
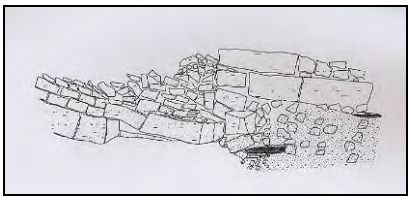
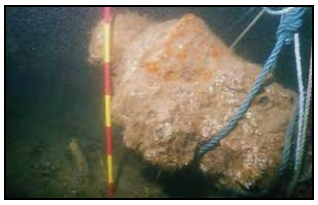

UNDERWATER & INTER-TIDAL ARCHAEOLOGICAL ASSESSMENT RIVER LIFFEY, 100M WEST OF O'CONNELL BRIDGE TO BUTT BRIDGE, DUBLIN CITY

08D094, 08R310

Client: The Railway Procurement Agency

THE ARCHAEOLOGICAL DIVING COMPANY LTD.

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08D094, 08R310

27 January 2008

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THE ARCHAEOLOGICAL DIVING COMPANY LTD.

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EXECUTIVE SUMMARY

The Archaeological Diving Company Ltd (ADCO) was appointed by Irish Archaeological Consultancy Ltd (IAC), on behalf of the Railway Procurement Agency (RPA), to conduct non-disturbance quayside, inter-tidal, and underwater archaeological assessment of the River Liffey between O'Connell Bridge and Butt Bridge. The inter-tidal and underwater assessment was conducted on 9th-12th December 2008; licence numbers 08D094 and 08R310. The assessment was undertaken in a systematic manner across both the inter-tidal and sub-tidal zones. Survey data was logged and position-fixed using a hand-held GPS unit and a Total Station EDM.

The survey area lies within an area of river reclamation, undertaken in the late seventeenth-century, delineated by Eden Quay to the North and Burgh Quay to the South. These quay structures were both constructed c.1800, quayside development within along the River Liffey having largely taken place towards the end of the eighteenth-century and into the early part of nineteenth-century.

The area under assessment retains a number of features of historic interest that include two nineteenth-century quayside structures (Burgh Quay and Eden Quay), a bridge structure of late eighteenth and nineteenth-century date (Carlisle/ O'Connell Bridge), and a nineteenth-century timber revetment associated with Burgh Quay. In addition, a possible fording-point was encountered upstream of O'Connell Bridge.

The first bridge structure to be constructed within the area under assessment was Carlisle Bridge, completed in 1794. This structure provided a crossing point between Sackvillle Street (now O'Connell Street) and Westmoreland Street. This crossing replaced a ferry service that operated c.40m upstream of the existing O'Connell Street Bridge. Carlisle Bridge was the fourth (masonry) bridge structure to have been built across the River Liffey during the eighteenth-century. The bridge, a low slung, triple-arched structure represented the easternmost bridge

crossing located along the Liffey and its presence helped push the focus of maritime activity eastwards to the newly re-claimed lands east of Custom House Quay. Carlisle Bridge was widened in 1880 to accommodate increased traffic volumes present within in the city. The bridge was subsequently re-named O'Connell Bridge.

It is proposed that the Metro North alignment will cross in tunnel under the River Liffey at the site of O'Connell Bridge. This will not directly affect any of the upstanding features of the bridge structure. A temporary pontoon with decking area will be constructed to the east of O'Connell Bridge and a temporary, decked, bailey-bridge will also be constructed to facilitate traffic management during the construction phase. The bailey bridge will cross the River Liffey to the east of the proposed new Marlborough Bridge, c.100m downstream of O'Connell Bridge. Marlborough Bridge is to be constructed by Dublin City Council and will provide a link from Marlborough Street to the south, and Hawkins Street to the north. This development will impact both of the existing quayside structures located downstream of O'Connell Bridge. The following report provides a detailed account of the existing river environment and is supported by detailed survey of any features encountered as part of the assessment.

This report recommends that no further archaeological pre-construction requirements are necessary prior to commencement of the proposed development. However, Archaeological monitoring, licensed to the Department of the Environment, Heritage and Local Government (DoEHLG), is recommended during all construction works associated with the project. This monitoring process should be conducted on all riverbed and landside ground disturbance activities, with the proviso to resolve fully any archaeological material that becomes apparent.

Recommendations are subject to the approval of the Department of the Environment, Heritage and Local Government (DoEHLG).

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1.0 INTRODUCTION

The Archaeological Diving Company Ltd (ADCO) was appointed by Irish Archaeological Consultancy Ltd (IAC), on behalf of the Railway Procurement Agency (RPA), to conduct a non-disturbance quayside, inter-tidal, and underwater archaeological assessment of the River Liffey, commencing 100m upstream of O'Connell Bridge and continuing downstream to Butt Bridge (Figure 1, Plate 1). The work was conducted under licence from the Department of the Environment, Heritage and Local Government (DoEHLG) as a non-disturbance underwater inspection and metal-detection survey on 9th-12th December 2008; licence numbers 08D094 (Dive Survey Licence) and 08R310 (Detection Device Licence). The survey area is located between National Grid Coordinates: 315867E, 234346N (upstream) and 316249E, 234469N (downstream).

The survey sought to provide a detailed account of the existing riverside environment at this location, supported by detailed survey data to record the historic features present. In addition, a detailed desktop study of relevant archaeological publications and related unpublished archives in the DoEHLG and the National Museum of Ireland (NMI) was undertaken to provide a comprehensive overview of the receiving environment; allowing all impacts arising from the proposed development to be fully assessed and a strategy for their resolution to be implemented.

2.0 PROPOSED DEVELOPMENT

It is proposed that the Metro North alignment will cross under the River Liffey at the site of O'Connell Bridge. The alignment will be contained in tunnels drilled through the limestone bedrock *c*.28m beneath the River Liffey. To accommodate construction of Metro North, a temporary pontoon decking area will be constructed to the east of O'Connell Bridge (Figure 2). A temporary decked bailey-bridge will also be constructed in order to facilitate traffic management for the construction phase of the project. The bailey-bridge will be located on the River Liffey to the east of the proposed new Marlborough Bridge. The proposed Marlborough Bridge is to be built by Dublin County Council and will provide a link from Marlborough Street in the south to Hawkins Street in the north (Figure 3).

3.0 RECEIVING ENVIRONMENT

Historic Development along the River Liffey

The River Liffey rises at an elevation of 540m above sea level near Kippure in the Wicklow Mountains, *c.*20km south of Dublin. The river forms a large arc as it flows westward, then northward, and finally eastwards through Dublin City to its confluence with the Irish Sea at Dublin Bay. It flows over a range of different geological formations; from granite, to sandstone, to sandstone–limestone and finally pure limestone. The River Liffey has a drainage catchment area of just over 1380 km².

The assessment area extends 100m upstream (west) and *c*.200m downstream (east) of O'Connell Bridge, located within the busy urban commercial area of Dublin City centre (Figure 4). The river survey area is tidal in nature, being located c.3km east of Dublin Bay and the Irish Sea. Extensive reclamation of the river floodplain has been undertaken since the seventeenth-century. This reclamation and adaptation of the natural environment was extended to the river as it flowed through the city; the river currently being delineated by a series of eighteenth and nineteenth-century quayside structures.

The river divides the Dublin city into its north and the south sides and has provided the need for numerous river crossings. Ancient ferry crossings and fording points would have facilitated this requirement, later being superseded by wooden bridges and a series of masonry bridges. Historical evidence indicates a river fording point was in use from at least the early medieval period onwards (fifth to tenth-century AD). It is thought to have been situated near the rivers mouth and was known as *Áth Cliath* or 'ford of the wickerwork, wattles or hurdles'.[1] In addition, there are references in the fifteenth and sixteenth-century to fords and shallow places between the bridge of Dublin and the island of Clontarf and a ford passing between Dame's Gate to St. Mary's Abbey (around 700m west of the current assessment area). It would appear that the latter crossing point was a well-known and much used ford leading from the Fownes Street-Eustace Street area on the south side to Jervis Street on the north side.[2]

[1] Clarke, H., (ed.) Medieval Dublin: The Making of a Metropolis, Irish Academic Press, Blackrock, 1990, 57, 110
[2] Ryan, J., 'Pre-Norman Dublin', in Howard Clarke, (ed.) Medieval Dublin: The Making of a Metropolis, 1990, 111

Reference to an early bridge across the River Liffey dates to 1214 when King John gave permission to build a new bridge within Dublin and leave was given to demolish the old bridge; 'should the citizens desire to do so in order to defray expenses'. This early bridge would have been situated upstream, allowing the unhindered access of shipping to Wood Quay and Merchant's Quay. The bridge is thought to have been located at the site of Father Mathew Bridge (previously Dublin Bridge) constructed in 1916. [3]

The majority of Liffey bridges date from between the late eightieth and late nineteenth-century; ten masonry bridges being re-built or constructed between 1764 and 1879. At present a total of sixteen bridges transect the River Liffey from Sean Heuston Bridge (built 1829, previously Sarsfield Bridge) to the west and Link Bridge (built 1984) to the east. The two bridges located within the river assessment area were constructed in the nineteenth-century, O'Connell Bridge (replacing Carlisle Bridge) was constructed in 1880 and Butt Bridge in 1879. The proposed Marlbourgh Street Bridge will represent the latest addition to this set of bridges, the preceding bridge-build being the James Joyce Bridge located at Blackhall Place (built in 2003).

Maritime activity within the River Liffey is documented from the eighth-century onwards and it is clear that the area under assessment has a long history of human landscape intervention, adapting the topography of the river to conditions favourable for navigation and anchorage of vessels within the area. Excavations at Winetavern Street and Wood Quay uncovered large wooden revetments dating to around 1200AD. These structures are thought to form part of an early reclamation and dockside area at Wood Quay.[4] In addition, extensive seventeenth to nineteenth-century land reclamation was undertaken downstream of the assessment area, dramatically changing the landscape along the river's mouth. Indeed, this reclamation process coupled with the eastward shift in bridge construction across the Liffey resulted in the movement of port and shipping activity from the city centre to the easternmost parts of the river. Early maps of Dublin (Speed's Map of 1610 and Moll's of 1714) show a largely unaltered estuary environment with the river mouth located *c*.1km east of the assessment area (Figures 5-6). In contrast, it is evident in Roque's map of 1756 that extensive reclamation has taken place with the construction of the north wall (1710-1718), facing the river channel, and the East Wall (1718-1729), running northwards along the line of the present day East Wall Road (Figure 7).

[3] Ryan, J., 'Pre-Norman Dublin', in Howard Clarke, (ed.) Medieval Dublin: The Making of a Metropolis, 1990, 110-1
[4] Halpin, Andrew, The Port of Medieval Dublin, Four Courts Press, Dublin, pp.179-80

These constructions provided a tidal barrier behind which extensive land reclamation could take place, a process that lasted until the early part of the nineteenth-century and significantly extended the land mass on the north side of the River Liffey. As a result, a total of 263 plots of land, ranging in size from one acre to three-and-a-half acres, were created and sold by the City Council.[5]

This historic reclamation process has been highlighted by recent excavations undertaken along Ormond Quay and Custom House Quay, located immediately downriver of Butt Bridge. These excavations have produced evidence of seventeenth-century reclamation deposits with eighteenth-century structures built above (Table 2). Moreover, recent excavations at the site of Building C, Spencer Dock, North Wall Quay (bulletin entry 2004:565) identified three principle phases of activity.[6] These included a series of Late Mesolithic fish traps located on the old shoreline of the Liffey channel, artefacts from the eighteen and nineteenth-century reclamation of that area, and structures from the nineteenth and twentieth-century development of that reclamation land.

Further development within the vicinity included the construction of a new Custom House in 1791, Custom House Dock in 1796 (DU18-020564A), a boat-building/repair yard and Patent Slipway, completed in 1833, and the construction of Dublin's first dry-dock, completed in 1860. Prior to these constructions, the majority of the port trade took place on the south side of the river, however, the establishment of the Custom House and associated quayside structures facilitated a lasting shift in port development to the north side.

Cartographic Evidence

From the twelfth-century onwards Dublin's location is pin-pointed on numerous maps, however, the earliest surviving map showing the city in plan-view is found in John Speed's *Theatre* (published 1610). This publication includes maps of the provinces of Ireland and detailed plans of Dublin, Cork, Limerick and Galway. Speed's map of Dublin depicts limited development to the northern side at this time; a large section of the north bank comprising of marshland. River alteration is indicated with the presence of two walls or quays restricted to the eastern (possibly Inns Quay) and western limits of the settlement (Figure 5). In contrast, the south of the river is

[5] De Courcy, J.W., Anna Liffey, The River of Dublin, (O'Brien Press, Dublin 1988), p.47.
[6] McQuade, Melanie, 'Building C, Spencer Dock, North Wall Quay, Dublin', in Isabel Bennett (ed.), Excavations 2004, (Dublin, 2007), 128-9.565; McQuade, Melanie, 'Gone Fishin'', Archaeology Ireland, (2008), 22 (1), 8-11.

depicted as a well developed walled-town, with water-frontage located between Merchants Quay to the west, and Wood Quay to the east. A single bridge, marked as '*The Bridge'* (no.5), crosses the river at the western limit of the settlement. This bridge known as the *Bridge of Dublin* or *Old Bridge* was constructed in the thirteenth-century and replaced an original timber structure, known as *Dubhghall's Bridge.*[7] The earlier bridge structure is thought to date from the eleventh-century, and in turn replaced a natural fording point known as the *Ford of the Hurdles*.[8]

Little alteration to the natural estuary environment is visible along the area identified for the current river assessment. Only two buildings are marked in the vicinity of the survey area. These are situated on the south bank and are named: '*The Hospitall'* (no.10) located immediately beside a river wall (probably a reclamation wall) and *'The Colledge'* (no.12) located to the southeast of the hospital structure.

By Hermon Moll's Map of 1714 the northern side of the river has undergone increased reclamation for farmland and suburban areas called *'Oxman Town'* (Figure 6). Excavations carried out along Arran Quay uncovered evidence that reclamation of land on this side of river took place from the thirteenth-century onwards. It is thought that these newly created suburbs would have been home to traditional urban craftsmen such as potters, smiths, tanners, and farming in and around Oxmanstown Green would have supplied the suburb and the city.[9] The south bank is depicted as having an urban waterfront located in a tidal area with braiding river channels to the east in Dublin Bay.

John Rocque's Map of 1756 shows extensively reclaimed areas of river estuary with increased use/development of water-frontage along the river (Figure 7). Aston Quay, Georges Quay, and Rogerson's Quay delineate the south side of the river, with Bachelors Walk to the north. A large amount of shipping is depicted along these quays, alluding to the navigable nature and concentrated use of the river at this time. In addition, large scale reclamation works are evident on the north side of the river estuary with the construction of the North Wall (1710-1718) and the East Wall (1718-1729), behind which the port of Dublin was to be developed in the nineteenth-century.

[7] Healy E., Moriarty c. and O'Flaherty G. The Book of the Liffey from Source to the Sea. Wolfhound Press, Dublin, 1988.
[8] M. Phillips and A Hamilton, Project History of Dublin's River Liffey Bridges, Bridge Engineering, Issue 156, , Vol. 4, 2004, p.161.
[9] Purcell, Emer, 'The city and the suburb: medieval Dublin and Oxmantown', in Seán Duffy, (ed.) Medieval Dublin VI: Proceedings of the Friends of Medieval Dublin Symposium 2004, Four Courts Press, Dublin, 2005, 188-9, 213

Burgh Quay and Eden Quay are not shown, being later constructions. The area between Aston Quay and Georges Quay, now occupied by Burgh Quay, depicts housing or warehouse structures abutting the river channel. Adjacent to this, on the north side of the river, a small quayside structure is marked as '*Iron Quay'* (site listed in RMP; DU18-20-461). Immediately downriver (east) of this quay structure is a shipbuilding yard, timber storage facilities, and large slipway marked as the *'North Wall Slip'*.

The easternmost bridge depicted on this map is Essex Bridge (built 1676), crossing between Essex Street and Capel Street. Two ferry crossing points are shown, the first operating between Porter's Row and Batchelor's Walk, and the second between Aston Quay and Batchelor's Walk. The latter ferry crossing is situated c. 40m upstream (west) of the current location of O'Connell Bridge.

The OS 6" First Edition Map of 1844 depicts the newly developed Custom House (1791), Custom House Dock (1796), a boat-building/repair yard, and a Patent Slipway completed in 1833, (Figure 8). Burgh Quay and Eden Quay are both marked, Burgh Quay also being marked as the location of the *'Corn Exchange'.* In addition, the OS First Edition Mapping depicts two new bridge structures spanning the River Liffey, both located downstream of Essex Bridge. These were Wellington Bridge built in 1816 and Carlisle Bridge built in 1794. Wellington Bridge, later known as Liffey Bridge, crosses between Liffey Street Lower and Wellingtion Quay. Carlisle Bridge, re-built in 1880, and later named O'Connell Bridge links Sackville Street Lower and Westmoreland Street. Butt Bridge, located along the eastern limit of the river survey area, is not indicated on this map, being constructed in 1879.

Liffey Quays

The present day river assessment area is delineated by a series of four quayside structures, constructed at the end of the eighteenth and in the early part nineteenth-century. Aston Quay and Bachelor's Walk, located upstream of O'Connell Bridge, were built *c.*1700. Eden Quay and Burgh Quay, located downstream of O'Connell Bridge, were built around *c.*1800. A chronology relating to the construction of the various quay structures located along the River Liffey is tabulated in Appendix 1. [10]

[10] [10] De Courcey, J.w., Anna Liffey: The River of Dublin, O'Brien, Dublin, 1988, 16

Carlisle Bridge, later O'Connell Bridge

O'Connell Bridge represents the second bridge building endeavour across the River Liffey at this location, Carlisle Bridge preceding the present day structure (Plates 2-5). Carlisle Bridge was designed by James Gandon in 1789 and constructed between 1791 and 1794. It was a three-arched structure (semi-circular arch design) constructed of granite, with a granite façade and balustrade of Portland stone (Plate 6). The structure measured 64m (210ft) in length, and 12.2m (40ft) in width and was slighted raised at its centre.

This bridge represented the easternmost bridge-build and the fourth masonry structure to span the river at this time. The bridge was fixed-span, restricting river access to upstream quayside areas, and it is clear that its construction was part of a general shift in river activity downstream to the Custom House and Sir John Rogerson's Quay.

O'Connell Street Bridge was constructed between 1877-1880 and widened the existing structure to a width of 70m, making the new bridge as wide as it is long. The area surrounding the in-water pier structures was cofferdamed and riveted iron-caissons were positioned on the riverbed, immediately to the east and west of the existing in-water pier structures (Plate 7). The riverbed within these caissons was then dredged to natural bedrock prior to in-filling with poured concrete. Following placement of the pier-extensions, new arch-extensions were constructed and the original structure (Carlisle Bridge) was removed; its cut stone facing being saved and re-used to for the upstream and downstream facades of O'Connell Bridge (Plate 8).[11]

Butt Bridge

Butt Bridge, located *c*.250m downstream of O'Connell Bridge was originally designed by Bindon Stoney, the Dublin Port Engineer, and was built between 1877 and 1879 by William Doherty. The bridge was a steel swivel-bridge that allowed river access to larger vessels seeking access to Burgh Quay and Eden Quay. The design consisted of a single masonry approach span measuring 11.28m (37ft), springing from each bank, with a central swing-section measuring 38.71m (127ft). This swing-section provided two 12.9 (40ft) wide navigable channels each side of a central pier structure (Plates 9-10). The swing section was powered by a steam engine, housed on a

[11] M. Phillips and A Hamilton, Project History of Dublin's River Liffey Bridges, Bridge Engineering, Issue 156, Vol. 4, 2004, p.166.

timber pier located downstream of the central pier.[12] The swing bridge was decommissioned in 1888 with a new concrete reinforced bridge structure replaced the cast iron swig-section. The new bridge was opened to traffic in 1932 and spans the river between Beresford Place to the north and Tara Street to the south (Plate 11). The bridge was named Butt Bridge after Isaak Butt, leader of the Irish Party in the House of Commons and founder of the Home Rule for Ireland Movement.

Record of Monuments and Places[13]

The Record of Monuments & Places (RMP) is a list of archaeological sites known to the National Monuments Service with accompanying RMP Maps, based on OS 6" Sheets, which indicate the location of each recorded site. The RMP list is based on The Sites and Monuments Record files housed in the National Monuments Services offices. The Sites and Monuments Records (SMR) are lists with accompanying maps and files of all known or possible archaeological sites and monuments, predominately pre-1700AD in date, for all counties. These lists were, in many cases, initially based on cartographic, documentary and aerial photographic sources. The SMR (as revised in the light of available fieldwork) form the basis of the statutory RMP. The record is updated on a constant basis and focuses on monuments that predate 1700AD. Buildings belonging to the seventeenth-century and later are not well represented in their archive, although they are considered as archaeological sites today.

Only one site is listed in the RMP for the area under investigation (DU018-020-461; Iron Quay), a number of sites are listed for the wider area (Figure 9, Appendix 2):

RMP Number:	Classification:	National Grid Reference:	Townland:	Proximity to Developmet:
DU018-020-428	Bachelors Walk	315864E, 234372N	Dublin North City	*c*.80m West
DU018-020-458	Gerorges Quay	316373E, 234427N	Dublin South City	*c*.300m East
DU018-020-479	Rogerson's Quay	334389E, 234389N	Dublin South City	*c*.1km East
DU018-129	Burial (17th century)	316030E, 234470N	Dublin North City	*c*.50m
DU018-020-	Iron Quay	316104E, 234474	Eden Auy, Dublin	wihtin 20m

[12] M. Phillips and A Hamilton, Project History of Dublin's River Liffey Bridges, Bridge Engineering, Issue 156 BE4, p.167.
[13] The RMP is maintained by the National Monument Section, Department of Environment, Heritage and Local Government.

RMP Number:	Classification:	National Grid Reference:	Townland:	Proximity to Developmet:
461-			North City	
DU018-020-464	Windmill	16240E, 234410	Tara Stret/ Burgh Quay, Dublin South City	*c*.250m
DU018-020-154	Glasshouse	316043E, 234464N	O'connell Street Lower, Dublin North City	*c*.100m

Table 1: Known Archaeological Sites and Monuments located within the vicinity the river survey area.

RMP DU018-020-461 refers to the site of Iron Quay, a small quayside built *c*.1733 to the east of Bachelor's Walk. The quayside is depicted on Rocque's map of 1756 as a small quayside with a river frontage of *c*.30m. The site is thought to be located under the junction of Eden Quay and Marlborough Street. A document of 1781 refers to it as the Iron Yard.[14] The site of Iron Quay is located in close proximity to the proposed Marlbourgh Bridge crossing.

Topographic Files

The National Museum of Ireland Topographical Files is the national archive of all known antiquities recorded by the National Museum. These files relate primarily to artefacts but also include references to monuments and also contain a unique archive of records of previous archaeological excavations. The Museum's files present an accurate catalogue of objects reported to that institution from 1928. There is a computerised database of finds from the 1980s onwards. The find-spots of artefacts can also be an important indication of the archaeological potential of the related or surrounding area.

A large number of artefacts have been recovered form excavations undertaken close to the existing River Liffey. Among the earliest artefacts encountered were those recovered from excavations at Fishamble Street, these included: two flint blades of Larnian style (similar pieces dated to about 3350BC at Sutton and on Dalkey Island), a Neolithic polished stone axe-head, and a barbed and tanged flint arrowhead of Early Bronze Age type. [15] However, only total of twenty-six artefacts have been listed in the topographic files for the River Liffey and its associated quays structures. A full reference for these finds is tabulated in Appendix 3. Listed artefacts range in date from the early Bronze Age (axe-head, 1922:4) to nineteenth-century material (clay

[14] De Courcy, J., Anna Liffey: The River of Dublin, 1996, Gilll & McMillan, p.202.
[15] Mitchell, G.F., Archaeology and Environment in Early Dublin, Royal Irish Academy, Dublin, p.7.

pipe fragments, etc, 1937:2379-2416). Eleven artefacts are listed as coming form the River Liffey itself, the rest being recovered during quayside excavation works. Only one artefact, an iron sword (1964:1), is listed as coming directly form riverbed deposits; recovered from the River Liffey, *c*.10ft from the edge of Arran Quay.

The relative paucity of artefacts being recovered from the River Liffey may relate to the successive river dredging works that have taken place along its navigable length; this process having removed any buried archaeological material.

Shipwreck Inventory

The Shipwreck Inventory in the Department of the Environment, Heritage and Local Government's archive is a list of recorded instances of wrecking since 1750. The details provided describe the type of vessel, the journey it foundered on, and information on the ultimate plight of the vessel and its crew, where possible. In describing the wrecking event, the records will locate the incident in relation to the nearest headland or other topographic marker where known. This is not however a record of where the wreckage lies, since the historic records generally only deal with the vessel before it sunk. Such finer details emerge from other sources, such as fishermens' records of snag points and diver records of sites located underwater. These are included in the Inventory wherever possible but it is true to say that most entries lack this final level of data. Finally, it should be pointed out that while the Inventory provides a record of wrecking incidents since 1750, it does not claim to be a comprehensive record for earlier events, and therefore the medieval and prehistoric periods are not represented in this archive.

A total of 463 shipwrecks are listed in the inventory for the Dublin Bay. Topographic references from the list include: The Horrocks, west side of Dublin Harbour, Old pier at Dublin, Behind the piles at Dublin, 1 mile off Dun Laoghaire east pier, Near Dublin, Dublin Bay, Dublin Bar, Dublin Harbour/Port, Dublin, McCarthy's wharf, River Liffey/Dublin River, Quay Wall/River Liffey, North Wall, South Wall, St John's Quay, Pigeon House (Fort), Bailey Light, Poolbeg (Harbour), North Bull, South Bull, Bull Island, Clontarf, Sutton, Blackrock, Ringsend (Point), Howth (off Howth, Howth Head, near Howth and Howth harbour), Dalkey.

A total of twenty-six wrecks are listed in the inventory for the River Liffey and surrounding area (Table 3). This includes: seventeen listed as River Liffey/Dublin River, five for Ringsend, one for Sir John's Quay, one for the South Wall, one for Pigeon Hole, one for Halpin's Pond, and one for Pigeon House. The earliest of the

listed wrecks date from the 1760s, with the latest reordering dating to 1892. There are no entries listed for Eden Quay, Burgh Quay, Aston's Quay, or Bachelor's walk.

Location:	Name:	Date:	Ship Type:	Information:
At sea-put into Dublin	*Amy*	7/11/1854	223-ton brig of Hartlepool.	En-route from Cardiff to Harve. She encountered a W force 9 wind and became leaky at sea. She had to put into Dublin to discharge. Cargo: 12 crew and coal
Opposite the old coastguard station at Ringsend, River Liffey	*Argo*	10/12/1892	31-year old, 46-ton, Dublin, wooden fishing smack	Moored in the River Liffey.
Between the walls at Dublin	*Britannia*	6/5/1774		This vessel was en route from London, under Captain Williams, when she hit an anchor. She went ashore.
River Liffey	*Carolina*	5/10/1799	Galliot of Oporto	Ran aground and sank.
Dublin River	*Commerce*	25/10/1811		En route from Dublin when sank.
Between the city of Dublin Company's jetty and breakwater head	*Edith*	8/9/1875	London and Noth-Western Railway Company Steamer aboard.	En-route from the company's wharf to Greenore. She departed at around 1.25am but collided with another London and North-Western Railway Company vessel, the Duchess of Sutherland. This vessel was under the command of Captain Beaumont and was en route from North Wall Dublin. The Edith was violently struck on the starboard bow and sank within a quarter of an hour. A fireman called Jones and his brother who slept in the forecastle were drowned. The weather was clear and calm at the time of the incident. Cargo: 60 to 80 passengers
Sir John's Quay, Dublin	*Emma*	17/06/1851	Smack	En route from Liverpool ran aground and listed on her beam ends. She was seriously strained and brought to Eden Quay where she filled. The cargo was damaged. Cargo: Wheat and staves
South Wall	*Henry*	23/11/1798	Brig of Liverpool	Wrecked
River Liffey	*Hibernia*	22/03/1776		Vessel was burnt
Pigeon Hole, Dublin River	*James and Ann*	7/2/1812		En route from Drogheda was hit by a collier brig and sank.
'Dublin River'	*Langston*	21/03/181		Portsmouth vessel was reported

Location:	Name:	Date:	Ship Type:	Information:
		2		lost.
River Liffey, Dublin	*Leonard*	10/01/1853		Struck by a steamer.
Entrance to Dublin River	*Maria Carolina*	16/8/1799		En route from Oporto to Dublin when she sank. The cargo was landed.
Old pier at Dublin	*Marian*	7/1/1826		Thjis vessel parted from her cable and chain and went ahsore at the back of the old pier. The captain was Harvie
Abreast of no 2 bouy, River Liffey	*Mermaid*	16/07/1892	Unregistered wooden yacht/cutter was 5 yrs old and weighed 1 ton.	The master and owner was P. Carolan, Clontarf, Dublin. She was en route from Clontarf to Dublin, in ballast, with 6 crew. She sank in an easterly force 6 wind but was later raised. 4 lives were lost
The Liffey	*Newport*	20/05/1851	Montrose schooner	En route up the Liffey when she came in contact with Hebden from Barbados, which made a hole in her stern.
Dublin River	*Nosha Squera de Bonamo*	28/06/1798	Brig of Oporto	Ran onto a bank.
Ringsend, R. Liffey	*Pelican*	8/4/1889	37-ton 32-year old wooden smack of Dublin	At anchor at Ringsend when burnt. Vessel in ballst
Behind piles at Dublin	*Providence*	5/02/1771		En route from London, under Capt Mayne, when she was lost
Opposite Halpins Pond, River Liffey	*Rat*	25/05/1891	10-year old wooden pleasure sailing boat	Capsized and was wrecked during pleasure trip.
Off Ringsend	*Seaflower*	24/01/1856	Dublin vessel	Broke away from moorings by wind and ran into steamer Liffey
River Liffey	*Times*	1-2/06/1853	Dublin vessel	En route from Dublin to Liverpool encountered easterly wind. Her boilers burst while in river. Cargo: Passengers
Off Pigeon House	*Times*	13/09-29/11/1851	Steamer	Steamer plying to and from Dublin went ashore but got off again after discharging some cargo.
Dublin River	*William*	10/01/1812		Went aground.
Ringsend	Unknown	1760s (Oct.)		A severe gale in Dublin Bay wrecked two ships.
Dublin River	*Usk*	8/10/1856		This vessel, en route from Dublin to Wexford, became stranded.

Table 3: Shipwrecks listed in the Shipwreck Inventory for the River Liffey Area.

Excavations Bulletin

The *excavations bulletin* provides a published (yearly) summary of accounts of archaeological excavations undertaken throughout Ireland.[16] Summaries may also be submitted for inter-tidal survey, underwater assessments, and the archaeological monitoring of marine dredging works. The majority of the entries relate to development-led archaeological work. Appendix 4 lists entries relating to the River Liffey and its surrounding environs, including: River Liffey, River Liffey Quays, and the North Wall. These entries are summarized below in Table 4.

One excavation bulletin entry of particular interest relating to the River Liffey refers to the recent excavations at the site of Building C, Spencer Dock, North Wall Quay (bulletin entry 2004:565). The excavation identified three principle phases of activity. These included a series of Late Mesolithic fish traps located on the old shoreline of the Liffey channel, artefacts from the eighteen and nineteenth-century reclamation of that area, and structures from the nineteenth and twentieth-century development of that reclamation land.

Entry Number:	Location:	National Grid Reference:	Licence Number:	Summary description:
2000:0245	River Liffey, Blackhall Place	31413E, 23429N	00E0733	Riverbed with Medieval and later artefacts. Site of eighteenth-century slipway.
2000:0346	River Liffey, strawberry Beds	30775E, 23590N	00D068	No archaeological significance
2001:365	River Liffey, Blackhall Place	31413E, 23429N	01E0246	Post-medieval/early modern quays
2002:0518	River Liffey, Blackhall Place	31413E, 23429N	01E0246ext.	Post-medieval/early modern quays
2002:0543	River Liffey, Guild Street/Macken Street	--------	02E1811	No archaeological significance
2003:509	River Liffey, City Quay/Custom House Quay	31665E, 23440N	03E1060	No archaeological significance
2003:520	River Liffey, Custom House Quay/City Quay	--------	03D0363	Riverbed deposits and associated quayside features/walls
2003:527	7–8 Eden Quay, Dublin	31603E, 23447N	SMR 18:20 02E1713	Human skull and 13th–18th-century finds in river gravels.
2002:0516	14–18 Aston Quay	311580E,233435N	02E1621	Urban, eighteenth-century
2003:495	14–18 Aston Quay, Dublin	31489E, 23336N	02E1621	Urban post-medieval
2003:509	River Liffey, City	31665E, 23440N	03E1060	No archaeological

[16] Isabel Bennett (ed.) Excavations Bulletin: summary Accounts of archaeological excavations in Ireland, Wordwell.

Entry Number:	Location:	National Grid Reference:	Licence Number:	Summary description:
	Quay/Custom House Quay			significance
2003:520	River Liffey, Custom House Quay/City Quay	--------	03D0363; 03R107	Riverbed deposits and associated quayside features/walls
2003:0576	Spencer Dock, Sheriff Street	317169E, 234711N	03E0654	Post-medieval industrial
2004:0565	Building C, Spencer Dock, North Wall	317169E, 234711N	03E0654	Late Mesolithic fish traps and post-medieval structures
1995:080	8 Ormond Quay Lower, Dublin	31550E 23430N	95E063	Mid to late seventeenth-century reclamation, eighteenth-century houses
1996:106	22—23 Ormonde Quay, Dublin	31530E 23420N	96E272	River shoreline up to the seventeenth century when land was reclaimed. Houses are eighteenth century
1997:155	40 Ormond Quay, Dublin	315550E 234250N	97E013	Urban, eighteenth century
1997:156	15 Ormond Quay Lower, Dublin	315550E 234250N	97E265	Urban, post-medieval reclamation
1999:222	31A-36 Ormond Quay Ormond Upper/Charles Street West, Dublin	315250E 234200N	99E0126	Urban post-medieval
2000:280	24–27 Ormond Quay Lower, Dublin	315600E 234208N	00E0162	Urban post-medieval
2003:520	River Liffey, Custom House Quay/City Quay, Dublin	316650E 234400N	03D063; 03R107	Riverbed deposits and associated quayside features/walls
2003:527	7–8 Eden Quay, Dublin	316030E 234470N	02E1713	Human skull in river gravels
2003:562	14 Ormond Quay/11–14 Strand Street, Dublin	315500E 234300N	03E0964	Urban post medieval
2003:563	14 Ormond Quay/11–14 Strand Street, Dublin	31550E 23430N	03E0964 ext.	Urban post-medieval
2004:0569	31-36 Ormond Quay Upper/Ormond Place/Charles Street West/Ormond Square, Dublin	31540E 234230N	04E1206	Urban post-medieval

Table 2: Summarized entries relating to the River Liffey taken from the *Excavations* Bulletin.

Conclusion

It evident that significant maritime activity has taken place within the city to stimulate river adaptation, the Liffey providing an essential artery for trade import and export to and from the city. This activity is reflected in the number of shipwreck events listed in shipwreck inventory, which records 464 wrecks around Dublin and includes twenty-six wrecks near or from the River Liffey; the majority dating from the eighteenth and nineteenth century when river use by shipping was at its peak.

The current desktop study attests to this long history of river adaptation and the river area under assessment retains a number of historic features that correspond with this river development, namely: two eighteenth-century quayside structures (Bachelors Walk and Aston Quay), two nineteenth-century quayside structures (Eden Quay and Burgh Quay), and two eighteenth to nineteenth-century Bridge Structures (O'Connell Bridge and Butt Bridge). While these structures are of historic value, no structures of archaeological significance were identified in the desktop study for this area. However, the potential that features, deposits, and artefacts of archaeological significance remain buried within riverbed and reclamation deposits should be considered high. This potential is highlighted by Mesolithic fish-traps encountered as part of recent excavations at Spencer Dock.[17]

4.0 SURVEY METHODOLOGY

Site assessment was conducted within the tidal area of the River Liffey, from an area 100m west of O'Connell Bridge to the eastern limit of the survey at Butt Bridge. It was possible to access approximately 10% of the survey area at Low Water; this area being inspected as a waded exercise (Plate 12). The remaining assessment was carried out as a dive operation, undertaken during both the flood and ebb tides (Plates 13-16). A significant buffer-zone was incorporated into the survey extending the underwater assessment a minimum of 50m upstream and 50m downstream of all in-water impacts associated with the proposed Metro North project.

[17] McQuade, Melanie, 'Building C, Spencer Dock, North Wall Quay, Dublin', in Isabel Bennett (ed.), Excavations 2004, (Dublin, 2007).

Sub-tidal zone

Systematic visual inspection of the sub-tidal area consisted of approximately 19978m² of riverbed, the base of both attendant quayside structures, and those sections of riverbed located under O'Connell Bridge (Figure 10). Detailed descriptions were made of riverbed topography, bottom composition, and the existing river environment; recording all changes in substrate, flora, and fauna encountered as part of the survey. In addition, a probe survey was undertaken to record sediment levels within identified riverbed areas (Table 4). A series of river profiles were also taken, mapping the topographic changes encountered across the riverbed (Figures 11-13).

A 7m rigid inflatable boat (RIB) was used as the dive control platform. A diver-towed method was used for much of the survey area, allowing controlled movement of the diver across the riverbed area. In addition, a series of underwater baselines were laid to assist diver positioning. To facilitate underwater survey of O'Connell Bridge, the RIB was moored within the bridge archways and along the upstream and downstream sides of the structure.

In addition, three underwater video surveys were carried out and included the detailed video documentation of the riverbed areas along the base of the central pier structure, and the Base of Burgh Quay and Eden Quay (see accompanying DVD).

A finds retrieval strategy dealing with conservation issues, cataloguing, and locational recording was in place to deal with any artefacts recovered during the survey. Position-fixing of features encountered as part of the underwater survey was facilitated by the use of a hand-held GPS unit, a differential GPS unit, and Total Station survey.

A medium-high current was noted during both the ebb/flow tides and no 'slack-water' period was evident at this site. Visibility ranged between 0.20m-0.60m, depending on location within the river. A maximum water depth of 5m was encountered (at High Water) and an average water temperature of 4º degrees was recorded. A total of six archaeological dives were undertaken as part of the project. The longest dive was 226mins; bottom-time being limited due to the strong currents and low water temperatures encountered during the survey. The accompanying dive-logs are tabulated in Appendix 5. The in-water/ sub-tidal work was undertaken by a team of three maritime archaeologists and a Dive Supervisor. The dive operations were carried out to HSA/HSE standard using surface supplied equipment, supported with

suitable boat cover and mobile/ VHF communications to the relevant authorities, in accordance with the Safety in Industry (Diving Operations) Regulations 1981, SI 422.

Inter-tidal Areas

A systematic visual inspection of all exposed inter-tidal riverbed areas was undertaken at Low Water, allowing a detailed written and photographic record of any features encountered to be made. This record was supplemented by GPS position-fixing and total-station survey (Plates 13 & 18). Particular attention was paid to the inspection and recording of a timber revetment (Feature 2) located along the northern half of Bugh Quay (Figures 14-16). In addition, two sections of quayside located within the proposed impact area for Marlbourgh Street Bridge underwent detailed survey, recording the quay structures in plan, cross-section, and elevation (Figures 15-18). A team of three maritime archaeologists and a certified surveyor undertook the inter-tidal survey work.

Site assessment of the riverbed and attendant quaysides was conducted, under Licence from the DoEHLG, over a four-day period between Tuesday 9th and Friday 12th December 2008.

5.0 ARCHAEOLOGICAL ASSESSMENT

Riverbed Topography

The riverbed upstream of O'Connell street bridge is composed of coarse, angular, gravel deposits, interspersed with sub-rounded to angular stones (measuring <0.02m x 0.04 in size). Frequent cobbles and large rocks (average size 0.30. x 0.40m) are located across the riverbed and form snag-points for debris moving downriver. A large amount of modern material is located immediately upstream of the bridge structure. This debris includes shopping trolleys, traffic cones, tree-branch material, bicycles, and smaller objects such as mobile phones, pint glasses, bottles, cans, breeze blocks, metal-drum fragments, iron pipes fragments, sections of rolled-up carpet, plastic bin liners, mannequin fragments, ladder sections, mobile phones, etc. The debris covers 50%- 60% of the riverbed near the quay walls but drops to c.40% coverage in the central channel. The greatest concentration of debris was noted on the north side of the river, below the adjacent overhanging pedestrian walkway.

A large amount of eighteenth to twentieth-century ceramic fragments were encountered, scattered across the riverbed. These fragments are present in high concentrations with an average of 10-15 fragments (>0.05m size) being encountered

in every 1-2m². Fragment types included: blue and white ware, sponge-ware, stoneware, and various earthen ware types. Other material encountered included nineteenth-century roofing-slate fragments, red brick fragmnets, rough-cut masonry blocks, nineteenth-century bottles, and clay pipe fragments.

A degree of riverbed erosion was noted *c*. 20m upstream of the bridge structure and scouring has exposed shelving bedrock, lying c. 0.15m below the riverbed, in a number of areas (Figure 10). This bedrock appears to extend the full length of the river, running between Bachelors Walk (north-side) and Aston Quay (south-side). Riverbed erosion intensifies eastwards towards the bridge structure; and scour holes have developed on the upstream side of each of the three bridge-arches. These scour holes act as catchment areas for larger objects moving downriver (shopping trolleys, traffic cones, etc.); smaller debris being flushed through the bridge arches (Figure 10). In addition, large debris concentrations were noted across the base of the upstream cutwaters. Tree trunks, telegraph poles, and large quantities of leaf-litter are interspersed with modern metallic material to form large undulating debris mounds, c.1.5m in height.

The riverbed beneath O'Connell Bridge is composed of river gravels overlying a compact silt-clay (60%/40%) deposit. Water velocity is greatly increased within the bridge arches, most notably within the central archway. This increased water-velocity has resulted in a riverbed that is largely free from modern debris, any portable material being transported downriver. Only large, heavy, objects being encountered within this riverbed area.

As with the upstream survey area, the riverbed downstream of O'Connell Bridge recorded dense concentrations of modern discarded material. In addition, a large concentration or debris-mound was encountered running between the downstream bridge piers of the central arch. This mound measures 2m in maximum height along its north side, decreasing to 0.50m at its southern extent. It is composed of tree branch material, shopping trolleys, traffic cones etc. and has acted as a snag-point point for leaf-litter, plastic bags, and similar portable objects.

A leaf-litter deposit with a maximum depth of 0.07m is concentrated within the central river channel. In addition, a number of large mooring blocks and associated link chain were encountered within this area (see Profiles 1-3). These have acted as snag points for debris moving downriver. Beneath the debris across the wider channel area, the riverbed comprises frequent river cobbles (average size: 0.05 x 0.08m) overlying a sub-strata of coarse river gravels.

Riverbed material within the downstream survey area is similar to that encountered within the upstream section. Most notably, the concentrated scatter of ceramic fragments continues with an average of 15 fragments per 1m² being noted. In contrast to the upstream section, a degree of sediment deposition is taking place within the downstream survey area. A deposit of silt is present at the base of the quay walls on both sides of the river. The silt deposit measures up to 0.65m in depth and extends a maximum of 7m-8m into the river channel. It overlies a concentrated scatter of modern debris, river cobbles, and coarse river gravels

A probe survey was carried out across three river transects, the results of which are tabulated below. The hard substrate in the centre of the river and the discarded material encountered below the quay walls inhibited the penetration of the probe. The probe survey transects correspond to the three river profile lines (Figures 11-13).

River Profile numbers 1 and 2 show a steep slope running from the base of each quay structure (7m distance) before gently sloping toward the central river channel. This central channel is largely flat apart from a debris mound that has formed along its north side. In contrast, River Profile 3 shows a gentle riverbed slope extending 8m from each quay structure before levelling off to form a wide, flat, and featureless riverbed area.

Distance from south wall (m):	First transect substrate (Profile 1):	Second transect substrate (Profile 2):	Third transect substrate (Profile 3):
0	Soft silt gently sloping	Soft silt leaf litter	0.2m silt above stones
2	Soft silt/mud	0.6m soft silt	0.65-0.7m mud
4	Soft silt/mud	0.65m soft silt	0.65m mud above gravel
6	Hard compact gritty silt	0.5m deep mud	0.7m mud
8	Hard compact gritty silt	0.1m mud above cobbles/gravel	0.1m silt above gravel
10	Cobbles/Pebbles/ Gravel/silt/sand	Compact cobbles/gravel	Gravel
12	Cobbles/Pebbles/ Gravel/silt/sand	Compact cobbles/gravel	Gravel
14	Cobbles/Pebbles/ Gravel/silt/sand	Compact cobbles/gravel	Gravel
16	Cobbles/Pebbles/ Gravel/silt/sand	Very compact cobbles/gravel	Gravel
18	Pebbles/gravel/ sand/silt	Very compact cobbles/gravel	Gravel
20	Pebbles/gravel/ sand/silt	Very compact cobbles/gravel	0.5m soft silt and leaf litter above gravel
22	Gravel with 0.1m silt covering	Very compact cobbles/gravel	

Table 4: Probe survey transects taken across of River Liffey (see Figure 10 for locations).

Visual Survey and Assessment

The assessment area is located within a bend in the River Liffey, approximately 400m long and 48m wide. The river flows eastwards through Dublin city centre and is delineated by nineteenth-century quayside structures, Eden Quay to the north, and Burgh Quay to the south. Two bridges are located within the river survey area: O'Connell Bridge located at NGR 315985E, 234396N, centre-point, (Feature 1, Plates 2-5); and Butt Bridge, located along the eastern limit of the survey area, NGR: 316262E, 234467N (Plates 9-11).

Four features of historic interest were recorded as part of the archaeological assessment. These include: the sub-tidal elements of O'Connell Bridge (**Feature 1**), Burgh Quay and its associated Timber Revetment (**Feature 2**), Eden Quay and associated stone steps (**Feature 3**), and a possible Fording Point located upstream of O'Connell Bridge (**Feature 4**).

Feature 1: Sub-tidal elements of O'Connell Bridge (Figure 10):

Underwater inspection was carried out within the three archways, however, detailed survey of the sub-tidal elements of the in-water piers was restricted to the central and southern bridge arches. This inspection included a detailed video survey, documenting the riverbed area along the base of the central pier structure on its north side (see accompanying DVD).

Central Arch

Visual inspection of the in-water elements of the pier structure located along the north side of the central-archway was limited to localised areas of erosion caused by scouring along the base of the structure; a build-up of river gravels being present along much of its extent. The pier structure is composed of three distinct elements, the original masonry pier structure belonging to Carlisle Bridge and two concrete pier extensions placed as part of the later bridge widening endeavour. For ease of discussion the pier sections have been divided into three sections: Pier Section 1, Pier Section 2 and Pier Section 3 (see Figure 10 for locations):

The central section of pier (Pier Section 1) that comprises the original masonry pier measures c.15m in length. Inspection of the pier footings was limited to c1.5m long area forming a medium-sized (1m width x 1m depth) scour-hole located along the south-eastern side of the structure (Figure 10). The footings consist of four, stepped, courses of masonry. The lowest course protrudes 0.25m from the riverbed and is stepped at a 0.30m distance form the arch wall, the next course is stepped at a

distance of 0.25m, the next at a distance of 0.20m, and the highest course at a distance of 0.10m. These masonry blocks measure up to 0.40m in length x 0.30m in height. The remaining masonry forms the arch-wall on the northern side of the arch and is flush along its extent.

A number of granite blocks are located along the downstream (eastern) limit of the masonry pier. These have an average size of 0.45 length x 0.27 width x 0.15m depth. They are shaped on the outer-face, the other sides being rough-cut. These blocks are likely to be associated with the removal of the upper elements of Carlise Bridge; representing fragments that have fallen into the water during that removal process.

The downstream (east) pier extension (Pier Section 2) abuts the masonry pier approximately 6m downstream from the aforementioned scour hole at Pier section 1. A large section of iron shuttering has been placed across Pier section 2, running along much of its extent. This shuttering overlaps the masonry pier, sitting upon the topmost masonry course, and covering the transition point between the two structures. The iron shuttering measures 2.25m in height and covers the lower reaches of the arch-wall. It is unclear whether this shuttering represents a section of the iron-plate used in the construction of the pier extension or a section of shuttering placed at a later date to reinforce the downstream pier structure/arch-wall. Two (vertical) rows of twenty-five equidistantly spaced rivets, 0.06m in diameter, fasten the sections of shuttering together. Each vertical row is spaced 0.06m apart and each shutter-section is spaced 0.65m apart. In addition, a series of riveted reinforcing plates were noted running horizontally along the base of the shutter-sections; these are 0.14m x 0.12m in size, and are riveted in place using 0.04m diameter rivets. Two sets of bolts fasten the shuttering to the arch-wall. These are located in the middle of each shutter-section and are spaced 0.80m apart on the vertical, and 0.85m apart on the horizontal. These bolts measure 0.06m in diameter, protrude 0.12m from the shuttering, and are fastened using a hand-crafted hexagonal nut measuring 0.15m in diameter. The section of shuttering terminates at the transition between the arch-wall and the downstream cutwater. The downstream cutwater is curvilinear, a cutwater design that is exclusive to the nineteenth-century, against which a large debris mound has formed. This build-up of refuse, measuring 4m in height, obscures the base of the cutwater and extends southwards to the adjacent cutwater on the southern side of the arch. It is primarily composed of tree-branch material, shopping trolleys, traffic cones, and bicycles with an overlying leaf-litter deposit.

A large, square profile, timber pile is located 0.85m south of the pier extension, roughly midway along Pier Section 2 (downstream pier extension). It is upstanding

0.60m from the riverbed and measures 0.25m x 0.25m (Plate 14). A second timber pile is located 1.5m downstream from this pile, c.1.2m from the pier wall. The timber is upstanding 0.85m from the riverbed and measures 0.25m x 0.25m in profile. No further timbers were encountered adjacent to pier Section 2, the debris mound located along the downriver limit of the pier extension obscuring any further timbers that may be present at this location.

The upstream cutwater (Pier Section 3) is also curvilinear in shape and has a large debris mound (composed of tree trunks, branches, shopping trolleys, etc.) located along its western extent. A small scour-hole (*c*.1.5m length x 0.80m width x 0.40 depth) is located along the base of the cutwater, exposing the western limit of the pier extension. This section of pier forms a triangular point, above which the curvilinear cutwater has been placed.

A series of six timber (oak) piles were encountered running adjacent (east-west) to Pier Section 3. The timbers are equidistantly spaced, 1.5m apart, and run for a distance of 9m. There are located 4.2m south of the pier structure/ arch-wall and protrude from the riverbed 0.55m, 0.30m, 0.50m, 1m, 0.50m, and 0.25m respectively. Two further timbers area located 2.2.m to the northwest, running in line with the triangular shape of the upstream side of the pier structure. These timbers are spaced 2m apart and protrude from the riverbed 0.10m and 0.12m respectively. An undulating concrete in-fill, with frequent gravel and stone inclusions, forms the riverbed between the pier structure and the line of timber piles. These piles are thought to be associated with the upstream and downstream extension of Carlisle Bridge and are the remains of timber shuttering (probably forming a cofferdam) placed as part of the construction procedure for extending the original bridge piers.

The southern side of the central arch displays similar characteristics to that encountered along the northern side of the arch, although the timber piles were less exposed and a greater build-up of river sediment was present along the base of the arch-wall. This deposit prevented the detailed inspection of the three pier sections on this side of arch.

Southern Arch

It was not possible to fully inspect either the original structure (Pier Section 1) or the pier extensions (Pier Sections 1-2) due to the build-up of riverbed material along the base of the arch-walls. As such, only a description of those features visible, protruding from the riverbed, along the north and south sides of the southern archway given below.

The north side of the archway is characterized by a thin layer of river gravel and silt overlying an undulating concrete base. This concrete, as noted in the central arch, extends *c*.4m from the base of the arch-wall/ pier structure to meet an east-west orientated line of timber piles. The majority of these piles lie buried with the riverbed, their presence being identified with the use of a probe. Five piles were noted, only two of which were visible. These timbers protruded 0.05m and 0.08m from the riverbed and measured 0.25m x 0.25m. Both the upstream and downstream cutwaters are curvilinear in from and have large debris mounds built-up against them. Iron shuttering was present along the upstream and downstream arch extensions.

A large horizontal oak timber is present along the upstream side of the archway, running in southeast direction for 7.5m before disappearing into the riverbed. The timber measures 0.43m in width x 0.43m in depth, only 0.10m of this depth protruding from the riverbed. It is unclear whether this timber remains in-situ, articulated to other timbers, or whether it is a disarticulated structural timber that has floated downriver.
The southern side of the arch is characterized by a series of closely plied vertical (oak) timbers forming an almost continuous east-west line along the base of the arch-wall. These piles are visible running west for a distance of 5m from the transition line between the downriver cutwater and the ach extension. The timber piles are of good quality, heartwood, construction with 160-200 tree-rings being noted for each timber. They are upstanding 0.35m from the riverbed (downstream section) and between 0.10 and 0.15m from the riverbed along the upstream section. The timbers are square in profile, measuring 0.30m x 0.30m, and are identical to those found along the base of Burgh Quay (Feature 2). The timbers are positioned 1.3m from the southern side of the ach-wall.

Conclusion

The bridge at this location represents a composite of the masonry (granite) piers, constructed to accommodate Carlisle Bridge in the late eighteen-century, and the concrete pier extensions placed as part of the late nineteenth-century bridge widening endeavour. Both sections of the bridge foundation are largely obscured by riverbed deposits; the pier structures only being visible due to the presence of localised scour-holes. The remains of timber pilling associated with the pier extensions is evident along both sides of the in-water piers. In addition, iron shuttering is present and encases large sections of the arch-wall extensions. This shuttering is likely to have been placed as part of bridge consolidation measures undertaken subsequent to the bridge build. However, it is also feasible that it represents part of the build sequence for the nineteenth-century bridge extension.

Impact from proposed works

It is proposed that the Metro North alignment will cross under the River Liffey at the site of O'Connell Bridge and the temporary bridge and pontoon will be built to the east of the bridge structure. The alignment will be contained within tunnels drilled through the limestone bedrock *c*.28m beneath the River Liffey. No direct impacts are anticipated to either the upstanding or the sub-tidal elements of the bridge structure as part of the proposed development. However, it is unclear what in-direct, secondary, impacts may arise from the proposed tunneling procedure. No further archaeological mitigation measures are deemed necessary with regard to Feature 1 prior to commencement of the construction phase of the project.

Feature 2: Burgh Quay and Timber Revetment (Figure 15-17, Plates 18-25).

Burgh Quay is located on the south side of the river, running east-west between Butt Bridge and O'Connell Bridge. The structure was built c.1800 and comprises of eighteen courses of neatly-faced masonry (granite blocks) rising from the existing riverbed level (Figures 16-17). The quayside is stepped in two places along its extent, raising its height from 5.4m above the riverbed to 5.7m and 6m respectively. The masonry components have an average size of between 0.26m-0.33m in width and 0.76m-2.1m in length. The smallest blocks measure 0.15m in width x 0.30m in length. The quayside is topped by a line of rectangular capping stones measuring a uniform 0.40m in width with an average length of 1.2m. The top-face of these capping stones has been angled as a decorative feature. A number of iron mooring rings are fixed to the quayside, located approximately just below the High Water mark (Plate 19). These mooring rings measure 0.07m in width and have an external diameter of 0.58m and internal diameter of 0.43m. They protrude 0.23m from the quay wall. In addition, three nineteenth-century drain features are located along the base of the quay structure at NGR: 316104E, 2344411N, 316063E, 234396N, and NGR: 316025E, 234380NE. The drains are rectangular in profile and measure 0.88m in width and 1m in height (Plate 20). The remains of iron hinges are visible along the top of the drain openings. An iron shutter would have been attached to these hinges, but, the shutters have eroded away.

Inspection of the riverbed along the base of the quayside did not reveal any quayside footings or structural elements relating to its initial construction (Plate 21).

The quayside was originally bonded with a hydraulic lime mortar, and it is evident that a large section of the structure was subsequently re-pointed using modern cement bonding. A section of possible structural repair work is also evident (Figure 15).

A 160m long section of timber revetment is located between NGR: 316024E, 234381N and NGR: 316128E, 234416N. (Figure 14, Plate 22). The revetment served the purpose of consolidating the base of Burgh Quay at this location. The structure stands out between 0.77m and 1m from the quayside. It was not possible to inspect the base of the revetment as it is obscured by a 0.50m+ deposit of river-silts and mud. The timbers which comprise the revetment may be grouped into seven distinct types (Types A-G), which are discussed below:

Type A timbers are closely spaced (2mm-spacing), vertical timbers that are square in profile (measuring an average of 0.30m x 0.30m). The timbers are aligned in a continuous series that runs East-West for a distance of 105m (Plate 23). The timbers are upstanding a maximum of 1m from the riverbed and have been in-filled with a mixture of coarse gravel, angular stone, and modern debris along their southern side. The timbers are grouped in an average run of 8-9 timbers, inter-spaced with larger vertical timbers classified as 'Type B' timbers. Type B timbers are on average 1m longer than Type A timbers, and stand c.1.9m from the riverbed (Plate 24). Along their length Type B timbers are square in profile, and the topmost 0.65m is sloped on its outer (North) face. These timbers measure between 0.30m in width and 0.30m in depth. A second vertical timber of similar proportions is often located immediately behind these uprights; these have been classified as 'Type C' timbers. Type C timbers are fastened to a series of eight large horizontal timbers that abut the quay wall, classified 'Type D' timbers. These timbers are bolted to the quayside by 0.06m diameter iron pins, fastened with 0.15m diameter hexagonal nut.

The horizontal Type D timbers sit into a 0.08m recessed notch, cut into the inner face of the vertical timber. In addition, a 0.03m diameter metal pin runs through the shaft of the two vertical timbers (Types A and B) and into the main body of the horizontal timber; the iron pin being positioned to enter mid-point through the notched fastening. The eight (Type D), horizontal, timbers are square in profile (0.30m x 0.30m) and measure up to 14m in length. Each section is fastened to the other using a straight-splayed vertical scarph-join, measuring 0.07m in width and 0.72m in length (Plate 25). The joins were originally held in place using a large iron-bolt; however, these fastenings have eroded away and separated the scarph-joins. A number of wedge-shaped timbers (classified 'Type E') are fastened to the horizontal (Type D) timbers. These are located south of vertical timber Types B and C, attached in pairs to the outer and upper face of the horizontal timber (Plates 26-27). The wedged-shaped timbers that are fastened to the outer-face of the horizontal timber were used to strengthen the adjacent composite of vertical timbers. The Type E timbers fastened

to the upper-face of the horizontal timber are likely to have held another vertical timber in pace, similar to that of the Type B and C timbers. However, none of these timbers are present having eroded away. In addition, only three pairs of the wedge-shaped timbers remain in situ, the rest having eroded and fallen onto the in-fill material located behind the timber revetment.

A second series of horizontal timbers, classified as 'Type F' timbers, are located immediately behind the east-west line of the Type A vertical timbers (Plate 28). A total of eight Type F timbers remain in-situ, running between NGR: 316020E, 234383N and NGR: 316103E, 234414N These timbers measure between 8-9m in length, 0.21m in width, and are upstanding from the in-fill material c.0.02m. These timbers were originally fastened using vertical scarph-joins measuring 0.30m in length. The timbers are currently present in a semi-articulated state, the scaph-joins having partially separated. One further, disarticulated, Type F timbers is located along the eastern limit of the timber revetment.

A final set of timbers, thought to be associated with the revetment, are fastened to the quay wall above the High Water Mark, 2.7m above the riverbed (Plate 29). These timbers have been classified as 'Type G' timbers. They are vertically fastened to the quayside using a 0.06m iron screw-bolt and 0.15m diameter hexagonal nut. An iron clench-plate sits between the nut and the timber. The timbers are equidistantly spaced (2.6m apart) and number thirty-six in total. They measure 1.5m in length x 0.33m in width x 0.33m in depth. These, Type G, timbers are similar in appearance to timbers that are often placed as fenders along quayside structures. However, the presence of the protruding iron-fastenings makes their use as ship-fenders impractical. It is thought that these timbers represent bracing-timbers for a series of iron reinforcing pins that run through the quayside and into the roadway behind.

Conclusion

The archaeological assessment of Burgh Quay was focused on the immediate impact areas associated with proposed Marlborough Bridge and temporary bailey-bridge structure. The assessment recorded in detail both the quayside structure and the conjoined timber revetment. It is clear that the revetment and associated bracing-timbers have been placed to consolidate this section of Burgh Quay. In addition, it was noted that a degree of repair work, coupled with cement re-pointing, has taken place along this section of quayside. Analysis of the revetment and its fixtures and fittings suggest that it is contemporary with the iron-shuttering observed on the central and southern arch of O'Connell Bridge and the timber piling on the bridge's southern arch. However, it is unclear whether the above bridge features formed part

of the original bridge build or were placed as part of bridge consolidation measures undertaken at a later date. Therefore, the revetment is either part of repair work undertaken during, or caused by, the construction of O'Connell Bridge, or it is part of subsequent bridge and quayside consolidation measures carried out in the nineteenth or early part of the twentieth century.

Impact from proposed works

Burgh Quay will not be affected by the Metro North river crossing. However, it will be impacted along its upper levels by the proposed construction of Marlborough Bridge and a temporary bailey-bridge structure. The permanent bridge will impact a 22m section of quayside and the temporary bridge will impact a 14m section. No impact to the timber revetment is anticipated as a result of the proposed bridge crossings. Burgh Quay and its associated features have been fully recorded as part of the archaeological assessment and no further archaeological mitigation measures are deemed necessary prior to the construction phase taking place.

Feature 3: Eden Quay (Figure 18).

Eden Quay is located on the north side of the river, running east-west between Butt Bridge and O'Connell Bridge. The structure was built c.1800 and comprises of sixteen courses of neatly-faced masonry (granite blocks) rising from the existing riverbed level to a height of 5m. The masonry components have an average size of 0.30m in width and between 1.1m-1.6m in length. The smallest blocks measure 0.50m in width x 0.30m in length. The upper levels of the quayside are obscured by a modern boardwalk that extends *c*.4m from the quay structure. The boardwalk is held in place by a series of 'v' shaped supporting struts that are fastened to the quayside, located c.2.8m from the riverbed. A number of iron mooring rings are fixed to the quayside, located approximately just below the High Water mark (Plate 30). A square profile drain is located at NGR: 316162E 234502N. This is similar in both design and dimensions to those encountered along Burgh Quay (Plate 31).

A set of masonry steps are located at NGR: 316119E, 23442N. These provided river access prior to the construction of the boardwalk (Plates 32-33). The steps, thirteen in number, measure 0.90m in length x 0.32m in width x 0.35m in depth. Two iron-fixtures used as boat tie-off points have been set into the steps

Conclusion

The archaeological assessment of Eden Quay was focused on the immediate impact areas associated with the proposed Marlborough Bridge and temporary bailey-bridge

structure. The assessment was comprehensive and provided detailed recording of the existing quay structure.

Impact from proposed works

Eden Quay will not be affected by the Metro North river crossing. However, it will be impacted along its upper levels by the proposed construction of Marlborough Bridge and a temporary bailey-bridge structure. The permanent bridge will impact a 22m section of quayside and the temporary bridge will impact a 14m section. Eden Quay has been fully recorded as part of the archaeological assessment and no further archaeological mitigation measures are deemed necessary prior to the construction phase taking place.

An earlier, eighteenth-century quay structure is thought to be located behind the existing quayside structure at Eden Quay, at the junction between Marlborough Street and Eden Quay. It is referred to as Iron Quay (RMP DU18-020-461). No direct impact is anticipated to this structure,

Feature 4: Possible fording point (Figure 10).

A section of natural limestone bedrock was recorded during the underwater survey, c.40m upstream of O'Connell Bridge and c. 15m north from the south wall; NGR: 315870E, 234337N. This bedrock outcrop was visible in several places underneath the river gravel deposit that forms much of the riverbed at this location. The bedrock appears to extend across the central-channel from Aston Quay to Bachelors Walk, lying directly between Aston Place and Litton Lane. This bedrock would have provided ideal conditions for fording the river in antiquity; should water levels at Low Water drop sufficiently to make this feasible. Moreover, it is thought that this bedrock extends underneath O'Connell Bridge/Carlisle Bridge, forming a stable platform upon which the bridge foundations were constructed.

Conclusion

While there is no direct evidence that a fording point existed at this location there is documentary evidence that a number of fording points were being used across the river. In addition, it is likely that this section of the river provided favourable conditions for such a crossing. Moreover, the importance of this area as a crossing point is indicated with the presence of a ferry service at this location, as depicted on Sir John Roque's Map of 1756, and the later by the construction of the Carlisle and O'Connell Bridge structures.

Impact from proposed works

This feature will not be impacted by the proposed development and no further archaeological mitigation measures are deemed necessary prior to the construction phase commencing.

Metal-detection Survey

The metal-detection survey proved impractical due to the large number of targets encountered. The survey revealed an almost constant hit ratio and it was not possible to tune out the background metallic signature generated by the volume of modern metallic debris present.

Discussion

The river area under assessment provides the opportunity to document the existing river environment at a key location within Dublin city centre. The river is bounded by four historic quay structures ranging in date from *c*.1700 to *c*.1800. These quaysides represent the culmination of a programme of river reclamation and adaptation initiated in the seventeenth-century; the river having been the focus for maritime trade and commerce within the city. However, there is evidence of human activity and exploitation of the river from the prehistoric period onwards, and it is clear that the riverbed and the riverine deposits bounded by the quay structures have an inherent potential as a result.[18] In addition, two masonry bridge structures cross the river along the upstream and downstream sides of the survey area; Carlisle Bridge (1794) was replaced by O'Connell Bridge (1880), and Butt Bridge (1879) was subsequently built further downstream. These structures represent bridge building endeavours initiated in conjunction with the on-going eastward shift of vessel portage along the River Liffey; a shift that was spurned on by the extensive reclamation works carried out along the river estuary in the eighteenth and nineteenth-centuries. While no structures, deposits, or artefacts of archaeological significance were encountered as part of the survey, all features being of historic rather than archaeological value, the river may still be considered to hold a high archaeological potential. As such, it is recommended that a programme of archaeological monitoring be undertaken during the construction phase of the development to mitigate against any buried structures, deposits, or artefacts that may be uncovered as a result of the proposed works.

[18] Mesolithic Fishtraps found at Spencer Dock, downstream of the river survey area: McQuade, Melanie, 'Building C, Spencer Dock, North Wall Quay, Dublin', in Isabel Bennett (ed.), Excavations 2004, (Dublin, 2007), 128-9.565

6.0 PROPOSED IMPACTS

It is proposed that the Metro North alignment will cross under the River Liffey at the site of O'Connell Bridge. This will not directly affect any of the features identified from the archaeological assessment.

A temporary pontoon decking area will be constructed to the east of O'Connell Bridge and a temporary decked bailey bridge will also be constructed as part of Metro North in order to facilitate traffic management for the construction phase. This bailey bridge will be located on the River Liffey to the east of the proposed new Marlborough Bridge. The proposed Marlborough Bridge is to be constructed by Dublin County Council and will provide a link from Marlborough Street in the south to Hawkins Street in the north. These bridge constructions will have a negative impact on the two quaysides structures (listed as Features 2 and 3); both structures being impacted along their upper level. It is anticipated that the permanent bridge will impact a 22m section of quayside and the temporary bridge will impact a 14m section. The current archaeological assessment has sought to fully record the exposed extents of these structures. It is anticipated that further archaeological mitigation relating to these structures is not required prior to commencement of the development. It would be anticipated that construction phase monitoring will be necessary, to record the interior fabric and construction details of the quays underneath the exposed facades, and to record any features or fill deposits that may underlie same.

No direct impact is anticipated to RMP DU18-020-461 (Iron Quay), a small eighteenth-century quayside thought to be located behind the existing quayside structure at Eden Quay; impacts to Eden Quay being restricted to its upper levels. However, archaeological monitoring of all impacts to Eden Quay is recommended to resolve the exposure of structural remains during the course of construction works.

Riverbed deposits will be impacted by the proposed bridge developments. These areas have been systematically inspected by non-disturbance survey, and no upstanding features, deposits, or features of archaeological significance were observed. Further pre-disturbance investigation of these areas is not deemed necessary prior to commencement of the development. Construction phase archaeological monitoring should be conducted of any ground disturbance activities associated with the agitation/removal of riverbed deposits.

7.0 RECOMMENDATIONS

Pre-construction Measures

No further pre-construction measures are recommended.

Construction Phase Measures

ARCHAEOLOGICAL MONITORING. Archaeological Monitoring, licensed to the Department of the Environment, Heritage and Local Government, is recommended for all quayside, bankside, and riverbed disturbance works associated with this scheme. This archaeological work should be undertaken with the proviso for full excavation of any archaeologically significant material uncovered at this time. The archaeological monitoring should be carried out by a suitably qualified archaeologist with previous experience of river-based development projects.

RETAINING AN ARCHAEOLOGIST/S. An archaeologist will be retained for the duration of the relevant works.

THE TIME SCALE for the construction phase will be made available to the archaeologist, with information on where and when ground disturbances and dredging will take place.

SUFFICIENT NOTICE. It is essential for the developer to give sufficient notice to the archaeologist/s in advance of the construction works commencing. This will allow for prompt arrival on site to monitor the ground disturbances. As often happens, intervals may occur during the construction phase. In this case, it is also necessary to inform the archaeologist/s as to when ground disturbance works will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that any machine work cease in the immediate area to allow the archaeologist/s to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once the presence of archaeologically significant material is established, full archaeological recording of such material is

recommended. If it is not possible for the construction works to avoid the material, full excavation would be recommended. The extent and duration of excavation would be a matter for discussion between the client and the licensing authorities.

ARCHAEOLOGICAL TEAM. The core of a suitable archaeological team will be on call to deal with any such rescue excavation. This would be complimented in the event of a full excavation.

SECURE SITE OFFICES and facilities should be provided on or near those sites where excavation is required.

FENCING/BUOYING of any such areas would be necessary once discovered and during excavation.

ADEQUATE FUNDS to cover excavation, post-excavation analysis, and any testing or conservation work required should be made available.

MACHINERY TRAFFIC during construction must be restricted as to avoid any of the selected sites and their environs.

SPOIL should not be dumped on any of the selected sites or their environs.

PLEASE NOTE: All of the above recommendations are based on the information supplied for the Metro North development project. Should any alteration occur, further assessment maybe required.

PLEASE NOTE: Recommendations are subject to the approval of The Department of the Environment, Heritage and Local Government.

ACKNOWLEDGEMENTS

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Appendix 1: Chronological List of Quay Structures built along the River Liffey on the North and South sides of the river.

Location:	Name:	Approximate Construction Date
South Quay	Wood Quay (Coal Quay)	900
South Quay	Mechants Quay (Bridge Street Quay and, jointly with Wood Quay, Dublin Quay)	1300
South Quay	Blind Quay	Early 1700s
South Quay	Old Custom House Quay	1620
South Quay	Usher's, Quay	1650
South Quay	Usher's, Quay	1650
South Quay	Essex Quay	1680
South Quay	Aston Quay	1700
South Quay	Saint George's Quay; known as Georges Quay and included Whites Quay.	1700
South Quay	City Quay	1700
South Quay	Sir John Rogerson's Quay	1720
South Quay	**Burgh Quay**	**1800**
South Quay	Wellington Quay	1820
South Quay	Victoria Quay	1850
South Quay	South Quay; South Bank Quay.	1960
North Quay	Inns Quay; developed in 1700 (King's Inns Quay)	1250
North Quay	Ormond Quay Lower	1700
North Quay	Ormond Quay Upper	1700
North Quay	Arran Quay	1700
North Quay	Bachelors Walk; this originally included part of Eden Quay.	1700
North Quay	North Wall Quay (North Quay)	1800

Location:	Name:	Approximate Construction Date
North Quay	Ellis Quay, eastern part built 1760 and called Black Quay.	1750
North Quay	**Eden Quay; included the earlier Iron Quay.**	**1800**
North Quay	Custom House	1800
North Quay	Custom House Quay	1820
North Quay	Sarsfield Quay; built Pembroke Quay and included earlier Sand Quay.	1830
North Quay	Wofle Tone Quay (Albert Quay).	1800
North Quay	North Quay (North Wall Extension)	1890
North Quay	Alexandra Quay	1935
North Quay	Alexandra Quay East	1955

Appendix 2: List of RMP sites located in the vicinity of the River Assessment Area.

RMP Number:	Classification:	RMP Description:
DU018-020-428	Bacheler's Walk	De Courcy (1996: 15-17) 'The Liffey in Dublin' mentions that the quay at Bachelor's walk is in existence in 1685. The lease granted to Johnathon Amory in 1675 entitled him to reclaim the strand on the north bank of the east Liffey east of the pill. The stretch of the quay from the halfpenny bridge down to the Abbey Theatre, to use modern landmarks was developed as Batchelours Walke. The origin of the name may have derived from a capitalist called Batchelor, or it was a popular promenade for unattached males.It is unlikely by the nature of the terrain and by its difficulty of access that it would have been a popular walking place before 1674.; and it soon afterwards became a bustling quay. In December 1738 at Batchelor's Walk a Bristol ship fastened and came down on another ship, the current being very strong, they went adrift both and broke loose six or seven other vessels which all came to damage, which damage in all probability cannot be repaired with less than £100. The importance of this quay emerges also from the evidence given at an enquiry held before 1774 into proposals for building a new customs house downriver. Hamilton, the secretary to the Commissioners for Customs, testified that 'merchants seek leave to unload and load their ships at Bachelor's walk rather than at the old custom house. Graydon, the haven master, said that the best lying for ships is from Bachelor's lane to the graving bank. Bachelor's Lane is now known as Williams Row. The graving bank was on the north shore, possibly at or near the north wall slip. Another witness, Dempsey, said 'the deepest water between the walls is from the old glass house to Bachelor's Lane and there also the ground is softer. In 1817 the residents of Bachelor's walk petitioned the ballast Board for kerbs and a gravel walk along the quay to have 'this side of the water placed in the same stile of elegance as the opposite. In 1813 Eden Quay was opened to the public. With the intervention of Carlisle Bridge, Bachelor's Walk ceased to be a quay for seagoing vessels and joined the other quays 'west of Carlisle Bridge' as river side city streets with little maritime function.
DU018-020-458	George's Quay	Archaeological testing revealed a human skull in association with 13th- to 18th-century finds. A late 17th to 18th-century date is assigned on the basis of the riverine depositional sequence and the dates of the riverside developments.
DU018-020-479	Rogerson's Quay	----------
DU018-129	Burial (17th century)	De Courcy (1996, 173) mentions that George's Quay was erected in the early 18th century as a part of the development of Mercer's Ground and the slightly later construction at City Quay. George's Quay ended at the west end with a block

RMP Number:	Classification:	RMP Description:
		of buildings that separated it from Burgh Quay until early in the 19th century. The quay ended at the east end at Moss street where it ran into City Quay. The quay was an important link in the cross-channel passenger trade, whether as a direct berthing place or a s a terminal for ferries bringing passengers upriver from primary landing places at Ringsend. The commerce on George's Quay reflected the shipping trade and in 1850 the 38 houses on the quay, when it was considered to extend from White's Lane to Moss street included 5 vintners and wine merchants, four hotels and taverns, four supplies of food including ships biscuit, four ship's chandlers and rope stores, three manufacturers of canvas oil and sailcloth, three seaman's outfitters, three coal factors and two commercial agents and ship-brokers. The construction of terminals further to the east at the Pigeonhouse and at Howth and Dun laoghaire later in the 18th century and early in the 19th century largely brought an end to the south bank passenger traffic upriver in the city. George's Quay, however, continued to be very active well into the 20th century for cross channel freight with Bristol Seaway maintaining its base at the Quay until 1966.
DU018-020-461-	Eden/Iron Quay	In 1733 the city ordered that a quay be built on its own land at what was then the east end of Bachelor's Walk. Named as Iron Key on Rocque's map of 1756, the quay had a river frontage of about 30m and its site now lies under the junction of Eden Quay and Marlborough Street. A document of 1781 refers to it as the Iron Yard. (de Courcy, J, 1996, 202).
DU018-020-464	Windmill	A map dated 1683 shows 'Mr Hawkins Windmill' at Lazars Hill on the south bank of the River Liffey. No visible trace today.
DU018-020-154	Glasshouse	On J. Rocque's map 1756 labelled 'Glasshouse'

Appendix 3: Artefact Entries from the Topographic Files at the National Museum of Ireland listed for the River Liffey.

Artefact:	Find place:	NMI Reg. No.	Description:
Flat Copper axehead	River Liffey, near Phoenix Park Gate	1922:4	Harbison Type Lough Ravel, Subtype Ballybeg. References Harbison P (1968) The axes of the early bronze age in Ireland. Prahistoische Bronzefunde 9 (1). Munich.
Glass Bead	River Liffey	4042:WK428	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4041:WK427	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4034:WK420	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4034:WK419	Found with other beads and an iron sword pommel
Glass ring	River Liffey	4031:WK417	Found with other beads and an iron sword pommel
Glass Bead	River Liffey	4030:WK416	----------
Glass Bead	River Liffey	4029:WK415	----------
Bronze pin	River Liffey, near Chapelizod Gate of Phoenix Park	1908:36	----------
Copper alloy spoon	Near Bloody Bridge, Dublin	1907:70	Found in excavation of the bank of the Liffey
Iron Pommel Portion	Near River Liffey	1881:363	Found with human skeleton (feet towards east)
Iron Pommel	Near River Liffey	2264:WK040	Found with human skeleton (feet towards east)
Stoneware vessel	Usher's Quay	1991:78	Found during building work in 1930
Gold pin	Wood Quay	1994:22	
Fish hook	Wood Quay	E132:2009	Iron-silvered.
Leather boot, leather shoe	Wood Quay, Dublin	1980:115-116	Leather boot and shoe from the spoil heap at Memorial Park, Islandbridge
Spur	Wood Quay	E132:25104A	Soiled with concretions
Key	Wood Quay	E132:62378	Copper alloy and iron, soiled.

Artefact:	Find place:	NMI Reg. No.	Description:
Fish hook	Wood Quay	E132:95154	Soiled with concretions
Crutched headed ringed pin	Wood Quay	E173:x255	Found in bull-dozed soil
Leather shoes	Wood Quay	X register	----------
Antler, bone, iron strip	Wood Quay	Transferred to Mr Wallace	Antler probably dates to the medieval period when it was used for manufature of combs. The bones have butcher marks and they are meat bones.
Fyan's Tower	Wood Quay	Site inspection in 1975	Site of Fyan's Tower had masonry exposed in the road cutting at the corner of Fishamble Street and Wood Quay. The structure measured at least 10m north to south and 7.7m east to west.
6 Animal bones, 2 oyster shells, 3 clay clay pipe fragments	Ballast Office, Westmoreland Street, Dublin	Record	Following the discovery of human bones and a clay pipe at the ballast office the site was investigated in 1977 uncovering the artefacts
Various	River Liffey at King's Ford, Islandbridge, Dublin	1937:2379-2416	6 clay pipes, socket of bronze spearhead, badge of royal regiment of artillery, 3 clay pipes and stem of pipe, 3 iron spearheads, socketed iron axehead, 2 iron harpoons, open socketed iron axehead, socketed iron spearhead, bronze spiral ring, 3 buttons, part of metal brooch, 2 bronze buttons, bronze mount, iron blade-like object, perforated bone scoop (apple scoop), small bronze key, stone weight with grooves for cords, fossilised shark's tooth
Iron sword, Sudanese?	River Liffey at Arran Quay	1964:1	Found in the bed of the River Liffey about 10ft out from the edge at Arran Quay. It is Sudanese dating from fourteenth to nineteenth century. Length 100cm, length of blade 88cm, width across cross-guard 15.5cm. The blade is long tapered and flexible tapering to a blunt rounded point.

Appendix 4: Excavations Bulletin entries for River Liffey, River Liffey Quays, and the North Wall.

Entries for River Liffey:
Dublin **2000:0245** **RIVER LIFFEY AT BLACKHALL PLACE, DUBLIN** Riverbed **31413, 23429** **00E0733, 00D059, 00R067** Five investigation cuttings were undertaken in the River Liffey on the site for the new bridge proposed at Blackhall Place, Dublin. The site lies between Usher's Island on the south quay and Ellis Quay on the north. A cutting was opened at each of the four abutment locations and mid-channel, where supports for a temporary works platform will be located. The work was carried out under water using a suction dredge to assist in the removal of silts. The work was also carried out in the semi-dry at low water where part of the site is exposed during spring tides. Several objects of archaeological interest were recovered ranging in date from the medieval period to the present and including leather fragments, an antler clothes toggle, burned bone, potsherds, and the corroded remains of a service revolver. No structures of archaeological interest were observed in the cuttings, but the fragmentary remains of two cobbled surfaces were recorded off the south bank. These are probably the remains of 18th-century slipways and may be the slipways William Usher was granted permission to construct in 1705. The location is of interest as an area of Dublin City's archaeological heritage that has tended to be neglected. Located adjacent to the inlet that Rocque's city map labelled 'Gravel Walk Slip' in 1756, the site and the slipways off the south bank would have served as a natural wharf area for materials transported across the river to and from the 'Slip'. Further archaeological work is planned. **Niall Brady, 2 Vale Terrace, Lower Dargle Road, Bray, Co. Wicklow, for Archaeological Diving Company Ltd.**
Dublin **2000:0346** **RIVER LIFFEY, STRAWBERRY BEDS** No archaeological significance **30775 23590** **00D068, 00R075** Pre-development underwater archaeological assessment of the riverbed and an adjacent millrace beneath the proposed second bridge for the M50 across the River Liffey at Strawberry Beds, Co. Dublin, did not reveal in situ archaeological material. It was a non-disturbance survey. **Niall Brady, 2 Vale Terrace, Lower Dargle Road, Bray, Co. Wicklow, Archaeological Diving Company Ltd.**
Dublin **2001:365** **River Liffey at Blackhall Place, Dublin** Post-medieval/early modern quays **31413 23429** **01E0246** Underwater investigation and land-based monitoring occurred on this site in advance of and during construction of the new bridge scheme, first reported in Excavations 2000 (No. 245, 00E0733). The investigations focused on two locations. At the base of Usher's Island Quay a linear stone

anomaly originally considered to be a possible slipway was revealed to be a large area of collapsed walling. The walling would have functioned as a quayside in its own right, but is of a character and composition that is quite unlike the existing quay wall. A variety of late medieval and post-medieval finds associated with the wall indicate a dating framework that precedes the formalisation of the city's quays in the early 18th century.
At the base of Ellis Quay a second investigation revealed a large and deep hole that was filled with quarried granite. It is localised to an area around the upstream abutment for the new bridge on this side of the river, and provides supporting insight to the deep and soft riverbed that would have been located here, at what was an entry to the inlet that was subsequently defined by 'Gravel Walk Slip' in Rocque's map of 1756. The soft bed obviously presented a problem to the builders of Ellis Quay, and the investigation has provided an insight into the means by which the builders were able to stabilise the base of the quay wall. A series of squared timber piles were observed against this base outside the granite-filled hole and reflect further successful attempts at stabilisation.
The monitoring operation has recovered a further range of late medieval and post-medieval/modern finds. It has also recorded a large block of limestone masonry that collapsed from Ellis Quay into the river. The nature of the stonework is similar to the walling observed at the base of Usher's Island Quay, and suggests a parallel early quay walling prior to the more formal construction represented by the present quays.
Niall Brady, 2 Vale Terrace, Lower Dargle Road, Bray, Co. Wicklow, for Project Manager: The Archaeological Diving Company Ltd.

Dublin
2002:0518
River Liffey at Blackhall Place, Dublin
Post-medieval/early modern quays
31413 23429
01E0246
Land-based monitoring concluded on this site during the construction of the new bridge, originally reported in Excavations 2000, No. 245 (00E0733) and again in Excavations 2001, No. 365. The monitoring did not uncover further material of archaeological significance.
Niall Brady, 2 Vale Terrace, Lower Dargle Road, Bray, Co. Wicklow, for The Archaeological Diving Company Ltd.

Dublin
2002:0543
River Liffey, Guild Street/Macken Street, Dublin
No archaeological significance
02E1811
Investigations were conducted in the River Liffey before the construction of a bridge at the Guild Street/Macken Street section of the river in November 2002. As part of a continuing investigation, the first phase of this project produced no features or deposits of archaeological interest.
David A. McCullough, 41 The Orchard, Kilkenny, for The Archaeological Diving Company Ltd.

Entries for River Liffey, Quays:

Dublin
2003:509
River Liffey, City Quay/Custom House Quay, Dublin
No archaeological significance
31665 23440
03E1060
Monitoring was undertaken of the River Liffey investigation works in relation to a proposed pedestrian bridge by Dublin Dockland Authority. The proposed site is located crossing the River Liffey from City Quay to Custom House Quay, in front of the New Jury's Hotel. A pontoon with a drill rig present was set up from the bridge site to agreed locations. The work was carried out over three days and four boreholes were drilled, each 0.2m in diameter. It was

possible to attain solid cores of the drilled material.
No material of archaeological interest was identified during this monitoring of operations.
Finola O'Carroll, for CRDS Ltd, Unit 4, Dundrum Business Park, Dundrum, Dublin 14.

Dublin
2003:520
River Liffey, Custom House Quay/City Quay, Dublin
Riverbed deposits and associated quayside features/walls
03D0363; 03R107
An underwater archaeological and metal-detector survey of the River Liffey took place along a corridor between Custom House Quay and City Quay just west of Lombard Street, Docklands, Co. Dublin. A detailed record of the quay wall and survey of associated areas of riverbed was carried out as part of the archaeological requirement for the planning application associated with the development of this site.
The riverbed in this area has been subjected to a cycle of dredging and redeposition of silts at regular intervals. Dumping of modern debris from both the quayside and from the vessels using this area also contributes to the nature of materials in this area. Near continuous metal detector readings were encountered along an approximately 5m-wide zone adjacent to the quaysides, with metal detector readings occurring approximately every 1.5m elsewhere. All of the identified materials were modern debris.
David A. McCullough, 41 The Orchard, Kilkenny, for The Archaeological Diving Company Ltd.

Dublin
2003:527
7–8 Eden Quay, Dublin
Human skull in river gravels
31603 23447
SMR 18:20
02E1713
Testing was undertaken in advance of development in January 2003. The existing 19th-century basements were found to have removed even the late 17th/early 18th-century slobland infill formerly present on the site and cut directly into underlying river gravels. Trenches achieved a depth of 0.15–0.2m OD before they began to flood. No significant archaeology was found.
Excavations by Christine Baker nearby in the centre of O'Connell Street have indicated that the former quay wall associated with the Amory grant of 1675 was located along the alignment of the south edge of what is today The Lotts (No. 561 below). A jetty or pier of a similar late 17th/early 18th-century date extended south from the quay wall some 14.5m. The Eden Quay site lies entirely south of the former line of the quay and even of any jetties that may have existed nearby (if they had, they would now lie north of Harbour Court). The implication of the synthesis of results from these and other archaeological work suggests that (contra some map and document-based studies) the present Bachelors Walk is not in the location of the 17th-century toponym, and that the name migrated south with the later extension of the quay.
In November 2003, a human skull was recovered from the river gravels during bulk excavation, at a depth of approximately 2m OD. A handful of other 13th–18th-century finds were also recovered from the gravels between 2m and 3.5m OD, including a medieval Saintonge potsherd, assorted late 17th/early 18th-century finds (c. 1660–80 clay-pipe bowl, base sherd of a North Devon gravel-tempered footed pipkin, base sherd of a small black-glazed earthenware posset cup) and a few fragments of butchered-animal bone. Denise Keating undertook analysis of the skull, which is from a probable male of 18–25 years. There is evidence of calculus (mineralised plaque) on the teeth, as well as some evidence of developmental stress ('Harris lines' caused by poor diet/starvation, illness, etc.) at two unspecified times during childhood, probably before the age of seven. Taphonomically, the skull exhibited characteristics in accordance with its discovery in riverine deposits, and there is a reasonable possibility that it had travelled some distance with currents of tidal flow. There is no evidence to indicate where the skull originated, or its date, although a late 17th/early 18th-century date seems most likely, on the basis of the riverine depositional sequence and the dates of quayside development on and close to the site.
William O. Frazer, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower,

Glenageary, Co. Dublin.

Dublin
2002:0516
14–18 Aston Quay, Dublin
Urban
311580 233435
02E1621
Monitoring took place of six trial-pits excavated in the basement of 14–16 Aston Quay (formerly the Virgin Megastore), necessitated by structural investigations. Four revealed deposits dating from the 17th and 18th centuries.
Construction of the quay and land reclamation from the Liffey began in the late 17th century. The quay proper first appears on Charles Brooking's map of 1728. Early in the 19th century McBirney, Collis and Co., silk merchants and drapers, built a large building on one block of the quay, replacing the terraced houses recorded on John Rocque's map of 1756. This building subsequently became McBirney's department store.
As a result of reconstruction work carried out in c. 1899, the floor level in the basement was reduced, except for a section in the north-east corner. This section, which was c. 0.9m higher than the rest, measured c. 18m north–south by 6m.
Three test-pits were excavated in this area. Above the natural, grey, compact, sandy silt and pebbles were two layers of reclamation deposits. The first, c. 0.2m deep, was a dark grey, moist, gritty clay deposit. Pottery from this deposit dated to the late 17th century. Above this was a dark brown, silty clay deposit (c. 0.6m deep) with inclusions of cockle and oyster shell, animal and bird bone, clay-pipe stems and some 18th-century pottery sherds.
Another three pits (Pits 4–6) were excavated through the lower basement floor. Only in Pit 4 was an archaeological deposit present. This dated to the late 17th century. From the riverbed deposits in Pit 5 an animal vertebra was recovered. This indicates the possibility of archaeological artefacts in the riverbed deposits.
Abi Cryerhall, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.

Dublin
2003:495
14–18 Aston Quay, Dublin
Urban post-medieval
31489 23336
02E1621
An excavation and programme of monitoring were carried out at a development site at 14–18 Aston Quay, Dublin 2. The development involved the alteration and refurbishment of the extant structure at the site, including the lowering of the basement floor level for a new ground slab and the insertion of a swimming pool.
Previous monitoring of geotechnical investiga_tions by Abi Cryerhall at the site took place in October and November 2002 (Excavations 2002, No. 514). Potential archaeological strata were noted in the trenches excavated. A full assessment was carried out in January 2003. It was established that substantial undisturbed deposits of land reclamation soils survived at the section of the basement corresponding to No. 18 Aston Quay, as well as possible structural remains. However, only very vestigial and disturbed remains of the land reclamation deposits could be identified over the remainder of the basement area
In 1899, a massive refurbishment of the existing structures at the block was carried out by McBirney, Collis and Co., in order to create the present structure. This involved the consolidation of the basements to form a single unit covering the entire block. It was during this refurbishment that the floor level in the majority of the basement was lowered to the present level. Only in a small section in the north-east corner of the basement (corresponding to the original No. 18 Aston Quay) was the original floor level maintained. This section of the basement was the subject of the present investigation.
Excavation took place in February and March 2003, followed by a programme of monitoring. Three phases of activity were identified at the site. The earliest was characterised by riverine clays covered by layers of dumped land reclamation material, which were in turn sealed by flood silts. The second phase of activity was mainly characterised by a series of structural walls, pre-dating the extant structure. These walls appear to relate to plot divisions at the site illustrated on survey plans held in the City Archives and dating to as late as 1823. The final

phase was characterised by the construction of the extant structure at the site and the subsequent development and refurbishment of that structure.
Monitoring did not identify any archaeological features in the main basement area.
Teresa Bolger, c/o Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.

Dublin
2003:509
River Liffey, City Quay/Custom House Quay, Dublin
No archaeological significance
31665 23440
03E1060
Monitoring was undertaken of the River Liffey investigation works in relation to a proposed pedestrian bridge by Dublin Dockland Authority. The proposed site is located crossing the River Liffey from City Quay to Custom House Quay, in front of the New Jury's Hotel. A pontoon with a drill rig present was set up from the bridge site to agreed locations. The work was carried out over three days and four boreholes were drilled, each 0.2m in diameter. It was possible to attain solid cores of the drilled material.
No material of archaeological interest was identified during this monitoring of operations.
Finola O'Carroll, for CRDS Ltd, Unit 4, Dundrum Business Park, Dundrum, Dublin 14.

Dublin
2003:520
River Liffey, Custom House Quay/City Quay, Dublin
Riverbed deposits and associated quayside features/walls
03D0363; 03R107
An underwater archaeological and metal-detector survey of the River Liffey took place along a corridor between Custom House Quay and City Quay just west of Lombard Street, Docklands, Co. Dublin. A detailed record of the quay wall and survey of associated areas of riverbed was carried out as part of the archaeological requirement for the planning application associated with the development of this site.
The riverbed in this area has been subjected to a cycle of dredging and redeposition of silts at regular intervals. Dumping of modern debris from both the quayside and from the vessels using this area also contributes to the nature of materials in this area. Near continuous metal detector readings were encountered along an approximately 5m-wide zone adjacent to the quaysides, with metal detector readings occurring approximately every 1.5m elsewhere. All of the identified materials were modern debris.
David A. McCullough, 41 The Orchard, Kilkenny, for The Archaeological Diving Company Ltd.

Dublin
1996:106
22—23 Ormonde Quay, Dublin
Medieval urban
O153342
96E272
Archaeological test excavation was undertaken at 22—23 Ormonde Quay on 9 October 1996 to fulfil requirements for the planning application. The site is located on the north side of the Liffey opposite Wood Quay and to the south-east of the medieval suburb of Oxmantown.

The site appears to have been located on the river shoreline up to the seventeenth century, at which time reclamation commenced. The housing built behind the new quay front is likely to date to the early eighteenth century on the basis of the findings. The work on site involved the mechanical excavation of four test-pits. The first pit was located in the south-west corner of the site close to the street front of No. 23 Ormonde Quay. The second pit was located in the middle of the western side of the site. The third pit was located in the middle of the eastern side of the site, while the fourth pit was located in the north-east corner at the rear of the site.

The natural deposits of gravel and estuarine mud encountered at the base of the test-pits indicate the area as slobland, as depicted on Speed's map of Dublin in the seventeenth

century. The greater depth of gravel found in pit 2 than in pit 1 suggests the presence of inlets or channels running parallel to the main Liffey course, also depicted by Speed.

The earliest archaeological activity on the site is seventeenth-century land reclamation, dated on the basis of finds recovered from the deposits, including North Devon gravel-tempered ware, sgraffito and early clay pipes. No trace of the early quay wall was encountered in the test-pits but it is likely to occur under the present quayfront road. The lowest, early dumped deposits were up to 1mthick, and the upper layers, including ash and domestic debris, were interpreted as occasional sporadic dumping in the late seventeenth century. The last major phase of activity was the construction of houses fronting onto the quays and onto the lane at the rear of the site (in the eighteenth century). This involved the removal of seventeenth-century material, when basements were constructed at both the front and rear.

The material revealed is not archaeologically sensitive though it has illustrated the development of the riverfront in the area. There were no implications for the development as piled foundations were proposed and no intrusive excavation was planned.
Margaret Gowen, Rath House, Ferndale Rd. Rathmichael, Co. Dublin.

Entries for River Liffey, North Wall:

Dublin
2003:0576
Spencer Dock, Sheriff Street, Dublin
Post-medieval industrial
317169 234711
03E0654
The excavation of environmental test-pits on the site of the Spencer Dock residential development was monitored between 19 June and 2 July 2003 and in October 2003. Monitoring of groundworks on this site commenced on 5 January 2004 and is ongoing. The results of this monitoring will be detailed in Excavations 2004. What follows is a summary of findings to date.
The ground uncovered in the environmental test-pits comprised post-medieval rubble and fill, overlying silts and river gravels. A series of subsurface structural remains of red-brick and limestone construction were uncovered. These are the remains of industrial structures, dating from the 19th and 20th centuries. A number of artefacts dating from the post-medieval period were recovered from the test-pits. During initial site clearance and shoring, cellars were uncovered in the south of the site, where they extend under the North Wall road. These are from the demolished structures Nos 46 and 47 North Wall, and may date from as early as the mid-18th century. It is anticipated that a record will be made of the structural remains exposed during bulk excavation works, which have yet to commence.
Melanie McQuade, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.

Dublin
2003:576
Spencer Dock, Sheriff Street, Dublin
Post-medieval industrial
317169 234711
03E0654
The excavation of environmental test-pits on the site of the Spencer Dock residential development was monitored between 19 June and 2 July 2003 and in October 2003. Monitoring of groundworks on this site commenced on 5 January 2004 and is ongoing. The results of this monitoring will be detailed in Excavations 2004. What follows is a summary of findings to date.
The ground uncovered in the environmental test-pits comprised post-medieval rubble and fill, overlying silts and river gravels. A series of subsurface structural remains of red-brick and limestone construction were uncovered. These are the remains of industrial structures, dating from the 19th and 20th centuries. A number of artefacts dating from the post-medieval period were recovered from the test-pits. During initial site clearance and shoring, cellars were uncovered in the south of the site, where they extend under the North Wall road. These are from the demolished structures Nos 46 and 47 North Wall, and may date from as early as the

mid-18th century. It is anticipated that a record will be made of the structural remains exposed during bulk excavation works, which have yet to commence.
Melanie McQuade, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.

Dublin
2004:0565

BUILDING C, SPENCER DOCK, NORTH WALL QUAY, DUBLIN
Late Mesolithic fish traps and post-medieval structures
317169 234711
03E0654
Monitoring and excavation were carried out on the site of Building C, Spencer Dock, North Wall Quay, Dublin 1, between January and September of 2004. Three principal phases of activity were uncovered. Monitoring on the site of a northern block (RSTUV) is ongoing. To date, 19th-century foundation remains have been uncovered. The results of monitoring on this block will be reported in Excavations 2005.

Late Mesolithic
The earliest phase relates to fishing and other activity carried out when the Liffey estuary occupied the south of the site. The transition of silt and gravels uncovered between 13-16m north of the southern limit of excavation marked the old shoreline of the Liffey channel. The remains of wooden fish traps, stake rows and miscellaneous pieces of worked wood were preserved in the waterlogged silts. A semicircular wicker structure or fish trap comprised stakes and a series of smaller upright rods, around which rushes had been woven. A radiocarbon date of 6090-5840 cal. BC was returned for this feature. Along the shoreline to the south-west of the fish trap was a deposit of horizontally set roundwoods. These were truncated to the east by machine excavation, but the remains covered an area 3.4m by 1.28m and have been radiocarbon dated to 6070-5890 cal. BC. In the south of the site was a row of 36 stakes aligned northeast/south-west; a date of 5920-5720 cal BC was obtained for one of these stakes. Along the western shoreline, to the north of the western stakes, were the remains of a wicker-basket-type structure and a group of stakes. The structure, which survived up to 0.6m long and 0.3m wide, has been dated to 5990-5750 cal. BC. On the west of the site were two rows of rods and stakes, a horizontal panel of wicker (dated to 6100-5970 cal. BC)and a fragmentary wicker fence, which were probably part of a truncated fish trap.

The fish traps were constructed mainly but not exclusively of hazel and were in a good state of preservation. In addition, there were several other stakes and pieces of worked wood, which did not form any coherent structures.

Phase 2 was the reclamation of land from the estuary and its floodwaters. This was achieved by depositing a series of fills in order to build up the ground. Artefacts recovered from these reclamation deposits have been dated to the 18th and 19th centuries and corroborate with the documentary sources in indicating the date when this work was carried out.

The third phase was the development of the reclaimed land. From the later 18th up to the 20th century a series of structural remains were founded on the reclamation deposits and the site was drained by a series of brick culverts cut into these deposits. In the south of the site, c. 112m to the east of the canal and 45m north of where the canal opens into the Liffey, were the remains of a circular masonry structure. This had an internal diameter of 11.2m and its encircling wall was constructed of limestone blocks (0.35m by 0.22m by 0.16m), bonded with mortar. The wall was 1m wide and survived to a maximum of 1m in height. In the west was an entrance. Leading from the western entrance was a walkway, which comprised two rows of granite slabs on either side of which was a red-brick floor (6.1m by 5.1m) and to the west were four sandstone slabs. To the east of the floor and abutting the external wall was a north-south masonry wall with an eastern return at its north. This was probably an internal division within the circular structure. This was the earliest masonry structure uncovered on site. Its location roughly corresponds with the windmill at North Wall Quay, which was recorded as being 100m east of the mouth of the Royal Canal. The windmill had burned down in a spectacular fire late in 1810 but is shown on Taylor's map of 1816. The inclusion of the windmill on Taylor's map suggests that it was reconstructed after the fire of 1810. However, it is not shown on the first-edition OS map (1837), which shows a warehouse on the same location. The western wall of this warehouse was uncovered during site works, partly

overlying, and therefore post-dating, the windmill wall. The archaeological evidence corroborates the cartographic evidence in indicating an early 19th-century date for the windmill. It was larger in diameter (11.2m) than typical tower mills (4-6m). Its location on low-lying ground, which was prone to flooding, suggests that it may have served for pumping and draining water rather than milling corn.

To the north, west and south of the windmill structure were a series of 19th- and 20th-century walls and basement floors, which largely corresponded with the structures shown on the OS maps. A series of five arched vaults was uncovered along the street front and extending under the road, south of Nos 46 and 47 North Wall Quay. The vaults extended for c. 16m east-west and were accessed from the north through an arched corridor. The individual vaults measured c. 3m long and 3.2m wide and the corridor was c. 1.5m wide. The vaults were constructed of limestone blocks bonded with mortar.

Red and yellow brick used in the upper structure of the walls may represent modifications to the original structure. These vaults were filled in and remain in situ.
Melanie McQuade, Margaret Gowen & Co. Ltd, 27 Merrion Square, Dublin 2.

Appendix 5: Tabulated Dive Logs from the Underwater Assessment.

Diver Number:	**001**	
Date:	09.12.08	
Dive Location:	River Liffey, upstream and downstream of O'Connell Bridge.	
Vessel/Installations:	7m Avon RIB	
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)	
H/P Main Gas: 232 Bar		**Reduced to:** 10 Bar
B/O: 230 Bar		**S/B Diver Gas:** 232 Bar
Diver: ……Rex Bangerter		**S/B Diver:** Edward Pollard
L/S: 11hrs 52mins		**A/S:** 13hrs 23mins
Bottom Time: 1hrs 31mins		**Max Depth:** 4m
Table used: 10/240 USN		**Diver Supervisor**: Brian McAllister

Diver Number:	**002**	
Date:	09.12.08	
Dive Location:	River Liffey, continuation of previous survey on downstream side of O'Connell Bridge.	
Vessel/Installations:	7m Avon RIB	
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)	
H/P Main Gas: 232 Bar		**Reduced to:** 10 Bar
B/O: 230 Bar		**S/B Diver Gas:** 232 Bar
Diver: ……Edward Pollard		**S/B Diver:** Rex Bangerter
L/S: 15hrs 22mins		**A/S:** 16hrs 14mins
Bottom Time: 47mins		**Max Depth:** 4m
Table used: 10/240 USN		**Diver Supervisor**: Brian McAllister

Diver Number:	**003**	
Date:	11.12.08	
Dive Location:	River Liffey, visual inspection Eden Quay + Central Arch and southern arches of O'Connell Bridge.	
Vessel/Installations:	7m Avon RIB	
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)	
H/P Main Gas: 232 Bar		**Reduced to:** 10 Bar

B/O: 230 Bar	**S/B Diver Gas:** 232 Bar
Diver: ……Rex Bangerter	**S/B Diver:** Edward Pollard
L/S: 10hrs 48mins	**A/S:** 14hrs 34mins
Bottom Time: 3hrs 46mins	**Max Depth:** 6m
Table used: 10/240 USN	**Diver Supervisor**: Brian McAllister

Diver Number:	**004**
Date:	11.12.08
Dive Location:	River Liffey Burgh Quay and timber revetment.
Vessel/Installations:	7m Avon RIB
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)

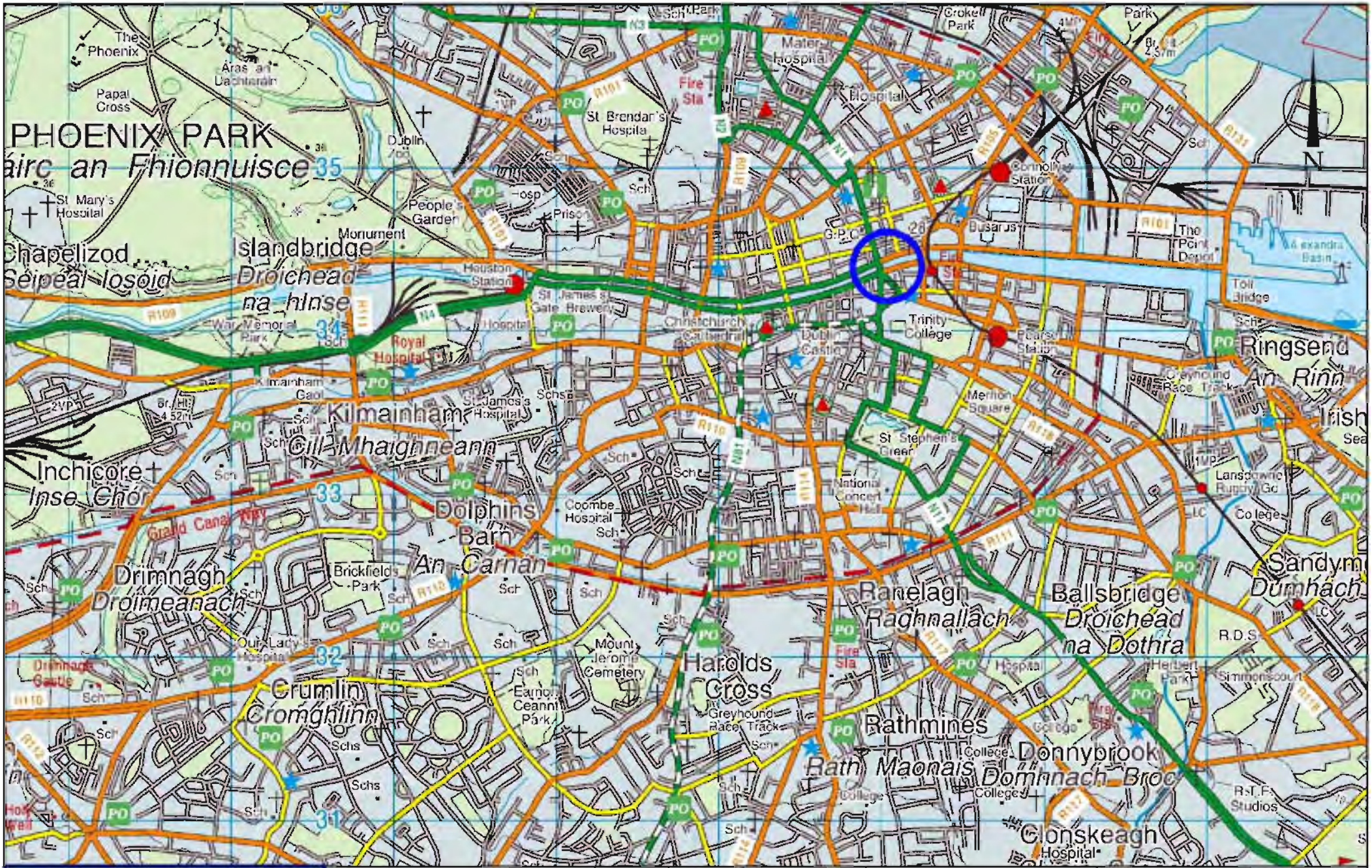
H/P Main Gas: 220 Bar	**Reduced to:** 10 Bar
B/O: 180 Bar	**S/B Diver Gas:** 230 Bar
Diver: ……Edward Pollard	**S/B Diver:** Rex Bangerter
L/S: 15hrs 42mins	**A/S:** 16hrs 32mins
Bottom Time: 51mins	**Max Depth:** 3m
Table used: 10/240 USN	**Diver Supervisor**: Brian McAllister

Diver Number:	**005**
Date:	12.12.08
Dive Location:	River Liffey, visual inspection and video survey along base of Eden Quay and central arch of O'Connell Bridge.
Vessel/Installations:	7m Avon RIB
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)

H/P Main Gas: 220 Bar	**Reduced to:** 10 Bar
B/O: 170 Bar	**S/B Diver Gas:** 230 Bar
Diver: ……Rex Bangerter	**S/B Diver:** Edward Pollard
L/S: 11hrs 32mins	**A/S:** 12hrs 55mins
Bottom Time: 132mins	**Max Depth:** 5m
Table used: 10/219 USN	**Diver Supervisor**: Brian McAllister

Diver Number:	**006**
Date:	12.12.08
Dive Location:	River Liffey, visual inspection and video survey along base of Burgh Quay +

	continued inspection of central river channel.	
Vessel/Installations:	7m Avon RIB	
Type of Dive:	Surface Supplied AIR (Kirby Morgan 18B)	
H/P Main Gas: 120 Bar		**Reduced to:** 10 Bar
B/O: 170 Bar		**S/B Diver Gas:** 230 Bar
Diver: ……Edward Pollard		**S/B Diver:** Rex Bangerter
L/S: 13hrs 44mins		**A/S:** 15hrs 05mins
Bottom Time: 121mins		**Max Depth:** 3m
Table used: 10/219 USN		**Diver Supervisor**: Brian McAllister



THE ARCHAEOLOGICAL DIVING COMPANY LTD.
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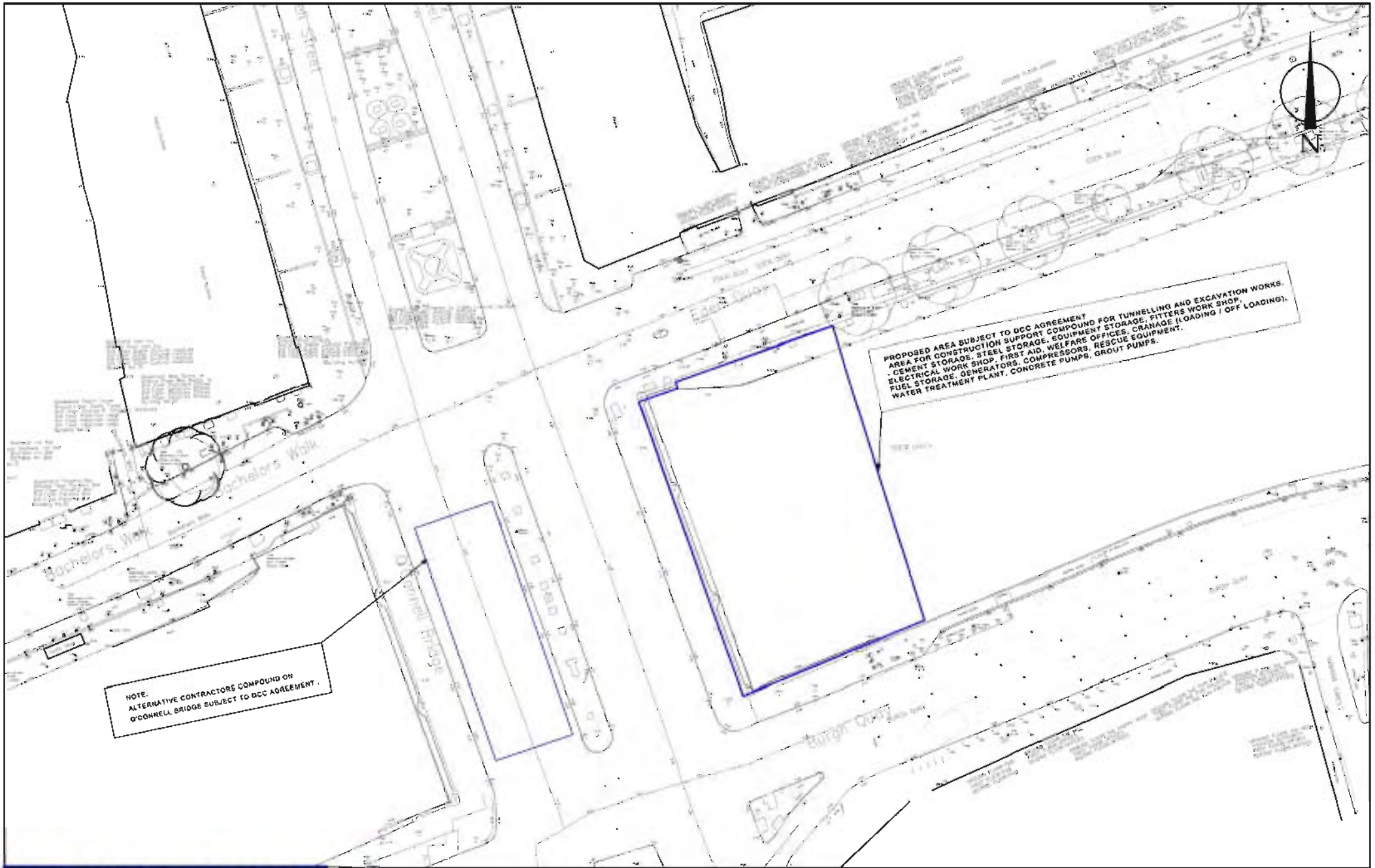
Notes
ADCO Survey Area
Source: Ordnace Survey Ireland

Job/Exc No. 08D094, 08R310.	**Compiled by** R.Bangerter	**CAD reference** RPA-River Liffey	**Client** Railway Procurement Agency
Date 14.01.09	**Scale** N.T.S	**Drawing No.** Figure 1	**Project** Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 1- Extract from OS 1:50,000 Discovery Series Mapping showing location of the Proposed Development.



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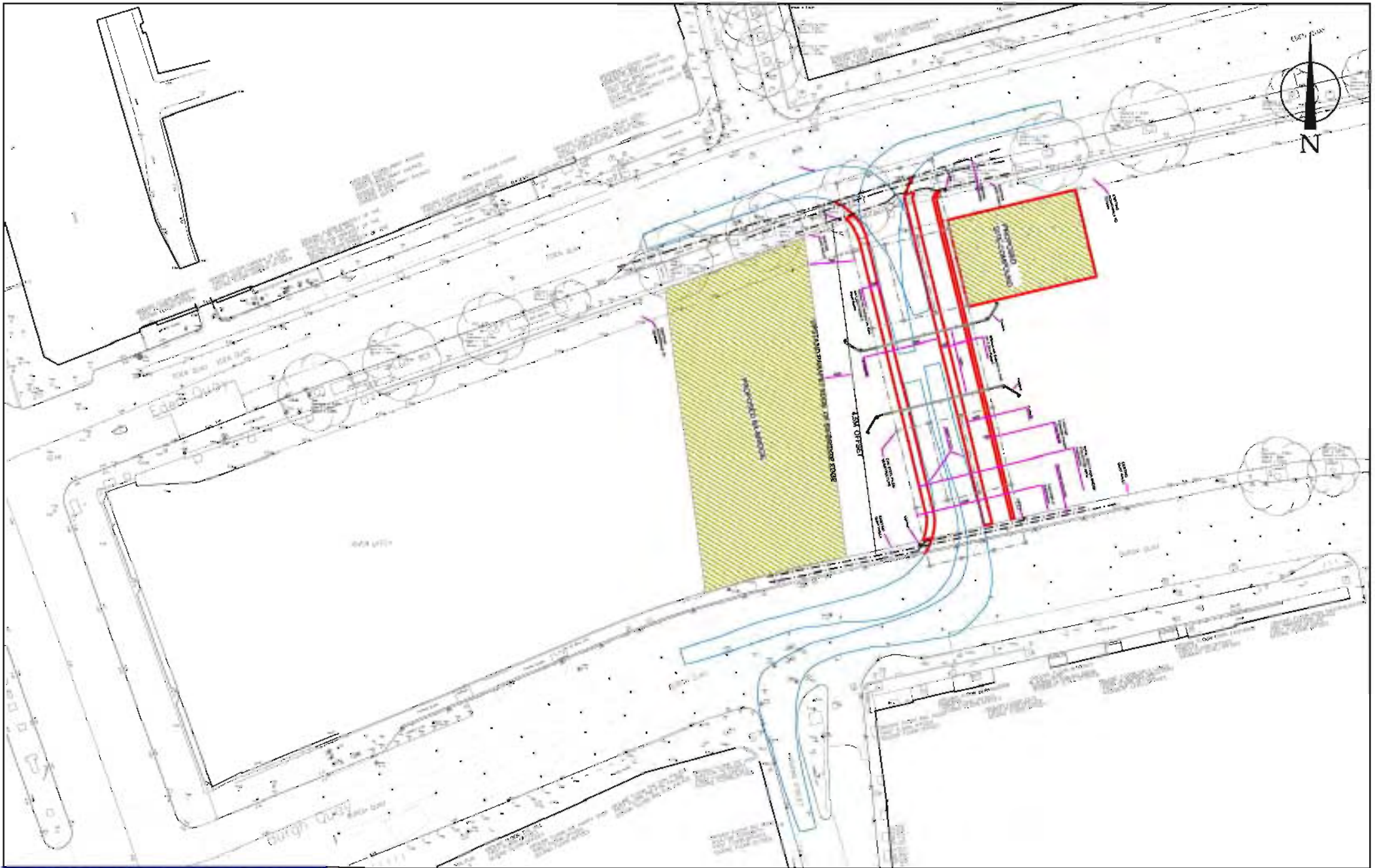
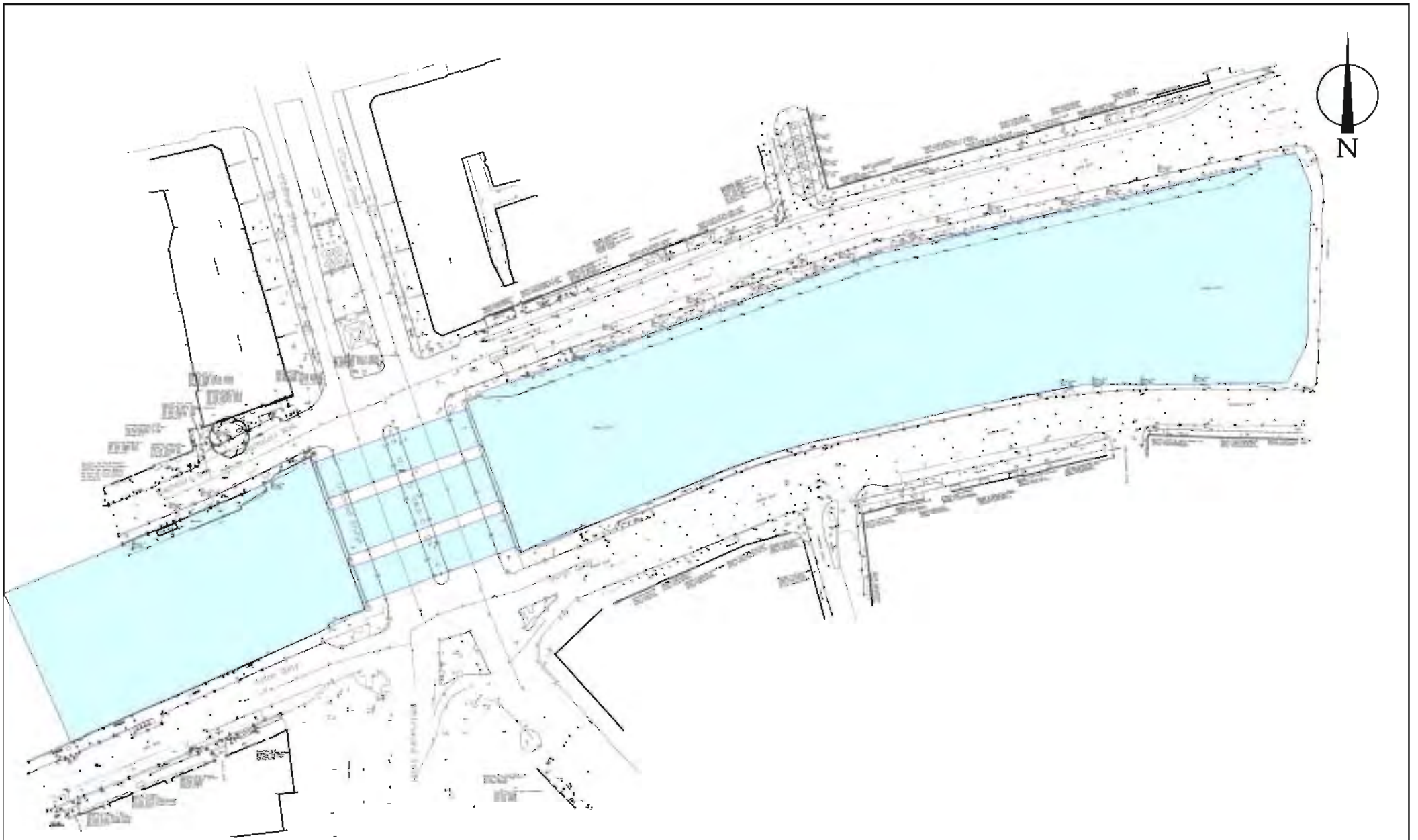
Notes Draft Bridge Layout Plan, Source: Jocobs Ltd./RPA	**Job/Exc No.** 08D094, 08R310	**Compiled by** R.Bangerter	**CAD reference** RPA-River Liffey	**Client** Railway Procurement Agency
	Date 03.02.09	**Scale** 1:750	**Drawing No.** Figure 2	**Project** Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 3- Extract from Project Drawing showing location of proposed temporary decking area to be placed immediately east of O'Connell Bridge.



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** Draft Bridge Layout Plan. Source: Jacobs Ltd./RPA	**Job/Exc No.** 08D094, 08R310	**Compiled by** R.Bangerter	**CAD reference** RPA-River Liffey	**Client** Railway Procurement Agency
		Date 29.01.09	**Scale** 1:750	**Drawing No.** Figure 3	**Project** Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 3- Extract from Project Drawing showing location of the proposed Marlborough Bridge and temporary Bailey Bridge structures.



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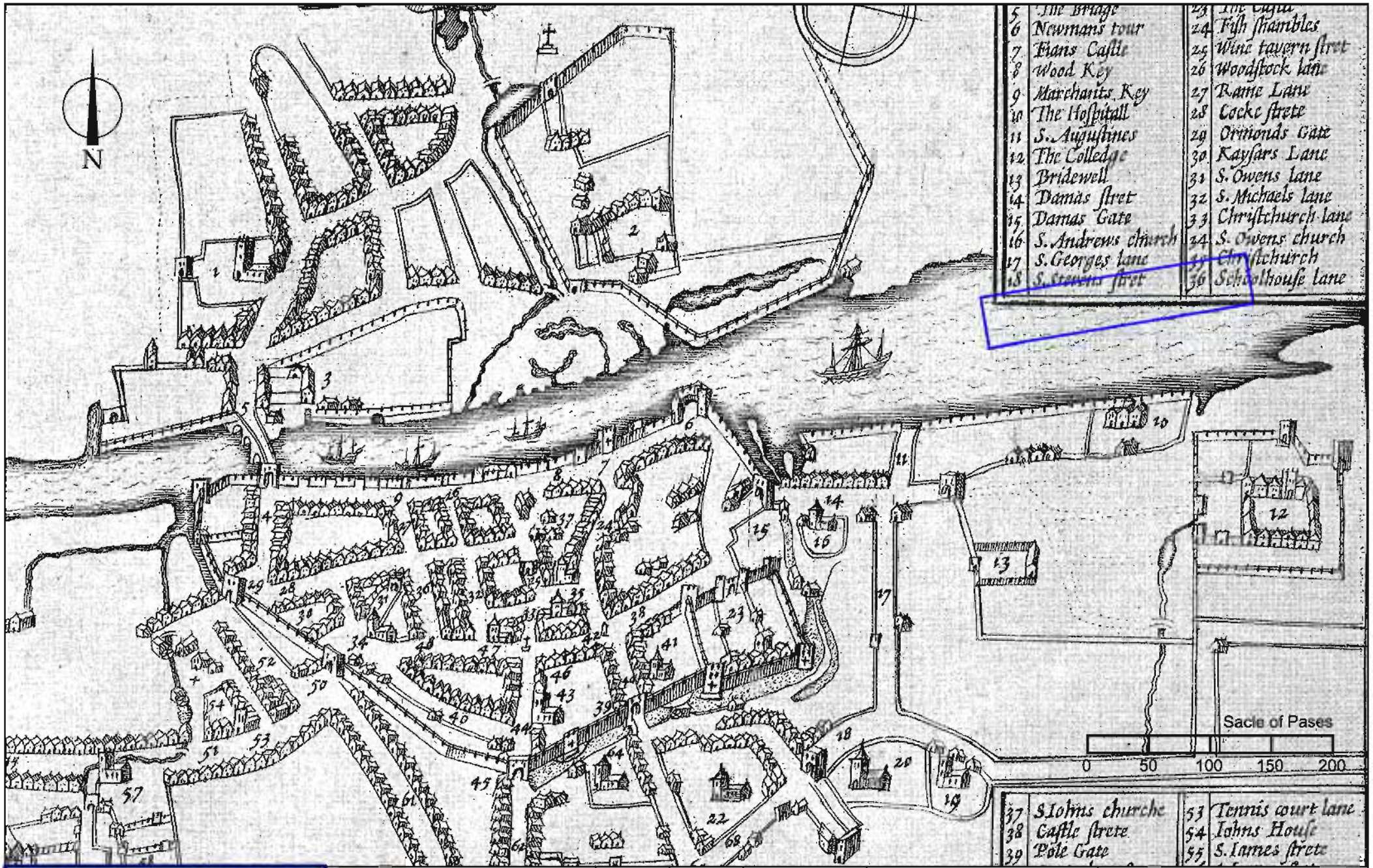
Notes
ADCO River Survey Area

Job/Exc No. 08D094, 08R310	Compiled by R.Bangerter	CAD reference RPA-River Liffey	Client Railway Procurement Agency	Title Figure 4- OS Background Mapping showing location Of ADCO River Survey Area.
Date 19.01.09	Scale 1:1500	Drawing No. Figure 4	Project Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.	



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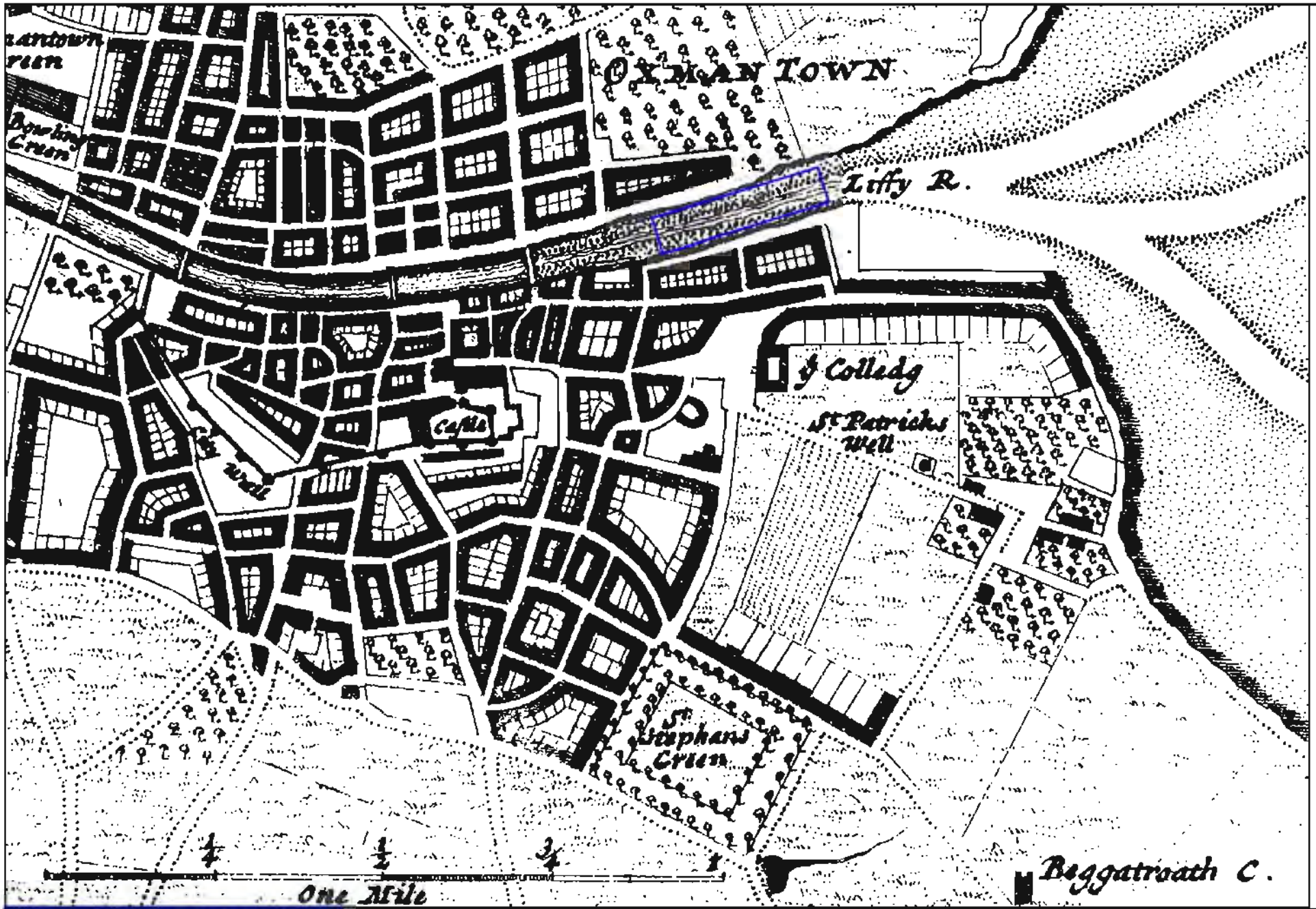
Notes
Appoximate loctaion of ADCO Survey Area
Source: John's Speed's Theatre (1610) reproduced in the Irish Historic Towns Atals, No 11.

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310,	R.Bangerter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
23.01.09	As shown	Figure 5	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 5- Extract from John Speed's (1610) map with approximate location of ADCO River Survey Area superimposed.



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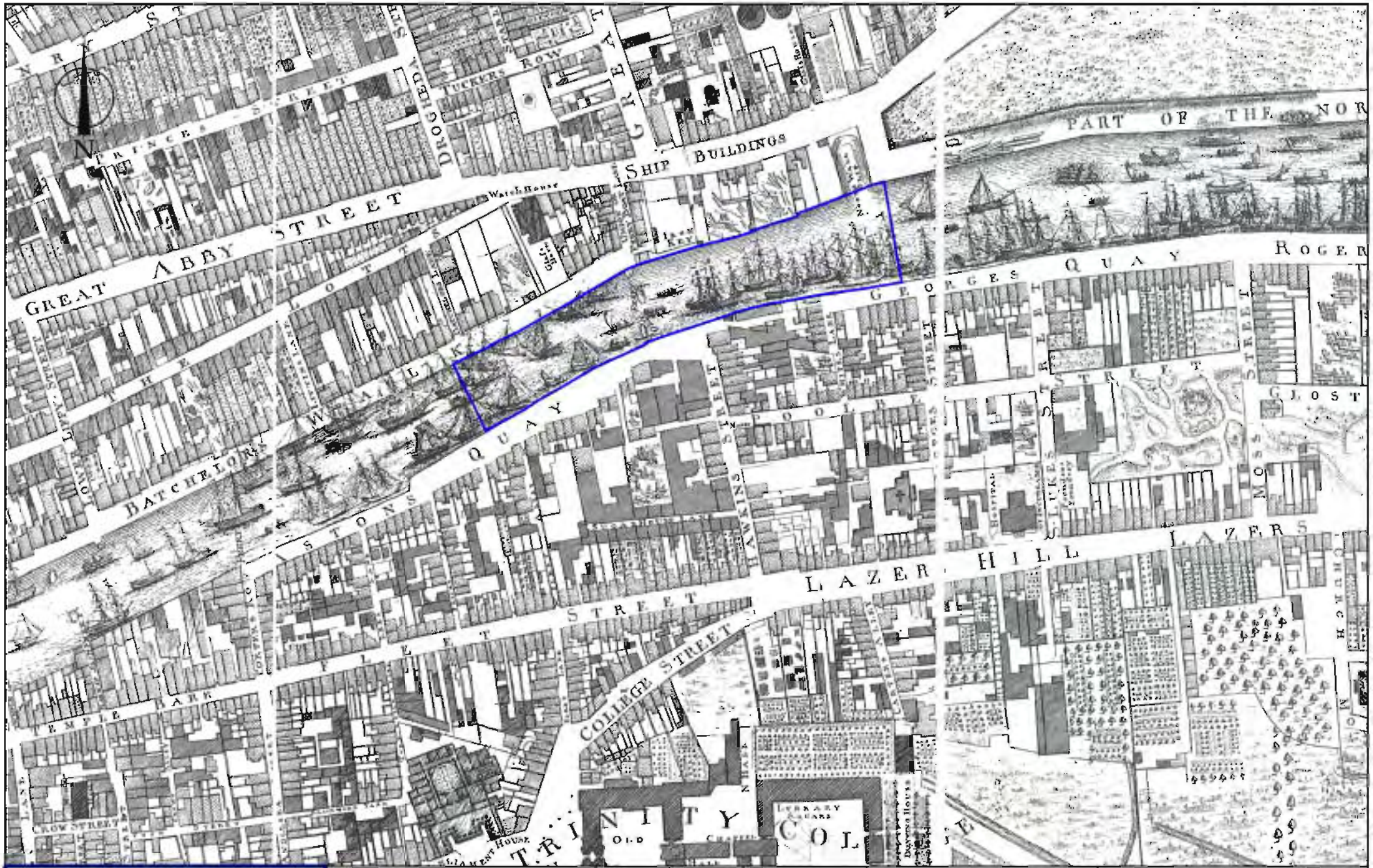
Notes
Appoximate loctaion of ADCO Survey Area
Source: Herman Moll's Map (1714), reproduced in the Historic Dublin Maps Series, the National Library of Ireland.

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310,	R.Bangerter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
23.01.09	As shown	Figure 6	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 6- Extract from Hermon Moll's (1714) map with approximate location of ADCO River Survey Area superimposed.



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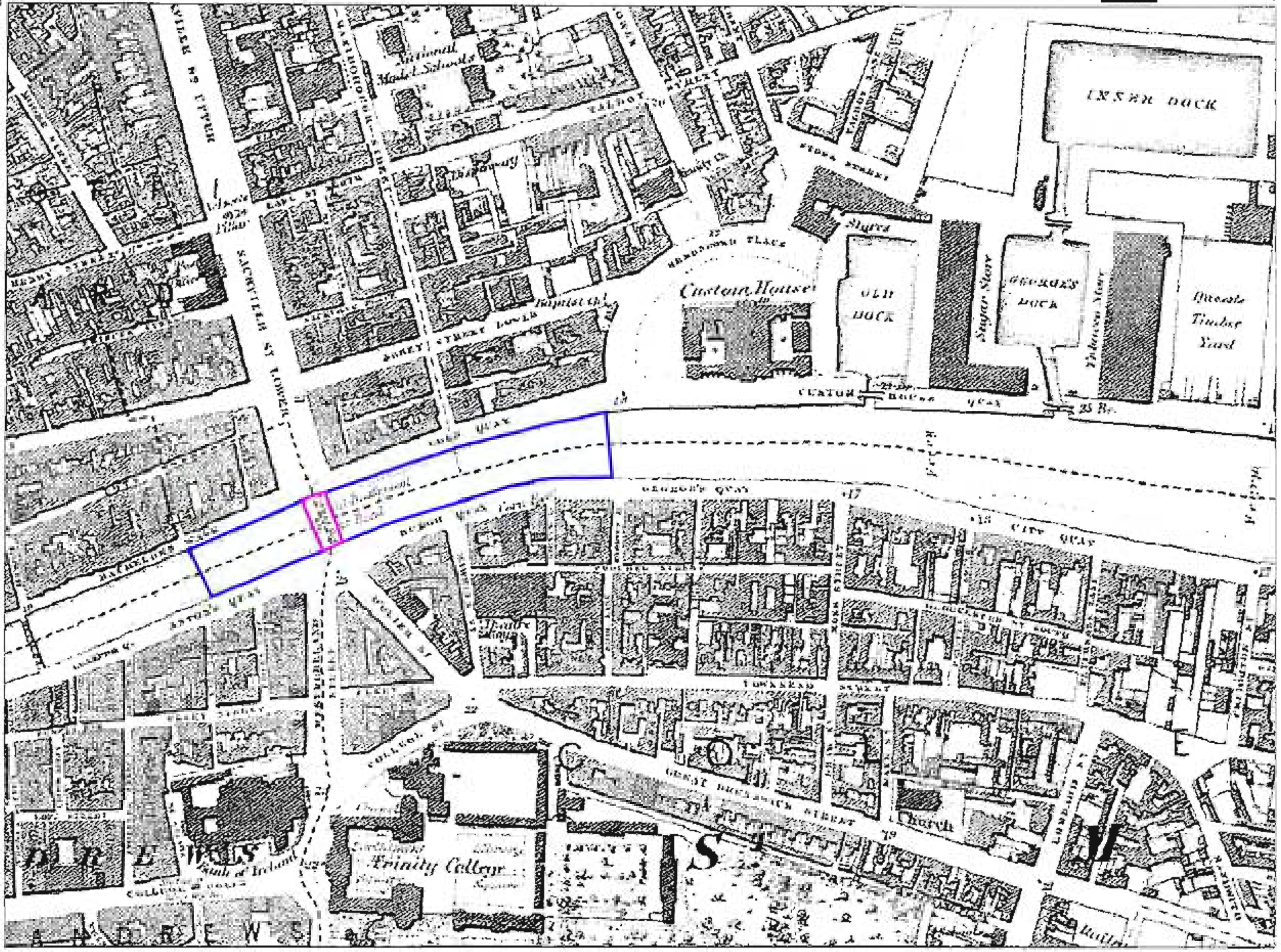
Notes
Approximate location of ADCO Survey Area
Source: John Roque's Dublin City Maps 1756.

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310,	R.Bangerter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
15.01.09	N.T.S	Figure 7	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 7- Extract from John Rocque's (1756) map with approximate location of ADCO River Survey Area superimposed.

Surveyed 1837
Revised 1837
Levelled

Historic Map



ITM CENTRE PT COORDS

716202,734446

DESCRIPTION

MAP SHEETS

6 InchBE1
DN018

Scale:- 1:5,000

0 100 200 300 400 500 Metres

Plot Ref. No. 9004155_1_1
Plot Date 16-JAN-2009

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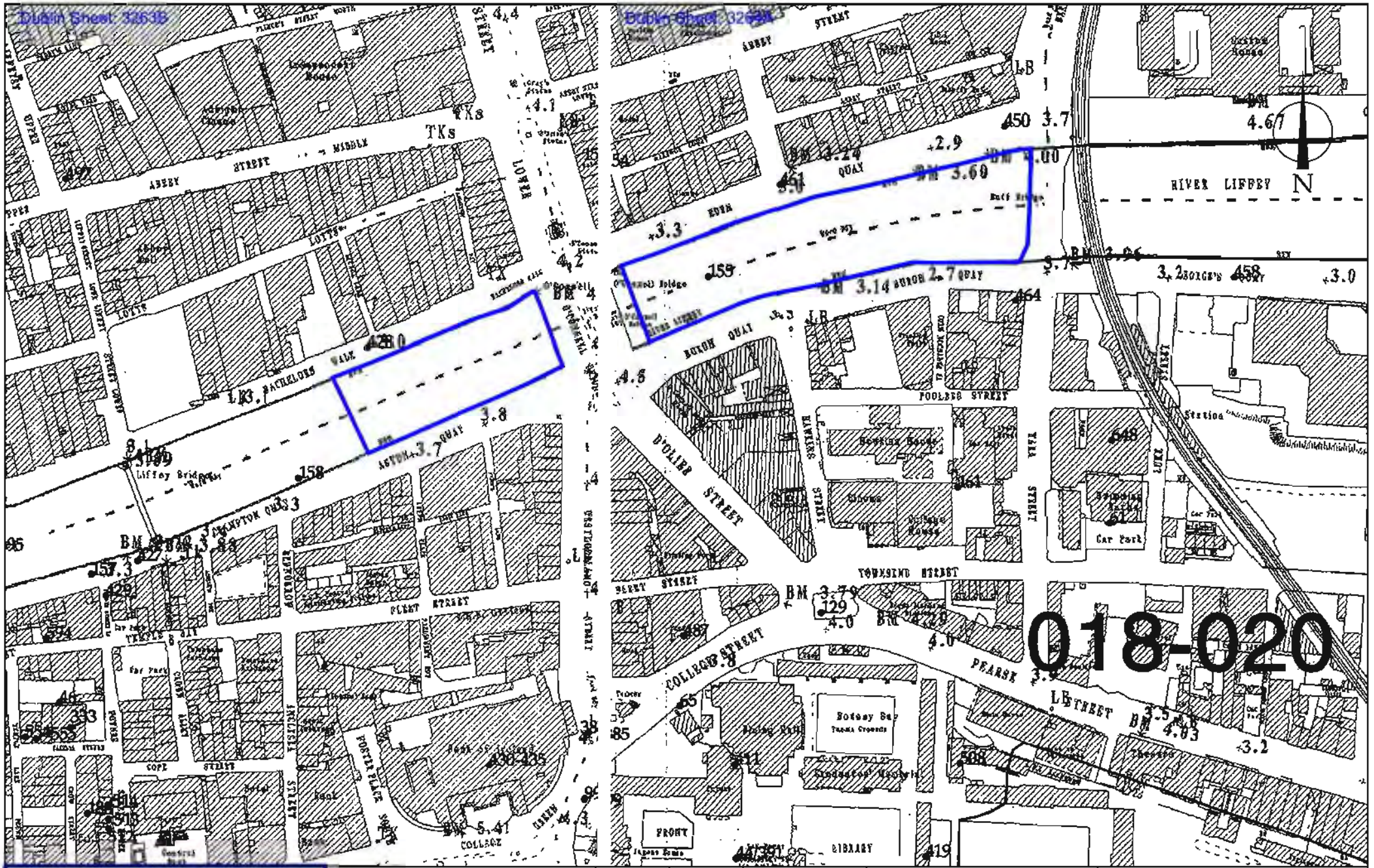
Notes	Job/Exc No.	Compiled by	CAD reference	Client	Title
Location of ADCO Survey Area (blue); Location of Carlisle Bridge (pink). Source: OSI Historic Map Service.	08D094, 08R310,	R.Bangerter	RPA-River Liffey	Railway Procurement Agency	Figure 8- Extract from Ordnance Survey First Edition Map (1837) with ADCO River Survey Area superimposed.
	Date	**Scale**	**Drawing No.**	**Project**	
	15.01.09	As shown	Figure 8	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.	



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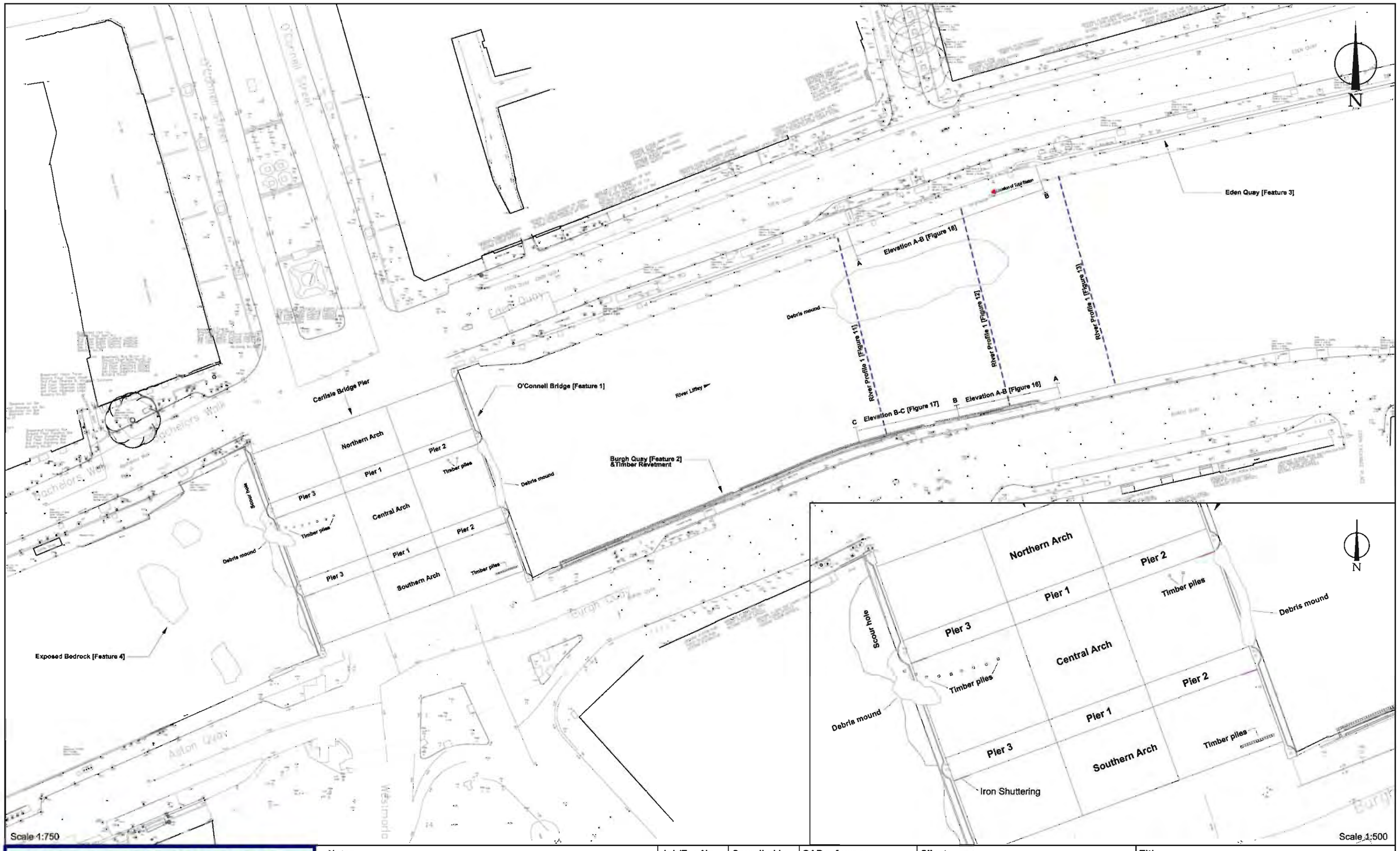
Notes
ADCO Survey Area
Source: OS 6", 1:2,500, RMP Map (Dublin Sheets: 3263A & 3264B).

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310.	R.Bangerter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
16.01.09	N.T.S	Figure 9	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 9- Extract from OS 6" RMP Archaeological Mapping with ADCO River Survey Area superimposed.



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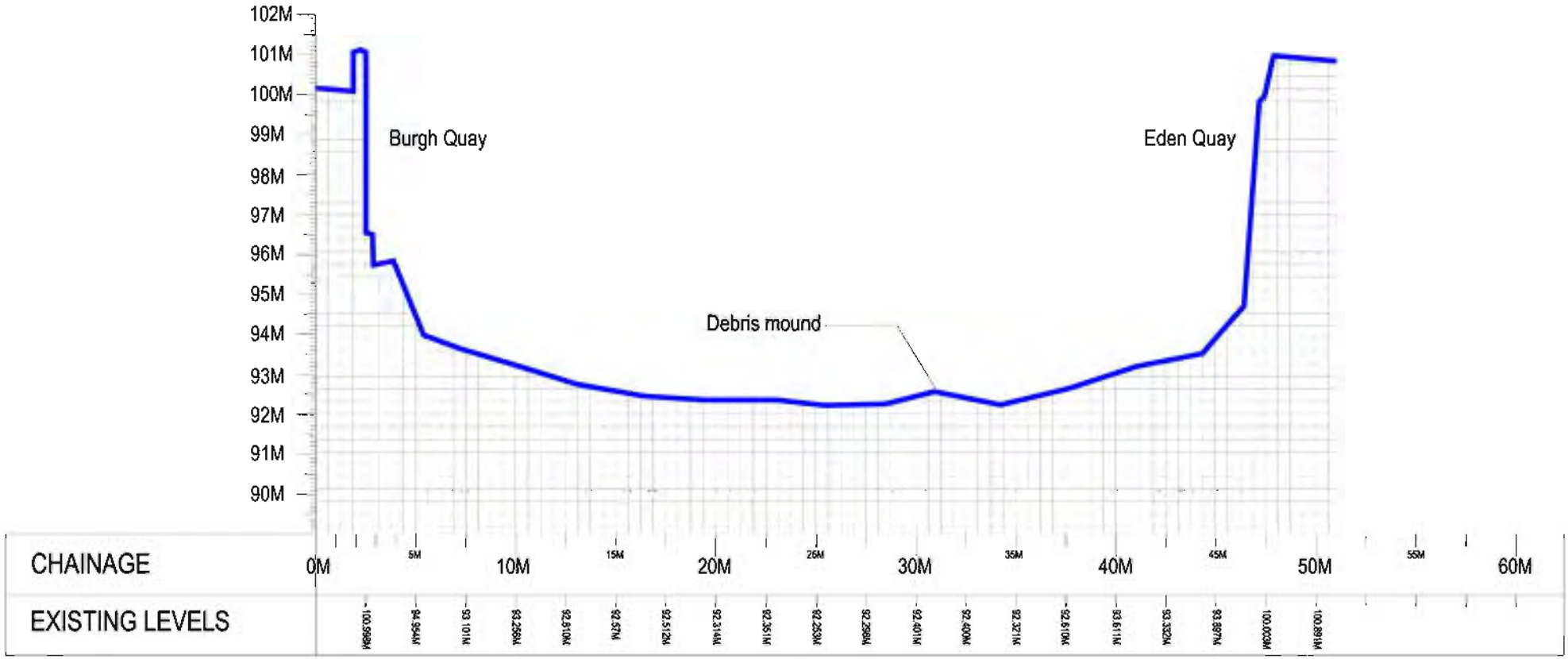
Notes
Data gathered by O.Ryan and R.Bangerter
See Figures: 14,16,17, & 18 for additional information regardig Burgh Quay and Eden Quay.

Iron Shuttering

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310	R.Banegrter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
29.01.09	1:750	Figure 10	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeologlcal Survey.

Title
Figure 10- Plan showing Diver observations, Features Identified, Elevation Locations, and position of River Profiles.



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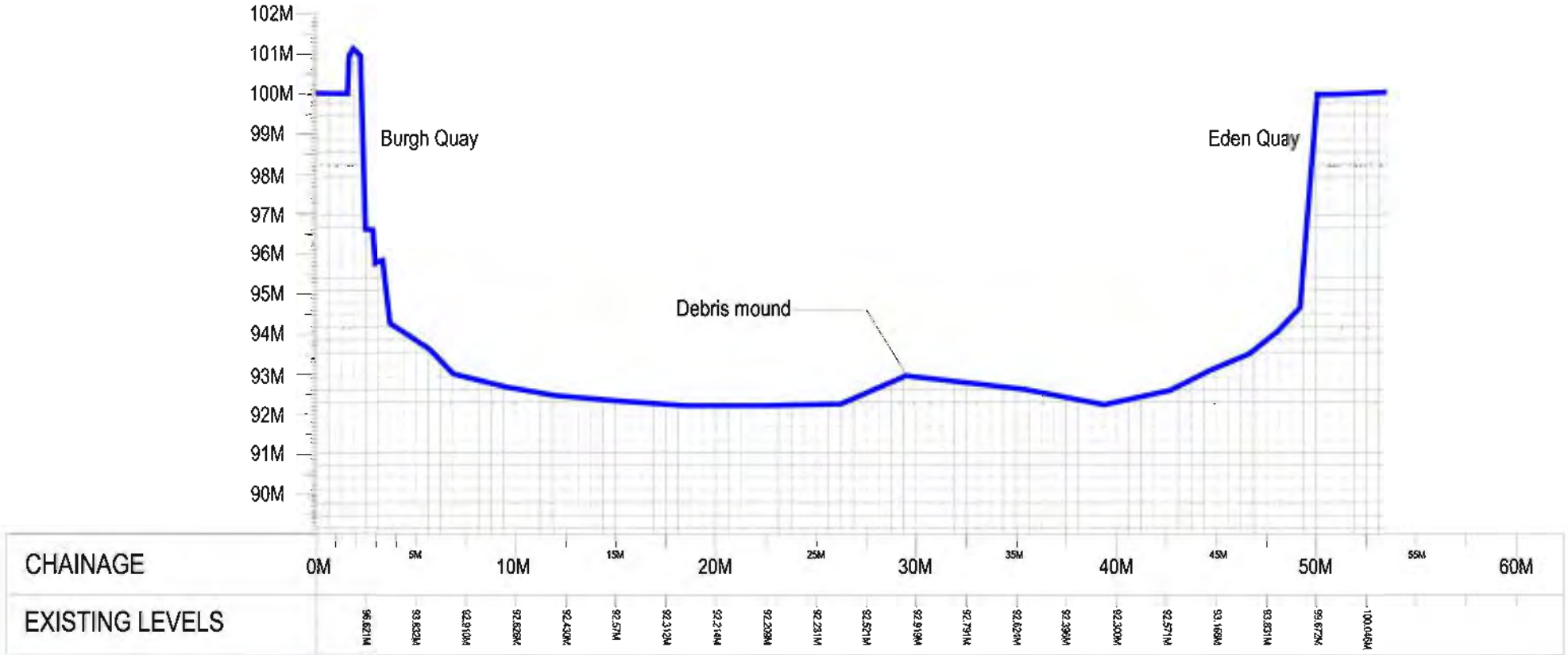
Notes
Survey data Gathered by: O. Ryan

Job/Exc No. 08D094, 08R310,	Compiled by R.Bangerter/ O. Ryan	CAD reference RPA-River Liffey	Client Railway Procurement Agency	Title Figure 11- Profile Number 1, N-S profile across River Liffey within proposed development area [see Figure 10 for profile locations].
Date 15.01.09	Scale 1:300	Drawing No. Figure 11	Project Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.	

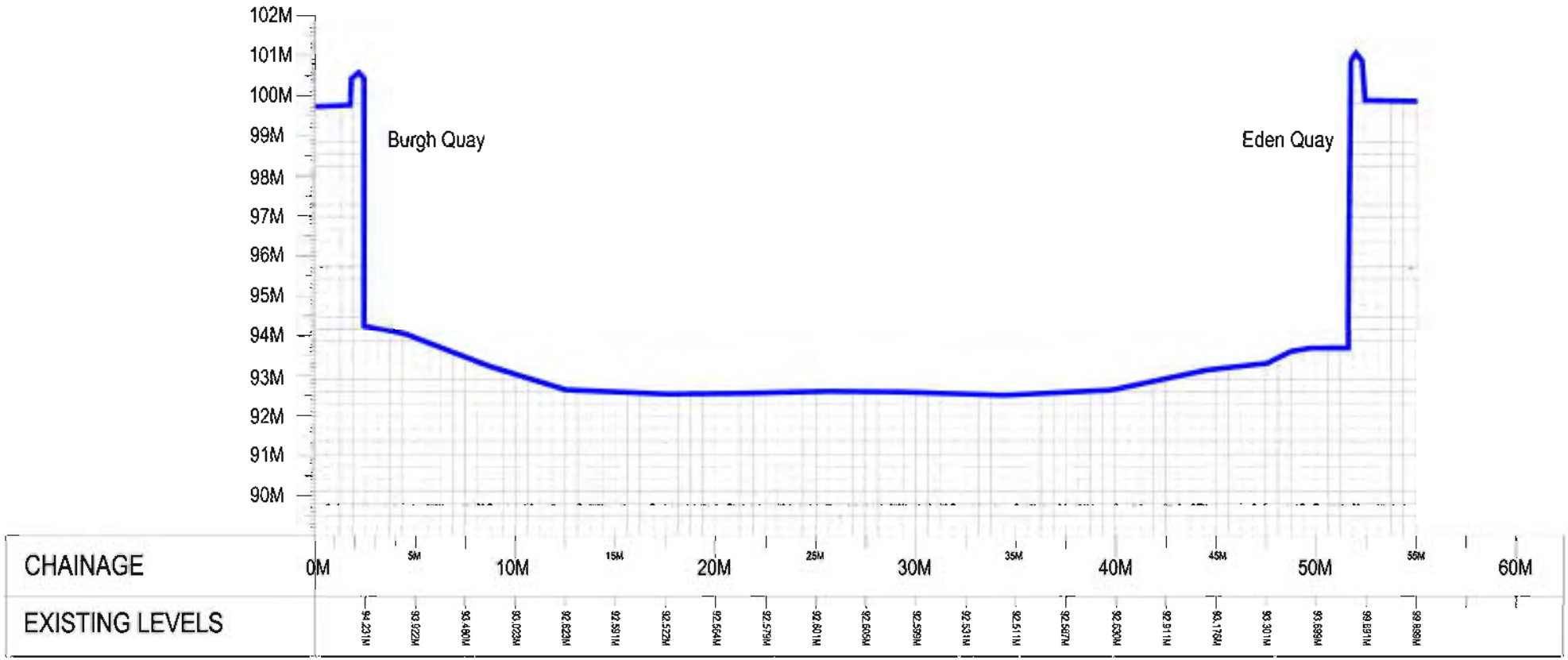
River Profile Number 2



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** Survey data Gathered by: O. Ryan	**Job/Exc No.** 08D094, 08R310,	**Compiled by** R.Bangerter/ O. Ryan	**CAD reference** RPA-River Liffey	**Client** Railway Procurement Agency
		Date 15.01.09	**Scale** 1:300	**Drawing No.** Figure 12	**Project** Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

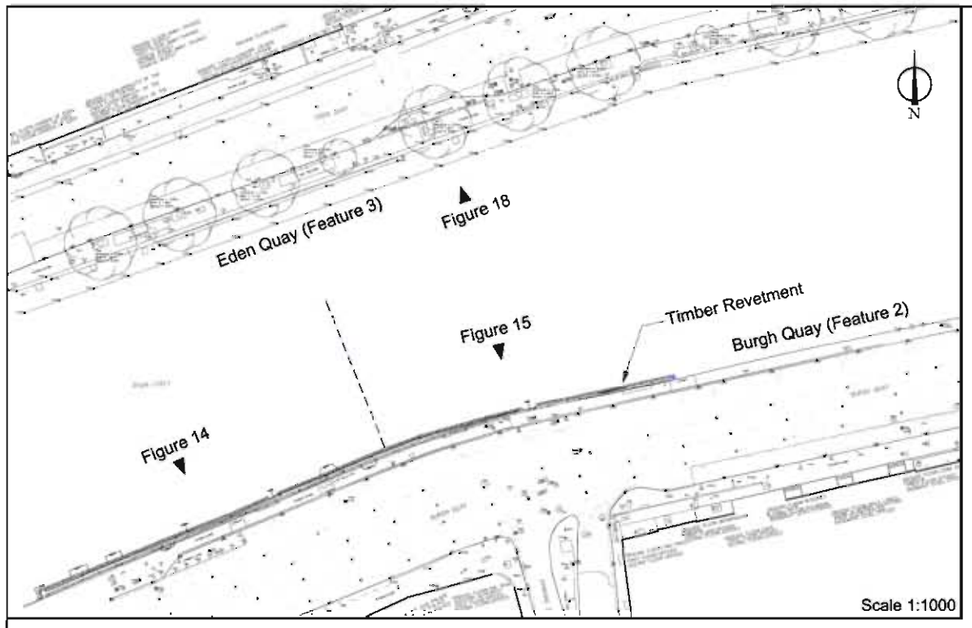
Title
Figure 12- Profile Number 2; N-S profile across River Liffey within proposed development area [see Figure 10 for profile locations].

River Profile Number 3



THE ARCHAEOLOGICAL DIVING COMPANY LTD. Tel. 056 4440236 email: info@adco-ie.com	**Notes** Survey data Gathered by: O. Ryan	**Job/Exc No.** 08D094, 08R310,	**Compiled by** R.Bangerter/ O. Ryan	**CAD reference** RPA-River Liffey	**Client** Railway Procurement Agency
		Date 15.01.09	**Scale** 1:300	**Drawing No.** Figure 13	**Project** Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 13- Profile Number 3; N-S profile across River Liffey within proposed development area [see Figure 10 for profile locations].



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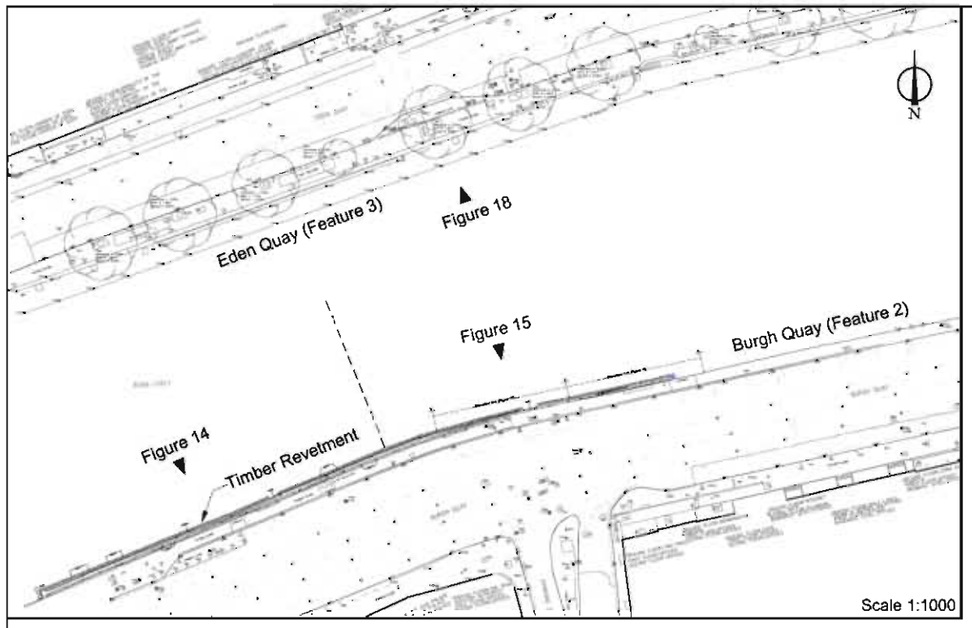
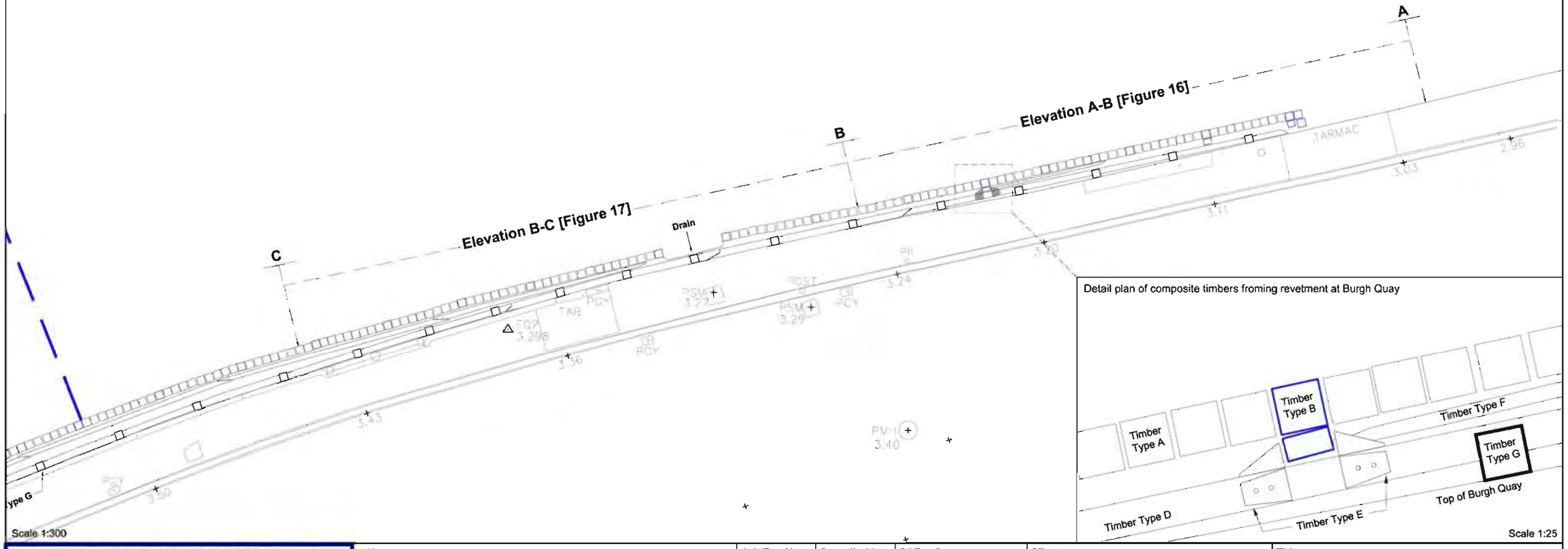
Notes
Data gathered by O.Ryan and R.Bangerter
See Figures: 15,16,17 for additional information regardig Burgh Quay and associated Timber Revetment.

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310	R.Banegrter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
27.01.09	1:300	Figure 14	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 14- Total Station Plan of western half of Timber Revetment located along base of Burgh Quay (Feature 2).





Detail plan of composite timbers froming revetment at Burgh Quay

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Notes
Data gathered by O.Ryan and R.Bangerter
See Figures: 14,16,17 for additional information regardig Burgh Quay and associated Timber Revetment.

Job/Exc No.	Compiled by	CAD reference	Client
08D094, 08R310	R.Banegrter	RPA-River Liffey	Railway Procurement Agency
Date	**Scale**	**Drawing No.**	**Project**
27.01.09	1:300	Figure 15	Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 15- Total Station Plan of eastern half of Timber Revetment located along base of Burgh Quay (Feature 2).

North-Facing Photographic Elevation of Burgh Quay

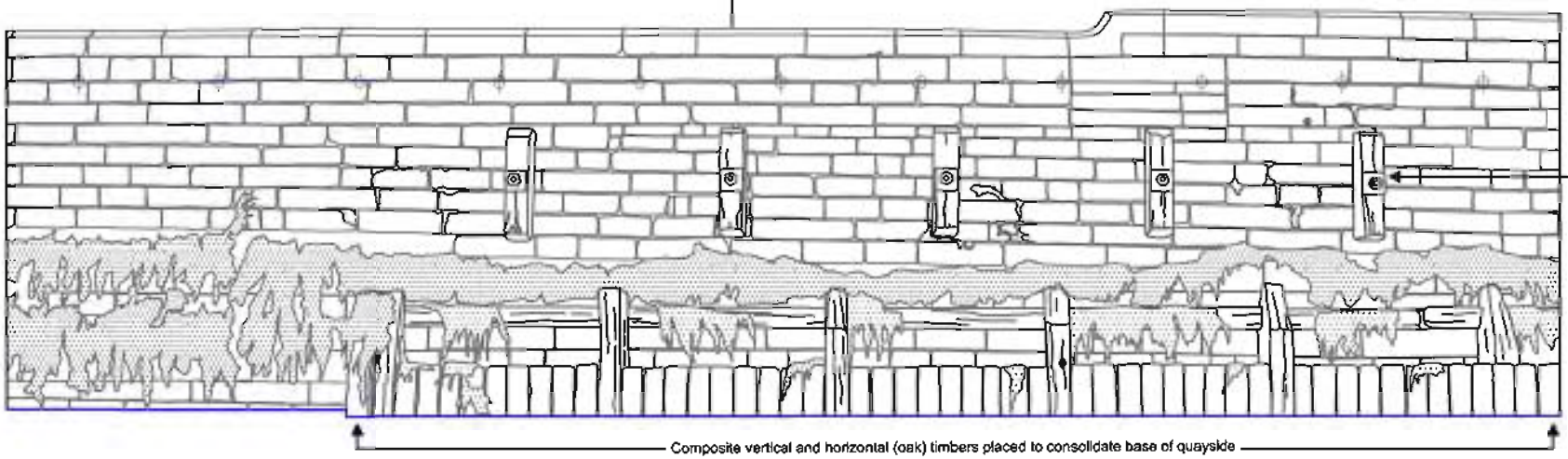
A

B

N

North-Facing Elevation of Burgh Quay

Figure 17



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Notes
Survey Datum Point
Quayside Section Marker
Bladderwrack Seaweed
Cement Re-pointing

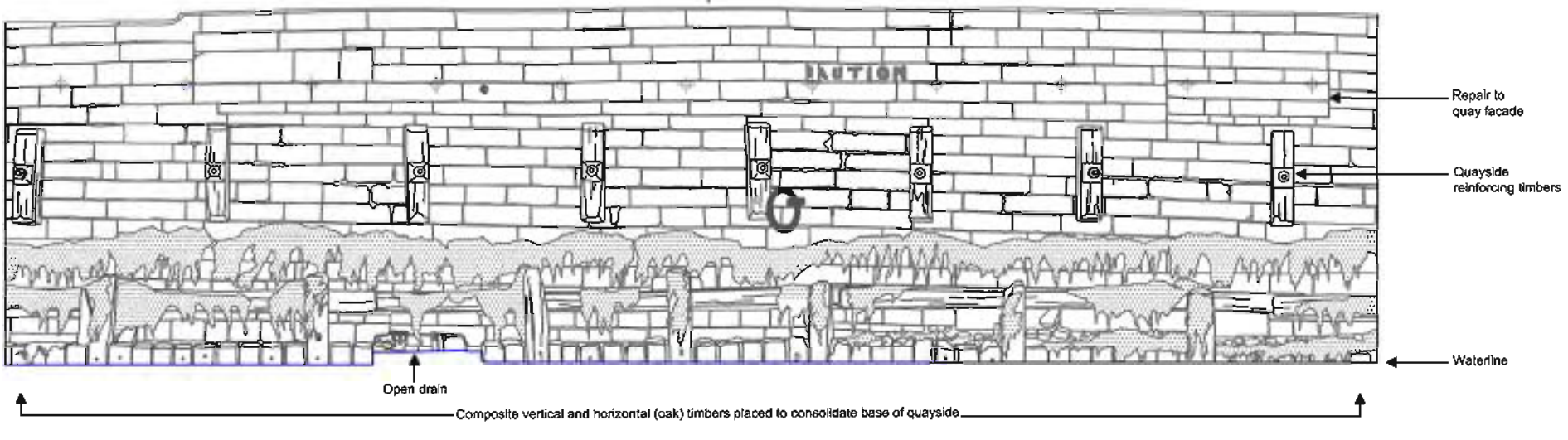
Job/Exc No. 08D094, 08R310	Compiled by R.Bangerter	CAD reference RPA-River Liffey	Client Railway Procurement Agency
Date 09.01.09	Scale 1:100	Drawing No. Figure 16	Project Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.

Title
Figure 16- Photographic and Drawn Elevation of Burgh Quay [see Figures 10 & 15 for location].

North-Facing Photomosaic Elevation of Burgh Quay

Figure 16

North-Facing Elevation of Burgh Quay



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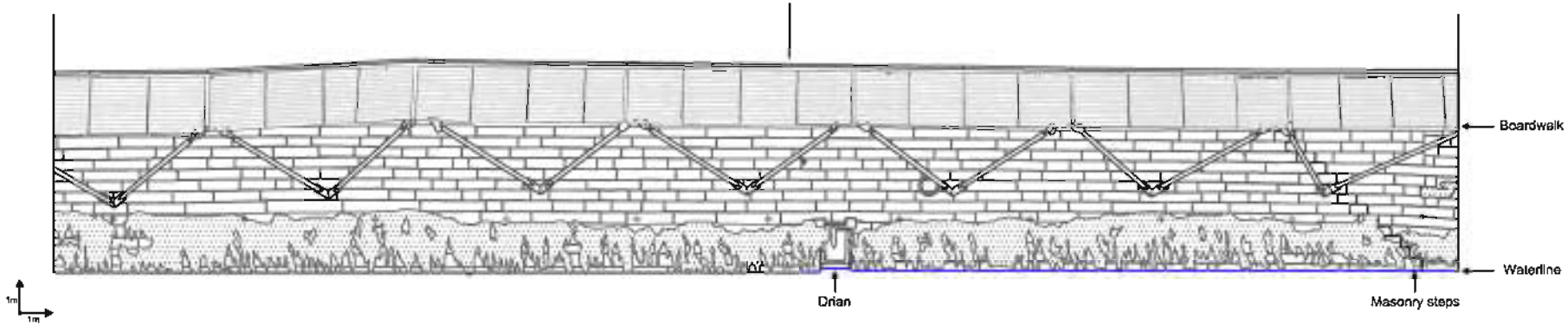
Notes
Survey Datum Point
B Quayside Section Marker
Bladderwrack Seaweed
Cement Re-pointing

Job/Exc No. 08Dxxxx, 08Rxxxx,	Compiled by R.Bangerter	CAD reference RPA-River Liffey	Client Railway Procurement Agency	Title Figure 17- Photomosaic and Drawn Elevation of Burgh Quay [see Figure 10 & 15 for location].
Date 13.01.09	Scale 1:100	Drawing No. Figure 17	Project Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.	

North-Facing Photomosaic Elevation of Eden Quay

North-Facing Elevation of Eden Quay



N

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Notes
Survey Datum Point
A Quayside Section Marker
Bladderwrack Seaweed

Job/Exc No. 08D094, 08R310	Compiled by R.Bangerter	CAD reference RPA-River Liffey	Client Railway Procurement Agency	Title Figure 18- Photomosaic and Drawn Elevation of Eden Quay [see Figures 10 & 15 for location].
Date 29.01.09	Scale 1:200	Drawing No. Figure 18	Project Metro North- River Liffey, O'Connel Bridge to Butt Bridge Archaeological Survey.	

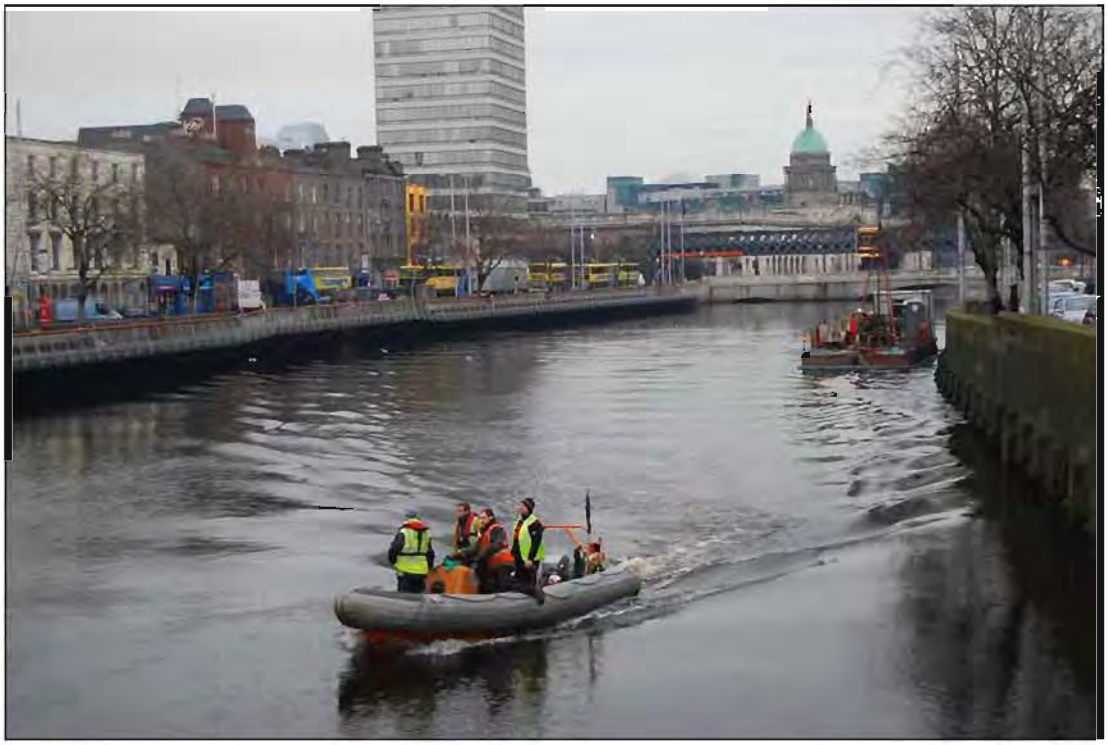


Plate 1: East-facing view of downstream side of O'Connell Bridge; dive boat in foreground and drilling platform in background.

Plate 2: East-facing view of upstream façade of O'Connell Bridge.

Plate 3: East-facing view of upstream cutwater, located between the northern and central archway.

Plate 4: Detail shot of River God located above the downstream side of the central arch of O'Connell Bridge; this feature has been re-used from the original Carlisle Bridge façade.

Plate 5: West-facing view of arch *intrados* (internal-arch ceiling) of the central-arch of O'Connell Bridge.

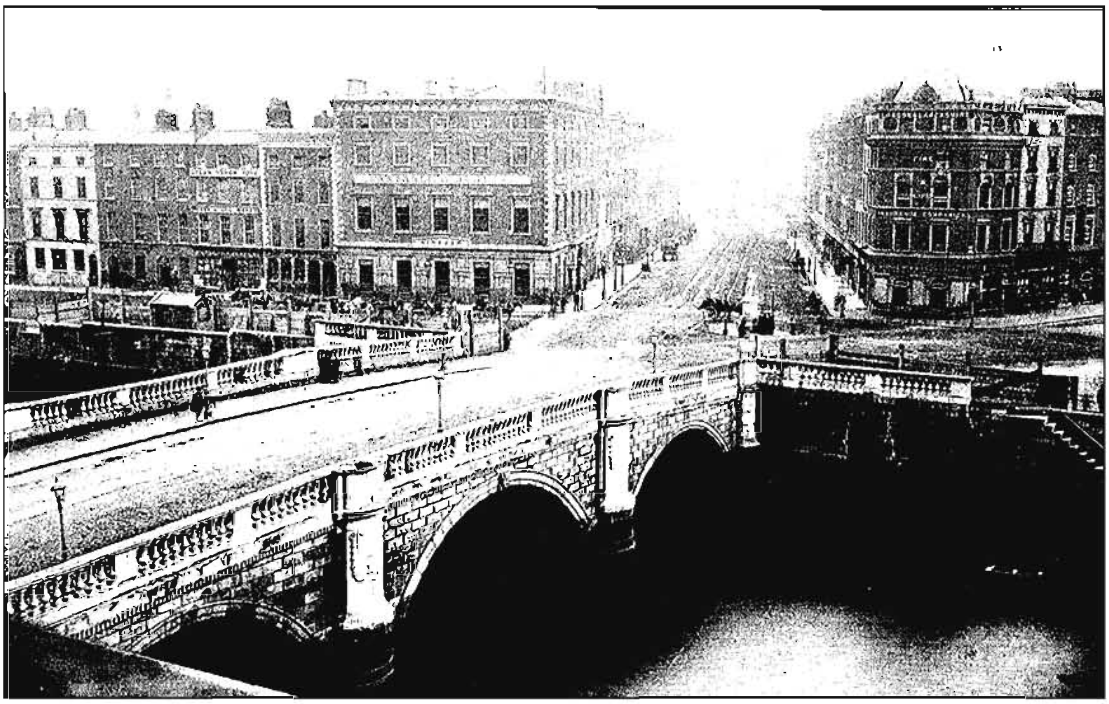


Plate 6: Eighteenth-century photograph showing upstream façade of Carlisle Bridge.

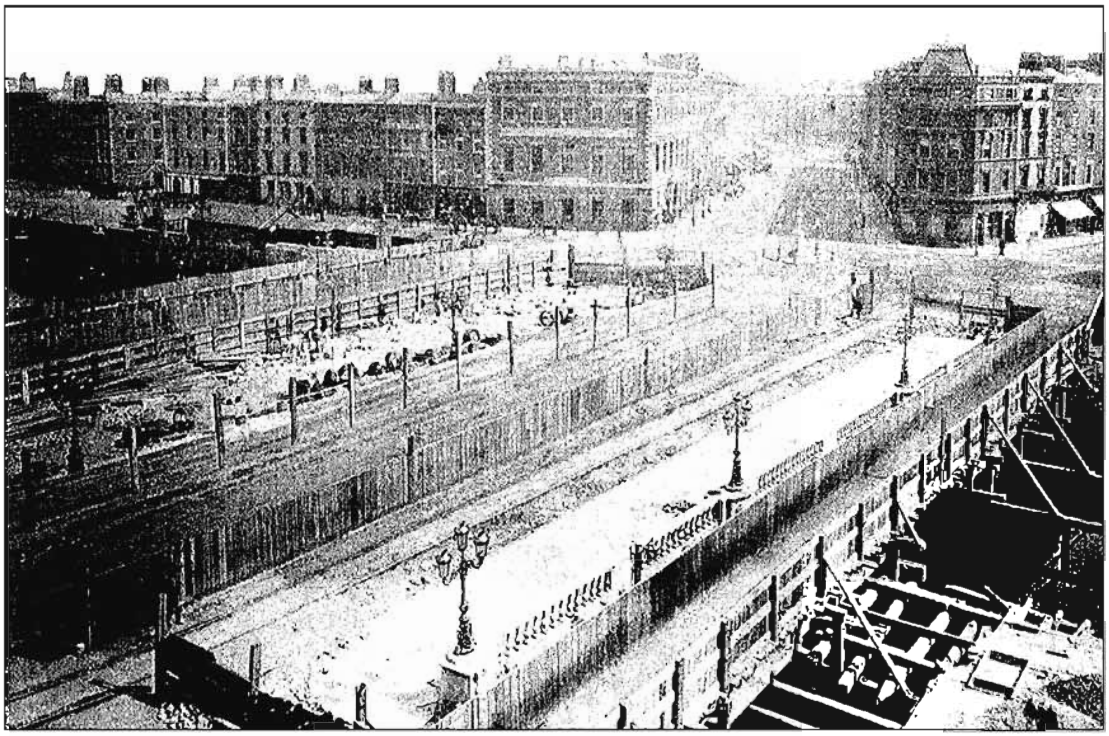


Plate 7: Photograph of O'Connell Bridge under construction in 1879.

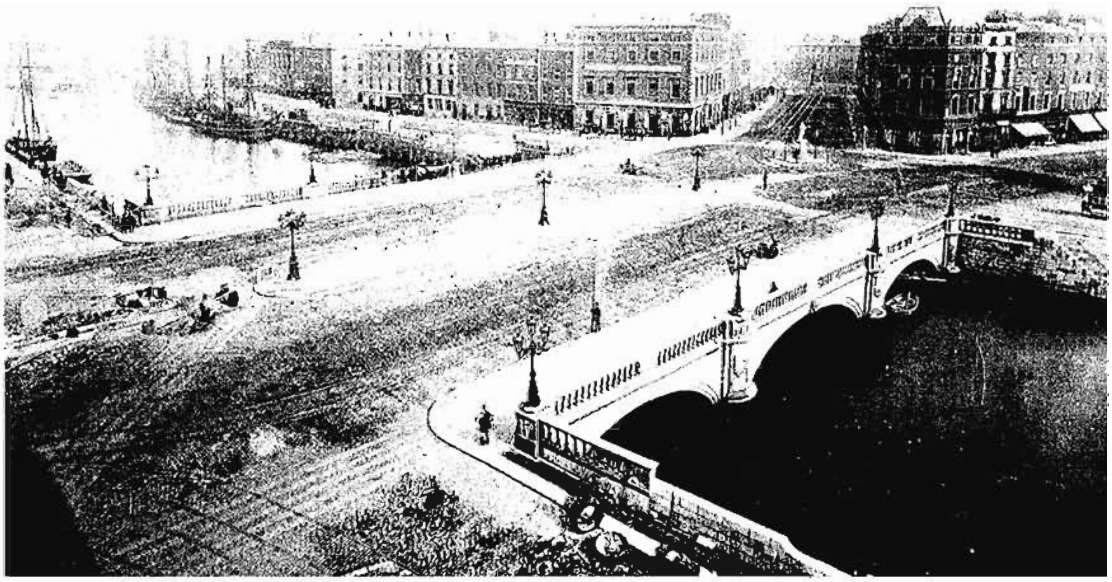


Plate 8: Photograph of O'Connell Bridge near completion in1880; note shipping moored along Burgh Quay and Astor Quay.

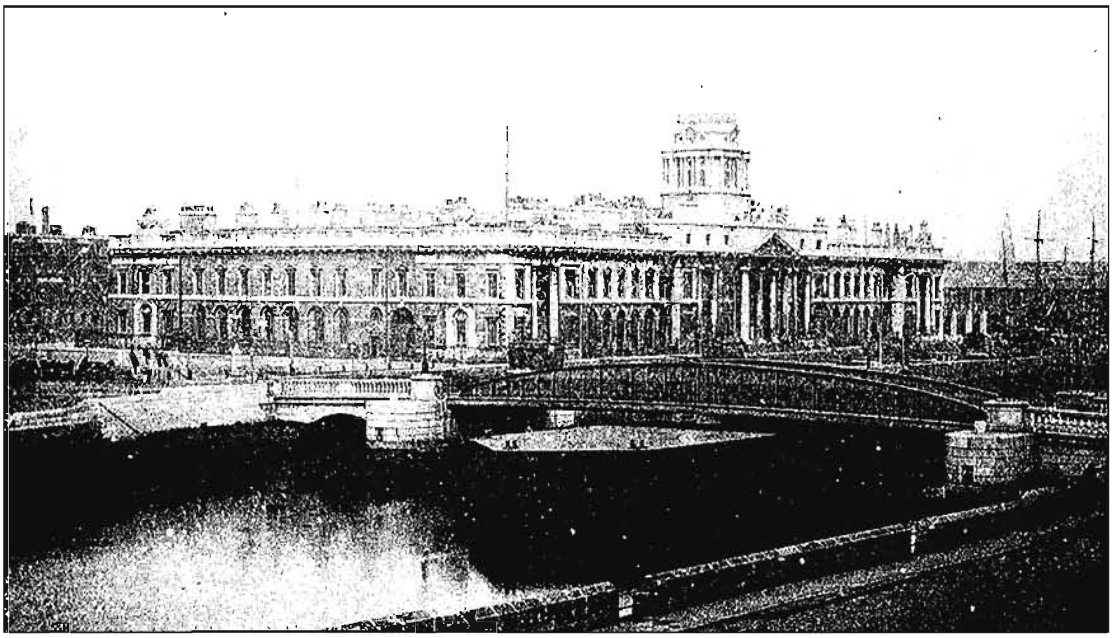


Plate 9: Photograph of Butt Bridge taken in the late nineteenth-century.

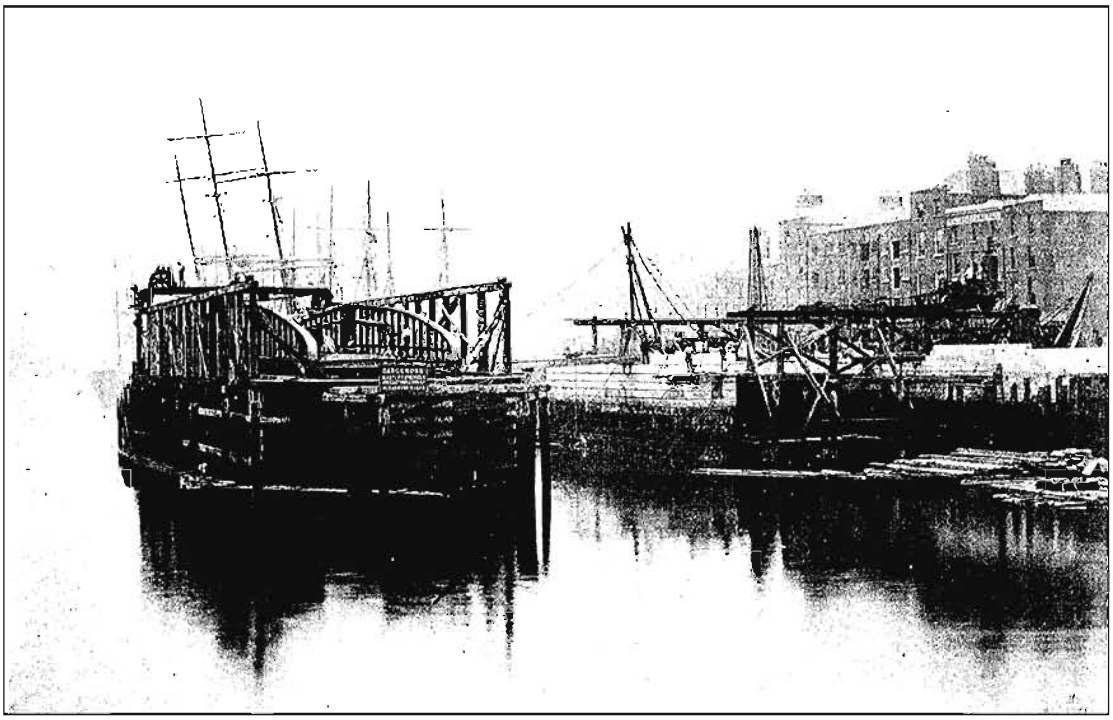


Plate 10: Photograph of Butt Bridge under construction in 1879.

Plate 11: East-facing view of upstream façade of Butt Bridge.

Plate 12: Working shot of Total Station survey of the Timber Revetment located alongside Burgh Quay (Feature 2).

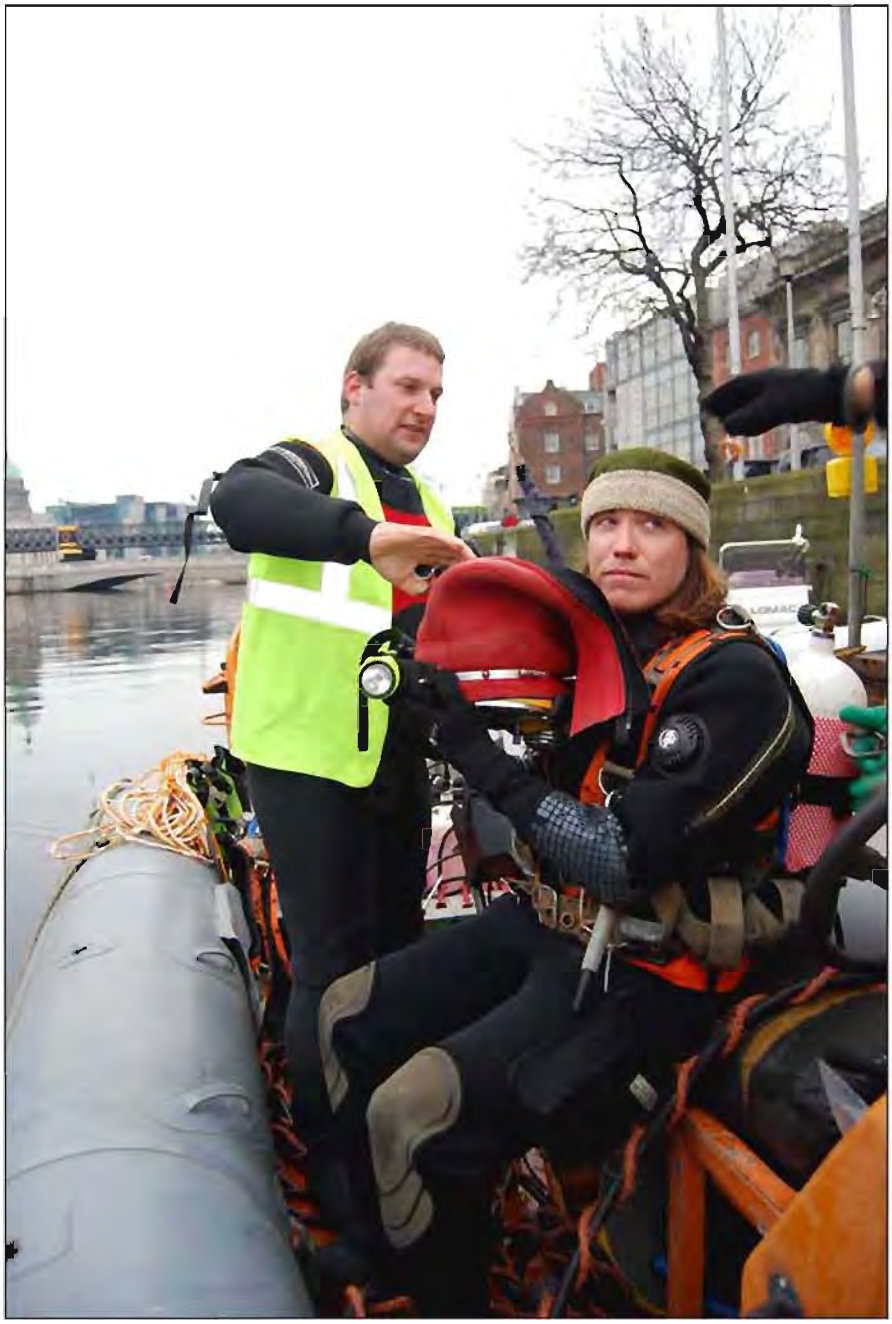


Plate 13: Working shot showing diver preparing for water. Note: diver using mobile Surface-supplied diving set-up.

Plate 14: West-facing view of top of timber pile upstanding 0.60m from riverbed, c. 0.85m from arch-wall on north side of central archway.

Plate 15: Working shot of dive set-up during underwater survey undertaken along the downstream side of O'Connell Bridge.

Plate 16: Working shot showing diver surfacing after dive survey; diver in the water immediately east of O'Connell Bridge.

Plate 17: Working shot of diver preparing to enter water at start of underwater survey of the southern arch of O'Connell Bridge.

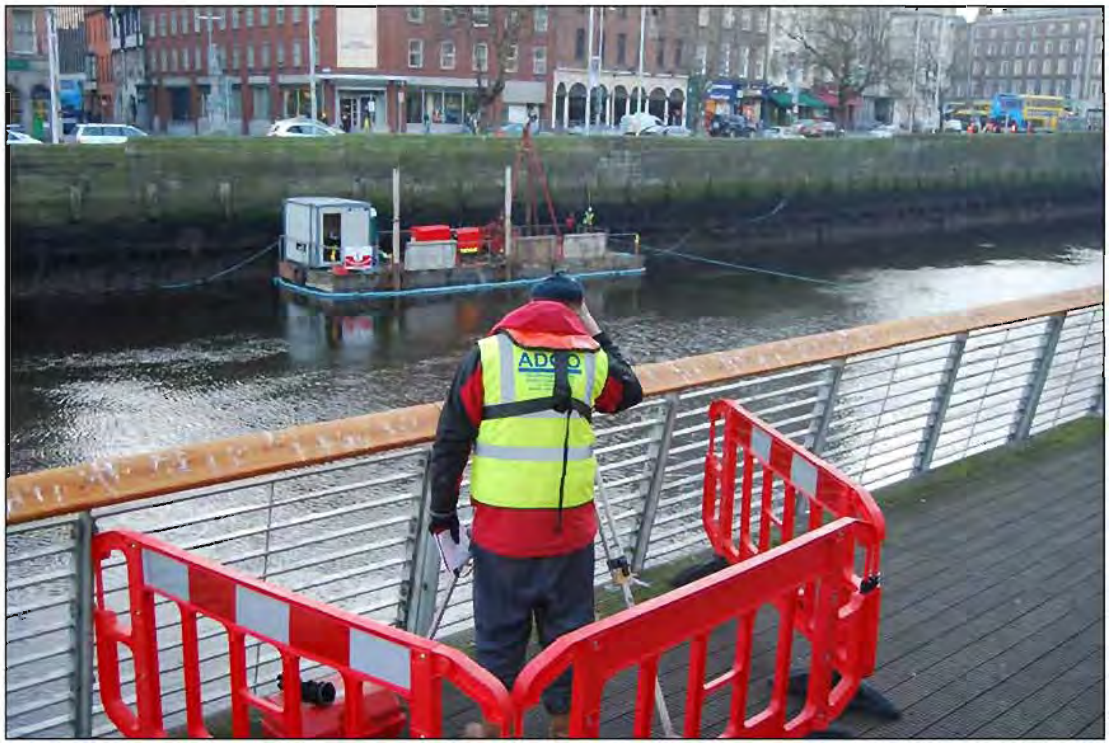


Plate 18: Working-shot of archaeological surveyor shooting points along the timber revetment at Burgh Quay (Feature 2).

Plate 19: Detail shot of nineteenth century iron mooring hoop located along the HWM of Burgh Quay (1m scale).

Plate 20: Detail shot of top section of nineteenth-century drain located along the base of Burgh Quay (1m scale).

Plate 21: Working-shot of underwater survey undertaken at low water along the base of Burgh Quay (Feature 2) and its associated timber revetment.

Plate 22: Southwest-facing view along Burgh Quay (Feature 2) and its associated timber revetment; O'Connell Bridge in distance.

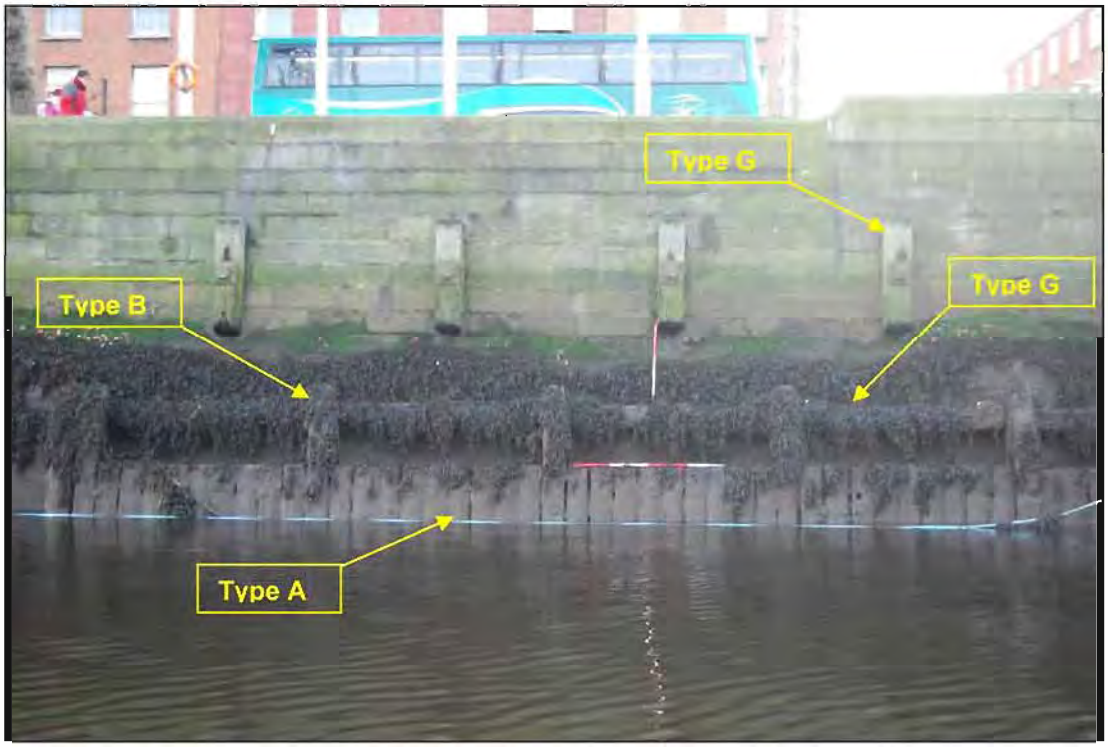


Plate 23: North-facing elevation of Burgh Quay (Feature 2) and associated timber revetment (Feature 2); horizontal scale 2m, vertical scale 1m. Plate also annotated with timber classifications.

Plate 24: Detail shot of timber revetment at Burgh Quay (Feature 2) showing vertical Timber Types A, B, and C; horizontal scale 2m, vertical scale 1m.

Plate 25: Detail shot of vertical Scarph-join used to fasten the horizontal timbers (Type D) that run along Burgh Quay (Feature 2); 0.10m scale.

Plate 26: Plan view of composite section of timber revetment at Burgh Quay (Feature 2) showing timber types A, B, C, D, and the wedge-shape timber type E.; 0.10m scale.

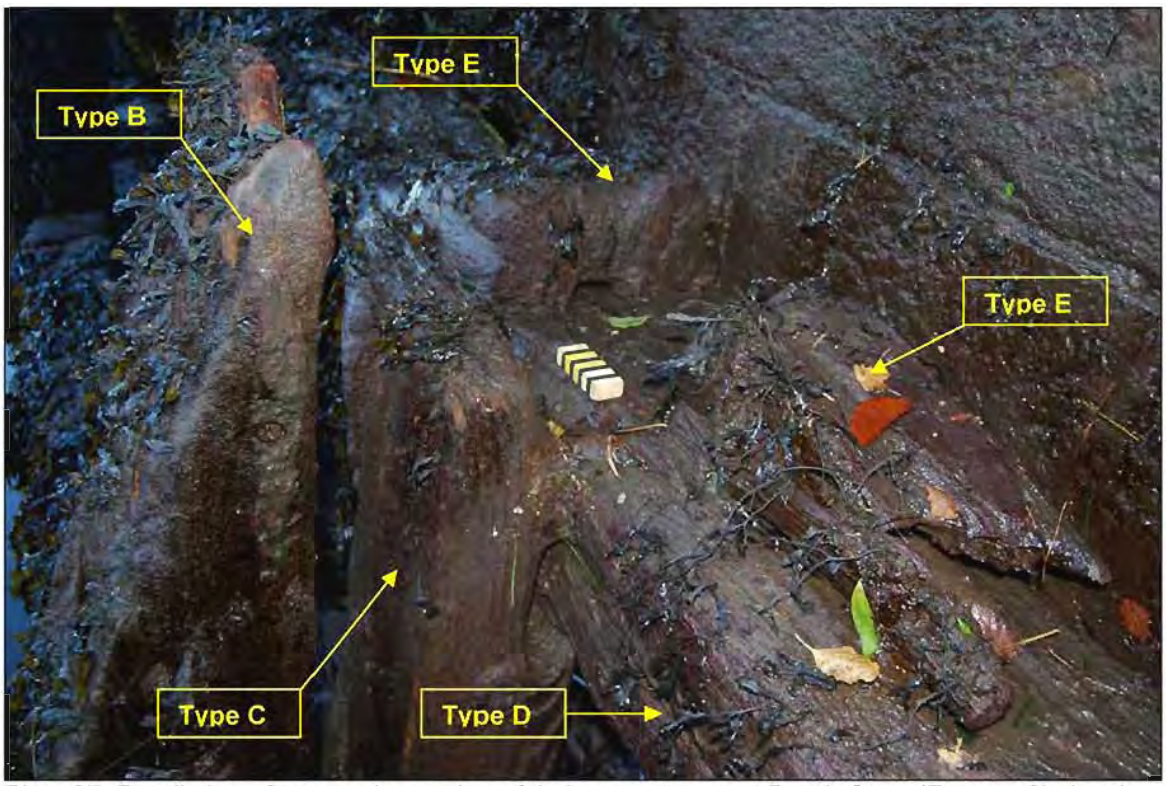


Plate 27: Detail shot of composite section of timber revetment at Burgh Quay (Feature 2) showing Timber types A, B, C, D, and the wedge-shape timber type E.; 0.10m scale.

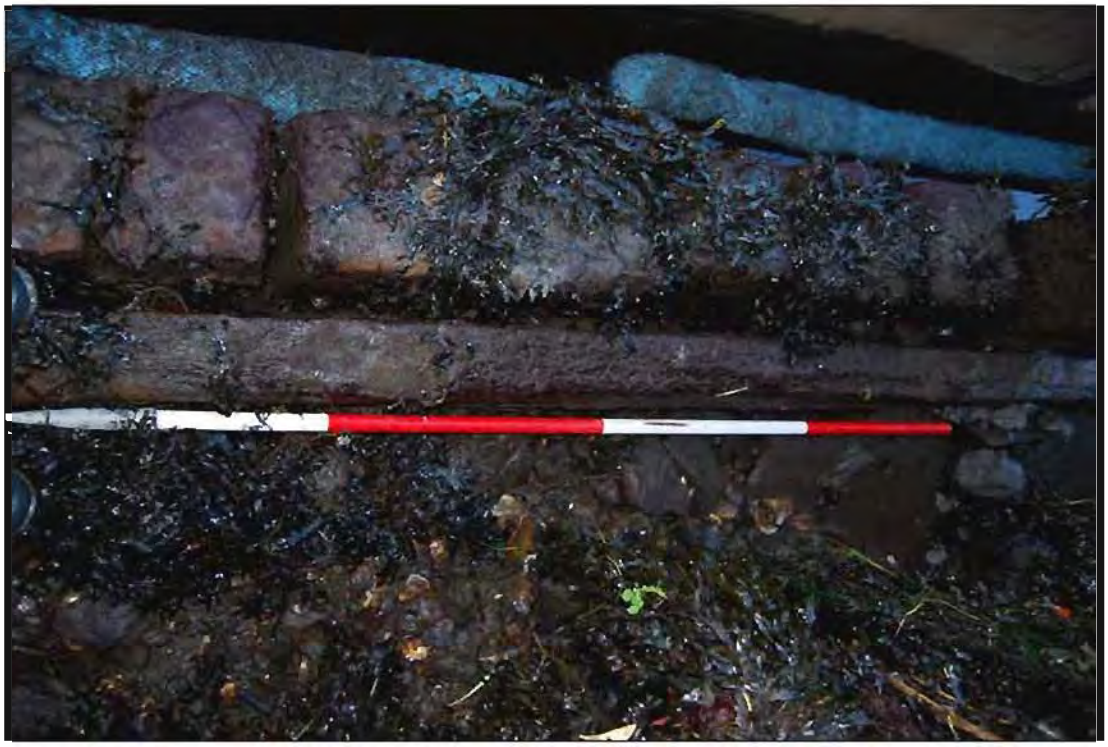


Plate 28: Plan view of timber vertical timber piles (Type A) and adjacent horizontal timbers (Type F); 2m scale.

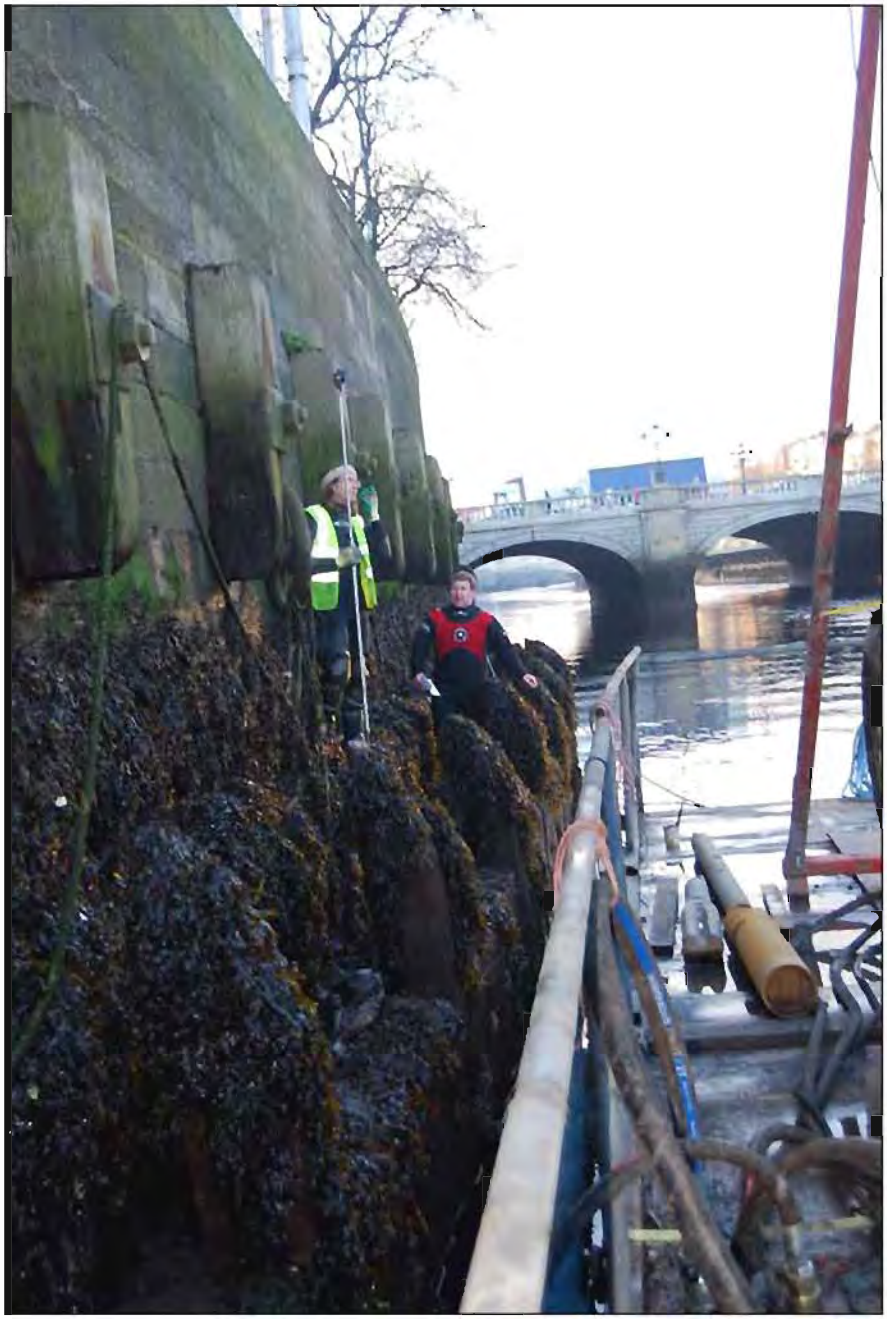


Plate 29: West-facing view along Burgh Quay showing total station recording of the timber revetment; plate annotated to show Type G timbers.

Plate 30: Detail shot of iron mooring hoop located along HWM of Eden Quay (Feature 3).

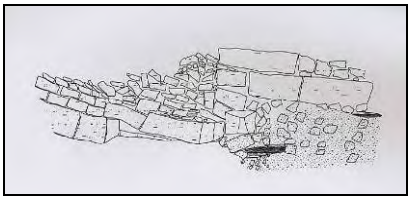
Plate 31: North-facing view of nineteenth-century drain located along the base of Eden Quay (Feature 3); 1m scale.

Plate 32: East-facing detail shot of masonry steps providing access to the river from Eden Quay (Feature 3); 1m scale.

Plate 33: North-facing view of masonry steps providing access to the river from Eden Quay (Feature 3); 1m scale.

Recording prehistoric logboat at Gormanston, Co. Meath
GAS 2025 Irish Sea Interconnector

Underwater elevation of bridge pier collapsed in 1763. River Nore Flood Alleviation Scheme



Iron cannon on site of 17th-century timber wreck discovered during dredging programme, Waterford Harbour