
Chapter 14

Archaeology and Cultural Heritage

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14.1 Introduction

This chapter examines the potential impact on the archaeological and cultural heritage resource of the proposed flood defence scheme immediately north of the River Suir at Waterford City (Plate 14.1).

This study determines, as far as reasonably possible from existing records, the nature of the archaeological resource within the proposed development area using appropriate methods of study. In order to provide an appropriate archaeological context, the wider vicinity was also examined. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (ClfA 2014). This leads to the following:

- Determining the presence of known archaeological heritage sites that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme; and
- Suggested mitigation measures based upon the results of the above research.

The assessment involved detailed interrogation of the archaeological and historical background of the development area. This included information from the Record of Monuments and Places of County Waterford, the County and City Development Plans, the topographical files of the National Museum of Ireland and cartographic and documentary records. Aerial photographs of the assessment area held by Ordnance Survey Ireland were also consulted. A field inspection was carried out during March 2021 in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the study area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid or reduce such adverse impacts.



Plate 14.1 Location of the Proposed Development

14.1.1 Definitions

In order to assess, distil and present the findings of this assessment, the following definitions apply. 'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological and cultural heritage features, where –

- the term '*archaeological heritage*' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places);
- the term '*cultural heritage*', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations. This designation can also accompany an archaeological or architectural designation.

As assessment of the potential architectural heritage impacts is presented in Chapter 15 Archaeological Heritage of this EIAR.

14.1.2 Statutory Instruments and Guidance

In the first instance, the scope of the EIAR has been determined with regard to the statutory instruments and regulations relating to EIAR and related guidance from the European Union, the Government and the EPA. These include the following:-

14.1.2.1 EU Directives / Legislation

- The EU Directives on Environmental Impact Assessment (85/337/EEC as amended by 97/11/EC, 2003/35/EC, 2009/31/EC (codified in 2011/92/EU) and 2014/52/EU)
- The Planning and Development Act, 2000 (as amended)
- The Planning and Development Regulations, 2001 (as amended)
- National Monuments Acts, 1930-2014;

- The Planning and Development (Strategic Infrastructure) Bill, 2006;
- Heritage Act, 1995;
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Local Government (Planning and Development) Act 2000;

14.1.2.2 EIA and related Guidance

- EPA, 2002, *Guidelines on the Information to be contained in Environmental Impact Statements*
- EPA, 2003, *Advice Notes on Current Practice in the preparation of Environmental Impact Statements*
- EPA, 2015, *Advice Notes for preparing Environmental Impact Statements* (Draft)
- EPA, 2017, *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft)
- European Commission, 2017, *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report*
- DHPCLG, 2018, *Circular PL05/2018 – Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DHPCLG, 2018, *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DEHLG, 2003, *Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development.*

The scope of the study is also informed by various other sources of relevance to the proper planning and sustainable development of the site.

14.1.3 Terminology

In accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Statements (2002) and Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003), the descriptions in Table 14.1 are used in this EIAR to describe the effects on the environment.

These descriptions take account of updated Guidelines and Advice Notes prepared by the EPA in response to the 2014 EIA Directive, namely: - Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2017) and Draft Advice Notes for preparing Environmental Impact Statements (2015): -

Table 14.1 Description of Effects

The quality of the effects is defined as:-	
<i>Positive effects</i>	A change which improves the quality of the environment (e.g. by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).
<i>Negative effects</i>	A change which reduces the quality of the environment (e.g. lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
<i>Neutral effects</i>	A change which does not affect the quality of the environment.
The significance of the effects is described as:-	
<i>Imperceptible</i>	An effect capable of measurement but without significant consequences.
<i>Not significant</i>	An effect which causes noticeable changes in the character of the environment but without significant consequences.
<i>Slight effects</i>	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
<i>Moderate effects</i>	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
<i>Significant effects</i>	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
<i>Very significant</i>	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
<i>Profound effects</i>	An effect which obliterates sensitive characteristics.
The magnitude of the effect is, where appropriate, indicated as:-	
<i>Extent</i>	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
<i>Duration</i>	Describe the period of time over which the effect will occur. (See further detail below)
<i>Frequency</i>	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
<i>Context</i>	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
The probability of the effect is, where appropriate, indicated as:-	
<i>Likely Effects</i>	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
<i>Unlikely Effects</i>	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
The duration of the effect is, where appropriate, indicated as:-	
<i>Momentary Effects</i>	Effects lasting from seconds to minutes
<i>Brief Effects</i>	Effects lasting less than a day
<i>Temporary Effects</i>	Effects lasting for less than a year
<i>Short-term Effects</i>	Effects lasting one to seven years.
<i>Medium-term Effects</i>	Effects lasting seven to fifteen years.
<i>Long-term Effects</i>	Effects lasting fifteen to sixty years.

The quality of the effects is defined as:-	
<i>Permanent Effects</i>	Effects lasting over sixty years.
<i>Reversible Effects</i>	Effects that can be undone, for example through remediation or restoration
The type of effect is described, where appropriate, as:-	
<i>Cumulative Effects</i>	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
<i>Do-nothing Effects</i>	The environment as it would be in the future should the subject project not be carried out.
<i>Indeterminable Effects</i>	When the full consequences of a change in the environment cannot be described.
<i>Irreversible Effects</i>	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
<i>Residual Effects</i>	The degree of environmental change that will occur <i>after</i> the proposed mitigation measures have taken effect.
<i>Worst-case Effects</i>	The impacts arising from a development in the case where mitigation measures substantially fail.
<i>Synergistic Effects</i>	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SO _x and NO _x to produce smog).
<i>Indirect Effects</i>	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
<i>Secondary Effects</i>	Effects that arise as a consequence of a project (a new waste water treatment plant will reduce the yield of mussels in a nearby estuary).

14.1.4 Consultation

Following the initial research, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the baseline environment, receiving environment and study area, as follows:

- Department of Housing, Local Government and Heritage – the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Shipwreck Inventory, Monuments in State Care Database; Preservation Orders and Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- Waterford City and County Council: Planning Section; and
- Historical and Ordnance Survey Maps.

14.1.5 Methodology

Research for this chapter was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical and cartographic sources. The second phase involved a field inspection of the site.

14.1.6 Paper Survey

The following databases were reviewed as part of the paper survey to determine any existing records relating to the development site:

- Record of Monuments and Places for Counties Waterford and Kilkenny;
- Sites and Monuments Record for Counties Waterford and Kilkenny;
- National Monuments in State Care Database;
- Preservation Orders List;
- Register of Historic Monuments;
- Shipwreck Inventory of Ireland;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Waterford City Development Plan 2013–2019 (as extended);
- Kilkenny County Development Plan 2014-2020;
- Aerial photographs; and
- Excavations Bulletin (1970–2020);

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Service, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites, which also includes records of previous archaeological investigations, are listed on a website maintained by the Department of Housing, Local Government and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the Department of Housing, Local Government and Heritage (DoHLGH) may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Shipwreck Inventory of Ireland contains information gathered from a broad range of cartographic, archaeological and documentary sources, and each entry in the Inventory gives information on the ship's name, type of vessel, port of origin, owner's name, cargo, date of loss and other relevant information where available.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape. The following sources have been reviewed:

- William Petty's Down Survey, Map of the Barony of Ida Igrin Ibercon, c. 1655;
- William Richards and Bernard Scale's Plan of the City and Suburbs of Waterford, 1764;
- Nicholas Sinnott's Map of Waterford, 1830;
- Patrick Leahy's Map of the city of Waterford and its environs..., 1834; and
- Ordnance Survey Mapping 1839-1953.

Documentary sources were consulted to gain background information on the archaeological and cultural heritage landscape of the proposed development area.

Development Plans contain a catalogue of all the Protected Structures and archaeological and architectural sites within the counties of Waterford and Kilkenny. The Waterford City and County Development Plan 2013–2019 (as extended) and the Kilkenny County Development Plan 2014-2020 were consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Google Earth and Bing Maps.

Excavations Bulletin is a summary publication that has been produced every year since 1970. The hard copy publication summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files.

This information is also available within an online database (www.excavations.ie) that covers the years from 1970–2020.

14.1.7 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and historical remains, and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological field inspection was carried out on the 15th of March 2021. Access to the landward side of the development (adjacent to the River Suir) was not possible due to the presence of a live railway track. As such, that section of the inspection was carried out from a boat on the River Suir. The remaining landward sections of the development were inspected on foot. The field inspection entailed -

- Walking the proposed development area and its immediate environs.
- Noting and recording the terrain type and land usage.
- Noting and recording the presence of features of archaeological or historical significance.
- Verifying the extent and condition of any recorded sites.
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

14.2 Description of the Receiving Environment

14.2.1 Archaeological and Historical Background

The proposed development is located along the northern edge of the River Suir, in the townlands of Newrath, County Kilkenny and Mountmisery, County Waterford. A small section of Newrath is also located within County Waterford, due to a slight change in the county boundary at the end of the 19th century. There are no recorded monuments within the site boundary of the proposed development. There are five sites proposed for inclusion in the next revision of the RMP within 200m of the proposed development, including a mound (WA009-017003), two standing stones (WA009-017001/2) and two *fulachtaí fia* (KK046-006004/5) (Plate 14.2). It should be noted that archaeological monitoring of vegetation clearance and of site investigations was carried out at the site of the mound (WA009-017003) and two standing stones (WA009-017001/2) in 2019 as part of a rock stabilisation project. No evidence of any of the sites was identified during the course of these works (Licence 19E0027, Bennett 2019:465).

The zone of archaeological potential associated with the historic settlement of Waterford City, which is a recorded monument, is located c. 260m south of the proposed development.

Whilst the Shipwreck Inventory provides a record of wrecking incidents since 1750, it is not a comprehensive record for earlier events, and therefore the medieval and prehistoric periods are not represented in this archive. Numerous shipwrecks are listed for the coastal water surrounding the Port of Waterford. However, none are listed for the specific area under assessment.

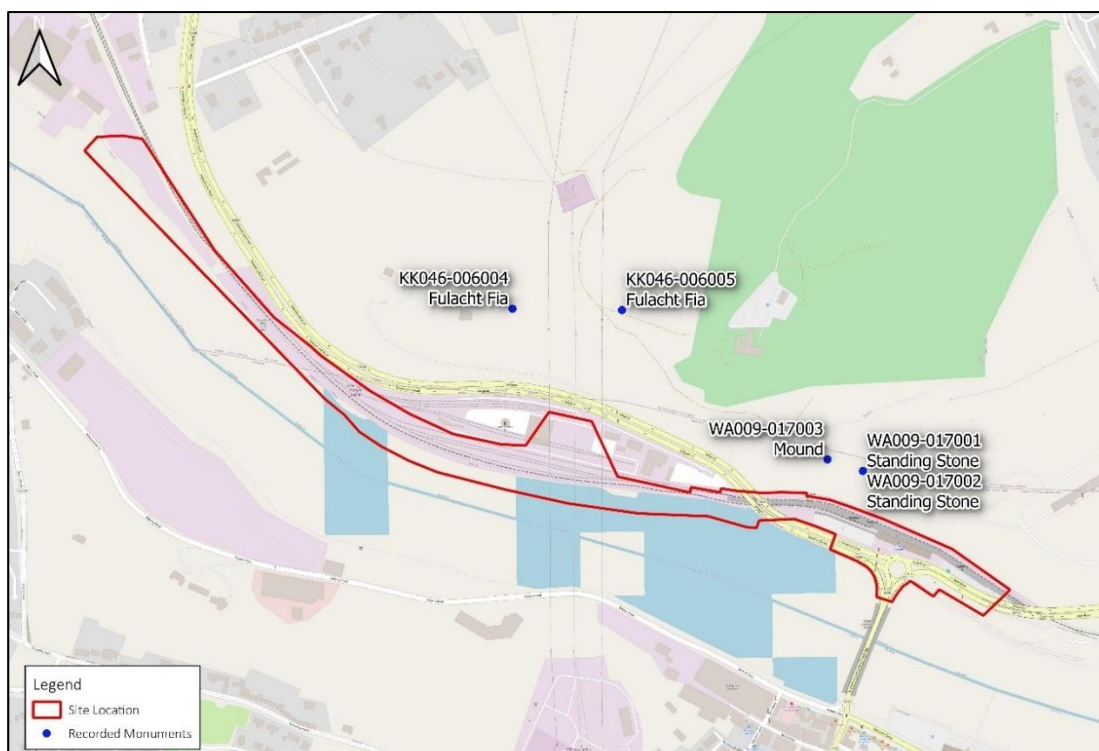


Plate 14.2 Archaeological sites within 200m of the proposed development

14.2.1.1 Prehistoric Period (6000 BC – AD 400)

Although recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden 2016), the Mesolithic period is the earliest time for which there is clear and widespread evidence of prehistoric activity in Ireland (6000-4000 BC). During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. Evidence of settlement during this period is rare, although Mesolithic deposits are typically found within riverine and coastal areas. The first evidence of human occupation in the Waterford area dates to the Mesolithic Period, as seen by the large quantities of Late Mesolithic implements, around 5000 BC, found during the Bally Lough project (Zvelebil et al. 1996). The River Suir would have been an excellent resource for people to utilise in terms of food, water and transport during the prehistoric period.

During the Neolithic period (4000–2500 BC) communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape. Forests were cleared and field boundaries constructed. There was a greater concern for territory, which contributed to the construction of large communal burial monuments called megalithic tombs, which are characteristic of the period. A number of Neolithic tombs are located in the vicinity of Waterford City, such as the portal tomb (WA017-016) located at Ballindud, c. 4.2km to the south and a megalithic structure (WA018-004), located at Ballygunnertemple, c. 5.1km to the southeast. An excavation c. 550m to the west of the proposed development discovered a pit containing a polished stone axehead of Neolithic date (Bennett 2003:1039).

The Bronze Age in Ireland (2500–800 BC) was marked by the use and production of metal for the first time. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The megalithic tomb tradition gradually diminished and was replaced by a focus on the individual in

mortuary practice, with subterranean cist or pit burials that were either in isolation or in small cemeteries becoming common. These burials contained inhumed or cremated remains and were often, but not always, accompanied by a pottery vessel. Settlement traces from the Bronze Age are plentiful in the area surrounding Waterford City. There are two standing stones (WA009-017001/2) of possible Bronze Age origin recorded c. 60m north of the eastern section of the proposed development (see Plate 14.2). Although these sites were recorded by the NMS in 1998, a subsequent visit in 2010 found no evidence of the features, and recent archaeological monitoring at the site failed to identify any trace of the monuments (Licence 19E0027, Bennett 2019:465). A bronze axehead recorded in the National Museum was found in 1836 in 'the suburbs of Waterford'.

The most common Bronze Age site within the archaeological record is the burnt mound or *fulacht fia*. The term *fulacht* or *fulacht fia* is found in early Irish literature from at least the 9th century AD and refers to open air cooking places. Thousands of *fulachta fia* have been recorded in the country making them the most common prehistoric monument in Ireland (Waddell 1998). Although they may have functioned as cooking sites in some cases, many date to the Bronze Age indicating that they significantly predate the cooking sites referred to in early Irish literature (Brindley & Lanting 1990). There are a large number of recorded burnt mounds and *fulachta fia* located within the landscape surrounding Waterford city, two of which are located within the study area of the proposed development (KK046-006004/5) as illustrated in Plate 14.2.

There is increasing evidence for Iron Age (800 BC–AD 500) settlement and activity in recent years as a result of development-led excavations as well as projects such as LIARI (Late Iron Age and Roman Ireland). Yet this period is distinguished from the rather rich material remains of preceding Bronze Age and subsequent early medieval period by a relative paucity of evidence for material culture in Ireland. The Iron Age had traditionally been associated with the arrival of the Celts and the Celtic language in Ireland. The Celts were an Indo-European group who are thought to have originated probably in east-central Europe in the 2nd millennium BC. They were among the earliest to develop an Iron Age culture, as has been found at Hallstatt, Austria (c. 700 BC).

The available evidence suggests that large defensive structures and earthworks known as promontory or hill forts were characteristic of the period. The former is a banked and ditched structure located above a steep cliff or bluff and often found in coastal areas. The hill fort or hill top enclosures are very interesting in that they are frequently multi-period in date. As a result, their dating is problematic but there appears to be some consensus that their peak use and greatest extents are dated to the Iron Age (Raftery 1994). There is no recorded evidence of Iron Age activity in the vicinity of the proposed development.

14.2.1.2 Early Medieval Period (AD 500–1169)

The foundation of Waterford as a city dates to the Viking Age when the city stretched along the waterfront between Barronstrand Street and The Mall. The earliest date for the city itself is generally accepted as c. AD 912-33. Waterford began as a defended Viking longphort or ship-fortress and became Ireland's second city after Dublin. The original name, *Vedrarfjodr* is an Old Norse name likely meaning 'windy fiord'. Its great parchment book (1361–1649) represents the earliest use of the English language in Ireland for official purposes and demonstrates the importance of the city as the regionally pre-eminent port in the medieval period. The town developed from an early fort at Reginald's Tower, along the ridge of high ground which eventually became High Street and Peter Street. It was laid out in a regular, chequered street pattern. Excavations at the western limit of the early town at Bakehouse Lane indicate the

earliest fortifications comprised an earthen bank, constructed from the spoil of a deep moat-like ditch topped by a wooden palisade. Later during the 12th century, just before the Anglo-Norman invasion, the bank was fortified further by a stone wall. Material dated from underneath this bank gave an approximate date of between AD 898 and 920 (Scully, unpublished).

The proposed development is located along the northern bank of the river, 675m to the northwest of the Viking settlement.

14.2.1.3 Medieval Period (AD 1169–1600)

In 1170, Waterford City was captured by Anglo-Norman forces led by Richard de Clare, known as 'Strongbow', and Dermot McMurrugh, King of Leinster. King Henry II landed there the following year and received the submissions of the kings of Desmond and Thomond (Bradley & Halpin 1992). Waterford was retained by the Crown as a royal city and under this royal patronage it developed into one of the most important and prosperous towns in medieval Ireland. Waterford continued to thrive and prosper and between 1224 and 1246 three murage grants were given to Waterford to increase the walled area of the city and to accommodate the growing population which had reached the height of its power by the early 14th century under the reign of King Edward I (McEneaney 2001, 23). Following the arrival of the Normans the city expanded westwards, presenting a longer frontage to the river.

During the 13th and 14th centuries, Waterford and New Ross accounted for more than half of all Irish trade (*ibid.*). Trade rivalry between these two towns continued from the 13th to the 16th century. Waterford was involved in the trading of wine with Bordeaux, including acting as an entrepot, such as in 1300 when 3000 hogsheads of wine were re-exported to supply King Edward I's army in Scotland (Barry 1995) as well as with towns such as Southampton, Chester and Bristol.

The medieval period was also characterised by the foundation of a large number of ecclesiastical sites throughout Ireland in the centuries following the introduction of Christianity in the 5th century AD. These early churches tended to be constructed of wood or post-and-wattle. Between the late 8th and 10th centuries, mortared stone churches gradually replaced the earlier structures. Many of the sites, some of which were monastic foundations, were originally defined by an enclosing wall or bank. In addition to the cathedral, there were seven parish churches in Waterford city. On the north bank of the River Suir is the site of the parish church of Kilculliheen (WA009-008), dating to 1151, located c. 1km to the southeast of the proposed development. This is likely to have been an Arroasian convent founded as a priory of St Mary de Hogges (Dublin) by Dermot Mac Murrough, becoming an abbey in 1257.

14.2.1.4 Post-Medieval Period (Ad 1600–1900)

Waterford remained the second city in Ireland throughout the 16th century, due to a flourishing trade industry. This declined by the end of the century due to the curtailment of trade with Spain and the situation worsened during the religious and social upheavals of the 17th century. The city was later revived by a new quay construction in the early 18th century, which involved the demolition of waterfront fortifications and half-timbered houses in the area. This was undertaken during the mayoralty of David Lewis Esq.; Ryland states that '*the quay was greatly enlarged, by throwing down the town walls. He also threw down Baron-strand gate; filled the great ditch, which then joined that gate and the town wall; and made a communication between the old quay and the new. The present quay and several of the fine buildings on it, including the exchange, were commenced in his time*' (Ryland 1824, 178-9). By the mid-18th century, the south quays stretched along the full length of the city's river

frontage, from Reginald's Tower and The Mall in the east, to the Graving Bank in the west, around the site of the present Grattan Quay.

The improved quay allowed for trade with North America as well as with England and the Continent. Up to the end of the 18th century the ferry across the river was also extremely important to Waterford, as there was no bridge over the River Suir. The closest bridging point on the river being Carrick-on-Suir, c. 30km upstream. The 300m width of the river presented a major problem in terms of bridge construction until the end of the 18th century when Lemuel Cox, designed and constructed a timber trestle bridge that was completed in January 1794 and survived more than a century until it was replaced by a ferro-concrete bridge in 1910. This, in turn, was replaced by the present bridge, the Edmund Rice Bridge. The bridge greatly improved communications with the northern hinterland of Waterford including the landscape containing the proposed development, which had been hitherto cut off from the bustling city to the south.

The period of economic depression that followed the Napoleonic wars led to a collapse of trade in some sectors. The city became industrialised with the development of steam power and the advent of railway, with as many as six lines into and out of the city. By the opening years of the 20th century the most significant change along the northern bank of the Suir was the arrival of the railway. Waterford had received its first railway connection in 1854 with the opening of a line to Kilkenny by the Waterford and Kilkenny Railway Company and another to Limerick by the Waterford and Limerick Railway Company. These lines terminated to the west of Waterford Bridge and the station on the present site opened in 1864. A siding was constructed to Ferrybank in 1883 to serve Hall's Flour Mills and in 1904 the main line was continued through Ferrybank and onward to New Ross, while a second line opened to Rosslare in 1906. Today, the active railway line to Limerick and Plunkett Station are located to the immediate north of the proposed flood defences, the purpose of which is to prevent flooding along the railway track.

14.2.1.5 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970-2020) revealed no previous archaeological investigations have been carried out within the proposed development boundary to date.

Archaeological monitoring of vegetation clearance and of site investigations was carried out at the site of a mound (WA009-017003) and two standing stones (WA009-017001/2) recorded in 1998, as part of a rock stabilisation project. The site had been revisited by the National Monuments Service in 2010 and no evidence of the recorded monuments was located at that time. While monitoring encountered some small recumbent erratics, none of these correlated to the dimensions of the standing stones recorded earlier (Licence 19E0027, Bennett 2019:465).

Archaeological test trenching was undertaken c. 175m to the northeast of the proposed development for a large mixed-use development known as Waterford City Quays at the time of the works (Licence 09E0030). A total of 19 trenches were excavated but no archaeology was found (Bennett 2009:504).

In 2018 an underwater assessment was carried out within the River Suir, from the north quays to the immediate east of the proposed development and the existing Edmund Rice Bridge for the River Suir Sustainable Transport Bridge (O'Donoghue and McCarthy, 2018, Licence Refs: 18R0180, 18D0108). This section of the north quay is characterised by a 540m long concrete quay comprising concrete decking, supported on concrete piles. It is protected by fenders consisting of wooden vertical piles and

horizontal braces. The quay is in a state of disrepair and in particular the wooden fenders are considerably degraded. Behind this concrete quay are the remains of an earlier stone quay wall extending east for c. 480m from the bridge. The stone quay measures between 2.1m and 2.8m in height above the adjacent riverbed. It is constructed from coursed squared limestone blocks and contains multiple culverts and iron mooring rings. Some of the original timber fenders survive albeit in a very poor state of preservation. Multiple repairs and rebuilding phases are visible on the quay wall.

14.2.2 Cartographic Analysis

14.2.2.1 *William Petty's Down Survey, Map of the Barony of Ida Igrin Ibercon c. 1655 (Plate 14.3)*

The approximate study area for the proposed development is shown on Plate 14.3 by a red box, the northern bank of the River Suir, to the north of the City and Liberties of Waterford. No structures or features of archaeological potential are shown. A gibbet (KK046-007) recorded in the RMP to the north is marked on the boundary of Rathnew and Kilculliheen. Five houses and the parish church of Kilculliheen and abbey remains (WA009-008) are depicted to the east of the proposed development.

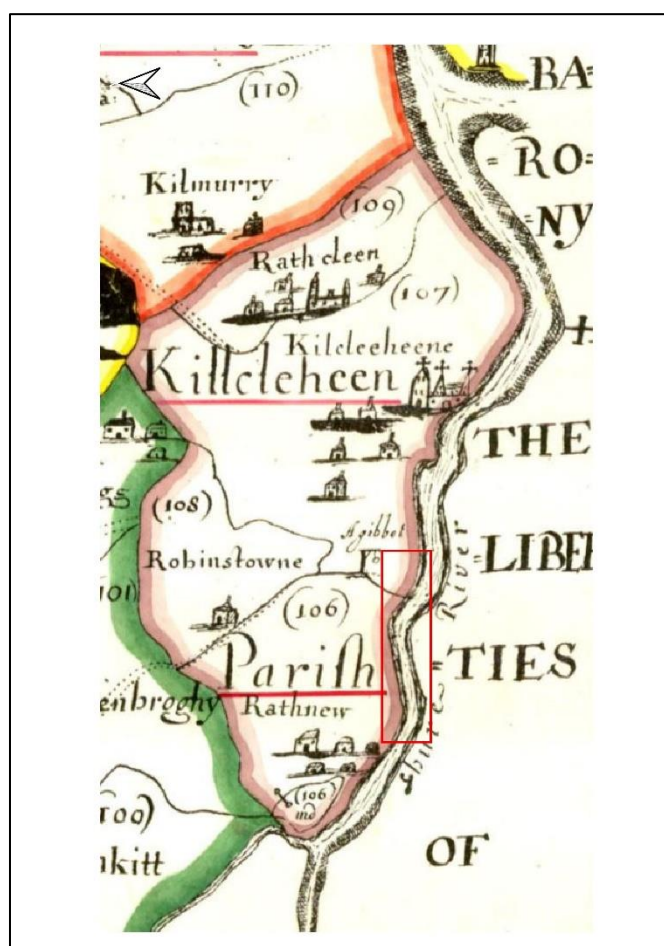


Plate 14.3 Extract from Down Survey of c. 1655 showing the approximate location of the proposed development

14.2.2.2 *William Richards and Bernard Scale's Plan of the City and Suburbs of Waterford, 1764 (Plate 14.4)*

This historic map depicts the city and suburbs of Waterford, including a narrow section of the northern bank within the margin. No bridge is shown crossing the River Suir

although a ferry boat slip is marked on the south bank directly opposite Ferrybank. Very little of the northern bank is depicted, though a small settlement is shown at Mount Sion and Ferrybank to the east of the proposed development. The area of the proposed development, where it is shown, remains undeveloped and lies in open fields.

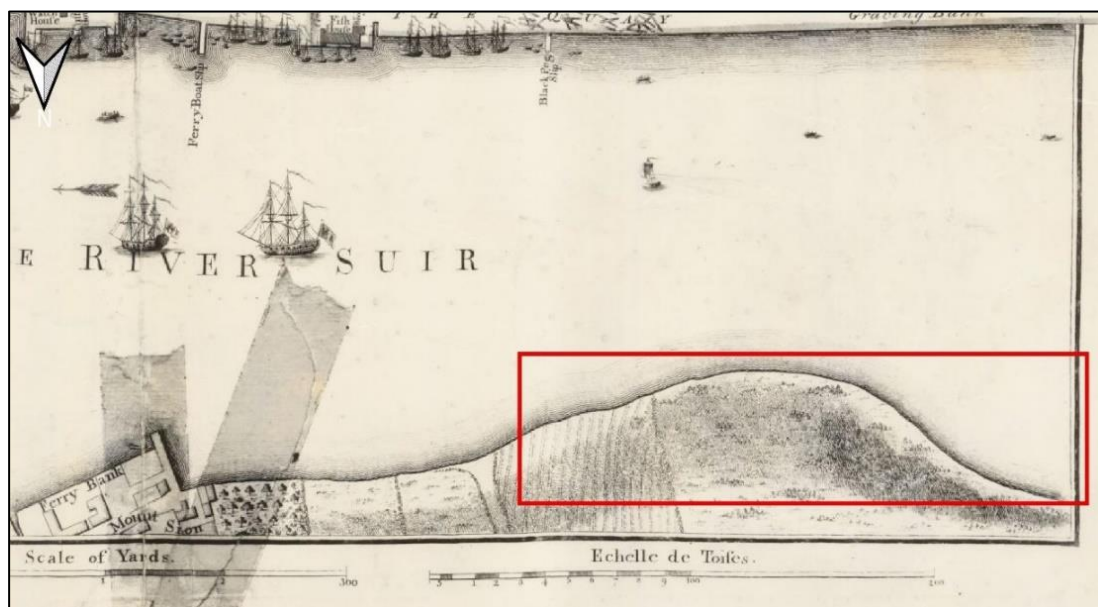


Plate 14.4 Extract from Richards and Scale map of 1764 showing the approximate location of the proposed development

14.2.2.3 Nicholas Sinnott's Map of Waterford, 1830 (Plate 14.5)

By this time, the wooden bridge has been constructed across the river in the approximate location of the current bridge. A road is now shown running west–east parallel with the river, along the route of the modern R711 and R448. To the north of the bridge a semi-circular scarp area appears to indicate a former quarry. The quayside to the east has been developed with numerous warehouses and storehouses indicated on the approach to Ferrybank. A number of structures are also indicated in the vicinity of the northern side of the bridge which would be within the proposed development boundary.



Plate 14.5 Extract from Sinnott's map of 1830 showing the approximate location of the proposed development

14.2.2.4 *Patrick Leahy's Map of the city of Waterford and its environs..., 1834*

There are no major changes to the area of the proposed development by this mapping, which was published only four years later.

14.2.2.5 *First Edition Ordnance Survey Map, 1839-41, scale 1:10,560*

The study area extends through the townlands of Mountmisery and Newrath. At this time the wooden bridge is shown with a Toll Gate marked on the northern bank of the River Suir. A group of structures are depicted in the immediate vicinity of the bridge's northern extent. The small demesne of Mountmisery Lodge is depicted to the immediate northeast of the proposed development. Newrath House is also shown with a short laneway leading to the main roadway.

The northern bank of the river within the proposed development does not follow the edge of the quays as present today, suggesting that the quay edge was not established until the construction of the railways and siding, which is first mapped in later OS mapping (Plates 14.7a/b below).

14.2.2.6 *Ordnance Survey Map, 1871, scale 1:1,250 (Plate 14.6)*

Only a small portion of the eastern part of the proposed development is depicted on this map. The wooden bridge across the Suir is depicted with a central draw bridge. On the northern bank, the Waterford and Limerick Railway Terminus has been established within the proposed development boundary, with the rail lines extending westwards. A number of terraced structures are shown lining the north of Dock Road and Terminus Street. The landscaped gardens of Knockane Villa (formerly Mountmisery Lodge) are shown to the northeast.

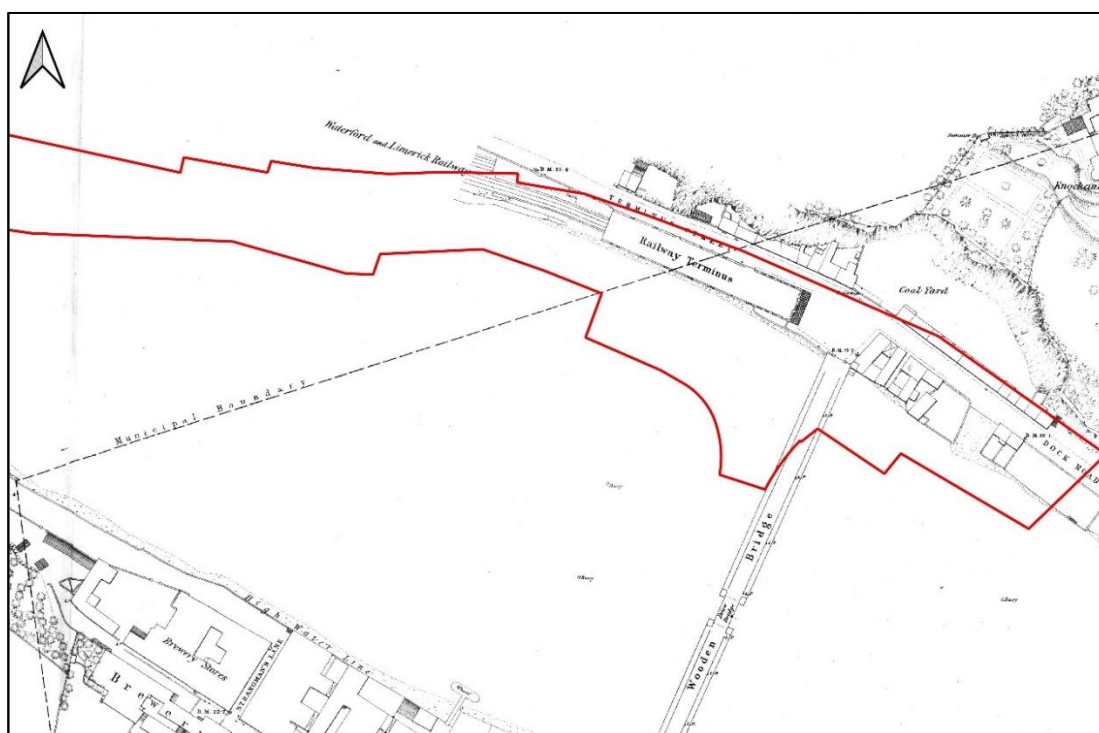


Plate 14.6 Extract from OS map of 1871 showing the eastern section of the proposed development

14.2.2.7 *Ordnance Survey Map, 1903/1907, scale 1:2,500 (Plate 14.7a/b)*

As noted above, by the time of this mapping, the railway to the north of the proposed development area has expanded significantly. Within the eastern section of the proposed development site, Plunkett Station is at this time known as 'Waterford North

Station' and is shown with a number of platforms to the north of the wooden bridge across the Suir. Ten landing stages are depicted along the river's edge to the west and a number of Goods Sheds, platforms and turn tables are shown to the west of the main station. Newrath House is depicted with two small laneways leading south and southwest to the main road. Knockane Villa (formerly Mountmisy Lodge) is also shown to the northeast. The Newrath Road appears to cross the railway via a bridge.

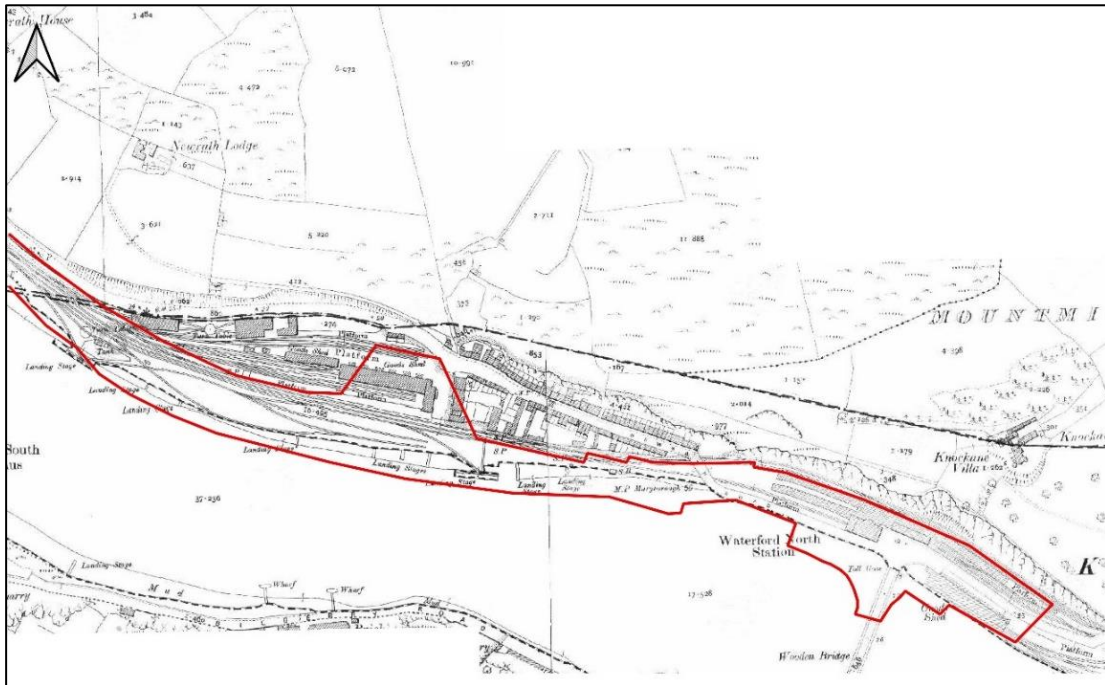


Plate 14.7a Extract from OS map of 1903/7 showing the east of the proposed development

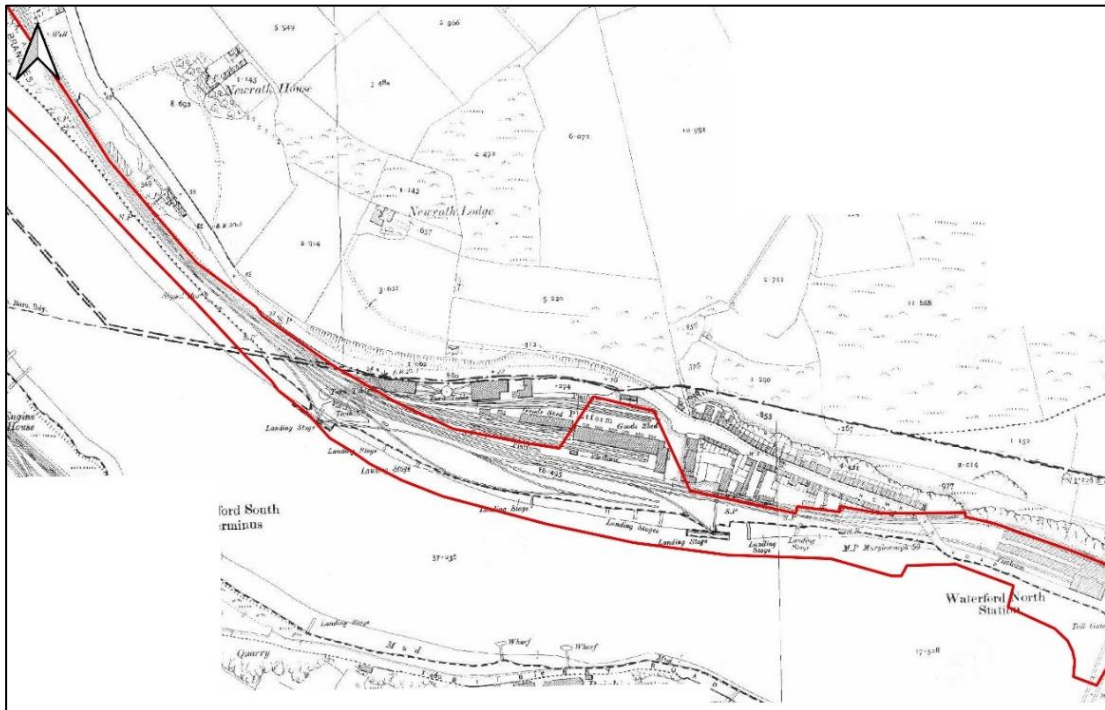


Plate 14.7b Extract from OS map of 1903/7 showing the west of the proposed development

14.2.2.8 Ordnance Survey Map, 1909, scale 1:1,250 (Plate 14.8)

Only a portion of the eastern part of the proposed development is shown on this mapping of 1909. 'Waterford North Station' is shown with a number of platforms. A signal box is shown for the first time. A number of slips, wharfs and landing stages are depicted extending into the River Suir from the north bank of the river. Knockane Villa (formerly Mountmisery Lodge) is again depicted to the northeast. There are no major changes to note within the mapping.

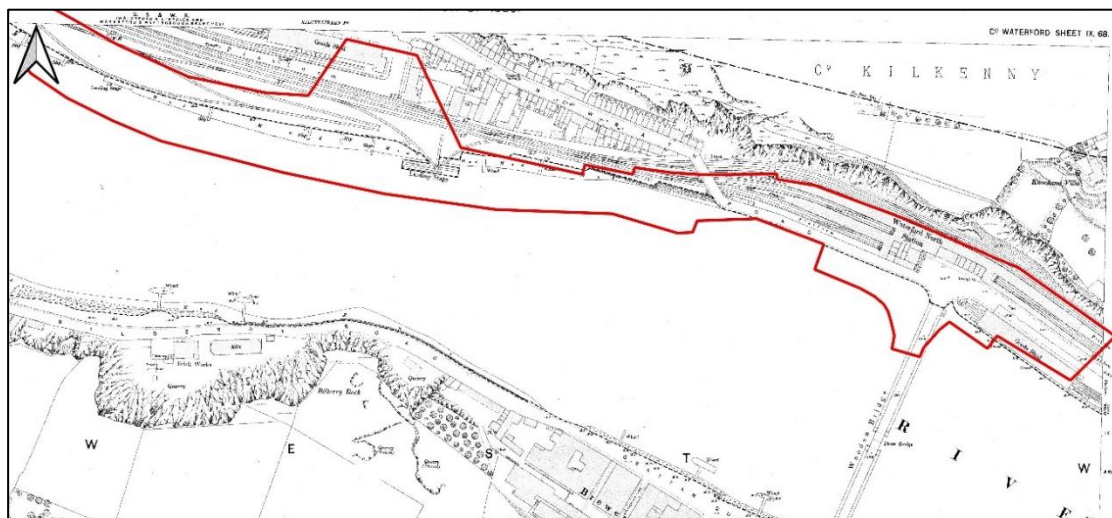


Plate 14.8 Extract from OS map of 1909 showing the eastern part of the proposed development

14.2.2.9 Third Edition Ordnance Survey Map, 1953, scale 1:10,560

There is little change to the railway structures within the proposed development boundary by the time of this map. To the west of the proposed development a Manure Works has been established. Only two of the landing stages formerly located within the proposed development site remain depicted within this mapping.

14.2.3 Development Plans

14.2.3.1 Archaeological Heritage

The Waterford City Development Plan (2013–2019- as extended) and the Kilkenny County Development Plan (2014-2020) recognise the statutory protection afforded to all recorded monuments under the National Monuments Legislation (1930–2014). The policies and objectives relating to archaeology are included in Appendix 14.2, whilst the sites themselves are described in Appendix 14.1.

There are no recorded monuments within the proposed development boundary. There are five archaeological sites proposed for inclusion in the next revision of the RMP within 200m of the development (Table 14.2). None of these sites are National Monuments in State Care or subject to a Preservation Order.

Table 14.2 Recorded Monuments within 200m of the proposed development

RMP/SMR No.	Location	Classification	Distance from development
WA009-017002	Mountmisery, Waterford	Standing stone	c. 60m north
WA009-017001	Mountmisery, Waterford	Standing stone	c. 60m north

RMP/SMR No.	Location	Classification	Distance from development
WA009-017003	Mountmisery, Waterford	Mound	c. 63m north
KK046-006004	Newrath, Kilkenny	<i>Fulacht fia</i>	c. 174m north
KK046-006005	Newrath, Kilkenny	<i>Fulacht fia</i>	c. 178m north

14.2.4 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development held by the Ordnance Survey (1995-2013), Google Earth (2008-2020) and Bing Maps (2021) did not reveal any previously unknown archaeological features due to the built-up nature of the site. The extensive railway features occupy a large portion of the proposed development and its immediate environs. The construction of the Newrath Link Road can be seen in the satellite imagery.

14.2.5 Topographical Files of National Museum of Ireland

Information on artefact finds from the study area in Counties Waterford and Kilkenny has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A review of the Topographical Files held by the National Museum of Ireland revealed that no stray finds have been recorded within the proposed development or its immediate environs.

14.2.6 Cultural Heritage

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural; however, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. There are no specific sites of cultural heritage significance within the study area of the proposed development area, however the archaeological sites discussed above, along with the later 19th century railway infrastructure are of cultural heritage significance. This is further added to by the townlands and placename analysis detailed below.

14.2.6.1 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174).

Prior to the Anglo-Norman invasion of Ireland, Ireland was made up of numerous small territories and kingdoms with frequent conflicts between these groups. Gaelic land ownership required a clear definition of the territories held by each group and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid.* 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on

paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid.*). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south, and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

The proposed development is located within the townlands of Mountmisery, County Waterford and Newrath, County Kilkenny. The townland boundary within the proposed development boundary has long since been removed to facilitate the development of the railway. The county boundary between Kilkenny to the north and Waterford to the south also passes through the proposed development boundary; however, in this case, the boundary is not a physical boundary. It should be noted that the county boundary was slightly altered in the late 19th century, meaning that a small section of Newrath townland is now in County Waterford.

14.2.6.2 Toponymy of Placenames

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main references used for the place name analysis are *Irish Local Names Explained* by P.W Joyce (1870) and www.logainm.ie. A description and possible explanation of each townland name in the environs of the proposed development are provided in the below table.

Table 14.3 Placename Analysis

Townlands	Derivation	Possible Meaning
Mountmisery	Unclear but may relate to the site of a gibbet on the townland boundary (KK046-007)	-
Newrath	An Ráth Nua	The new ringfort
Kilculliheen	Cill Choilchín	Church of Coilchín

14.2.7 Results of Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography and any additional information relevant to the report. Access to the landside of the proposed development was not possible due to the presence of live railway tracks. Due to current Covid-19 restrictions and the required health and safety for live railway track access, the inspection was carried out on a boat from the River Suir. The accessible sections of the development area were inspected on foot and photographic surveys compiled for ecological survey and geotechnical surveys in 2018 were also reviewed. Features identified during the field inspection are identified on Plate 14.12.

The proposed development will see the replacement of the existing northern quay wall along the bank of the River Suir. The existing Edmund Rice Bridge and section of the R448 are constructed within the river on concrete piles with a rear concrete wall (Plates 14.9). As the north quay emerges from beneath the R448 it is visible as a partially covered section of random rubble masonry, with supporting timber fenders, topped by a concrete parapet wall. At a projecting corner (indicated on Plate 14.9), the wall becomes more substantial, although the concrete parapet remains present.



Plate 14.9 Quay wall beneath the R448, facing north

The timber fenders are only present for a short distance and for c. 58m, the quay wall remains partially obscured behind silt and is formed by roughly coursed limestone masonry topped with a concrete wall (Plate 14.10). As indicated on Plate 14.10, the wall formation changes to a more roughly coursed construction with narrower stones, which continues for c. 102m. The historic mapping dating to 1903/7, shows two landing stages along this section of quay, although no remains of such features were noted during the field inspection. The walling along this section remains denuded and has been affected by the insertion of an outfall (Plate 14.11).

Approximately 160m west of the R448 are the remains of an abutment, which once formed part of a larger landing stage marked on the 1903/7 OS map (Plates 14.12 to 14.13). The abutment has been formed by coursed blocks of limestone masonry and is capped with concrete and a modern metal railing. The face of the abutment has been heavily patched with concrete and has been subject to subsidence and is gradually collapsing. There are no obvious remains of the landing stage associated with the abutment remaining.



Plate 14.10 Quay wall to the west of the R448, facing north



Plate 14.11 Quay wall to the west of Plate 14.10, showing outfall and denuded wall, facing north

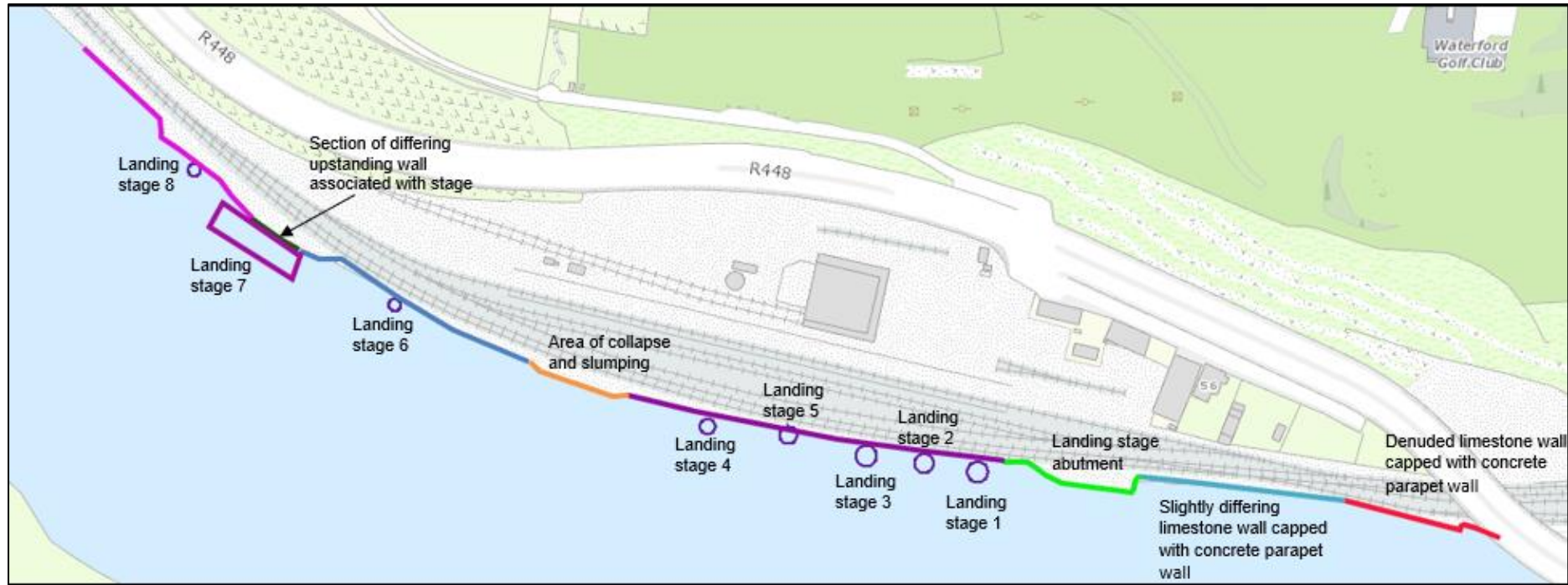


Plate 14.12 Features identified during field inspection



Plate 14.13 Eastern section of landing stage, facing north



Plate 14.14 Western section of landing stage, facing north

The section of quay wall running 180m west from the remains of the landing stage is of roughly coursed limestone masonry topped by concrete and a modern metal fence that bounds the railway lines. The remains of five landing stages were noted within the river silts, immediately adjacent to the quay wall. These are formed by denuded vertical timber piles that likely once supported horizontal timbers and a platform in order to be able to unload cargo from boats to the trains. Four of the stages are marked within the 1903/07 mapping (1-4, Plates 14.15 to Plate 14.17), whereas the fifth is likely to represent a similar feature and is formed by four upright and adjacent piles, parallel but not immediately adjacent to the quay wall.

At the western end of this section of quay wall are a number of surviving timber fenders shown in Plate 14.18 and after this point the wall has been subject to collapse for a short distance. A denuded section of wall continues west after the collapse, which has slumped down considerably, towards the water level (Plate 14.19).



Plate 14.15 Landing stage 1, facing north



Plate 14.16 Landing stage 2, facing north

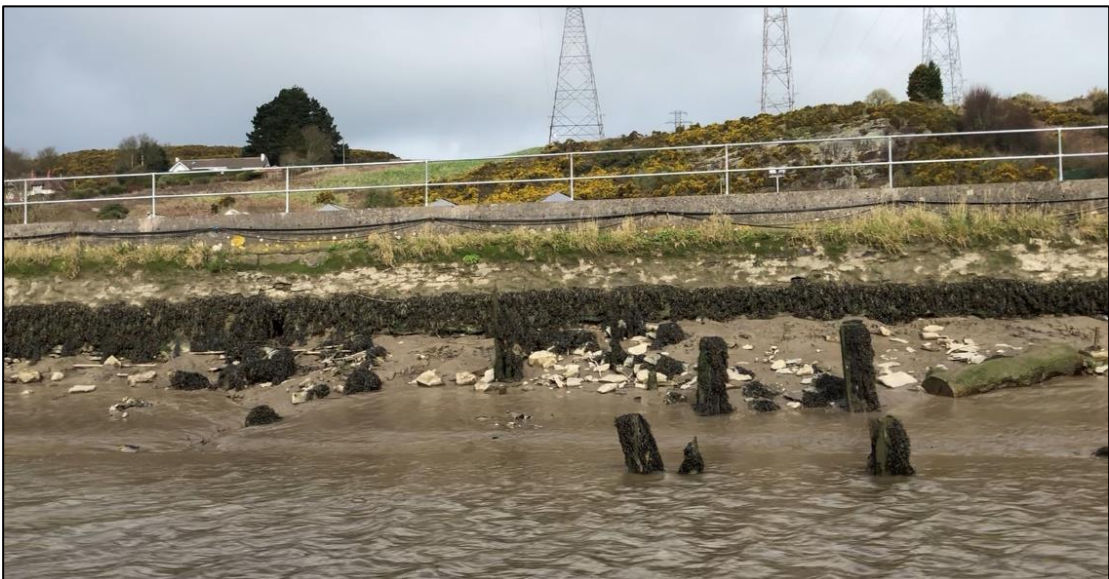


Plate 14.17 Landing stage 3, facing north



Plate 14.18 Timber fenders along quay wall and area of adjacent collapse, facing north-northeast



Plate 14.19 Slumping quay wall, facing north-northeast and adjacent fenders

After the area of collapse, there is a stretch of quay wall measuring c. 127m in length, which comprises roughly coursed limestone blocks, capped with a concrete parapet wall. The historic mapping shows two landing stages along with section of the quay and the remains of one were noted in the inspection (landing stage 6), which is formed by four denuded vertical wooden piles (Plate 14.20). To the immediate west of this section of walling is the remains of a substantial timber landing stage (7), formed by 18 bays of vertical wooden piles, with some horizontal bracing pieces still in-situ. The stage measures c. 45m WNW-ESE by 14m NNE-SSW (Plate 14.21- to Plate 14.22) and is marked on the 1903/07 OS map.

To the rear of the landing stage the quay wall differs and includes a taller section of walling on top of the quay wall measuring 27m in length. It possesses some low, partially blocked opes (architectural term for openings) and is constructed from masonry but in poor condition. The purpose of the wall, which is visible in Plate 14.21 to Plate 14.22, is unclear but it may have formed part a boundary prevented access to the railway infrastructure to the north (marked on the 1903/07 mapping).



Plate 14.20 Landing stage 6, facing north-northeast



Plate 14.21 Eastern section of landing stage 7, facing north-northeast



Plate 14.22 Western section of landing stage 7, facing north-northeast



Plate 14.23 Landing stage 8, facing north-northeast

To the northwest of landing stage 7 is the remains of another probable stage, formed by four denuded vertical timber piles (Plate 14.23). The quay wall continues along the edge of the river for 120m before extending beyond the edge of the proposed development. The wall is characterised by roughly coursed limestone masonry but is not capped by concrete or a modern parapet.

The proposed main compound area is located to the northwest of the main site of the development (quay wall replacement), refer to Figure 4.21 in Volume 3 of this EIAR. It is currently formed by a level area of hard standing, in between the railway tracks to the east, an inlet to the northwest and the river bank to the west. The compound contains a section of the early 20th century iron railway bridge, the remainder of which crosses the river c. 700m to the northwest (Plate 14.24) and is listed as a protected structure (RPS WA731015).



Plate 14.24 Section of iron railway bridge within the compound area, facing north



Plate 14.25 Inlet and modern structure to the north of the compound area, facing northeast

The eastern section of the proposed development area is formed by the existing road network and the car park associated with the existing railway station. The construction of the modern roads and railway station has removed any former structures or archaeological features in the area. The area to the north of the proposed flood defences is formed by live railway tracks. Whilst the railway tracks survive, none of the post medieval structures associated with the railway are present today with much of the area characterised with modern industrial buildings.

14.2.8 Summary of the Receiving Environment

The proposed Flood Defences West is located along the northern bank and within the foreshore of the River Suir, to the west of the Edmund Rice Bridge, within the townlands of Newrath, County Kilkenny and Mountmisery, County Waterford. Due to a slight realignment of the county boundary, a small section of Newrath is also included in County Waterford. There are no recorded monuments within the proposed development boundary. There are five sites proposed for inclusion in the next revision of the RMP within 200m of the proposed development, including a mound (WA009-017003), two standing stones (WA009-017001/2) and two *fulachta fia* (KK046-006004/5).

A review of the Excavations Bulletin (1970-2020) revealed no previous archaeological investigations have been carried out within the proposed development boundary. Previous archaeological investigations in the vicinity of the mound (WA009-017003) and two standing stones (WA009-017001/2) as part of rock stabilisation works in 2019, failed to identify any evidence of the monuments recorded in 1998. An underwater survey along the quays to the east of the development area revealed the former north quay walls hidden by later modern concrete piles. The structure is masonry built but in poor condition.

Cartographic sources depict the proposed development area as occupied by the railway lines and associated infrastructure from the mid-19th century onwards. The development of the railway is clearly visible in the historic mapping. The current quay wall within the development area is directly associated with the railway and is contemporary with the construction of the expanded railway infrastructure during the

late 19th century. It is likely that the quay wall was constructed in order to facilitate the stability of the railway tracks and also the loading and unloading of cargo from shipping.

A review of the Topographical Files held by the National Museum of Ireland revealed that no stray finds have been recorded within the proposed development boundary or its immediate environs.

A field inspection of the development area along the river was carried out from the River Suir, due to the fact that there was no access from the live railway tracks to the immediate north of the quay wall. The eastern section of the development area (including the car park associated with the existing train station) was inspected on foot. A total of eight post medieval landing stages were identified in varying states of preservation along the northern bank of the River Suir. These timber structures facilitated the transfer of goods from shipping to the railway. A further masonry abutment was identified, that was built into the quay wall and once formed part of a landing stage, the timber elements of which have disappeared. The largest landing stage is located at the northern end of the proposed development and comprises 18 bays of timber piles covering an area measuring 45m in length, which extend into the river by 14m.

The quay wall is extant, for the most part, along the length of the northern bank of the river, with some timber fenders still in-situ. One area of collapse and slumping was noted, although this section may be more recent in terms of a construction date. The remaining wall comprises roughly coursed limestone masonry that survives in moderate condition, although sections have covered over by river silts. Portions of the wall are either capped with concrete or a concrete parapet wall. At the site of the largest landing stage, a taller section of stone wall (27m in length) is located on top of the quay wall and although in poor condition, perhaps once formed part of the landing stage and railway infrastructure. Whilst the riverbank has been impacted by railway infrastructure, the overall archaeological potential of the landscape is considered to be high, due to the presence of a major watercourse. Large rivers have been utilised from prehistory onwards as a resource for food and transport and were often used for ritual deposition during the prehistoric periods.

The proposed main construction compound at the western site boundary of the proposed Flood Defences West, currently contains a section of the iron railway bridge, the remaining sections of which are in-situ across the river, c. 700m to the northwest. The main construction compound area is covered with hard standing and occupies rough ground in between the river and the railway tracks.

The eastern section of the development area is characterised by the car park associated with the existing train station. The car park is formed by an area of level, tarmacked surface. No archaeological features were noted within this area, due to the level of modern development that has occurred.

14.3 Description of Potential Impacts

14.3.1 Archaeology

No direct or indirect impacts will occur on the recorded archaeological resource, either during the construction or operation of the proposed development.

For the purposes of this assessment, the existing quay wall and riverine features are included in the archaeological impact assessment, as detailed below.

The proposed development will require the demolition and removal of the uppermost part of the existing quay wall (typically concrete capping/parapet wall and some masonry blocks) and existing handrails. The quay wall is not a recorded monument or a protected structure. The top of the wall extends up to 1.3m above ground level between Ch.355 and Ch.425, while from Ch.425 to Ch.900 it is approximately at level with the existing ground. The wall will be demolished to approximately 800mm below the existing ground level from Ch.355 to Ch.900. Approximately 25m of the quay wall will be demolished above and below ground (between approx. Ch.375 and Ch.400) to facilitate the construction of an underground pumping station at Ch.380. A small section of the quay wall (up to 3m) at Ch.900 will also be demolished to connect the landside and the riverside sections of the new sheet pile wall. The remainder of the wall will then be covered in, by the installation of the sheet piles and the backfilling of material between the riverside sheet piles and the existing wall, as part of the proposed development. The wall will not be demolished where sheet piles are positioned on landside after Ch.900 (up to Ch. 1090). Here, the sheet pile wall will be installed behind the quay wall. The location of the proposed sheet pile flood defence wall is shown in Figure 4.1 to 4.6 in Volume 3 of this EIAR.

The demolition of sections of the quay wall, including the landing stage abutment, but not including the wall associated with landing stage 7, will result in a *direct, negative, significant*, impact on the archaeological resource. No direct impacts are predicted upon the remains of the timber landing stages that have been identified as part of this assessment.

As part of the development, two existing outfalls will be replaced (at Ch.470 and Ch.490) and a new outfall will also be constructed at Ch. 390. The location of the works is shown on Figure 4.12 to 4.17 in Volume 3. The new and upgraded outfalls will extend approx. 6m into the riverbed and groundworks will be required to demolish 2 no. existing outfall structures and erect the new outfalls. The areas required for works will be defined by a temporary cofferdam for the duration of the new constructions. No specific features were identified in the area of the outfalls, although the historic mapping does indicate two landing stages along this section of the quay. No remains of these were identified during the field inspection. It is possible that ground disturbances associated with the construction of the outfalls may have a *direct, negative*, impact on archaeological features or deposits that have the potential to survive behind the riverbed. Impacts, prior to the application of mitigation, may range from negative, *moderate to very significant* in scale.

It remains possible that ground disturbances associated with the proposed development may have a *direct, negative*, impact on archaeological features or deposits that have the potential to survive behind the quay walls proposed for demolition or during any other associated ground works. Impacts, prior to the application of mitigation, may range from *negative, moderate to very significant* in scale.

The eastern section of the proposed development area is characterised by the existing train station and modern car park. Excavations associated with drainage and services will be required in this area as part of the development. Although the area has been disturbed, it remains possible that ground disturbances associated with the proposed development may have a *direct, negative*, impact on archaeological features or deposits that have the potential to survive below the existing ground level. Impacts, prior to the application of mitigation, may range from *negative, moderate to very significant* in scale.

14.3.2 Cultural Heritage

In addition to the above, it is possible that works associated with the proposed main construction compound may result in a *direct, negative* impact on the section of iron railway bridge that currently occupies the site.

14.4 Mitigation & Monitoring Measures

14.4.1 Archaeology

In order to ameliorate any negative impacts upon the archaeological resource, a full intertidal and wade/dive survey will be carried out along the sections of the existing quay wall to be directly impacted by the works and at the location of the upgraded and proposed outfalls. The survey will include a photogrammetry survey of the wall to be demolished (from Ch.350 to Ch.900), along with the mapping and recording of the former landing stages. All timber landing stages will be avoided during the course of works. The survey will also include a metal detecting survey and all works will be carried out by a suitably qualified underwater archaeologist, under licence to the National Monuments Service of the DoHLGH.

All ground disturbances associated with the works along the River Suir will be monitored by a suitably qualified underwater archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH).

All ground disturbances associated with excavations within the car park associated with the existing train station will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH).

14.4.2 Cultural Heritage

The section of the iron railway bridge that currently occupies the works compound will be left in-situ and undisturbed by contractors.

14.5 Residual Impacts

Following the implementation of the above mitigation measures, there will be no residual impacts upon the archaeological and cultural heritage resource.

14.6 Difficulties Encountered

No access to the landward side of the proposed scheme was possible during field inspections and as such the quay wall was inspected from a boat in the River Suir. It should be noted that photographs from an ecological survey and geotechnical survey, carried out in 2018, were also reviewed in order to supplement the field inspection.

14.7 References

- Barry, T. 1995 in Howard B Clarke (ed.), *Irish Cities*, 204-217.
- Bennett, I. (ed.) 1987–2010 *Excavations: Summary Accounts of Archaeological Excavations in Ireland*. Bray. Wordwell.
- Bradley, J. & Halpin, A. 1992 The topographical development of Scandinavian and Anglo-Norman Waterford. In W. Nolan and T. P. Power (eds), *Waterford: History and Society*, 105-129.
- Chartered Institute for Archaeologists 2014a *Standards & Guidance for Field Evaluation*.
- Chartered Institute for Archaeologists 2014b *Standards & Guidance for Archaeological Excavation*.
- Chartered Institute for Archaeologists 2014c *Standards & Guidance for an Archaeological Watching Brief (Monitoring)*.
- Culleton E. (ed.) 1999 *Treasures of The Landscape; Townland Names by An Tathair Seamas S. De Vaal* Dublin: Trinity College.
- Department of Arts, Heritage, Gaeltacht and the Islands. 1999a *Framework and Principles for the Protection of the Archaeological Heritage*. Dublin. Government Publications Office.
- Department of Arts, Heritage, Gaeltacht and the Islands. 1999b *Policy and Guidelines on Archaeological Excavation*. Dublin. Government Publications Office.
- Dowd, M. and Carden, R. 2016 First evidence of a Late Upper Palaeolithic human presence in Ireland. *Quaternary Science Reviews*: 158-163.
- Environmental Protection Agency. 2015 *Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Dublin. Government Publications Office.
- Environmental Protection Agency. 2017 *Draft Guidelines on the Information to be Contained in Environmental Impact Statements*. Dublin. Government Publications Office.
- Kilkenny County Development Plan 2014-2020
- Lewis, S. 1837 (online edition) *Topographical Dictionary of Ireland*.
- MacCotter, P. 2008. *Medieval Ireland: Territorial, Political and Economic Divisions*. Four Courts Press, Dublin
- McEneaney, E., 2001 *Discover Waterford*. O'Brien Press.
- McErlean, T. 1983 "The Irish townland system of landscape organisation". In Reeves-Smyth, Terence; Hamond, Fred (eds) *Landscape Archaeology in Ireland* BAR British Series 116. pp. 315–39
- National Monuments Service, Department of Housing, Local Government and Heritage, Counties Waterford and Kilkenny.

- National Museum of Ireland. Topographical Files, Counties Waterford and Kilkenny.
- Raftery, B. 1994 Pagan Celtic Ireland. London: Thames and Hudson
- Ryland, R.H. 1824 The History, Topography and Antiquities of the County and City of Waterford. London (reprint).
- Scully, Ó. (unpublished a) Preliminary report on the excavations and monitoring at the Theatre Royal and Deanery Gardens Waterford, C348, E4019.
- Smith, C. 1746 State of the County and City of Waterford: Being a Natural, Civil, Ecclesiastical, Historical and Topographical Description thereof. Reprinted 1969, Mercier Press, Cork.
- Waterford City Development Plan, 2013-2019 (as extended).
- Waddell, J. 1998 The Prehistoric Archaeology of Ireland. Galway. Galway University Press.
- Zvelebil, M., Macklin, M.G., Passmore, D.G. & Ramsden, P. 1996 Alluvial archaeology in the Barrow Valley, Southeast Ireland: The Riverford Culture re-visited. The Journal of Irish Archaeology: 13-40.

Cartographic Sources

- William Petty, Down Survey, Map of the Barony of Ida Igrin Ibercon, c. 1655
- William Richards and Bernard Scale, Plan of the City and Suburbs of Waterford, 1764
- Nicholas Sinnott, Map of Waterford, 1830
- Patrick Leahy, Map of the city of Waterford and its environs..., 1834
- Ordnance Survey Mapping 1839-1953

Electronic Sources

- www.excavations.ie – Summary of archaeological excavation from 1970–2020.
- www.archaeology.ie –DoH/LGH website listing all SMR/RMP sites.
- www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural and natural heritage.
- www.googleearth.com – Satellite imagery of the proposed development area.
- www.bingmaps.com – Satellite imagery of the proposed development area.
- www.booksulster.com/library/plnm/placenamesC.php - Contains the text from Irish Local Names Explained by P.W Joyce (1870).

Appendix 14.1

SMR/RMP Sites Within the Surrounding Area

APPENDIX 14.1 SMR/RMP Sites Within The Surrounding Area

SMR No.	WA009-017001
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Mountmisery
Parish	Kilculliheen
Barony	Kilculliheen
I.T.M.	660165/613203
Classification	Standing stone
Dist. From Development	c. 60m north
Description	Situated on a scrub-covered, SW-facing slope, on top of a S-facing cliff which overlooks the River Suir and Waterford City. Two conglomerate stones, placed 20m apart, form an alignment-oriented ENE-WSW. The W stone has a diamond-shaped cross-section (dims. 0.6m x 0.35m; H 1.2m) and is oriented E-W. The E stone has a square cross-section (dims. 0.6m x 0.45m; H 1.45m). A mound (WA009-017003-) is 30m to W. Although recorded in 1998, it was not present in 2010.
Reference	www.archaeology.ie/ SMR file

SMR No.	WA009-017002
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Mountmisery
Parish	Kilculliheen
Barony	Kilculliheen
I.T.M.	660165/613203
Classification	Standing stone
Dist. From Development	c. 60m north
Description	Situated on a scrub-covered, SW-facing slope, on top of a S-facing cliff which overlooks the River Suir and Waterford City. Two conglomerate stones, placed 20m apart, form an alignment-oriented ENE-WSW. The W stone has a diamond-shaped cross-section (dims. 0.6m x 0.35m; H 1.2m) and is oriented E-W. The E stone has a square cross-section (dims. 0.6m x 0.45m; H 1.45m). A mound (WA009-017003-) is 30m to W. Although recorded in 1998, it was not present in 2010.
Reference	www.archaeology.ie/ SMR file

SMR No.	WA009-017003
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Mountmisery
Parish	Kilculliheen
Barony	Kilculliheen
I.T.M.	660112/613221
Classification	Mound

Dist. From Development	c. 63m north
Description	Situated on a steep scrub-covered, SW-facing slope, on top of a S-facing cliff which overlooks the River Suir and Waterford City. Circular grass- and fern-covered, flat-topped mound (dims. at top 6.5m N-S; 6m E-W; dims. at base 9.5m N-S; 8.8m E-W; H 0.2m at N (upslope) to 1m at S). Stone pair (WA009-017002-) is 30m to E. Although recorded in 1998, it was not present in 2010.
Reference	www.archaeology.ie/ SMR file

SMR No.	KK046-006004
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Newrath
Parish	Kilculliheen
Barony	Kilculliheen
I.T.M.	659651,613441
Classification	<i>Fulacht fia</i>
Dist. From Development	c. 174m north
Description	No information available
Reference	www.archaeology.ie/ SMR file

SMR No.	KK046-006005
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Newrath
Parish	Kilculliheen
Barony	Kilculliheen
I.T.M.	659811,613440
Classification	<i>Fulacht fia</i>
Dist. From Development	c. 178m north
Description	No information available
Reference	www.archaeology.ie/ SMR file

Appendix 14.2

Legislation Protecting the Archaeological Resource

APPENDIX 14.2

Legislation Protecting the Archaeological Resource

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Housing, Local Government and Heritage) to establish and maintain a record of monuments and places where the Minister believes that such

monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989*, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Waterford City Development Plan 2013 - 2019

The Development Plan contains the following policies with regard to the archaeological resource:

POL 10.1.1: To protect and enhance archaeological monuments and their settings including city walls, embankments and ditches, gates, bastions or ancillary fortifications, church sites and associated graveyards and other monuments.

POL 10.1.3: To protect the archaeological heritage of the City as a source and instrument for historical and scientific study.

POL 10.1.4: To facilitate appropriate guidance in relation to the protection of the archaeological heritage of the City.

POL 10.1.5: To promote pre-planning consultations in relation to the archaeological heritage with the Planning Authority and with the National Monuments Service, Department of Arts, Heritage & the Gaeltacht.

POL 10.1.7: To promote the use of the archaeological heritage of the City as an educational, cultural and tourism resource and to promote public access and awareness of this rich archaeological heritage.

It is an objective of Waterford City Development Plan:

OBJ 10.1.1: To secure the preservation (in-situ or by record) of all sites and features of historical and archaeological interest.

OBJ 10.1.2: To preserve the integrity of existing archaeological monuments in their settings including the integrity of city defences and to ensure that development in the vicinity of a site of archaeological interest does not unduly affect the character of the archaeological site or its setting by reason of its location, scale, bulk or detailing.

OBJ 10.1.3: In securing such preservation, and with regard to proposed development and/or works within or in the vicinity of archaeological monuments in Local Authority or State ownership or guardianship (i.e. National Monuments) to consult and to have regard to the advice and recommendations of the National Monuments Service, the Department of Arts, Heritage & the Gaeltacht, authorization/Ministerial Consent may be required to proceed under Section 14 of the National Monuments Acts.

OBJ 10.1.4: To seek to retain the existing street layout, including laneways, historic building lines and traditional plot widths where these derive from medieval or earlier origins.

OBJ 10.1.5: When considering development in the vicinity of upstanding archaeological/historical monuments, to aim to achieve a satisfactory buffer area between the development and the monument in order to ensure the preservation and enhancement of the amenity associated with the presence of upstanding monuments within the historic urban pattern.

OBJ 10.1.6: In considering development in the vicinity of all upstanding monuments, including city defences, or development that may have implications for archaeological heritage, the Planning Authority will require the preparation and submission of an archaeological assessment report detailing the potential impact of the development on the archaeological heritage including upstanding, buried structures and deposits. The report will also include a visual impact assessment to ensure adequate consideration of any potential visual impact the proposed development may have on any upstanding remains.

OBJ 10.1.7: To promote the incorporation of or reference to significant archaeological finds in a development, where appropriate, through layout, displays, signage, plaques, information panels or use of historic place names.

OBJ 10.1.8: To provide guidance for developers, based on the experience of the archaeological environment in Waterford, and guidelines on development issued by the National Monuments Service, Department of Arts, Heritage & the Gaeltacht and the Department of the Environment, Community and Local Government, in order to ensure that the degree of commitment to a development in terms of finance and programme, may be planned in relation to Waterford City Development Plan 2013 - 2019 the degree of uncertainty concerning the archaeology and the stages in its clarification and resolution.

Kilkenny County Development Plan 2014 - 2020

The Development Plan contains the following policies with regard to the archaeological resource:

- Endeavour to preserve in situ all archaeological monuments, whether on land or underwater, listed in the Record of Monuments and Places (RMP), and any newly discovered archaeological sites, features, or objects by requiring that archaeological remains are identified and fully considered at the very earliest stages of the development process and that schemes are designed to avoid impacting on the archaeological heritage.
- To require archaeological assessment, surveys, test excavation and/or monitoring for planning applications in areas of archaeological importance if a development proposal is likely to impact upon in-situ archaeological monuments, their setting and archaeological remains.
- Ensure that development within the vicinity of a Recorded Monument is sited and designed appropriately so that it does not seriously detract from the setting of the feature or its zone of archaeological potential. Where upstanding remains of a Recorded Monument exist a visual impact assessment may be required to fully determine the effect of any proposed development.
- Require the retention of surviving medieval plots and street patterns and to facilitate the recording of evidence of ancient boundaries, layouts etc. in the course of development.
- Safeguard the importance of significant archaeological or historic landscapes from developments that would unduly sever or disrupt the relationship, connectivity and/or inter-visibility between sites.

Appendix 14.3

Impact Assessment and the Cultural Heritage Resource

APPENDIX 14.3

Impact Assessment And The Cultural Heritage Resource

Potential Impacts on Archaeological and Historical Remains

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;

- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

Appendix 14.4

Mitigation Measures and the Cultural Heritage Resource

APPENDIX 14.4 Mitigation Measures And The Cultural Heritage Resource

Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved in situ.

Definition of Mitigation Strategies

Archaeological Resource

The ideal mitigation for all archaeological sites is preservation in situ. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation in situ are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (ClfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (ClfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive' (ClfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

