Middle Wad Flood Alleviation Scheme - Contract E: Clontarf Outfalls Project
Intertidal Archaeological Assessment

22D0002 and 22R0004
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Executive Summary

The Archaeological Diving Company Ltd (ADCO) was commissioned by Nicholas O’Dwyer Ltd., consulting engineers on behalf of Dublin City Council to conduct an intertidal survey at the location of the outflow of the Wad River within the Tolka Estuary as part of the Middle Wad Flood Alleviation Scheme Contract E: Clontarf Outfalls Project.

The proposed development is located near the junction of Clontarf Road and Alfie Byrne Road. The intertidal survey was conducted along a 138m-long section of foreshore, extending either side (east/west) of the existing Wad River Outflow.

The work was completed under licence from the National Monuments Service Department of Housing, Local Government and Heritage (DHGLH); Licence Numbers 22D0002 (Dive survey) and 22R0004 (Detection Device).

The assessment included systematic visual inspection of the intertidal zone, within the vicinity of the Wad River Outflow and the rock armour that extends between the cycleway and foreshore. This assessment was conducted at Low Water, on the 15th of January 2022 in order to maximize foreshore exposure. A metal-detection survey of a sample area was also completed as part of the assessment.

No material, deposits, or features of archaeological or historical interest were encountered as part of the intertidal assessment and the report identifies no archaeological reason for the project not to proceed.

The recommendations of the report are subject to the approval of the National Monuments Service of the Department of Housing, Local Government and Heritage.
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADCO</td>
<td>The Archaeological Diving Company Ltd</td>
</tr>
<tr>
<td>AA</td>
<td>Appropriate Assessment</td>
</tr>
<tr>
<td>E</td>
<td>Easting</td>
</tr>
<tr>
<td>N</td>
<td>Northing</td>
</tr>
<tr>
<td>DHLGH</td>
<td>Department of Housing, Local Government and Heritage</td>
</tr>
<tr>
<td>ITM</td>
<td>Irish Transverse Mercator</td>
</tr>
<tr>
<td>HWM</td>
<td>High Water Mark</td>
</tr>
<tr>
<td>LAT</td>
<td>Lowest Astronomical Tide</td>
</tr>
<tr>
<td>LWM</td>
<td>Low Water Mark</td>
</tr>
<tr>
<td>NGR</td>
<td>National Grid Reference</td>
</tr>
<tr>
<td>NIAH</td>
<td>National Inventory of Architectural Heritage</td>
</tr>
<tr>
<td>NOD</td>
<td>Nicholas O’Dwyer</td>
</tr>
<tr>
<td>OS</td>
<td>Ordnance Survey</td>
</tr>
<tr>
<td>NMS</td>
<td>National Monuments Service</td>
</tr>
<tr>
<td>RMP</td>
<td>Record of Monuments and Places</td>
</tr>
<tr>
<td>RPS</td>
<td>Record of Protected Structures</td>
</tr>
<tr>
<td>UAU</td>
<td>The Underwater Archaeology Unit</td>
</tr>
</tbody>
</table>
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1.0 INTRODUCTION

ADCO was appointed by Nicholas O’Dwyer Ltd., consulting engineers on behalf of Dublin City Council (DCC) to conduct an archaeological assessment of the intertidal foreshore surrounding the location of an existing outflow for the River Wad, where it discharges into the Tolka Estuary (Figure 1). The assessment will form part of the environmental information to be submitted by Dublin City Council for an application to An Bord Pleanála under Section 177AE for the Middle Wad Flood Alleviation Scheme Contract E: Clontarf Outfalls Project.

The Wad River system flows southward from north Ballymun through Whitehall and Donnycarney. It is diverted at Malahide Road, passes through Killester, and empties into the Tolka Estuary at Clontarf. The river is predominantly culverted, and its existence goes largely unnoticed.

The proposed Clontarf Outfalls Project works are to be located on made ground that was reclaimed from the foreshore of Clontarf Road in the late 1930s. The study area is bounded by a rock armoured footpath on Alfie Byrne Road to the west, Clontarf Promenade to the north, and by the Tolka Estuary to the south and east.

No material, deposits, or features of archaeological/ historical interest were encountered within the immediate assessment area. However, a series of large granite blocks were observed to be incorporated into the rock armour at two points, some 10m and 85m to the east of the existing Wad outflow. The dressed ashlar granite blocks are clearly reused components of a former structure, perhaps previously located within the footprint of the twentieth-century reclamation of the foreshore.

The report absorbs the findings from a desktop review and the on-site archaeological survey. The desktop review focuses mainly on reclamation within the Tolka Estuary that preceded and formed the embankments to the north and west of the survey area.

2.0 PROPOSED DEVELOPMENT

The Clontarf Outfalls Project will comprise of the following items:

- Sealing of manholes in properties immediately north of Clontarf Road to prevent flooding of those properties.
- Construction of a new splitter chamber and parallel culvert in the green space between Clontarf Road and the shoreline to improve conveyance (Figure 2).
- Construction of a new outfall head wall with suitable flap valves at the foreshore. To minimise the intrusion into the mudflats/silts this headwall can be recessed into the existing rock armour (Figure 3).
• Remedial works to the existing partly collapsed head wall which will effectively result in its replacement / modification so that it matches the configuration of the proposed new adjoining headwall,

• All ancillary works including Operation and Maintenance.

The Wad outfall is a surface water outfall. The proposed works will not alter the operation of the current outfall (Plates 1–2). The aim of the works is to improve conveyance in the culverts to prevent upstream flooding. The provision of non-return valves on the outfalls will prevent tidal ingress back into the storm-water system during high tides.

<table>
<thead>
<tr>
<th>Head Waters</th>
<th>ITM Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Wad River Outflow</td>
<td>718455 E, 736180 N</td>
</tr>
<tr>
<td>New Outflow (west)</td>
<td>718461 E, 736179 N</td>
</tr>
<tr>
<td>New Outflow (east)</td>
<td>718462 E, 736179 N</td>
</tr>
</tbody>
</table>

Table 1: ITM coordinates of the existing and proposed outflows

The proposed development is shown on Drawing 20834-NOD-XX-XX-DR-C-08006 in Volume 2, Planning Drawings. Refer also to Section 3 Proposed Development of the Planning Statement as contained in Section 10 of the Planning Documentation for further details on the development.

3.0 RECEIVING ENVIRONMENT

Clontarf is situated c. 3.5km from the centre of Dublin City on the north shore of Dublin Bay. The name derives from the Irish Cluain Tarbh meaning 'the meadow of the Bull'. The area is renowned as the location for the Battle of Clontarf, 1014, when the forces of Brian Ború and his allies fought the armies of north Leinster, Dublin, and Viking mercenaries.

In 1538, Mathew King was granted a lease of some land at Clontarf and included the small Island of Clontarf. The island formed where the streams of the Liffey and the Tolka met. The King family estate was forfeited for supporting Charles I. Oliver Cromwell granted the lands to John Blackwell who later assigned his interest to the Vernons.

The Vernon family held the land at Clontarf from the mid-17th until early in the 20th century. Access to Clontarf was by means of Ballybough Bridge and the footprint of the coast road to Clontarf remained unchanged for centuries. Increased traffic from the city prompted John Vernon in 1791 to widen the road along Clontarf. This was facilitated in part by the taking land in front of the Royal Charter School, which was established in 1748. A view of the Clontarf Road and its seawall can be seen in a painting by William Ashford of 1794, entitled The Royal Charter School, Clontarf, County Dublin.¹ The school closed in the early 19th

¹ http://onlinecollection.nationalgallery.ie/objects/9020/the-royal-charter-school-clontarf-county-dublin.
century and was turned into a private bathing house known as Kingscourt House. The Ordnance Survey of Ireland, 6-inch First Edition map of 1837 records the proposed works to be situated just east of the Kingscourt House (Figure 4).

Clontarf was associated with fishing, and the many maps make record of this. In addition, in the late 18th and early 19th centuries, Clontarf was popular as a location for sea bathing. Clontarf’s regard as a coastal resort was later strengthened with the establishment of the Clontarf Baths and Assembly Rooms in 1881. In 1890, an extension to the horse-drawn tramline from the City to Annesley Bridge was also extended to Clontarf and by 1899, the line that ran along the roadway was replaced to allow for an upgrade to an electric tram.

Construction of the Dublin-Drogheda Railway, opened in 1844, and the associated embankment that carried the line across the Tolka Estuary would, in later years, simplify the reclamation that formed Fairview Park c. 1920.

Construction of the Clontarf promenade began in the 1930s to reduce the risk of flooding in Clontarf and to improve public amenity. It took approximately 20 years to complete. It would not be until the late 1950s before work began on the reclamation of land to the east of the rail-bridge. The reclamation would extend as far as the East Wall, and it was this stretch of reclaimed land upon which Alfie Byrne Road would later be constructed.

3.1 Cartographic Information
Examination of the historic mapping provides insight into surrounding land-use and any changes that may have affected the watercourse over time. A brief review of the cartographic information available for the area surrounding the assessment location is provided below:

1600s: De Gomme’s map of Dublin Bay (1673) shows Clontarf being accessed by Ballybough Bridge and Clontarf village as a collection of buildings centred around Clontarf castle. ‘Herring Towne’ is marked out on the coastline at the location of the fishing community of Clontarf.

1700s: John Roque’s map of the Bay and Harbour of Dublin (1756) records the continuing expansion of the village of Clontarf and Herring Towne, now referred to as the Sheds of Clontarf (which have subsequently been recorded as an archaeological site, RMP DU019–034). Also marked is the Royal Charter School of Clontarf built c. 1750. Ballybough Bridge remained the main means access to Clontarf from the city until the construction of Annesley Bridge in 1797. Begun in 1972 the bridge took five years to construct and is marked on W. Wilson’s map, ‘A modern Plan of Dublin City’ (1798).
1800s: Taylor’s map of the Environs of Dublin (1816) shows the study area close to an area described as cockle point and further east the Lead Mine (DU02976).²

The Ordnance Survey’s historical maps of Ireland illustrate the pronounced change in the seafront façade between the OS First Edition (1836-1837) and the 25-inch (1888-1913) (Figure 4). The addition of the tramway in the OS 25-inch shows the continued development of Clontarf towards the end of the 19th century (Figure 5).

1900s: A Dublin Corporation Planning Department map (1945) records a proposal to reclaim the estuary from Tolka Quay to a point as far east as St Lawrence Road, on the Clontarf shoreline, and rerouting the Tolka through Fairview Park. The resulting land was to be repurposed as a mix of industrial and public amenity. However the plan was never realised and a scaled-back reclamation was carried out.³

The Dublin OS Popular Edition (1:25,000) map (1948) shows reclamation of land to the north of the East Wall Road, a development that is likely to have affected river-flow into the estuary. Reclamation continued into the 1950s with the formation of the River Tolka Promenade.⁴ By 1958, the ground to the east of the Dublin-Drogheda Railway had begun to be reclaimed; extending eastward from the 1930s rock armour, along Clontarf Road, to abut the ground already claimed for Fairview Park. It is most likely that the reclamation formed the rock armour that exists on the west side of the assessment area today.

The East Point Business Park reclamation was completed in the early 1970s. This required the rerouting of the River Tolka channel again, and was followed by reclamation of the land on which Alfie Byrne Road was built.

3.1.1 Clontarf Promenade Land Reclamation

The Dublin and Environs OS (1:2000) map (1934) shows that Clontarf Road as still forming the border between Clontarf and the Tolka estuary. When the 1937 OS 6-inch map was issued, however, a 40m-wide strip of land to the south of Clontarf Road was in the process of being reclaimed by Dutch dredgers and included the installation of the stone embankment. Examination of the 1930s and 1940s OS 25-inch series maps suggests that the reclamation was completed as far as opposite St Lawrence Road. Further east reclamation was only partially complete, and this is explained by the fact that the high-water mark (HWM) returns to Clontarf Road at this location.

² https://digitalarchive.mcmaster.ca/islandora/object/macrepo%3A81283
⁴ Now known as Promenade Road it had been largely superseded by the M50 approach road to the Port tunnel.
The Geographia Plan of Dublin (1945) shows that reclamation had proceeded all the way to Bull Bridge on the Bull Wall, and records the new ground as Clontarf Promenade. The reclamation subsumed the access walkways to the Clontarf Baths and also partially to the landing pier further east. It seems to be the case that reclamation and reuse of this land was not considered completed until the mid-1950s.

3.2 Sites and Monuments Record

The Record of Monuments and Places (RMP) is a list of archaeological sites based on the Sites and Monuments Record (SMR) files, maintained by the National Monuments Service at the Department of Housing, Local Government and Heritage (DHLGH). SMR entries include detailed descriptions of archaeological sites based on site visits, historical studies and associated mapping where available. The SMR focuses on sites that date to the pre-1700AD period. While later buildings are not well represented in the archive, all structures that are more than one hundred years old are considered as archaeological sites today.\(^5\)

There are no RMP sites within the project area, although there are four sites recorded within 1km of the section foreshore areas under assessment.

<table>
<thead>
<tr>
<th>RMP Number</th>
<th>Coordinates [ITM]</th>
<th>Townland/ Street</th>
<th>Site Type</th>
<th>Proximity to Project Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU02976</td>
<td>719269E, 735936N</td>
<td>Dublin City North</td>
<td>Lead Mine</td>
<td>0.84 km</td>
</tr>
<tr>
<td>DU01552</td>
<td>719237E, 736141N</td>
<td>Dublin City North</td>
<td>Well</td>
<td>0.77 km</td>
</tr>
<tr>
<td>DU01480</td>
<td>717935E, 736417N</td>
<td>Dublin City North</td>
<td>Burial</td>
<td>0.58 km</td>
</tr>
<tr>
<td>DU01555</td>
<td>719040E, 735930N</td>
<td>Clontarf</td>
<td>Battle of Clontarf</td>
<td>The ITM coordinates provided for this battle must only be considered as indicative of its general location and have been purposefully positioned on the seafront at present-day Clontarf.</td>
</tr>
</tbody>
</table>

Table 2: Known sites and monuments listed in the RMP within a 1 km of the proposed works.

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\(^{5}\) Accessible online at www.archaeology.ie
3.3 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a county-by-county database that identifies, records, and evaluates the post-1700 architectural heritage of Ireland.

There are no NIAH sites within the project area but there are several sites in the wider vicinity, including Clontarf Baths (NIAH 50030148) built in the early 1880s and a number of concrete structures associated with the Clontarf Promenade dating from the 1950s (NIAH 50030145, 50030146 and 50030149) (see Figure 4).

3.4 Dublin City Industrial Heritage Record

The Dublin City Industrial Heritage Record survey register does not record any sites within the project area. However, the register does recommend the addition of four (4) sites within 1km of the project area (Table 3).

<table>
<thead>
<tr>
<th>Name</th>
<th>Purpose</th>
<th>Description</th>
<th>Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x Hole made in search of</td>
<td>Lead</td>
<td>Exterior Description: Former lead mine shaft, dating from fifteenth century and now forming part of shelter along promenade. Random rubble stone wall on circular plan situated on shoreline and now partly built into promenade wall with concrete render.</td>
<td>This former mine shaft was one of two located along the shore at Clontarf, the other (19 05 008) no longer having extant remains. The site was mentioned in a list of mines prepared in 1497 and appears to have continued production for another 300 years when it was abandoned owing to incursions from the sea. The surviving remains are of significant value within the industrial heritage of the Clontarf area attesting to an interesting mining past of which little else survives.</td>
</tr>
<tr>
<td>Tramway</td>
<td>Tramway</td>
<td>Exterior Description: Road resurfaced. No visible remains of tramlines</td>
<td>The Dublin Tramway System was in its day seen as the most efficient of its type in Europe and had the seventh largest electric tramway network in the world. Although not visible, there is every possibility that the tramlines survive beneath the existing road surface. This tramline, which ran from Nelson Pillar to Dollymount, was opened in 1873, electrified in 1897/8 and closed in 1938.</td>
</tr>
</tbody>
</table>

Table 3: Dublin City Industrial Heritage Record within a 1 km of the location of the proposed works.

3.5 Previous archaeological intervention

There has been no previous archaeological intervention reported at the project area, although there have been three (3) such interventions recorded in the wider vicinity.
The archaeological monitoring of pipe-laying works (water) took place between August 2014 and August 2015 in the townland of Clontarf West, along Hollybrook Park, Hollybrook Road, and part of Clontarf Road (Licence Number 14E0425). Trial holes drilled into the grassed area along the seafront south of Clontarf Road and east of Alfie Byrne Road were also monitored. The monitoring did not locate definite archaeological features, deposits or finds, however a single potential archaeological deposit, namely a small burnt feature, was recorded at one location on Hollybrook Road.

A test trench at 76 Clontarf Road was assessed by means of a desktop study and test-trenching in June 2008 ( Licence number 08E0344). A 10m x 2m wide trench was excavated to a depth of max 1.2m. No archaeological features or artefacts were revealed during the course of the testing.

The Bull Wall to Causeway Road section of the Sutton to Sandy cove Cycleway & Footway Scheme had groundworks monitored archaeologically between May and Dec 2015 (Licence number: 15E0240). No archaeological finds or features were uncovered.

4.0 ARCHAEOLOGICAL ASSESSMENT

4.1 Survey Methodology
The survey began with a walk along the cycle-path to inspect the rock armour delineating the northern extent of the survey area (Figure 6). On accessing the estuary, a visual non-disturbance inspection was carried out of the foreshore within the survey area. The survey was conducted at Low Water during daylight hours. Full access was possible, and no constraints were encountered.

A walkover inspection from east to west paid particular attention to the location of the exiting Wad River outflow and adjacent proposed outfall locations. A hand-held metal-detector was used concentrated within the proposed foreshore impact area. The survey formed an L-shaped area, following the line of the embankment. It measures 138m east-west with a maximum 29m north-south, totalling an area of approximately 2500m².

The survey was completed by a team of two maritime archaeologists on 15th of January 2022, under licence from the DHLGH; licence numbers 22D0002 and 22R0004.

<table>
<thead>
<tr>
<th>Survey Area</th>
<th>NW Corner</th>
<th>NE Corner</th>
<th>SE Corner</th>
<th>Southern</th>
<th>SW Corner</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITM coordinates</td>
<td>718433 E, 736189 N</td>
<td>718566 E, 736152 N</td>
<td>718562 E, 736139 N</td>
<td>718432 E, 736162 N</td>
<td>718418 E, 736174 N</td>
</tr>
</tbody>
</table>

Table 4: ITM coordinates of the survey area.
4.2  Foreshore Topography
The landward boundary is entirely artificially embanked and bordered by Clontarf promenade and roadway. The reclamation of the North Lots and the construction of the Great South Wall in the 1720s had an effect on the topology of the Tolka Estuary. A century later, the construction of the North Bull Wall and consequential formation of Bull Island have also shaped the wider topography of the area.

One of the most notable topographic changes has been the removal of Clontarf Island (locally referred to as Mud Island). The demise of Clontarf Island is attributed to a combination of continuous erosion by the sea and by artificial means. A build-up of sediment at the East Wall allowed access to the island at low tide, allowing the removal of its sand and gravels by horse and cart to the Clontarf shore or by boat. Before its disappearance in around 1880, the island measured 400 yards long, about 40 yards wide, and 16ft in height.6

Sediments within the survey area of the Tolka Estuary vary from soft silty-sand-to fine sand with frequent inclusions of sub-angular to rounded cobbles and gravel (Plate 3). A higher concentration of cobbles and boulders, forming a low V-shaped mound, was observed immediately south of the scour pocket beneath the Wad River outflow. Occasional boulders (>400mm), displaced from the embankment was also noted, mainly in the vicinity of the rock embankment but also one boulder 25m south of the Wad River outflow.

The wetland habitats contained within the River Tolka Estuary retain a conservation status for migratory waterbirds and are considered to be an additional Special Conservation Interest. The strand shows minimal variation across the intertidal foreshore but slopes subtly southward to the channel carved through the estuary by the Tolka River. At Low Water, the Wad River (on entering the estuary) meanders in a south-easterly direction to join the Tolka River (Plate 4). A shallow scour pocket (approximately 1.3m deep) remains beneath the outflow, even at Low Water.

4.3  Visual Survey and Assessment
The archaeological assessment was comprehensive and systematic, extending the survey 110m east and 28m west of the location of the proposed outfalls (Figure 6).

No deposits, material, or features of archaeological or historical interest was encountered as part of the intertidal survey. Some fragments of 19th- and 20th-century pottery and glass bottles were encountered intermittently across the foreshore area (Plate 5).

6 Bird Life in Dublin Bay. The Passing of Clontarf Island Alexander Williams 1908.
Rock armour forms the southern boundary of Clontarf and delineates the western and northern limit of the survey area (Plate 6). The rock armour to the west of the exiting outflow consists mainly of large angular limestone boulders, while to the east a significant portion of dressed ashlar granite blocks are present, concentrated in two areas (Figure 6, Plates 7–8). The granite blocks constitute re-used masonry that has been incorporated into the rock armour.

An active concrete pipe (250mmØ) passes through the rock-armour at a height of 300mm above the strand (Plate 9). A timber plank (modern), measuring 3.5m length and 260mm width, was submerged within a small scour pocket beneath the outflow. The timber is water-worn and retains two (2) rectangular nail-holes at one end (Plate 10). No other fastenings are visible along its extent.

4.4 Metal-detection Survey
A sample metal-detection survey was undertaken along a 138m-long section of foreshore, located immediately adjacent to the proposed outfalls.

A medium to high target ratio of 2 ferrous hits per m² was encountered. All inspected targets proved to be of modern origin and included bottle caps, aluminium cans, miscellaneous metal fragments, among other debris items.

4.5 Observations
The existing, double-chambered, outflow is constructed of poured mass-concrete, with roof slabs of varying size; average measuring 3.3m length, 1.4m width, and 400mm in thickness. The internal dimensions of each chamber measure 1.3m width and 1.2m in height. The roof slab above the opening has tilted slightly, but otherwise the chamber appears structurally sound and the concrete slabs are supported by steel girders. The outflow protrudes 1.6m beyond the rock armour on its eastern side and is flush with the rock armour on the west side (Plate 11).

The rock-armour extends 160m to the east of the outflow, after which a concrete retaining-wall separates the promenade from the shoreline.

The inclusion of large granite blocks within the rock armour is curious, insofar as dressed ashlar granite is a valuable building material. The widening of Clontarf Road in the direction of the reclaimed seafront may suggest a rationale for the stonework as re-used lengths of the former parapet wall.
5.0 PROPOSED IMPACTS

The installation of the new outflow will not impact on any known archaeological sites. The following impacts to the 1930s reclamation will occur.

1. The rock armour immediately to the west of the current Wad River Outflow will need to be lifted in order to install the new culvert and outflow.
2. The culvert trench will require excavation through the 1930s infill.

There is no cartographic evidence to indicate that the foreshore under the footprint of the proposed works was set to any specific use in the past, although the gathering of cockles and other shellfish at this location throughout the 18th and 19th centuries is likely. In an article for the *Dublin Historical Record* for 1966, M J Tully, describes the making of the promenade when Dutch dredgers pumped the sand scraped from outside the boundary wall of the promenade into the intervening space. When covered with a topsoil it soon ‘bore a healthy crop of grass’.

Clontarf Road was widened as a result of the reclamation, and it is more than likely that the original seawall that protected the coastal road is buried under the existing Clontarf Road. It is not expected that the proposed works will impact this structure.

6.0 RECOMMENDATIONS

The proposed construction works trench is required to install the new culvert and associated outfall headwall at the proposed foreshore location.

It is recommended that any excavated spoil associated with the 1930s reclamation should be subject to archaeological inspection.

In the event that the trench requires excavation to a depth that extends into the former seabed (beneath the reclamation infill material and rock armour), archaeological monitoring of such work would be required. Archaeological monitoring is subject to archaeological licensing. Licence applications take 3–4 weeks to be processed. Sufficient lead time is required to ensure that the licence is granted before site works commence.

**PLEASE NOTE:** All of the above recommendations are based on the information supplied for the proposed Middle Wad Flood Alleviation Scheme - Contract E: Clontarf Outfalls Project. Should any alteration occur, further assessment may be required.

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

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7.0 ACKNOWLEDGEMENTS

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Plate 1: Looking north at the Wad River outflow set into Clontarf promenade rock-armour.

Plate 2: Wad River outflow at Clontarf showing scour pool at low tide.
Plate 3: Overview of seabed within the survey area.

Plate 4: Looking southeast at the Wad River channel through the estuary at low tide.
Plate 5: Example of pottery encountered during survey.

Plate 6: Rock armour to the west of the outflow.
Plate 8: 75m east of outflow dressed ashlar granite blocks.
Plate 9: Concrete water pipe within the rock armour. Looking North

Plate 10: Timber plank within the scour pool of the outflow.
Plate 11: Outflow in relation to the rock armour.