People have lived, fished, hunted, farmed and traded here for over six millennia attracted to its rich natural environment that has been an immense source of sustenance. Testament to this are the numerous monuments, shipwrecks and artefacts that have been recorded, excavated and found in the waters of the bay, harbour, river and lake as well as along its shorelines, riverbanks, bogs and nearby fields and hills (Figure 13.2.1 and Appendices 13.2.2-5).

The vast majority of the proposed development site for the Galway Harbour Extension in Galway is currently covered by the sea. In that context this archaeological study is, to a large extent, focussed on the maritime archaeology of this coastal littoral environment and its immediate hinterland.

13.2.2.2 Prehistoric period

The earliest evidence of archaeological activity in Ireland dates to the Mesolithic Period or middle stone age *circa* 8,000-4,000BC. Seasonal occupation of the littoral and wider coastal zone, lakeshore, riverine and riparian locations are a feature of these nomadic people whose lifestyle largely comprised of hunting, gathering and fishing. Their seasonal camps and hut sites are extremely rare and difficult to find due to their ephemeral nature and low impact on the landscape. Sometimes their sites are only manifest by the remains of their dumped waste material from cooking and from their fires, known as shell or kitchen middens. These shell middens have been largely found exposed in sand dune complexes around our coasts. The most notable example to date was excavated on the west coast of Ireland at Ferriter's Cove on the Dingle Peninsula in Co. Kerry by Prof. P. Woodman (Woodman, Anderson, Finlay, 1999).

While no definitive Mesolithic sites have been discovered in the Galway Harbour area, numerous lithics, (stone artefacts), dating to this period have been recovered during 19th century drainage works and more recently from archaeological excavations and monitoring in Galway City itself. Lithic material dating to the Late Mesolithic Period, 6000-4000BC, was discovered in High St. / Cross St. (Spellissy, S. 1999, 29). Excavations at Courthouse lane, Barrack Lane and Kirwans Lane produced a small assemblage of stone artefacts, including three axes, dating to the Mesolithic or Neolithic Period (Fitzpatrick et al, 2004). Numerous Mesolithic artefacts have also been recovered from the River Corrib by divers, many of which have ended up un-catalogued in private ownership (Topographic files NMI, Appendix 13.2.5; Killian Driscoll). However, recent research into this diver derived material, by Killian Driscoll has reduced the quantity considerably. In any event, the fact remains that numerous stone artefacts from the Mesolithic Period have been found from four areas from the River and Lough Corrib including a fragment of a flint butt trimmed flake recovered in the townland of Townparks, Galway City (Driscoll, 2006).

It is clear that nomadic groups in the Mesolithic Period were availing of the rich natural resources of coastal zone and moving inland up the Corrib River and around its lakeshore. These small bands would have been attracted by the availability of quality raw material including, chert, siltstone and mudstones as well as the availability of good seasonal hunting, fishing and gathering shellfish and other seasonal fruit and berries.

The advent of the Neolithic Period or new Stone Age, (4000-2400BC), witnessed a transformation of lifestyle from the earlier nomadic hunter gatherer to sedentism i.e. permanent settlement, agriculture and the domesticity of animals. For the first time humankind altered the landscape, cleared forests, made fields, planted crops, stored food, built wooden homes and farmsteads, divided up the land by building walls and defined territories by the construction of massive megalithic tombs for their dead. The impact of humankind in the Neolithic Period was permanent and visible.

However, in the study area the Neolithic Period is poorly represented monumentally in the recorded archaeology. The wooden rectangular and circular houses of these first farmers have rotted away and are difficult to find. None are known from the Galway City area. It is a similar story in a ritual context with only a single megalithic structure recorded in the townland of Garraun South on the northern shore of Oranmore Bay (GA095-044 Figure 13.2.2). Artefactually the position in the Neolithic Period is much better with a substantial assemblage of lithic material recovered from excavations and monitoring in the city as well as numerous stone axes from the Corrib River. In 2009 a very fine polished stone axe was recovered during archaeological monitoring at NUI, Galway (Moore Group 2011).

Significantly, a Neolithic pine dugout canoe was discovered in the Barna area in 2002 and is now on submerged display in the Atlantiquarium in Salthill where it is being monitored by the National Museum of Ireland. The dugout which is reputed to date from around 3500 BC was found in peat exposure and a submerged forest on the shore between Barna and Spiddle and from where the finders had previously discovered deer antlers (MacSweeney 2008, 133-6; Oidreacht na Gallimhe, Vol. 22-23, 2009, 12).

The Bronze Age Period, 2400-500BC is monumentally represented in the Galway Harbour coastal zone area by the presence of two burnt mounds or *fulachta fiadh* (GA094:115 & 117) in the townland of Rinmore. *Fulachta fiadh*, possibly the most common Bronze Age field monument, have been interpreted as temporary, seasonal hunting camps where meals were expediently prepared in prehistoric times. The early work of M.J. O'Kelly, particularly his experiments relating to excavations of burnt mounds at Ballyvourney, Co. Cork, have often been cited as concrete evidence that cooking was the primary purpose of these monuments (O'Kelly, 1954). Furthermore, the functional nature of this explanation has made it popular, unburdened as it is by notions of ritual significance. Early Irish literary material does, to an extent, present an image of cooking on sites whose description is similar to burnt mounds, but other activities such as bathing are also mentioned (e.g. Ó Drisceóil 1990). At any rate, the direct relevance of this literature to Bronze Age burnt mounds is questionable, dating as it does to over 1000 years after the main period of burnt mound use.

Apart from the traditionally suggested activities of cooking, bathing, partaking in saunas, more recent excavations have revealed possible connections with other types of activity. Several recent excavations of burnt mounds in Ireland indicate possible association with metalworking activities. Excavation of a burnt mound at Manor West in Tralee, Co. Kerry, part of a large multi-phase complex of prehistoric date, yielded a significant quantity of metalworking slag (Dunne 2001). Excavations at Ballydowney, Co. Kerry also implied a possible relationship between metalworking activities and several *fulachta fiadh* (O'Callaghan 2002). Other excavations at Parksgrove 1, Kilkenny (Stevens 2000, 150), Tullahedey, Co. Tipperary (O'Brien, 2000, 204) and Bawnaglogh, Co. Cork (O'Neill 2000, 14) are also considered to have a possible connection with ironworking.

Fulachta Fiadh were excavated at Doughiska on the northern suburbs of Galway City in advance of construction works relating to the N6 (O'Sullivan 2007, 86).

Of recent significant importance was the discovery of a multivallate hillfort at Rahally in East Galway in advance of the same N6 roadworks. Traditionally, hillforts have been regarded as Iron Age monuments however; recent radiocarbon dates seem to indicate that they were often multi-period sites dating from the late Bronze Age and into the early medieval period. The earliest radiocarbon date from Rahally, 994-827 BC would seem to support this. Activity at the site in the Iron Age is reflected in the discovery of a La Tène artefact (*ibid*, 89). An Iron Age milieu for hillforts should not be ruled out entirely as excavations by this writer in 2006 of a recently discovered hillfort in Tralee returned a radiocarbon date of 90BC-79AD (Dunne 2006, 18).

In a megalithic context Bronze Age activity is more easily identified in the landscape by standing stones, sometimes as an alignment or stone row other times as a stone pair but more often as a single standing stone. An example of which is recorded (GA094:071) in the townland of Roscam *circa* 3.5km from the PDS. Standing stones appear to have served a variety of functions. Many, including the example in Roscam, were used as burial markers to designate the location of a cist grave, comprising a simple slab-lined box like grave. The burial rite included cremated remains or sometimes flexed articulated inhumations, usually accompanied by grave-goods. Standing stones appear to have been largely of ritual significance; however, others are believed to have served as territorial markers to denote the extent of tribal or familial boundaries.

The River Corrib has produced a number of artefacts dating to the Bronze Age Period including three Late Bronze Age swords (Topographical files of the NMI, Appendix 13.2. 5).

The remains of three dugout canoes dating to the Bronze Age have also been recovered from the River Corrib at Jordan's Island (Rynne, 1984, 22).

Iron Age (500BC-500AD) monuments are few and far between in Galway which is not untypical of Connacht as a whole. Six cremation burials were recorded from a ring-barrow at Granagh while three others were found in a barrow at Oran Beg, also in east Galway (Rynne 1970). Grave goods recovered from the excavations included bronze fibulae, glass and bone beads and a few other items (Raftery 1994, 188-9). One of the most important and notable Iron Age monuments is from Galway though and comprises the enigmatic La Tène decorated omphalos at Turoe in east Galway executed in false-relief (*ibid* 162). A number of other burials are known including the ritual deposition of a body from Gallagher in east Galway which was found in a bog at a depth of 3m in 1821. In the recent past the body was radiocarbon dated to 2040 BP

A recently discovered multivallate hillfort at Rahally in East Galway has returned a date from the Late Bronze Age, however, a La Tène artefact was also found there indicating Iron Age activity there also (O'Sullivan 2007, 89).

It is known that mariners were voyaging, exploring and trading along the western Atlantic coast by this time, beyond the Mediterranean Sea. One of the earliest records for this is the *Ora Maritima* written in the 4th century AD and attributed to Rufus Festus Avienus. The document is a fragment of a lost Massiliot or sailing-manual known as the *Massiliote Periplus*. It 'dates to about 600BC and consisted of an account of a voyage, starting in Massilia (Marseille), and proceeding down the eastern Spanish coast as far as the city of Tartessos which was probably located near the mouth of the Guadalquivir. The account included a reference to the inhabitants of two large islands. Ierné and Albion, namely Ireland and Britain, who were reputed to trade with the Oestryminians, the inhabitants of what is now Brittany. The words are Greek forms of names which survived amongst the Goidelic-speaking Celts, namely Old Irish Eriu and Albu. They are Indo-European words and most probably of Celtic origin' (Ross 1986, 25). An extract from the *Ora Maritima* referring to skin covered boats was published in the Kerry Archaeological Magazine of 1854 and is reproduced here:-

Yet not in ships they try the wat'ry plain
And rouse the shapeless monsters of the main
For neither galleys fram'd of lofty pine
They know to make, nor weaker fir to join
In barks; but wondrous! Skins to skins they sew;
Secure in these to distant regions go,
And pathless seas with keels of leather plow.

Accounts and charts from returning mariners were collected by Ptolemy in Alexandria who created a map of Ireland from about 150BC (Figure 13.2.3). 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 & Flynn, 2008, 56-8).

Artefactually, there is a small but increasing assemblage of Iron Age finds found in Galway of which the most famous is a La Tène decorated sword found in the River Corrib at Dangan Lower (*ibid* 148). Other finds from the period include a conical spearbutt from Ballybrit, a sword chape, an iron chisel from Freewore, while a bronze Navan type fibula was found in a hoard at Somerset, in east Co. Galway (*ibid* 139; 145).

13.2.2.3 Historic Period

Early Medieval Period (500-1100AD)

Settlement in the area of the PDS in the Early Medieval period (often referred to as the Early Christian or Early Historic periods) is best exemplified monumentally in a secular context by earthen Ringforts. These monuments (generally known by their Irish names *Rath* and *Lios*) are one of the most obvious extant monuments in Co. Galway. Many of the coastal townlands in the Galway Harbour area contain ringforts including Ardfry, Cappanaveagh, Cartron, Frenchfort, Garraun South, Knocknacarragh, Marshallspark, Oranhill, Propect Hill, Rinvile West. There is a named examples, *Rathcareen*, recorded in the northern limits of Rinmore townland itself (GA094-059). Ringforts consist of circular or roughly circular enclosures with earthen banks and external ditches or fosses. Stone examples are also recorded known as cashels or cahers.

They were most likely occupied by extended and dispersed family units and were probably largely self-sufficient. The interior (lios) would have contained features such as domestic dwellings, outhouses, animal pens, food processing structures, craft areas, hearths and souterrains (for storage and refuge). A mixed economy would have been practised which would have involved cereal growing and animal husbandry, in particular, dairying.

Early Christian sites are also manifest in the wider coastal study area by a small number of ecclesiastic enclosures. 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). It can only be assumed that the fleet of Limerick Vikings were able to negotiate up the Corrib River at optimum tide?

Significant monastic sites were founded on several islands in the Galway Bay area and indeed all along the coast of Connemara between St. Enda's on the Aran Islands and St. Colman's on Inishbofin. Small island monasteries and pilgrimage sites are a feature of the west coast of Ireland from the Skelligs off the south-west coast of Kerry to Tory Island off Donegal. Seafaring and voyaging was an important aspect of these early Irish saints that is probably best exemplified by the life of St. Brendan the Navigator who founded many sites on the west coast of Ireland from Kerry to Mayo and indeed stayed with St. Enda on Aran for a little while (De Paor, 1997,

107). He founded a monastery for his sister Bríg at Annaghdown on the shore of Lough Corrib, Co. Galway where he later died in 577AD. Brendan was buried in another site that he had established at Clonfert in Co. Galway. The *Vita* or life of St. Brendan is synonymous with voyaging (*immrama*) and exploration and an account of his life was published in Irish and Latin in the *Betha Brenainn* or *Vita Brendani* in the Book of Lismore (O'Donoghue 1994, 2). However, the more popular account of St. Brendan is the *Navigatio Santi Brendani abbatís* which was a best seller in the medieval period. According to Liam De Paor, (1997, 112), *'The narrative in the Voyage has the very smell and feel of the North Atlantic...it has many details showing knowledge of those waters. Some of the details are found in other Irish voyage tales. They are drawn from the lore of people who had seen whales, icebergs, volcanoes, islands white with birds and, perhaps, floating branches bearing strange fruit...he (Brendan), like so many of the monks of his time, a seafarer...the first Viking settlers on the Faroes and in Iceland found Irish monks and hermits there before them. The skin covered boats of the early Irish were capable of making the passage'*. This was best exemplified by Tim Severin who sailed from Kerry in 1976 via the Faroes and Iceland and eventually reached Newfoundland in July 1977 (Severin 1978).

Medieval Period 1100-1550AD

The Medieval Anglo-Norman town of Galway is said to be built on an earlier settlement known as Ballinshruane so called because of the flooding of the River Gaillimh (now the Corrib River). However it does not appear in the written record until 1124 when the castle of Bun Gaillimhe was built for Toirdhealbhach O Conchubhair- *Turlough O'Connor* (Annals of Galway, MS I.4.II).

Galway 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). The existing waterways provided protection for the north and west curtain walls and southern wall had the protection of the intertidal marshlands. The town's principal street ran along the crest of a ridge and then branched into two; one street leading to a fording point on the river and the other leading to the shoreline where the Spanish Arch is now situated (*ibid*).

It was not until the fourteenth century that Galway developed into a significant trading centre. Galway, unlike the other leading ports in Ireland, was not required to send ships and victuals to the Royal Army in its wars of 1245 and 1301 (O'Sullivan, 1933, 26). In 1275-6 Galway yielded £21 in customs dues; considerably less than other Irish ports such as Drogheda collecting £133, Dublin's £181, New Ross's £743, Waterford's £430, and Cork's £69 (*ibid*).

There was a major increase, however, in the 14th century which saw rapid development of the town and the establishment of extensive trading networks across Europe. The staple imports were wine, iron and salt. Principal amongst the goods exported were salted fish, hides, cloth, wool and excess agricultural produce which merchants obtained through a system of barter from the Gaelic-Irish community. The remains of several tower-houses in the wider Galway Bay area attest to the Gaelic Irish lordships operating outside of the town walls depending on a marine economy, partaking in fishing, smuggling and trading activities. Under pressure from Irish merchants Richard II issued a charter in 1380 allowing trade to pass freely between Ireland and Spain. This added to the existing trade links with France, Flanders and Italy. Hence the lucrative wine market expanded in Galway resulting in the growth of the port and strengthening of the town's economy. Galway merchants mainly utilised existing trade networks but also established consortiums to charter trading vessels across Europe (Hartnett 2004, 295).

The Medieval Town and Port of Galway continued to develop in the fifteenth and sixteenth centuries. In 1504 Stephen Lynch fitzDomk and his wife founded a hospital in High Street and dug a fosse (moat) into which a branch of the river was allowed to flow around the town wall on the east side (Thomas 1992, 106). The western curtain wall of the town was adjusted in 1536-7 to accommodate the construction of the New Quay Gate which was necessary to facilitate the increased traffic at the quay (Walsh, 2004, 317). The right of admiralty was granted to the Mayor's office in 1575, allowing the Corporation of Galway to legislate for trade in Galway Bay (Hartnett 2004, 293).

In response to the growing threat of an attack on England, upon entry through Ireland, Galway received instructions for fortifying the port in 1548. However, due to a lack of finance (the Corporation were obliged to raise this money) no major refortification took place until the 1580's. Gooche's sketch map of 1583 shows a plan of the town with "*a voyd place bye the haven whear the governour had designed to have a cyttadell...*". A fortification was built at Ceann- a-Bhalla (present day Spanish Arch) circa 1586-8 (Walsh 2007, 317).

Post Medieval period (1550-1700)

On the 21st September 1588 *The Falcon Blanco Mediano*, one of the Spanish Armada ships, was wrecked in Ballynakill Harbour off Connemara while seeking to return to Spain after the ill-fated attack on England. The crew survived and were taken into the care of Sir Murrough Na Doe O'Flaherty and later surrendered to Sir Richard Bingham in Galway. Virtually all the survivors, a total of 102 men, were executed at St. Augustine's Friary at Forthill with exception of Don Luis de Cordoba (Douglas 2009, 166; 176-7; 182, Plate 1). In anticipation of another Spanish attack and mindful of the support amongst the Gaelic Irish for such an attempt, the crown ordered an upgrading of the defences in Galway, the cost of which was to be borne by the Galway Corporation. Thus in 1602 a star-shaped fort was built at the site of the Augustine friary in order to protect the town and harbour but also to overawe its citizens whose sympathies were seen to lie outside the realm (Walsh 2001, 27). An artillery fort was established on Mutton Island 2km south of Galway Town in 1611. Another citadel began in 1625 outside the west bridge of the town but was never completed (Walsh 2004, 318).

During the 1642-3 rebellion Galway townspeople sided with the Confederate Catholics, and laid siege to the Kings garrison at Fort Hill. The confederates set up artillery works at Rintinnane Point (present day Nimmo's Pier), Mutton Island and Rinmore to discourage relief by sea and they succeeded in forcing the governor to surrender the fort. Greater defences were then required to protect the town against a possible assault by the Parliamentarian or Royalist forces. Two new bastions were constructed at the eastern curtain wall in 1646-7 and a further two were added in 1650. A raveline was also constructed outside the west bridge in 1650-51 (*ibid*, 325). Despite the increased defences, Galway was forced to surrender to the Parliamentary forces in April 1652.

The stone jetty which projected south-easterly from the quays and is illustrated on both the Pictorial Map of mid-seventeenth century Galway and the Plan and Prospect of Galway by Philips in 1685 was converted to a pier in 1688 by the corporation (Walsh 2004, 283).

Fortifications in Galway were once again enhanced at the outbreak of war following William of Orange's invasion of England in 1688. Galway capitulated in July 1691 just a few days after the Williamites arrived in Galway.

Early Modern Period (18th-19th centuries AD).

During the late 17th and 18th century the port facilities deteriorated. In 1729 a section of the wall near the quay gate had fallen down near the Quay Gate and it was noted that some of the cannon were being used as bollards on the quayside (Walsh 2004, 332). Some steps were taken to improve the harbour and port in the 18th century, e.g. the Eyre family undertook reclamation works at the salt-marsh area and commissioned the building of a dock at the end of the New Pier. However Galway was unable to provide the safe facilities necessary for a commercially successful port. Lloyds were increasingly unwilling to insure ships putting into Galway. 'From its position of prominence, a few centuries back, Galway as a port had regressed so far as to be listed 15th in terms of tonnage trade, coming after places like Youghal, Drogheda and Kinsale' (Woodman 2000, 6).

Early in the 19th century Galway was beginning to recover its position as a major Irish Port and mercantile centre. Economic confidence was regained in the 19th century with the passing of the Act for the Improvement of the Harbour of Galway (11 Geo IV) in 1830. The Act provided for the construction of docks and quays at Galway Port, a canal connecting the Corrib to the Sea as well as deepening and widening the channel. Exports from Galway in 1837 were 20,000 tons valued

at £250,000.00 while imports accounted for 12,000 tons and valued at £57,000 (Henry Harness map, 1837).

The Claddagh fishermen continued to dominate the Galway fishing industry into the early modern period. In 1855 the number of Claddagh sailboats employed in the herring fishery was 150 and the row boats numbered 100 (Marmion, 1885, 464). The main sailboat employed by the Claddagh fishermen during this period was the Galway Hooker. *Characteristically hookers were open or half decked and were carvel built with varying degrees of tumblehome on their tarred black hull...They are short, broad boats, with very hollow bows; they are exceeding lively in a seaway, but seldom a ship a sea, perfectly safe in every way except running when deep...*(Mac Cárthaigh, p.151)

Hookers are classified according to their size. They differ only in size and carrying capacity. All are constructed of oak or beech keel, and larch planking spiked on oak frames (ibid170). The largest of these, the Bád Mór, are generally between 35 and 45 ft and are gaff rigged. Next in size is the gaff rigged Leath Bád, 28 to 35ft in length. The Púcán is a 23-28ft lug rigged vessel.

Efforts were made to promote the port as a transatlantic port. Shipping companies like the British and Irish Transatlantic Steam Packet Company made only two sailings whereas the Atlantic Steam Navigation Company known locally as the Galway line made 55 return voyages between 1858 and 1864 (Collins 1994). Though its financial investors anticipated the establishment of Galway Port as the eastern terminus of the Atlantic mail trade, the Galway Line primarily facilitated the exodus of the Galway population.

The Chamber of Commerce when set up in 1923 made some progress in re-establishing the city as a transatlantic port. By 1933 over 100 liners had visited Galway.

13.2.3 Terrestrial Archaeology of the PDS

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 also accessible online from the National Monuments Section (NMS) of the Dept. of Arts, Heritage and Gaeltacht (DAHG) at www.archaeology.ie (see Appendix 13.2.2 below). The excavations online database of archaeological excavations for Ireland was also examined (www.excavations.ie).

The vast majority of PDS, essentially comprising Area 1, is outside the zone of archaeological potential for the medieval town of Galway, (RMP-GA094-100), as determined by the NMS and further denoted in the Galway City Council Development Plan, Fig.7.8-Section 7.3. Furthermore, as the majority of it is currently under the sea, it is dealt with below in the Underwater Archaeology section.

Area 2 relates to the upgrade of the road network within the recently constructed Enterprise Park where there are no recorded monuments. Work commenced on the Enterprise Park in the mid 1990's with almost half of it reclaimed from the sea. Examination of infra red aerial photography published by the marine institute in 2000 shows extensive clearance and scarring at the PDS (Plate 2).

Area 3 abuts the south-easternmost limits of the medieval town at Forthill Cemetery and extends northeast to the Lough Atalia Bridge (Figures 13.2.1 and 13.2.2). Forthill Cemetery is a recorded archaeological monument, GA094-099001, one of a palimpsest complex of three monuments within the graveyard site. Originally it was the site of an Augustinian Friary founded in 1508 while in the later 17th century, a bastioned fort, (GA094-00902) was built on top of the friary complex whilst retaining the church. In 1642/3, after a siege of six weeks, the walls of the fort were slighted and the friary church was given back to the Augustinians. However, in 1645, this was further demolished by the townspeople who feared that it could be re-fortified and used against them by the Parliamentarians (Walsh 2007, 319).

No relict above ground coherent remains of St. Augustines Friary or indeed the bastioned fort survive today. However, examination of the 1st. Edition OS map of 1840 clearly denotes that the south-eastern enclosing wall of the cemetery was formerly the outer wall of the south-easternmost corner bastion (Figure 13.2.15). In 1999 conservation works in Forthill Cemetery immediately west of the mortuary chapel revealed a small portion of a bastion that was subsequently covered over and is no longer visible (Walsh 2007, 319).

Industrial archaeology and settlement evidence around Forthill Cemetery is also cartographically evident on the OS 6" map of 1840 (sheet 94) and indeed on the later 25" map of around 1896 (Figures 13.2.15 & 13.2.16). The 1st Edition map of the area denotes a lime kiln abutting the south-eastern limits of the graveyard. The production of lime was an important aspect of wall construction and numerous kilns were established relating to the construction of the town defences and fortifications and therefore its location alongside the wall of the graveyard may not be coincidental but might relate to the construction of the earlier bastioned defences at the site. Between 1278 -1280 there are murage grant accounts in the Pipe Rolls of expenses relating to the making '*large fire to burn lime*' (Thomas 1992, 108-9).

A little east of the limekiln there is a small rectangular structure denoted beside the shingle shoreline (Figure 13.2.15).

It is clear from the later 25" map dating to the terminal decade of the 19th century that the graveyard has been largely extended particularly towards the south and south east which includes the current mortuary chapel at Forthill (Figure 13.2.16). The mortuary chapel forms part of the south enclosing wall of the cemetery a little to the west of the entrance gate while its blocked up pointed windows are clearly evident today (Plates 3 & 4).

In an industrial archaeological context the lime kiln is still clearly denoted on the 25" map as well as a few additional structures alongside (Figure 13.2.16). The previously mentioned small rectangular structure, noted to the south-east beside the shingle shore on the 1st Edition OS map, is also denoted. However, it is now further back from the shoreline in reclaimed land of 1.985 acres. The narrow roadway is also constructed by this time, denoted by a double dotted line. The extension of the graveyard, construction of the roadway and increased number of industrial buildings remains fundamentally the same today. The entranceway and high rubble stone wall, built to banded courses, enclosing the cemetery is the original late 19th century construct. The roadway has been widened and the lime kiln works is now currently a coal yard (Figure 13.2.2).

In the wider cultural context, Area 3 of the PDS is focussed around the railway underbridge / viaduct at Lough Atalia (Figure 13.2.2 & Plate 13.2.5). It is intended to lower the roadway beneath the bridge which is a recorded protected structure (NIAH Reg. No. 30315004). The railway line was officially opened in August 1851 the same year that James Stephen's Foundry, Galway completed construction of the underbridge, most likely to the design of William Fairbairn who built Lough Atalia viaduct (Carey 2010, 9).

Field walking of the entire PDS in the course of this study revealed no new archaeological sites or features.

13.2.4 Underwater Archaeology of the PDS

As stated above the vast majority of the PDS, Area 1, is either currently underwater or comprises land that was very recently reclaimed from the sea at Rinmore Point. In fact, today, geographically and topographically, Rinmore Point no longer exists as new reclaimed land extends southwards from where Rinmore Point was and thereby removing or subsuming the actual point of land (Plate 6). The land reclamation works relates to the construction of the Enterprise Park (Plates 7 & 8). Close examination of these lands and shoreline on the 1st Edition OS 6" map of 1840 identified no cultural features whatsoever (Figure 13.2.14). John O'Donovan's notes in the Ordnance Survey Name Books, that are contemporaneous with the 1840 mapping record that the dominant proprietors, owning 465 acres of Rinmore townland, were the Governors of Erasmus Smith, Dublin whose local agent was Mr. Hunt from Gort. The major part of Rinmore was held by Mr. John Ellard of Rinmore Cottage who sublet it to 41 tenants at will. Interestingly a large proportion of it was subject to tide which was rented at the lower rate of 1s. 10d per acre. It is further noted that that the letting of the seashore paid Mr. Ellard the tidy sum of £150 yearly which indicates that a lot of activity and use was made of the shore area in pre-famine times. Some of this activity may relate to lime burning works which was carried out in a kiln built into the north-eastern bastion of Rinmore Fort or locally as 'Cromwell's Fort' to the east of the PDS (Figure 13.2.2).

In the second half of the 19th century there were many changes taking place in Rinmore townland most notably was the construction of a new railway by the Mid Great Western Railway Company that opened in 1851 as well as the construction of a new military barracks by the Board of Ordnance that included two rifle ranges, a long and a short range. Of interest to this study is that the long rifle range extended from Cromwell's Fort in a north-westerly direction towards Lough Atalia, a distance of 700yds with intervals marked every 100yds; the 400yrd point being situated within the PDS (Figure 13.2.15).

By the end of the 19th century a cholera hospital was built at Rinmore Point immediately west of the PDS (Figure 13.2.15). No vestige of this building survives today and the land was developed to construct the Enterprise Park. Examination of infra red aerial photography published by the Marine Institute in 2000 appears to indicate the site of the hospital (Plate 2).

In 1996 an archaeological assessment including test trenches uncovered what the archaeologist interpreted as a possible midden at the Docks, Rinmore. However, subsequent archaeological

testing by hand by archaeologist Fiona Rooney in 2001 (Licence No. 01E0148) revealed nothing of archaeological significance (Rooney 2001, Appendix 13.2.3).

13.2.4.1.1 Shipwreck Inventory of Galway Bay

The Shipwreck Inventory of Ireland is principally a desktop survey of information gathered from a broad range of cartographic, archaeological and historical sources, both documentary and pictorial pertaining of shipwrecks around Irish shores of which a conservative estimate is at least 10,000. The files of the unpublished Inventory of Shipwrecks, very much a work in progress, is located in the UAU in Dublin and records a substantial list of wrecks for the Galway Harbour area (Appendix 13.2.4). The Shipwreck Inventory does record five wreckings, two from the 18th century and three more from the 19th century, in proximity to the PDS around the Rinmore Point and Galway River area viz:

Site Name: Friendship

Date of Loss: ¼ Galway Sept. 1750

Place of Loss: Galway River

This Dublin ship was en route from Norway to Galway, under the command of Capt. Cosgrove, when she went ashore.

Bourke, 1994, 186

L. L. no. 1541, 4 Sept 1750

Site Name: Royal Charlotte

Date of Loss: 10 Dec. 1762

Place of Loss: Galway

This vessel under Sinclair was en route from Quebec to London. She sprung a leak at sea. And while going into Galway River ran ashore and filled with water.

Bourke, 1998, 132

Site Name: Curbat

Date of Loss: 1 Oct. 1882

Place of Loss: Renmore Point, Galway Bay

This 39-year old, wooden of Dublin smack weighed 32 tons. She was fishing in Galway Bay in ballast, with crew of 4 on board. She became stranded in a westerly force 10 gale and was totally wrecked. Her owner and master was J. Flaherty of Reenbeg, Dingle. There was no loss of life.

CSP, 1884, Vol. LXXI, 102

Site Name: Ocean Queen

Date of Loss: 27 May 1887

Place of Loss: Galway New Dock

This 6 year old unregistered wooden fishing hooker weighed 12 tons. Her owner and master was M. Flaherty of Galway. She was moored in the dock, in ballast when she was involved in a collision with the steam tug Conqueror, of Glasgow and became a total loss.

CSP, 1888, Vol. XC, 171

Site Name: St. Patrick

Date of Loss: 6 Jan. 1839

Place of Loss: Galway Bay

This barque was carrying a valuable cargo when she was blown out the dock and driven onto the shore. This occurred during the Great Gale.

Bourke, 1994, 184

It is of course likely that the sites listed for the Galway River may just as easily be from the Claddagh area.

Examination of the Shipwreck Index of Ireland published by Bridget and Richard Larn in 2002 revealed several records of shipwrecks for the Galway Harbour area and three shipwreck

records are of relevance in the context of this report. Two of the shipwrecks are recorded in the Shipwreck Inventory (see above) while the third is not.

(1) In 1750 the wooden sailing vessel, *Friendship*, en route from Norway to Galway whose master was Captain Cosgrove, was recorded by Lloyds '...as ashore in Gallway River' (Larn 2002, Vol. 6, Section 6).

(2) In 1762 an unspecified sailing ship the *Royal Charlotte*, en route from Quebec to London sprung a leak and tried to make it to Galway. The entry in Lloyd's List record '...master Sinclair, from Quebec for London, sprung a leak at sea and in going into Galway River in Ireland, run ashore and is full of water' (ibid).

(3) The third shipwreck occurred in 1830 and records the wrecking of the *Blackstone*, an unspecified wooden sailing vessel under Captain Easdale. It was reported by Lloyds as a total wreck that was stranded at the entrance to Loughataille (ibid).

Interestingly, the *Blackstone*, is also recorded by Edward Bourke who also notes that it was wrecked on the rocks at the entrance to Loughataille on the 20th November 1830 and lay on her beam ends. Apparently seven other vessels were damaged in Galway Port by the same storm (Bourke 2000, 103).

13.2.4.1.2 Shipwrecks of Galway Bay

There are at least eighty two shipwrecks recorded in the unpublished Shipwreck Inventory of Wrecks for Galway Bay alone (Appendix 13.2.4). These eighty-two wrecks date to between 1750 and 1938 of which the vast majority, 59, are from the 19th century. Currently, there are no records earlier than the 18th century, however, the inventory is only a work in progress and therefore the records are not complete.

All shipwrecks whose wrecking event dates are at least a hundred years old are designated as monuments under the National Monuments (Amendment) Act, 1994. Virtually every class of vessel has been wrecked in the area, many of which are regional traditional boats including: eight hookers, one *gleoiteóg* and one *púcán*. Several other fishing vessel were wrecked also including one trawler, one fishing cutter, a fishing smack and other types of vessels that were also used in the fishing and local coastal trading.

The historic records are often non specific as to precise type and often only refer to them as vessels, (26), or ship (10). Otherwise, there are records of a West Indiaman (large ship), 6 barques, 4 schooners, 1 brigantine, 4 brigs, 1 yawl, 3 luggers, 2 ketches and two steamships. Records of cargoes lost or partially salvaged include are given for only 21 of the wreckings. More than 50% of the wrecks (44) cargoes are unrecorded while 7 were in ballast and 7 others had none. Records of cargoes include:- sugar, fish (3), coal (5 wrecks), salt, deal (timber), barley, oats, wheat, grain, ice, manure, seaweed (2) and poteen. At a human level the minimum numbers of people who died is 52. These numbers in no way reflect the total lives lost as often there is no mention or simply *all lost* or sometimes mention is only made of the survivors. In any event there was a substantial loss of lives associated with these wreckings.

13.2.4.1.3 Inventory of Ports and Harbours

The Record of Piers and Harbours is a draft unpublished document compiled by the Underwater Archaeological Unit of the Dept. of Environment, Heritage & Local Gov (DEHLG). It draws on various historical sources dealing with historical piers and harbour development in Ireland. There are numerous mentions of Galway in the Record of Piers and Harbours, however, none of the structures in the record will be affected in any way by the proposed development.

13.2.5 Surveys

13.2.5.1 Magnetometer survey and side-scan sonar survey

The Geophysical Survey was undertaken by Landscape and Geophysical Services in May 2010 and was complied with due regard to the unpublished guidelines for the undertaking of maritime geophysics provided by the Underwater Archaeology Unit (UAU) of the Department of Arts, Heritage and the Gaeltacht.

The instruments used were swept frequency sidescan sonar (Starfish 450F) and a caesium vapour marine magnetometer (Geometrics G881). The magnetometer data was corrected for diurnal variation using a fixed landward base station with synchronised clock. The output of both mobile survey instruments was displayed underway on a VDU for survey and quality control purposes (Barton 2011, 6 & Plate 9).

Seventeen magnetometer anomalies (M1-M17) were recorded of which nine were within the footprint of the proposed development (M1-5, M7, M9, M16 and M17, Figure 13.2.17), while the other eight were recorded immediately to the west of the PDS (M6, M8, M10-15). In general the amplitude responses were so large as to be unlikely to reflect archaeology.

Eighteen anomalies were recorded in the side-scan sonar survey which was carried out at a line spacing of 20m with a sonar range set at 50m on either side of the surveying boat thus establishing a 100m band incorporating successive overlaps with the narrow 20m spacing (Figures 13.2.18 and 13.2.19).

The ING co-ordinates of the survey area are 130300E to 131200E and 222800N to 224400N (Figure 13.2.19).

Following a review of the geophysical data with the UAU, it was decided to investigate a number of the anomalies. Those selected included all of the anomalies identified as potentially archaeological in nature and a sample of those identified as geological or mooring blocks were also included in the dive truthing survey (see Table 13.2.1 below).

13.2.5.2 Dive truthing survey

The dive truthing survey was undertaken in June 2011 by a five person team including dive supervisor, dive tender, stand-by diver and diver (Plate 10). A surveying engineer located the anomalies using a Trimble 5800 DGPS with <8mm accuracy. Conditions were calm and sunny which enabled precise anchorage over each of the anomalies (Plates 11, 12 & 13). Water depths were low, <7.5m, while visibility was generally poor, averaging 0.50m although it appeared to improve in places. Where anomalies were not immediately found a circular dive search encompassing a diameter of c.20m was undertaken.

Fourteen anomalies were surveyed of which six were magnetometer anomalies viz: M1, M2, M4, M9, M10 and M17 while eight were side scan sonar that were unwieldy numbered thus:- 12:12:54; 12:11:16; 12:40:36; 18:24:30; 06:39:04; 06:51:02; 07:03:42 and 13:21:56 (see Table 13.2.1 below).

Nothing was recorded on the flat featureless seabed for four of the six magnetometer anomalies while the other two anomalies, M4 and M10 proved to be a modern metal rectangular tank and a large section of flat plate metal 8m x 3.5m with transverse 0.07m high ridges that may reflect the remains of a metal container (Plate 13).

As predicted, four of the eight side scan sonar anomalies proved to be mooring blocks. Indeed one of them was attached to a red channel buoy (JFC 1112,). The buoy must have been out of the water when the geophysical survey was undertaken in 2010. Two anomalies proved to be

natural bedrock and another was an area of natural sub- angular stones while the last anomaly was a flat featureless seabed.

13.2.5.3 Overall Results of Surveys

The extensive geophysical surveys of the PDS discovered no definitive archaeological shipwrecks, features or artefacts. Fourteen anomalies were subsequently examined in a follow up archaeological licensed dive truthing survey. No archaeological features, shipwrecks or artefacts were noted or recorded during the dive survey.

The geophysical and dive truthing results are consistent with results from previous geophysics undertaken in 2004 in the same area though not as extensively undertaken.

However, the absence of definitive coherent archaeological shipwrecks or features on the seabed from the geophysical and dive surveys does not necessarily reflect the potential subsea archaeological content within the deep sediment there.

Dive survey anomalies			
Anomaly No.	Co-ordinates	Geophysical interpretation	Dive truthing identification
12:12:54	130311.40 223758.90	This anomaly lies in the western area which contains many moorings. It could be due to a mooring with tether and scoured area	Large mooring block and chain.
12:11:16	130311.40 223590.90	This anomaly lies in the western area which contains many moorings. It could be due to a mooring with tether and scoured area	Large mooring block and chain.
12:40:36	130302.60 223170.60	This anomaly lies in the western area which contains many moorings. It could be due to a sunken mooring with tether and scoured area	Large mooring block and chain.
18:24:30	130632.70 223256.50	This anomaly appears to have some spherical components	Occasional sub-angular stones recorded on seabed-natural.
06:39:04	130750.50 223543.60	This is a small irregular anomaly which could be a rock or boulder	Mooring block attached to navigation marking buoy. Buoy may not have been present during geophysical survey.
06:51:02	130750.60 224423.70	This anomaly could be geological in origin	Area of natural bedrock
07:03:42	130716.50 223455.00	This anomaly appears to be rectangular in nature	Flat featureless seabed. Nothing recorded.
13:21:56	131145.90 224334.80	This anomaly is likely to have a geological origin	Area of natural bedrock
M1	130365.6	Possible archaeological artefact	Flat featureless seabed, close to M4.
M2	130358.1 223665	Possible archaeological artefact	Flat featureless seabed. Nothing recorded.
M4	130359.8 223787.1	Possible archaeological artefact	Sunken rectangular metal tank measuring 2m x 0.8m. Modern
M9	130450 224151.1	Possible archaeological artefact	Flat featureless seabed. Nothing recorded.
M10	130198.4 224333.3	Unlikely to have archaeological significance	Large riveted steel plate protruding from seabed; exposed section measuring 8m (N-S) by 3.5m (E-W) by 0.2m.
M17	131038.6 224123.6	Possible archaeological artefact	Flat featureless seabed. Nothing recorded.

Table 13.2.1 - Dive Survey Anomalies

13.2.6 Description of works

Area 1: Undersea area of PDS. Primary works relating to the proposed development essentially comprise the removal of virtually all of the underwater sediment in sequential phases by marine dredging works using cutter suction and back acting hoe dredgers. It is calculated that some circa 1.8m cu.m of sediment material will be dredged and the extracted material redeposited into specially constructed lagoons formed by rock armour that will be built out into the bay from the south-east corner of the site in phases. These lagoons will release their high water content leaving behind hardening mud upon which the new harbour will be constructed.

At the northern terrestrial limits of Area 1 construction works will be undertaken in ground which for the most part was recently reclaimed from the sea (since the mid 1990's). The only 'original' *terra firma* comprises a tract of land at the north-east limits of the PDS where it extends to and integrates with the existing rail line. Examination of the 1st Edition OS 6" map of 1840 and indeed sections of earlier historic maps record no archaeological or wider cultural features in the area up to 1840. The second half of the 19th century saw the construction of the railway line as well as a new barracks and rifle range within the northernmost limits of the PDS and a cholera hospital at Rinmore Point (see above). The rifle range 400yd mark was within the PDS. All this area was cleared and severely impacted and scarped by works associated with Enterprise Park as is evidenced quite clearly by the infra red aerial photography and also on the orthographic aerial imagery by the OS from 2000 and 2005 (Plates 2, 7 & 8).

Area 2: The recently constructed existing roadways within the Enterprise Park will be upgraded.

Area 3: Two areas of cultural interest are identified here. (1) It is proposed to undertake a minor upgrade to the Harbour Access Junction. The aspect of the junction upgrade works that requires archaeological attention corresponds to a re-design of the pavement outside Forthill cemetery to include a bicycle lane (*ibid*). Groundworks will be minor and with shallow ground impact. (2) It is intended to lower the road by *circa* 1.3m beneath Lough Atalia Bridge (see Tobin Dwgs: 2139-2169). Currently, the central clearance beneath the bridge is only 4.16m and consequently it has been damaged by high load vehicles.

13.2.7 Impacts

The criteria contained within the EPA Advice notes on current practice in the preparation of Environmental Statements 2003 were adopted for assessing the impacts on the cultural heritage. A copy of these criteria is provided in Appendix 13.2.6.

13.2.7.1 Likely impact of the Proposed Development on the Known Recorded and unknown potential Terrestrial Archaeology and known recorded protected structure

Construction Phase

(1) Minor groundworks are proposed to the pavement immediately outside Forthill Cemetery which is a recorded protected archaeological site (GA094-099). Given the significant amount of historic groundwork activity associated with this site in the past as a monastery, bastioned fort and now as a cemetery, there is a possibility that liminal, clandestine burial(s) or other archaeological features associated with the graveyard, 17th century bastion or Augustinian friary may be uncovered in the course of these works. However, (1) as the ground disturbance works are minor and only generally relate to a redesign and relay of pavement to include a bicycle lane; (2) as there have been previous groundworks carried out along this area in the recent past, the likelihood of encountering *in situ* features or artefacts are greatly reduced.

Impact Classification: Imperceptible

(2) It is also proposed to lower the ground level beneath the eye of Lough Atalia Bridge by *circa* 1.3m (Tobin Dwgs. 1239-2169 & 2139-2170). Lough Atalia Bridge / viaduct is a Recorded

Protected Structure (Reg. No. 30315004). An investigative trial hole was opened under archaeological licence in 2010 by archaeologist Anne Carey. The trial hole was situated near the north east wall of the underbridge and measured 2.7m in length x 1.1m wide and was excavated to a depth of 1.44m. The archaeological results of the trial hole were negative. The trial hole did reveal:- (1) that the pier masonry of the bridge extended below ground for a further course; (2) the pier was constructed on a foundation of 'rough stone' of *circa* 0.50m in depth and with a projecting footing of *circa* 0.10m-0.115m; (3) the foundation was laid on 'stone-filled boulder clay'. Stratigraphically the trial hole comprised mainly infill material of 'highly mixed sand and soil' to a depth of 1.2m (Carey 2010, 15). Carey's conclusions determined that the foundations of the bridge were not excessive and did not appear to extend into the proposed for road level reduction. Ultimately, she concluded that no sub-surface element of the bridge will be impacted by the proposed works (*ibid* 18).

Further geotechnical investigations were undertaken by Ronan Killeen, Chartered Engineer, Irish Drilling Ltd (IDL) in July 2011. These investigations included two light cable percussive and four rotary core boreholes as well as four mechanically excavated trial pits (Tobin Drwg.1254-1011 A). IDL's investigations mandate from Tobin Consulting Engineers was to 'assess the feasibility of lowering the road under Lough Atalia Bridge' (Killeen, IDL Report 2011, 4). The trial pits were undertaken to expose the foundations to the existing bridge abutments (*ibid* 5).

The infill stratigraphy recorded by Carey to a depth of 1.2m in her trial hole of 2010 was similar to made ground in Trial Pits 2 and 3 recorded by Killeen (*ibid* 23-24). Killeen's TP3 terminated at 1.75m below ground level where it met the foundation. Much less made ground, <0.30m was recorded in Trial Pit 1 while the greatest depth of made up ground was in Trial Pit 4 where a depth of 2.05m was recorded (*ibid* 25).

One of the determinations of Killeen's report was that excavations close to the existing bridge abutments will have to be carefully excavated, using appropriate machinery and temporary works, to avoid damaging the integrity of the existing structure (*ibid* 7).

Impact Classification: Moderate

Operational Phase

- (1) There will be no direct or indirect impact by the proposed upgrade works at Forthill Cemetery.
- (2) Provided that there will be no impact on Lough Atalia Bridge during the construction phase the impact classification is determined to be positive

Impact Classification:

- (1) Forthill Cemetery:-Neutral.
- (2) Lough Atalia Underbridge:- Positive

Do nothing scenario

- (1) If the upgrade works do not proceed, Forthill Cemetery will continue to operate and function normally.

Impact Classification: Neutral

- (2) Should the road level reduction works proposed for Lough Atalia Bridge not proceed the bridge will continue to function in its current state. However, given its low height (4.16m) it will continue to be struck by overhigh vehicle traffic.

Impact Classification: Slight

13.2.7.2 Likely Impact of the Proposed Development on the known Recorded and Unknown Potential Underwater Archaeology

Construction Phase

(1) There are six recorded shipwreck listings in or abutting the PDS (see list above). These wreckings occurred between 1750 and 1887. The locations given are: Galway River (2); Renmore Point; New Dock Galway; Blown out of dock and driven on shore Galway Bay; Entrance to Loughatille. The comprehensive archaeological geophysics and subsequent dive investigation surveys did not detect these wrecks or any other unknown wreck or indeed any archaeology. Certainly, it is most likely that much of the fabric of the majority of these wrecks and cargoes were salvaged around the date of their demise as the water levels in these areas are low. However, it is also possible that coherent wreck sections of these vessels as well as disparate components of their fabric as well associated artefacts from them and their cargoes may be contained within the underlying subsea sediment. Given, that the subsea sediment within all of the PDS will be entirely removed by dredging works at the Construction Phase, any residual remains, including unrecorded shipwrecks, features or artefacts relating to the known recorded shipwrecks or potentially the recorded wrecks themselves, will be directly impacted on.

Impact Classification: Significant

(2) There are at least eighty two shipwrecks known recorded the unpublished Shipwreck Inventory of Wrecks for Galway Bay alone whose precise location is for the most part unknown or general i.e. off Mutton Island; Hare Island / Mutton Island; 1/4 mile NE of Mutton Island (Appendix 4). These eighty-two wrecks date to between 1750 and 1938 in no way reflect the busy local, regional or international maritime traffic into the medieval port of Galway through the medieval and post medieval period up to 1750. Wreckings aside it is also likely that accidental loss of property and people would have occurred in the PDS from all cultural periods, from the Mesolithic to the present day as the records indicate. Given, the extent of the maritime traffic through time and the known number of recorded shipping losses both within and around the PDS as well as the use and exploitation of people in this littoral zone, the likelihood of encountering unknown potential archaeological shipwrecks, features and artefacts is likely to be significant. Therefore, as subsea sediment within the PDS will be entirely removed by dredging works at the Construction Phase, all these potential archaeological remains, features and artefacts will be directly impacted on.

Impact Classification: Profound, Permanent and Irreversible.

Operational Phase

As all potential cultural content of the seabed will have been removed during the Construction Phase there will be no impact during the Operational Phase for both (1) and (2) above.

Impact Classification: Neutral

Do nothing scenario

Should the proposed development not proceed, all of the known recorded and unknown potential underwater archaeology will continue to be preserved in the deep subsea sediment.

Impact Classification: Neutral

13.2.8 Mitigation Measures

(1) *Mitigation by archaeological monitoring:* All groundworks associated with the upgrade of the roadway, footpath and construction of the bicycle lane at Forthill Graveyard should be archaeologically monitored under archaeological licence issued from the National Monuments Service. Should archaeological deposits features or artefacts be recorded during the monitoring, the monitoring archaeologist will have the necessary licence in place to investigate these features without having to apply for a licence that can take up to three weeks to receive.

(2) Mitigation by archaeological monitoring: All groundworks associated with the road reduction measures beneath the eye of Lough Atalia underbridge should be archaeologically monitored under archaeological licence issued from the National Monuments Service. Furthermore, extreme care should be undertaken during excavations under and beside the bridge to ensure the integrity of it and protect it from accidental damage during the works. The determination regarding excavation works by Killeen should be rigidly adhered to (ibid 7).

(3) *Mitigation by licensed archaeological monitoring and licensed archaeological excavation:* All underwater dredging works in the PDS and other excavation works from the shore area and other associated areas by land based mechanical machinery should be archaeologically monitored by experienced, licensed maritime archaeologists with a proven track record in equivalent, similar type work. The dredging works will most likely be undertaken by cutter-suction and back-hoe dredgers that will pump, excavate, remove and redeposit the sediment in constructed lagoons within the PDS in construction phases where the removed sediment will be left to dry. These dried lagoons should be archaeologically tested to recover any potential archaeological artefacts in the sediment. The archaeological testing should involve a program of sieving and licensed metal detection thus maximising artefact recovery.

Should archaeological material, wreckage, timbers or other artefacts be recorded in the course of the monitoring, the archaeologist will be empowered to recover and record the material. This may involve the temporary stopping of the work to recover the material on board the dredger. The recovered items should be placed in temporary wet storage tanks provided on the dredger. In the event that the dredger impacts on a possible shipwreck, then the dredger will be moved to a different area while a standby archaeological dive team, in place for such eventualities, is mobilised to undertake a rapid dive survey to undertake an initial assessment of the impacted material / wreck(s). Should the rapid dive survey record coherent remains of a shipwreck(s) it is most likely that the UAU of the NMS will require further archaeological work including further investigative, targeted excavations and / or potentially full excavation.

13.2.9 Residual Impacts

It is possible that a substantial number of artefacts from a number of archaeological periods will be recovered from the marine sediment by the proposed mitigation measures. These artefacts will greatly increase and enhance our current understanding and knowledge of the maritime archaeology of Galway. Furthermore, it is likely that these artefacts will most likely go on display in Galway City Museum or indeed in a dedicated cultural facility within the proposed new harbour complex as a visitor attraction and also as an important visible expression and understanding of the cultural maritime heritage of Galway.

The results of potential targeted, partial or full excavation of a shipwreck(s) will significantly enhance, increase our archaeological and historical records of Galway. Indeed, the prospect of a dedicated, local, contextual display of the results of underwater excavation, possibly including coherent sections of its fabric and artefacts etc would greatly increase and promote cultural tourism in the area by sensitively displaying the rich underwater maritime trading tradition of the historic Port of Galway.

Impact classification: Positive

13.2.10 Conclusion

Galway City is an outstanding heritage city with an extensive historic tradition associated with the sea, seafaring, voyaging, exploration, trade and international contact with Europe and especially with Spain. However, the historic record clearly demonstrates that its port has not been effective in being able to cope with larger and more diverse maritime traffic and trade. The proposed development will not in any way physically affect the continued use or enjoyment of the existing built cultural heritage of the historic quays and harbour of Galway.

It is the considered view of this writer that the impact of the proposed development on the potential unknown maritime archaeology is an acceptable cultural cost provided that the extensive comprehensive mitigation measures detailed above are put in place.

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13.2.11.2 Cartographic Sources

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A plot of the town of Galway by Barnaby Gooche (1583)
Plot of the town of Galway taken the 26 August 1583 by John Browne (1583)
The circuit of the Town of Galway (1589)
Plan of Galway (1610) from John Speed's Theatre of the Empire of Great Britain (1612)
The plot of the Town of Galway with the laying out of the new fort (1625)
Pictorial Map of mid-seventeenth-century Galway
The ground plan of Galway by Thomas Philips (1685)
A Prospect of Galway' by Thomas Philips (1685)
The town of Galloway from G. Story, An impartial history of the wars in Ireland (1693)
A plan of the Town and Fortifications of Galway taken in the year 1747
Plan of Galway by Anthony Blake (c.1755)
McKenzie's Maritime Map of Ireland (1776)
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Figure 13.2.2 - Extract from National Monuments Services on-line database

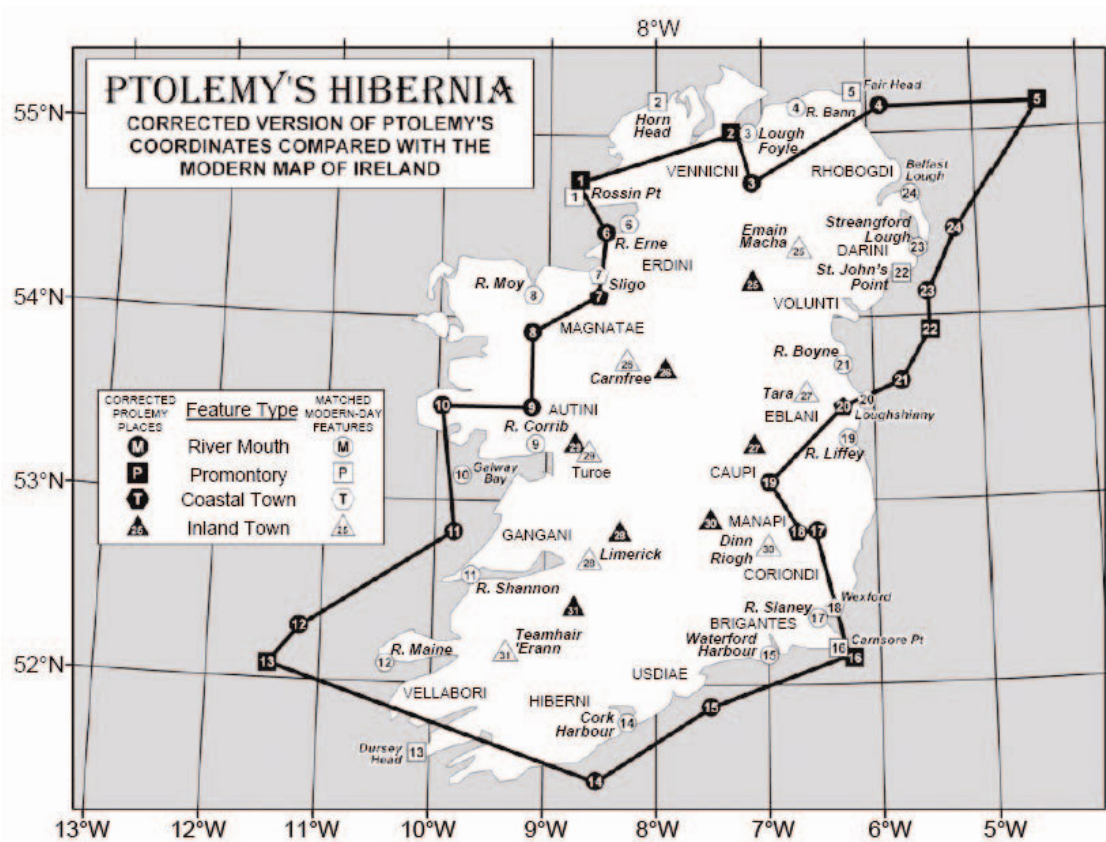


Figure 13.2.3 - Corrected version of Ptolemy's coordinates compared with the modern map of Ireland, taken from Darcy and Flynn (2008)

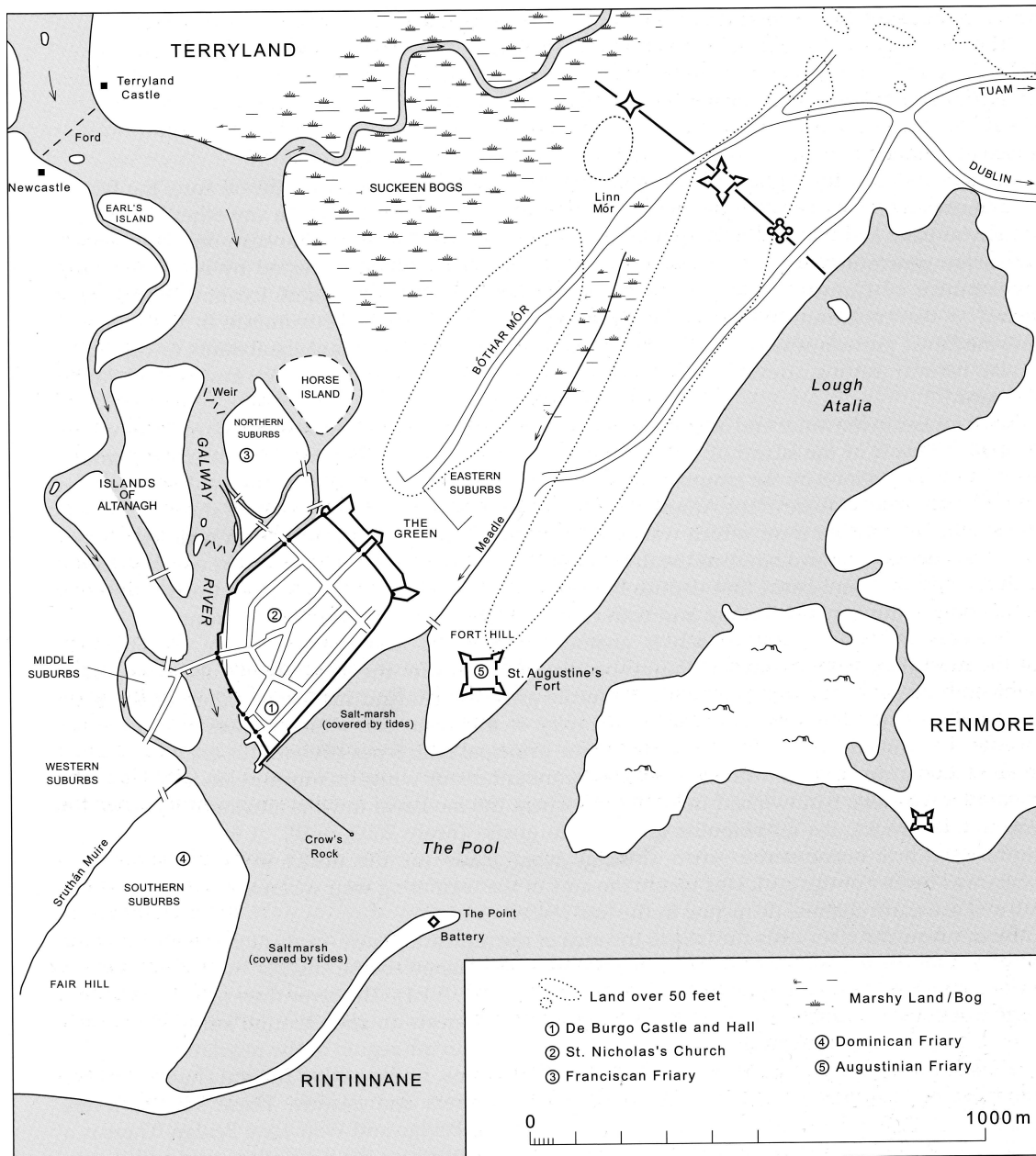


Figure 13.2.4 - Map of the topography of the topography of Galway and environs in the late medieval and post medieval periods

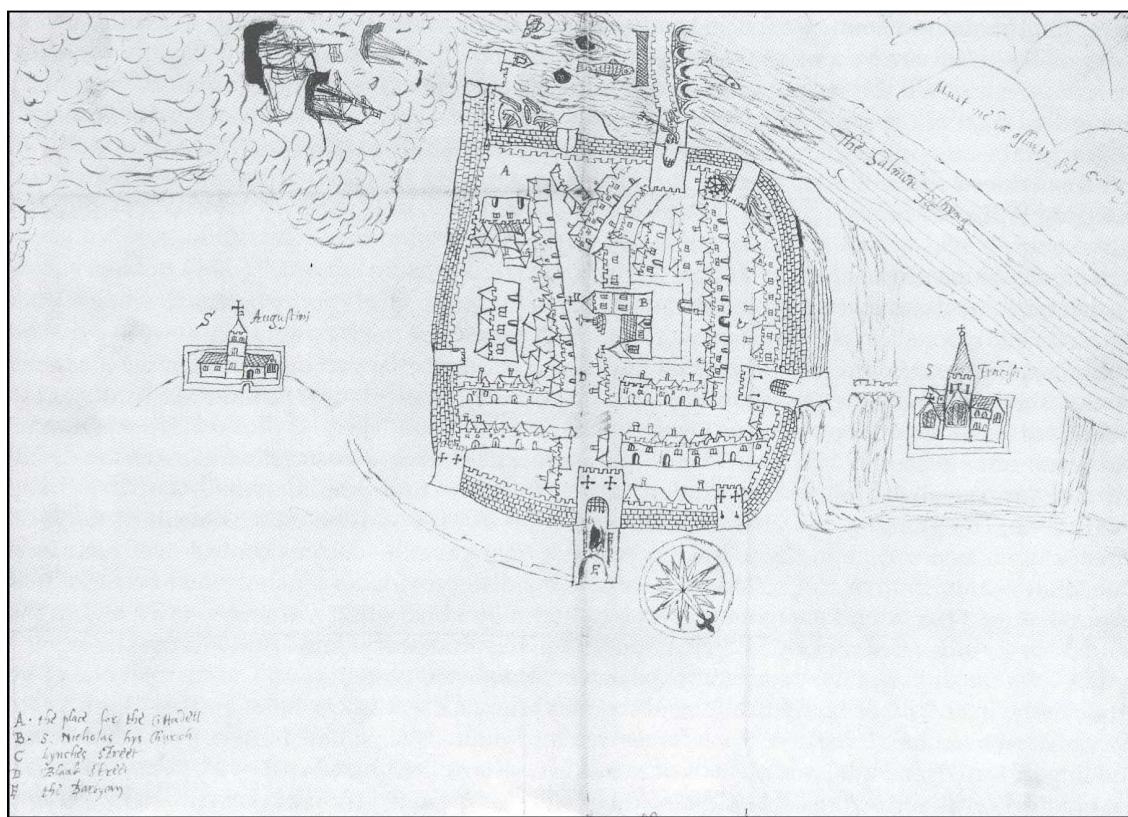


Figure 13.2.5 - A plot of the town of Galway by Barnaby Gooche (1583)

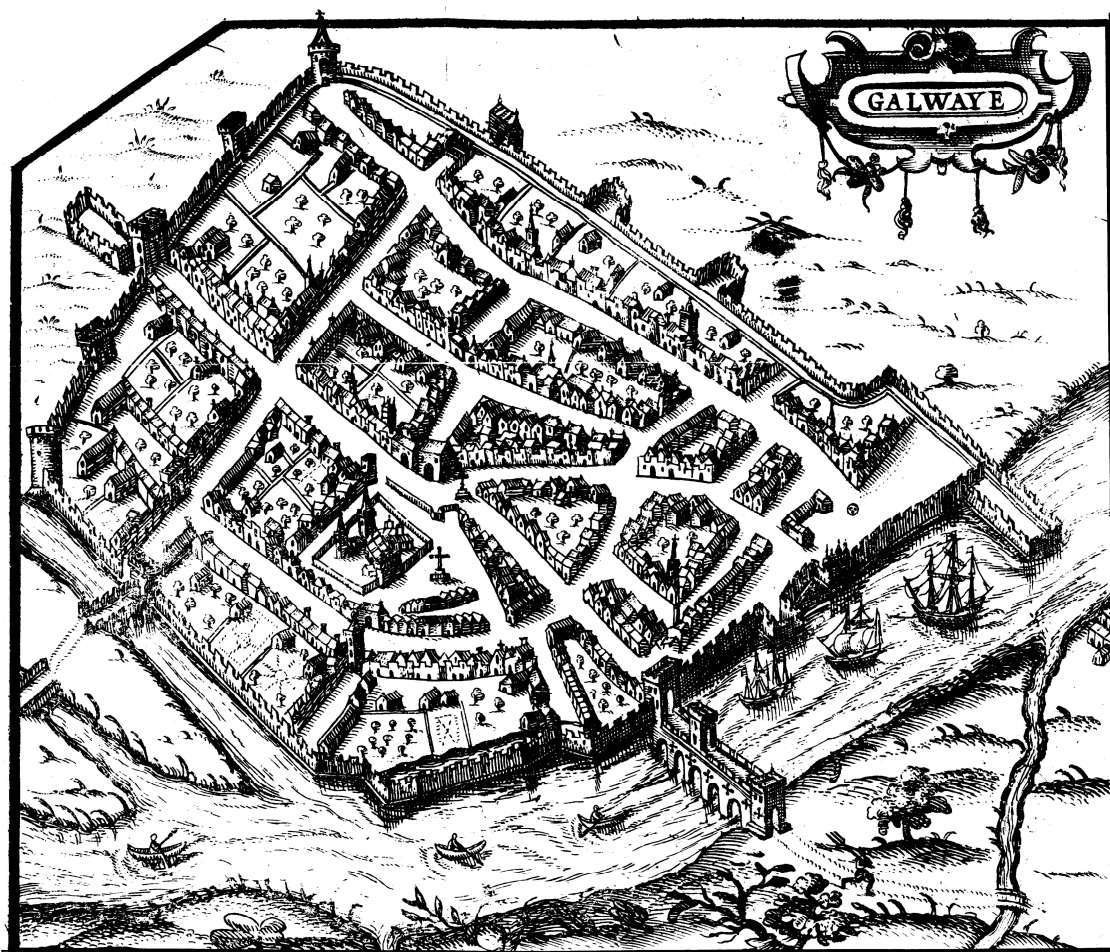


Figure 13.2.6 - Plan of Galway (1610) from John Speed's Theatre of the Empire of Great Britain (1612)

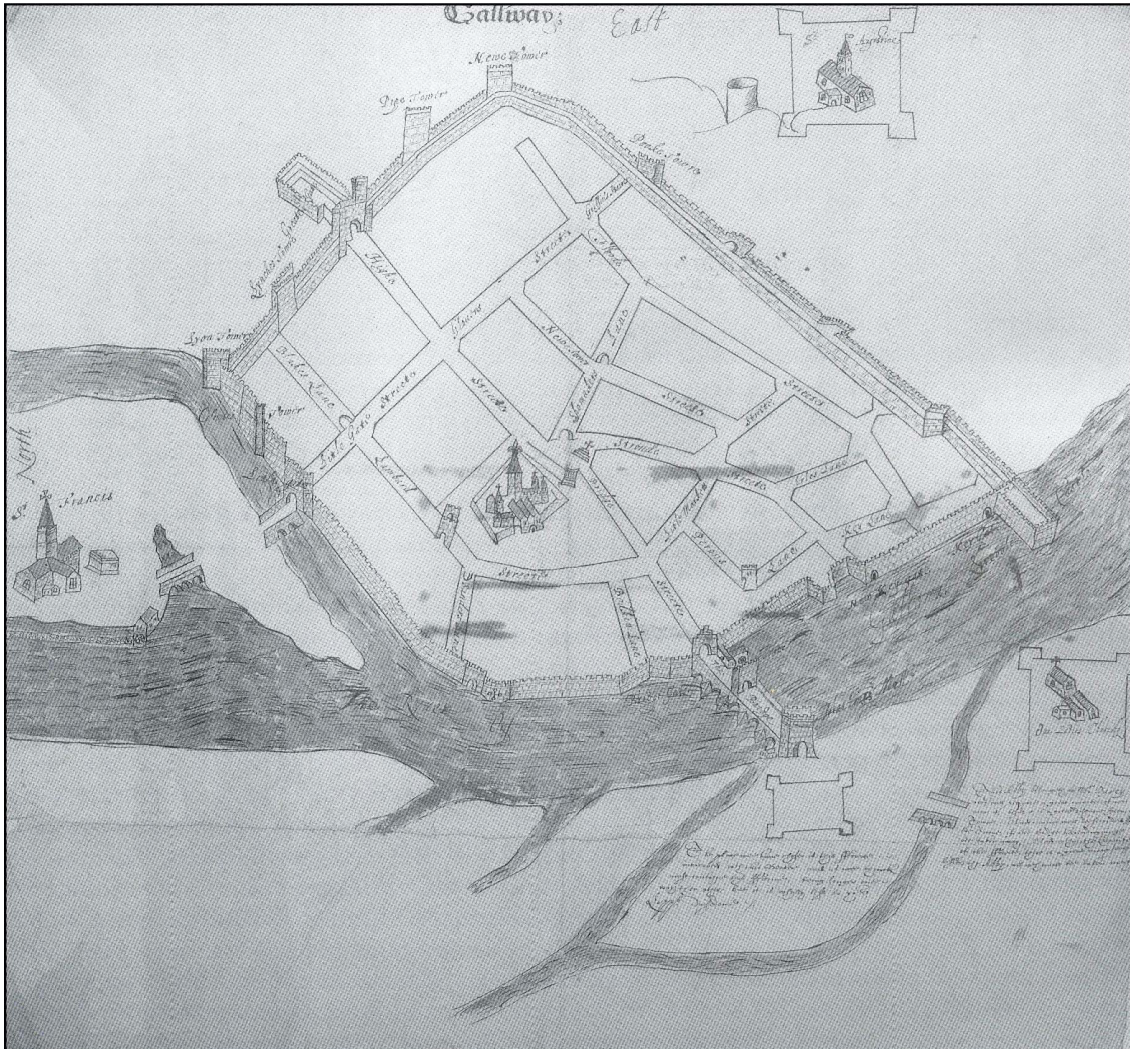


Figure 13.2.7 - The plot of the Town of Galway with the laying out of the new fort (1625) TCD MS 1209.72, after Walsh (2004)

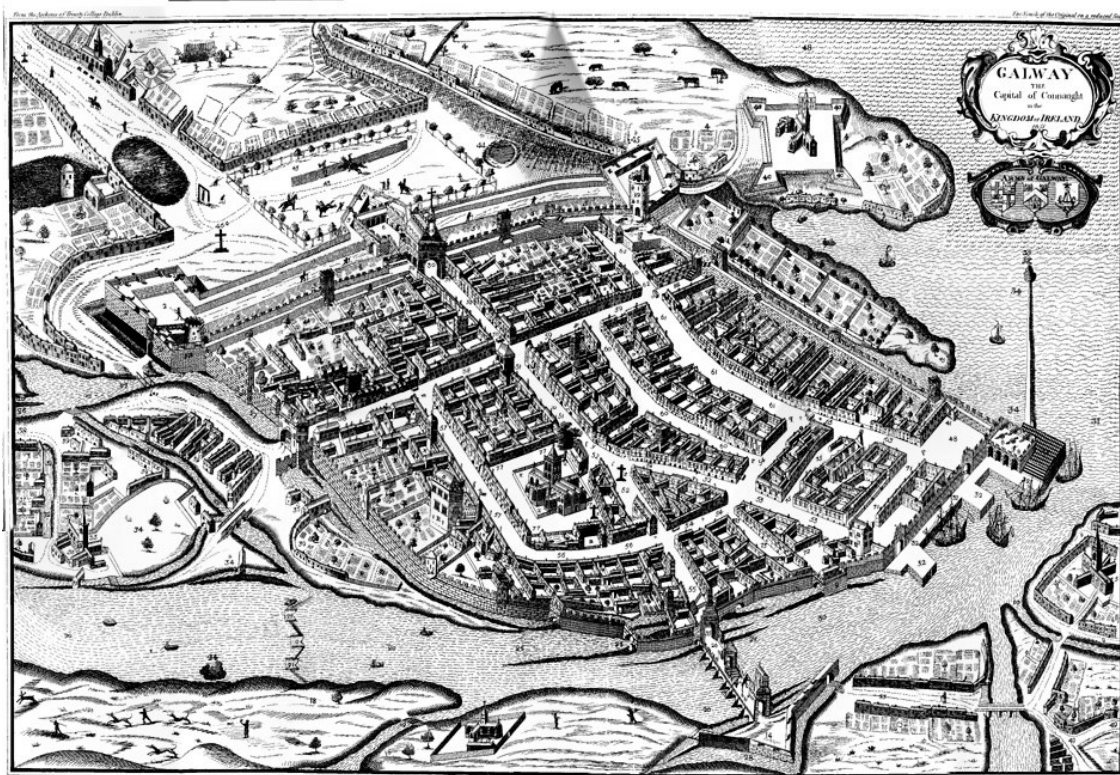


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Figure 13.2.9 - A Prospect of Galway' by Thomas Philips (1685)



Figure 13.2.10 - The ground plan of Galway by Thomas Philips (1685)

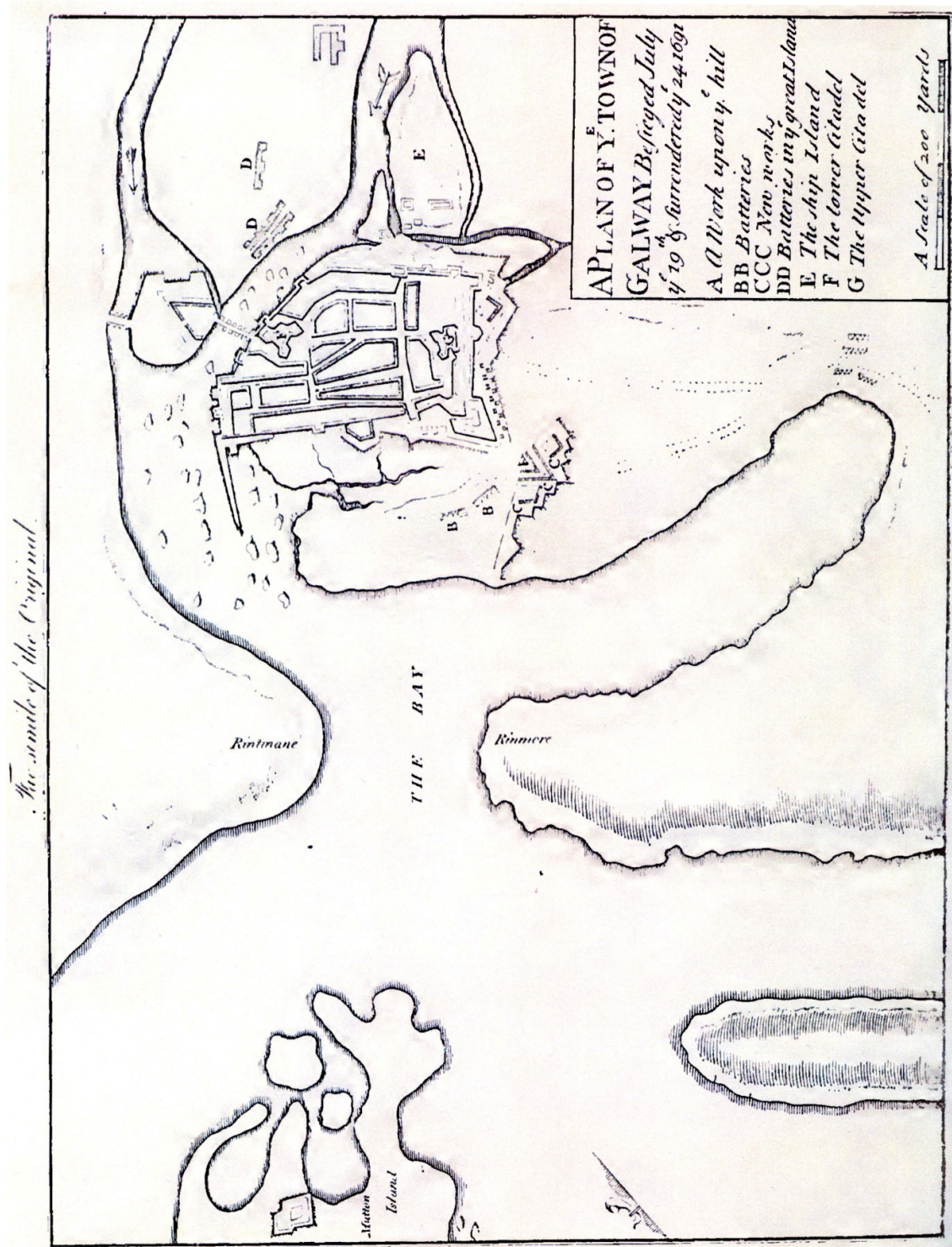


Figure 13.2.11 - The town of Galway from G. Story, An impartial history of the wars in Ireland (1693)



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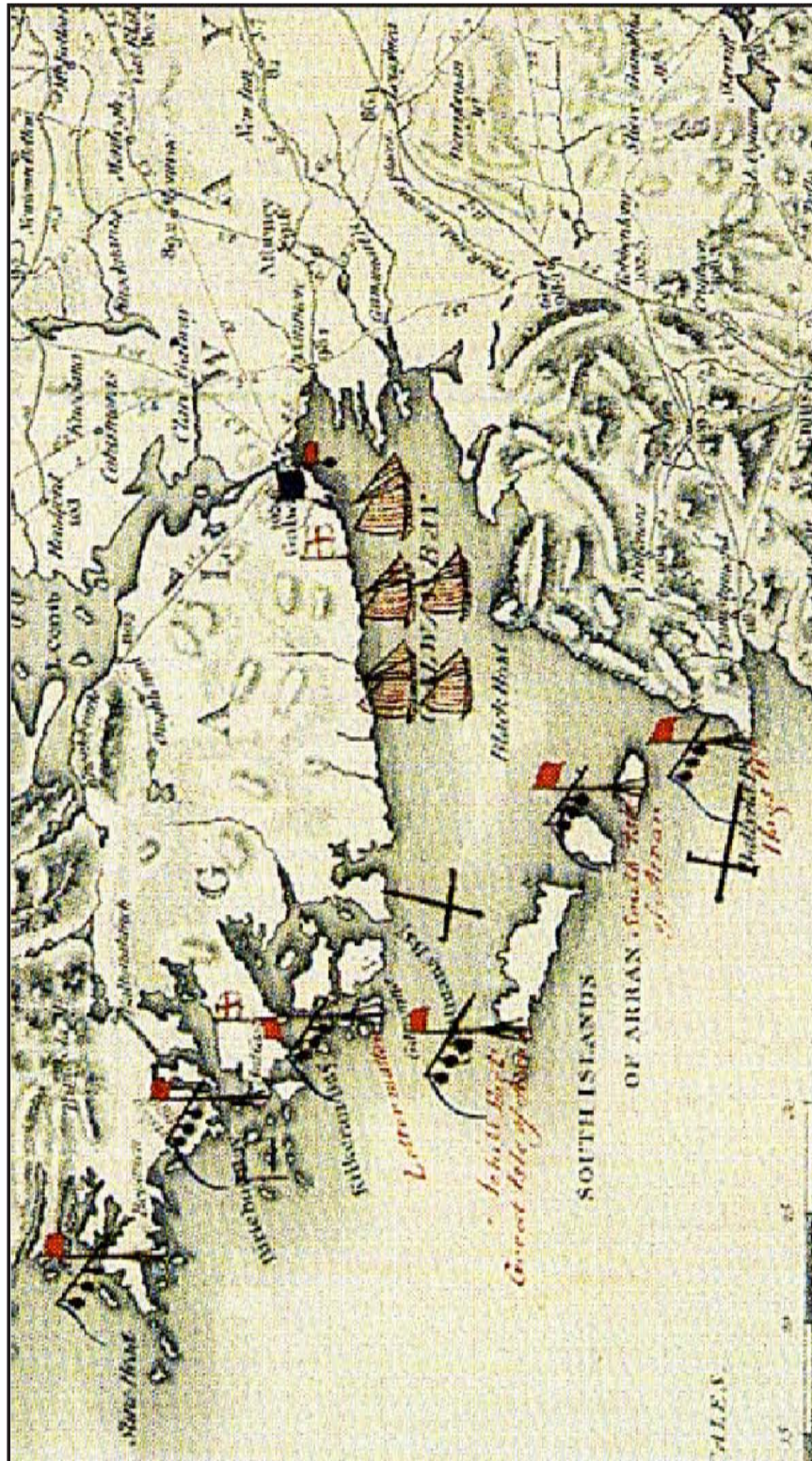


Figure 13.2.13 - Extract from New Map of Ireland (1804) by Alexander Taylor Galway by Anthony Blake (c.1755)

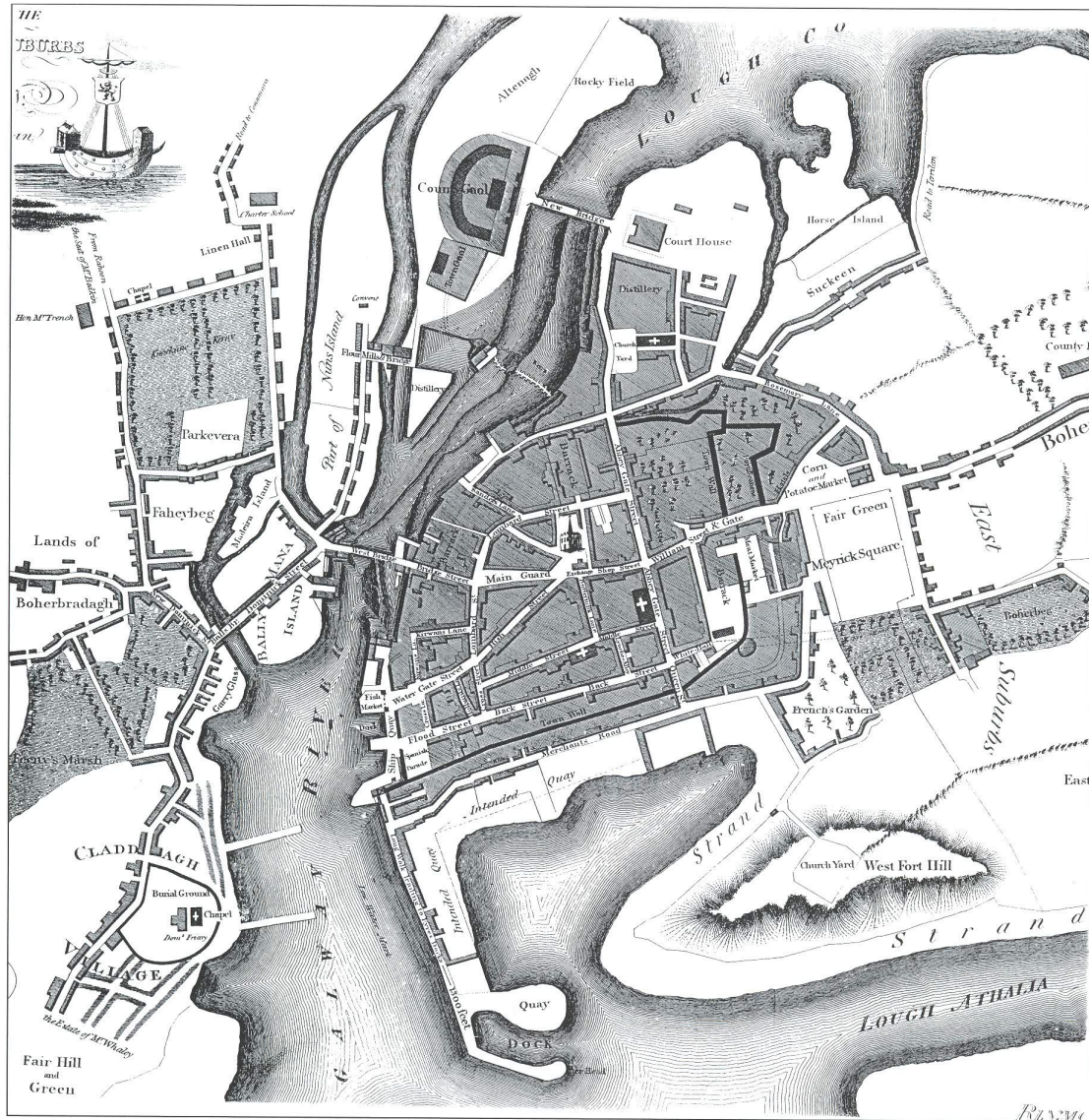


Figure 13.2.14 - Logan's map of Galway (1818)



Figure 13.2.15 - Ordnance Survey 6" Map 1st edition G092 & 084 (1839)

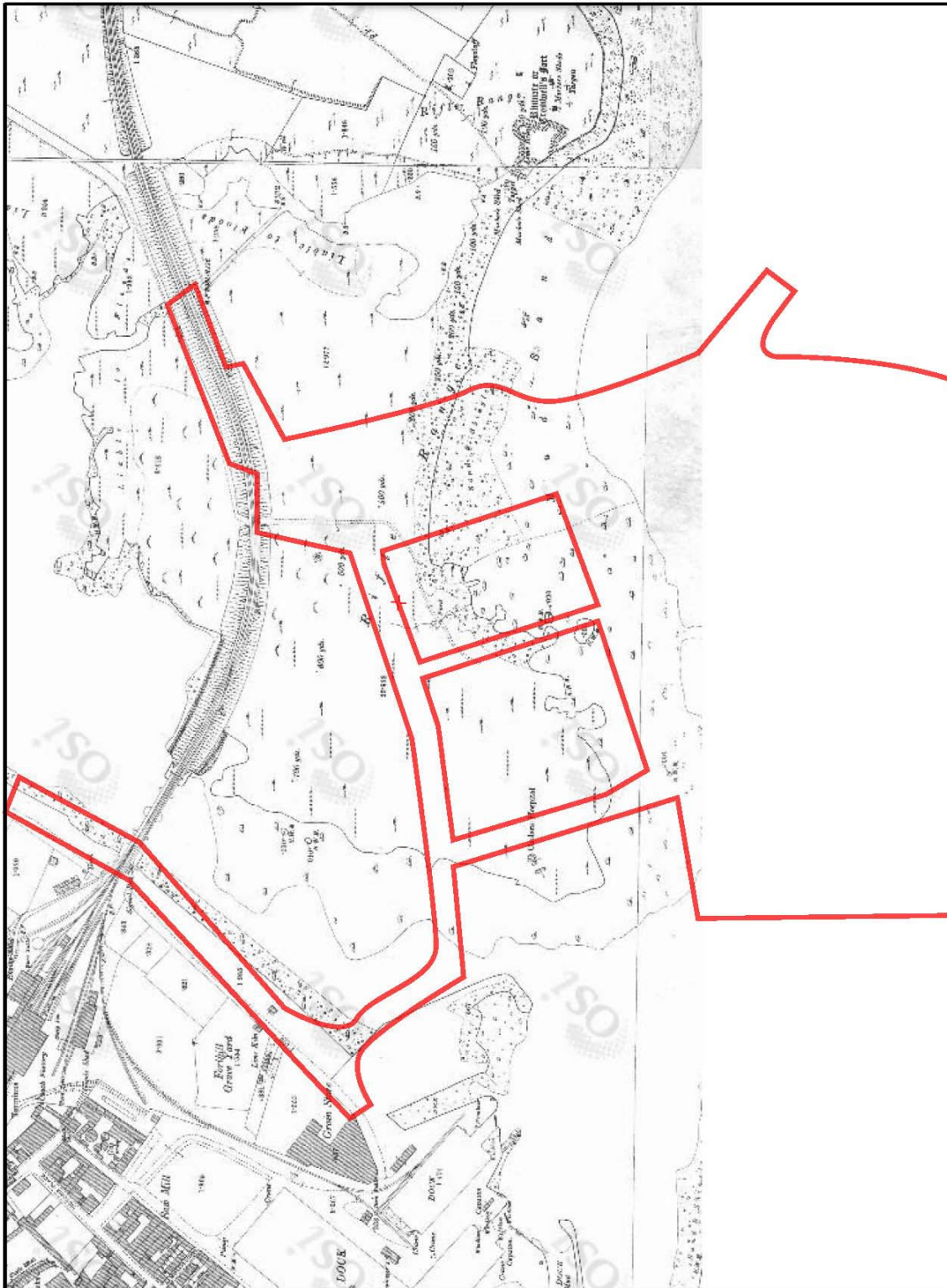


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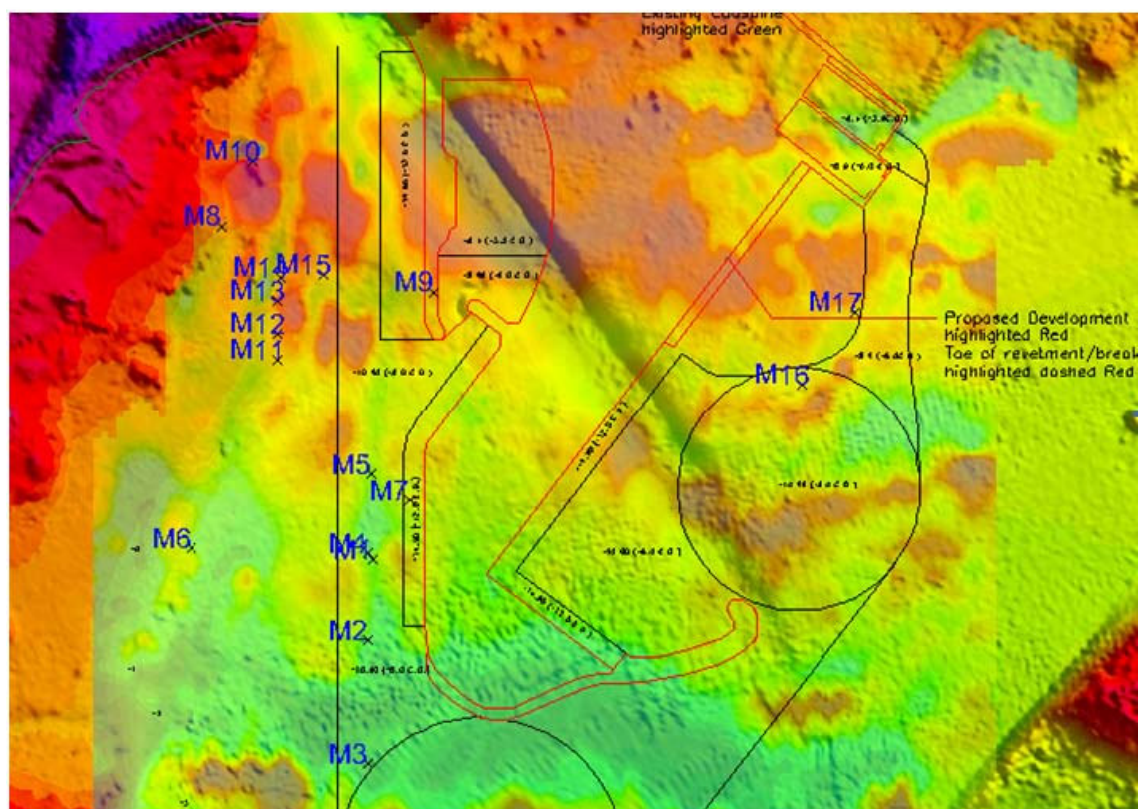


Figure 13.2.17



Figure 13.2.18

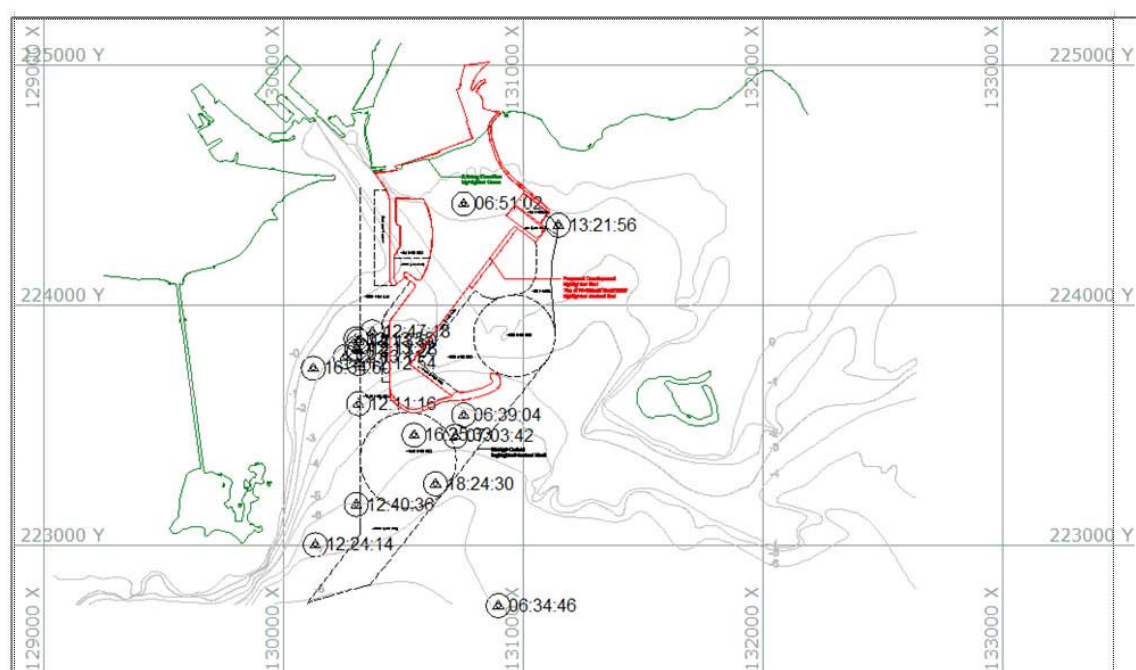


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