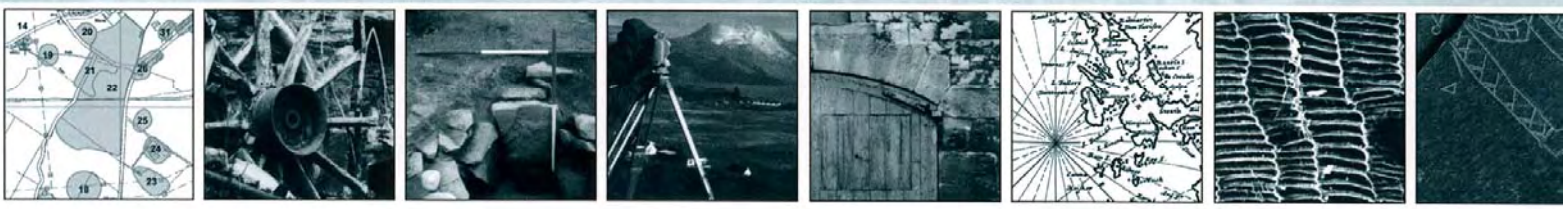

# LUAS BROOMBRIDGE

## Advance Archaeological Testing at Broadstone

## Assessment Report

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**Project code:** RPAB10
**Director:** Tara Doyle
**Author:** Tara Doyle
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HEADLAND ARCHAEOLOGY Ltd

The project was managed by Ross MacLeod and Patricia Long, Senior Archaeologists with Headland Archaeology Ltd. The licensed director of the archaeological testing was Tara Doyle. She was assisted by site supervisor Robert Hanbidge and site assistant Ann Frykler. Survey was carried out by Robert Hanbidge under the supervision of Brian MacDomhnaill, Survey Manager with Headland Archaeology. Logistics and Health and Safety were managed by James Gubbins of Headland Archaeology, who was assisted by George Morgan.

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## EXECUTIVE SUMMARY

Archaeological testing at the proposed Luas Broombridge stop at Broadstone, Dublin 7 was undertaken on the 15th April 2010. Broadstone is an area of the inner city on Northside Dublin, Ireland. The area is roughly triangular in shape, with Phibsborough Road and Constitution Hill located to the West, North Circular Road to the north, and Dorset Street and Bolton Street to the southeast. The testing area was located in the forecourt of the former Broadstone station terminal building and is currently used as a car park. The possible remains of an industrial heritage site comprising of a section of the infilled Broadstone Branch of the Royal Canal may be partially located within the footprint of the proposed stop at this location.

Archaeological testing was therefore proposed by the Railway Procurement Agency (RPA) as part of advance investigative works for the proposed Luas Broombridge stop at Broadstone. The purpose of the archaeological testing was to identify the nature and extent of any potential archaeological remains in the vicinity of the proposed Luas Broombridge stop at Broadstone, to assess the impact of the proposed Luas Broombridge stop design on any surviving archaeological remains and to inform the environmental impact assessment and detailed design of the proposed stop.

Three trenches were excavated in the forecourt/car park of the former Broadstone station terminal building. Excavation resulted in the temporary removal of the permanent asphalt surface. Each trench was subsequently dug by machine to a depth of 1.25m or a level were archaeological remains were encountered. The trenches were then hand dug and cleaned by a team of archaeologists. On completion of archaeological recording and survey, the exposed *in situ* archaeological material was covered with geotextile. All three trenches were subsequently backfilled and the appropriate surface reinstated.

Two substantial limestone walls were encountered in Trench 1. These were located approximately 5.30m apart and have been identified as the remains of the canal approach to Broadstone Harbour which was located to the southwest of the former Broadstone station terminal building. A possible slipway into the canal was also identified in Trench 2. This comprised of a shallow wooden plank built revetment and a mortared sloping flagstone surface. It is roughly located in an area were a temporary crossing or wooden pontoon bridge possibly crossed the canal. No archaeological features were encountered in Trench 3. All of the archaeological

features were post-medieval and industrial in nature. A single infill deposit covered both walls and the possible slipway. It was identified in all three trenches and was excavated to a maximum depth of 1.25m.

The southern can wall and any features to the immediate south of it will be subject to a direct impact from the proposed construction of a railway underpass at the location. In order to mitigate this impact a detailed mitigation strategy is presented below.

# 1. INTRODUCTION

This report presents the results of archaeological testing, comprising the excavation of three trenches located in the forecourt/car park of the former Broadstone station terminal building, undertaken as part of advance investigative works for the proposed Luas Broombridge stop at Broadstone (Figure 1).

Archaeological testing within the forecourt of the former Broadstone station terminal building was carried out by license eligible archaeologist, Tara Doyle of Headland Archaeology (Ireland) Ltd. An archaeological excavation licence was obtained in accordance with the conditions of Section 26 of the National Monuments Act (as amended) and the testing area is named as “Broadstone Harbour Depot, Constitution Hill, Dublin 7” on this licence. (10E0090).

# 2. BACKGROUND

## 2.1 Historical Background

An overview of the archaeological and historical background of the study area and its receiving environment is included with a review of literary and cartographic sources, results of previous archaeological investigation and the topographical files has been previously detailed (Lyons 2010a).

Located in the vicinity of the proposed Luas Broombridge Broadstone stop and cut-and-cover underpass are the possible remains of a section of the Broadstone Branch of the Royal Canal, Broadstone Harbour, and associated canal storage structures. The area is depicted on Rocque’s map (1756) as a patchwork of orchards; however a number of houses are also recorded in the vicinity of the present-day Western Way/Constitution Hill junction.

On Duncan’s subsequent map of 1821, the area is shown as being largely undeveloped also, although the Broadstone Branch of the Royal Canal is shown extending eastwards from the Broadstone Harbour and turning northwards within the vicinity of where the northern portion of Western Way would later be constructed. In addition, a number of structures are also shown in the general vicinity of the present-day Western Way/Constitution Hill junction on this map. These buildings are no longer present and it is possible that subsurface remains associated with these features lie beneath the current streetscape at this location.

The River Bradogue formerly ran through this area, although this is not depicted on Rocque's map. An undated plan of this area shows the River Bradogue running eastwards across the harbour and to the south of the canal channel (Dublin City Archive, WSC/Maps/071). Ordnance Survey maps dating to 1843 and 1875 do not depict the course of the river and it is possible that it was culverted at the time of the canal and harbour construction.

The Royal Canal Company under the direction of Engineer Richard Evans began construction on the Broadstone Branch *c*.1796 (Clarke 1992, Delaney 1992). By the turn of the century the construction of Foster Aqueduct, which carried the Broadstone Branch of the Royal Canal over the Broadstone Road (now Phibsborough Road / Constitution Hill), was also under way. Although the aqueduct is not labelled on Duncan's map (1821), it is represented and annotated on the 1st Edition 6 inch OS map (1843). It was an Egyptian Revival bridge designed by Millar & Ruddery (Casey 2005). The construction of Broadstone Harbour began in 1807 and was completed in the same year. The harbour and canal branch serviced a regular passage boat service to Mullingar (Nolan 2001).

The Midland and Great Western Railway (MGWR) Company purchased the Royal Canal Company to operate a new adjacent railway line to Mullingar in 1845. A new railway terminal building at Broadstone was completed in 1850. This was designed in a Graeco-Egyptian style by John Skipton Mulvany and overlooked the canal and harbour.

A floating pontoon bridge, which could be moved to one side to allow boats in and out of the harbour, was designed by J. & R. Mallet and provided access to the Broadstone terminus building and railway yard north of the canal and harbour (Delaney, 1992; Casey, 2005). The MGWR soon lost interest in the canal business and in 1877 they applied for and obtained legislation empowering them to fill in the harbour and canal spur west of Constitution Hill/Phibsborough Road. A new forecourt was created and a new approach road to the Broadstone terminus building, Western Way, was built by way of Foster Aqueduct (Delaney, 1992; Nolan, 2001). The aqueduct was subsequently removed in 1951 to facilitate road widening; however it is likely that an ashlar block wall located on the western side of Constitution Hill/Phibsborough Road is part of this former aqueduct. There are now no visible surface remains of the canal and harbour and the location is currently occupied by the forecourt of the former Broadstone Railway Terminus, an access road into the Broadstone Depot and the forecourt of the Dublin Bus Phibsborough Garage.

However, as documentary sources indicate that the canal branch and harbour were infilled rather than removed there is high potential for extant sub-surface remains (Delaney 1992; Nolan 2001).

Analysis of the 2nd Edition 25 inch OS map (1911) shows that significant alterations occurred in this area subsequent to the opening of the Broadstone station terminal building in 1851, after which time the Broadstone Branch of the Royal Canal gradually fell out of use. The 2nd Edition 25 inch OS map (1911) shows a road, named as 'New Road', following an almost identical route to present-day Western Way, although it can be seen from this map that the road extended over Phibsborough Road / Constitution Hill via Foster Aqueduct, and thus it appears that by this time the aqueduct was no longer in use for canal transportation and had been converted for vehicular access to the former railway station. Analysis of the 1925 and 1948 OS revision maps demonstrate that this road continued to provide access to the former railway station via Foster Aqueduct until the mid-20th century. The aqueduct was removed in 1951 to assist road widening in the area (Casey 2005, 282) and Western Way was laid out in its current form at this time. Remains of the aqueduct are still extant along Constitution Hill/Phibsborough Road and comprise a pebble-dashed ashlar block wall outlined against the Broadstone embankment (Casey 2005, 282; Lyons, 2010a).

## 2.2 Cartographic Evidence

Nineteenth century cartographic surveys record the location and dimensions of the canal, harbour and associated structures. Comparison of these surveys with recent OS mapping allows the location of the site to be gauged in relation to the current landscape. It should be noted that the information provided regarding location is approximate only, as there is always a level of inaccuracy when comparing earlier surveys with recent mapping. This inaccuracy could be as great as a 10m error margin which largely results from differences in scale and survey grid systems used.

Three 19th century surveys show the canal extending in a south-westerly direction in front of the Broadstone Railway Terminus for approximately 85m from the western edge of Phibsborough Road before opening into a harbour area orientated north-south and measuring approximately 30m in width. A large building, depicted to the east of the harbour area and south of the canal channel, may be an associated storage structure. An earlier map depicts storage structures to the east, south, west

and northwest of the harbour area (Dublin City Archive, WSC/Maps/071). However as already stated it is unclear whether this map represents proposed or actual works associated with canal construction.

The precise location, shape and size of the site varies between the 19th century surveys, in particular, the location of the canal in the 1843 OS survey versus the later surveys (1875 OS/1877 MGWR Survey). This may indicate that the canal channel was altered and narrowed during this period perhaps to accommodate the floating pontoon bridge introduced by the MGWR to access their terminus building.

### 2.2.1 1st Edition 6 inch Ordnance Survey Map (1843)

This map shows the location of the north-western canal wall *c.* 10m southeast of the former Broadstone station terminal building running parallel to the building line. The south-eastern wall is depicted *c*. 30m from the building line. Both walls are shown to narrow at the north-eastern end of the canal from 20m to 10m.

### 2.2.2 2nd Edition 6 inch Ordnance Survey Map (1875)

This map shows the location of the north-western canal wall *c*. 18m to the southeast of the former Broadstone station terminal building. Only the south-eastern wall is shown to narrow in this survey; at its north-eastern end, where this wall is *c*. 23m from the building line the canal width is *c*. 5m. At the south-western end the channel has widened out to 9m and the south-eastern wall is shown *c*. 27m from the building line.

### 2.1.3 Midland Great Western Railway (MGWR) Survey - Plan (1877) (Figure 2)

This plan shows the canal channel running at a slight angle to the building line of the former Broadstone station terminal building. The north-eastern end of the north-western canal wall is shown *c.* 16m to the southeast of the former Broadstone station terminal building while the south-western end is shown *c.* 13m from the building line. Only the south-eastern wall is shown to narrow in this survey; at two locations. This wall is closest to the former Broadstone station terminal building at its north-eastern end, where it is *c*. 21m from the building line and the channel width is approximately *c*. 5m. Further westwards the channel widens out to *c*.10m and the south-eastern wall is shown *c*. 25m from the building line. The channel then narrows again to *c*. 8 m and this wall is shown *c.* 23m from the building line.

The depth of the canal base along the proposed new approach road (Western Way) to Broadstone was recorded as approximately 2.3m below ground level in 1877.

## 2.3 Previous Ground Investigations

### 2.3.1 Ground Penetrating Radar Survey

Initial ground investigation works consisted of a Ground Penetrating Radar (GPR) survey which was carried out by RPA in the vicinity of the former Broadstone station terminal building and within the forecourt of the Dublin Bus Garage. The survey identified existing utilities and numerous linear anomalies in the locality. These anomalies could either be remains of the former canal and harbour and associated structures, or abandoned utility services.

Comparison of the GPR survey with 19th century historic mapping illustrates that a number of the anomalies appear to mirror the shape of the northern end of a structure marked on the 1843 and 1875 OS maps and 1877 MGWR plan. The location of these anomalies differs slightly to the historic mapping; however, this may be due to the potential margin of error between the historic surveys and the GPR survey, which largely results from differences in scales and grid systems used.

None of the linear anomalies accord precisely with the location of the canal/harbour as shown on the 19th century surveys. However, there are a number of linear anomalies in close proximity and given the potential margin of error between the 19th century surveys and GPR survey these anomalies could possibly represent the canal/harbour walls. As part of the GPR survey, historic records were examined and while not identified on the ground, the location of a combined sewer was identified in these records. It is recorded as running in a south-easterly direction 20m from the former Broadstone station terminal building, measuring 1.3m x 1.2m and located at a minimum depth of 5m. It is likely that this combined sewer contains the culverted Bradoge River.

### 2.3.2 Utility Slit Trenching

RPA Archaeologist Emer Dennehy monitored the excavation of two utility slit trenches in the forecourt of the former Broadstone station terminal building. The first trench ST-021C was excavated to the southeast of the railway building. Here the remains of a bonded rubble limestone wall was identified at a depth of *c.* 0.35m-0.38m below current ground level. This wall was truncated by the insertion of a utility

pipe. A second trench, ST-021B, was excavated to the west of the railway building. This trench contained deposits associated with the infill of the Broadstone canal.

### 2.3.3 Archaeological Investigations

Only limited archaeological investigations have been carried out in the vicinity of the Royal Canal in the Broadstone area. In 2004 investigations in advance of student housing residences at 1-3 Royal Canal Bank, Dublin 7 (Turrell 2004) identified a bank along with portions of walls. These belonged to the Broadstone Branch of the Royal Canal close to where the canal originally crossed the Phibsborough Road/Constitution Hill. The walls were deemed to have fulfilled some purpose relating to the canal and were incorporated into the design of the modern buildings.

## 3. OBJECTIVES

The aim of the advance archaeological testing was to establish the location of the canal walls and any associated structures, to establish the width, nature and condition of the canal walls, the nature of soil stratigraphy, the canal banks and any associated structures. The results of the testing are presented in Section 5 of this report. This information is required in order to fully assess the potential impact of the proposed design of the Broadstone stop at this location on all sub-surface remains associated with the former Broadstone Branch of the Royal Canal. This impact assessment is presented in Section 7 of this report. The results of the impact assessment will inform the environmental impact assessment and detailed design of the stop proposed at Broadstone. .

## 4. METHODS

Each test trench was excavated in accordance with specifications detailed by the client (RPA). The test trench layout was designed with reference to historic cartographic sources (1st and 2nd edition OS mapping dating to 1843 and 1875 respectively and MGWR plan dating to 1877) and modern utility maps. The test trenches have been positioned in order to expose potential remains associated with the north and south walls of the canal, the location of which varies substantially between the historic maps and in particular between the 1st and 2nd edition OS maps. The layout of the test trenches has also been designed to avoid the location of known sub-surface utilities.

Test Trench 1 and Test Trench 2 measured 12m long by 2m wide, Test Trench 3 measured 10 m long by 2 m wide. All three trenches were orientated in a northwest/southeast direction. The trenches were fenced off from the public and a traffic/pedestrian management plan was set in place by Headland Archaeology (Ireland) Ltd. The permanent asphalt surface of each trench was removed using a con-saw and mechanical excavator. A 20 tonne mechanical wheeled excavator with a toothless ditching/grading bucket was used to carry out all excavations. The asphalt and hardcore material removed from each trench was set aside and removed from site by skip. Each trench was mechanically excavated to a depth of 1.25m or to a level where potential archaeology or utilities were identified. On encountering possible underlying archaeological features the trenches were then hand dug and cleaned for survey, recording and photography by a team of archaeologists. All recovered artefacts were processed in accordance with the National Museum of Ireland guidelines. On completion of all recordings the exposed *in situ* archaeological material was covered with geo-textile and all three trenches were subsequently backfilled and the asphalt surface reinstated.

## 5. RESULTS

This report is concerned with three test trenches excavated on the forecourt/car park of the former Broadstone station terminal building. Each trench is described in detail below (Figure 3).

### 5.1 Trench 1

Trench 1 was located in the eastern section of the forecourt. It was orientated in a northwest/southeast direction and measured 12m long by 2m wide and was excavated to a maximum depth of 1.25m (Figure 4).

The first of two walls (005) was identified to the south of Trench 1 (Plate 1), orientated in a southwest/northeast direction across the width of the test trench. This wall did not appear to be disturbed; and the top of the wall was situated at a depth of 0.36m from the car park surface. The wall measured 1.90m wide and extended the width of the test trench (2m). The wall had a depth of 0.67m and clearly continued below the designated 1.25m depth cut off. Two separate wall faces were recorded. The northwest face or inner wall face was ashlar built and comprised of large fine cut, roughly hammer dressed square or rectangular blocks of limestone (Plate 2). The mortar between the stones was less than 3mm thick and possibly consisted of firm

hydraulic lime mortar. The southeast face or possible outer wall face comprised of random rubble (Plate 3). Due to the shallow exposed depth of this wall it remained unclear if this wall was built to course. The limestone blocks were much smaller on this side and roughly square cut with small stones or pinnings inserted between some of the joints. The mortar on this side varied in thickness between the stones and again, the mortar appeared to consist of hydraulic lime mortar. Between both wall faces was a core fill that possibly comprised of small calp limestones. This core fill was identified from the top of the wall, here; the mortar was at its thickest, with small amounts of limestone showing through the mortar (Plate 4).

In general the section of the exposed wall (005) was extremely sturdy and in good condition. There was some evidence of possible salt crystallisation on a couple of limestone blocks located on the ashlar built southeast face of the wall. This was concentrated to a very small area and there was no evidence of it affecting the mortar. A thorough examination of the entire wall would determine if this threatened the walls overall integrity.

A second wall (006) was identified approximately 5.30m to the northwest within Test Trench 1 orientated along the same alignment as the first wall (005). This wall was not as thick as the first wall (005) wall, measuring 0.75m wide and extending the width of the trench (2m). The top of the wall was located at a depth of 0.61m from the modern car park surface and approximately 0.67m of the wall was exposed to a total trench depth of 1.25m. The wall, although not as thick, was structurally similar to the wider wall (005) to the south. The second wall (006) had a southeast facing wall or inner wall that was ashlar built and comprised of large fine cut, roughly hammer dressed or punch dressed rectangular blocks of limestone (Plate 5). The mortar between the stones was less than 3mm thick and consisted of possible hydraulic lime mortar. The ashlar wall was backed by a northwest facing wall that comprised of random rubble. This wall face rose above the ashlar wall face by about 0.10m (Plate 6). The limestone blocks on this random rubble wall were small and were mostly square-cut with angular stones or pinnings inserted between. The mortar on this side of the wall varied in thickness between the stones, and again, possibly comprised of hydraulic lime mortar.

The mortar identified on both walls was mostly hard/firm set and varied in colour from light cream/brown to medium orange/brown. The aggregate within the mortar comprised of fine gravels and stones, with evidence of straw and occasional lumps of

lime. There was no evidence of degradation or fractures to the mortar on either wall and in general the mortar appeared to be in relatively good condition.

At a depth of 1.20m, directly southeast of the larger wall (005) was a deposit of firm dark grey clay (004) with occasional angular stone inclusions. This deposit was only identified here and within this trench measured approximately 3m long by 2m wide with unknown depth. As it was identified at a depth of 1.20m from the surface further investigation of this deposit was not possible. Directly over this grey clay deposit (004), the wider wall (005) and the narrower wall (006) was a deposit that comprised of firm medium brown clay silt (003) with frequent small to medium sized stone and occasional brick, oyster shell, charcoal and rubble inclusions. This deposit was found in all three trenches and possibly represented the infill material for the canal. Within Trench 1 this deposit had a thickness of 0.60m – 1.10m.

A total of nine post-medieval artefacts were recovered from this deposit and included two sherds of black glazed red earthenware (10E90:003:001-002), two sherds of red earthenware (10E90:003:003 and 10E90:003:007), a heavily corroded iron plate (10E90:003:005), a heavily corroded iron fragment (10E90:003:006), two square cut masonry fragments with rough punching and drafted margins (10E90:003:008-009) and a North Devon tempered rim sherd with applied straight handle (10E90:003:004). A large fragment of masonry with embedded iron bolt (10E90:003:010) was also identified within Trench 1. This was too heavy to remove from site and was reburied within Trench 2.

A modern utility (eircom) was identified at a depth of approximately 0.30m from the surface. This truncated the infill deposit (003) and was situated between the walls (005) and (006). Above this deposit (003) was a modern layer of hardcore (002). The car park surface (001) overlay the hardcore and formed the uppermost layer.

### 5.2 Trench 2

Trench 2 (Figure 5) was located in the western section of the forecourt (Plate 7). It was orientated in a northwest/southeast direction and measured 12m long by 2m wide and was excavated to a maximum depth of 1.25m (Plate 8).

Situated within the northern part of the trench were three planks of wood (007). These appeared to form a very shallow revetment. One plank of wood formed the base of the structure. The ends of this plank extended beyond the trench limits and no further dimensions could be determined. Overlying this were a further two planks of wood (Plate 9). These two planks abutted each other and again extended beyond

the trench boundary. A deposit of mortar (008) abutted the wooden planks to the north. This mortar was relatively weak and loose and was wet to touch. It was light cream/brown to orange/brown in colour with coarse gravel, small stones aggregates and lumps of lime throughout. The mortar deposit extended the width of the trench (2m) and was approximately 0.20m wide with unknown thickness (Plate 10). Directly north and abutting the mortar was a flagstone surface (009). This surface sloped to the north (Plate 11). The flagstones mostly comprised of flat sub-angular, sub-square and sub-rectangular limestone's that were bonded in a random/crazy paving fashion. They were set into firm brown grey clay (011) with the remains of loose weak wet mortar identified between the stones. The flagstone surface extended the width of the trench (2m) and gradually sloped to the north for a length of 1.28m. Beyond this, the surface did not appear to be truncated but had separated or drifted from the surface into a wet deposit of moderately compact mottled brown grey clay silt (012) with inclusions of large stones and occasional flagstones. This deposit filled the remainder of the trench to the north and measured 1.40 m long with unknown depth. A small deposit of loose black organic clay (010) containing red brick inclusions was located at the edge of the flagstone surface to the west of the trench. This measured approximately 0.30 m long by 0.25 m wide with unknown depth. As the trench was already at a depth of 1.25m the relationship between this (010) and the previously described deposit (012) could not be ascertained. Two post-medieval artefacts were recovered from this darker fill (010) and included the possible rounded base of a green glass nursery bottle (10E90:010:001) and a fragment of a clay tobacco pipe bowl (10E90:010:001). Directly over the wooden revetment (007), the mortared surface (008), the flagstone surface (009) and the two deposits described above (010) and (012) was the same infill (003) described in Test Trench 1. Again a modern hardcore layer (002) overlay this deposit and was completed by an upper layer of asphalt (001).

### 5.3 Trench 3

Test Trench 3 was located between Trenches 1 and 2 and positioned slightly further to the north. This trench measured 10m long by 2m wide and was excavated to a depth of 1.25m (Figure 6). No archaeological features were encountered (Plate 12). Within this trench was the same deposit (003) identified within Trenches 1 and 2. It comprised of firm medium brown clay silt (003) with frequent small to medium sized stone and occasional brick, oyster shell, charcoal and rubble inclusions. Two modern utilities were identified within this trench. The final 1m of trench to the north could not

be fully excavated to the agreed 1.25m depth. This was due to one of these modern utilities traversing the trench at a slight angle, quite close to the trenches northern limit. Similar to Trenches 1 and 2 a modern hardcore layer (002) overlay this deposit and was completed by an upper layer of asphalt (001).

## 6. DISCUSSION

Both walls (005) and (006) identified in Trench 1 are clearly part of the canal approach to Broadstone Harbour located to the southwest of the former Broadstone station terminal building. A distance of 5.30m separated each wall, forming the canal channel. This represents an extremely narrow canal channel, but on both the 2nd edition OS map dating to 1875 and the MGWR plan dating to 1877 (Figure 2) a narrowing of the channel can be identified on approach to the Foster Aqueduct to the east. The distance between the walls on both the 2nd edition OS map and on MGWR plan is c.5m. This is not far off the accurate channel width of 5.30m encountered during testing. The 1st edition OS map is less detailed. It depicts the harbour and its approach to Fosters Aqueduct, yet there is no narrowing of the canal channel. The 2nd edition OS Map is also quite vague although some detailing of the floating pontoon and the narrowing of the canal can be observed. The most accurate depiction of the Harbour and the canal's approach to Fosters Aqueduct can be seen on the MGWR plan dating to 1877. Here, both walls (005) and (006) identified in Trench 1 are roughly positioned over the narrow canal approach to fosters Aqueduct. The possible slipway identified in Trench 2 is also positioned in an area were a floating pontoon crossed the canal.

The wall to the south of the trench (005) was quite substantial. It measured 1.90m wide with an ashlar interior wall face and an outer random rubble wall face. The core of the wall was filled with calp limestones and hydraulic lime mortar. The wall to the north was not as wide. Again the interior wall face was ashlar built and was backed by a random rubble exterior wall. The smooth flat ashlar interior canal walls would have guided canal barges and boats to pass through this narrow part of the canal and over the aqueduct with minimum difficulty.

A possible slipway into the canal was identified in Trench 2. This is located in an area were a temporary crossing or floating wooden pontoon bridge crossed the canal. This floating bridge could be moved from one side of the canal to the other to allow boats in and out of the harbour. It was designed by J & R Mallet and provided access to the Broadstone terminus building and railway yard north of the canal and harbour

(Delaney 1992; Casey 2005). The condition of the possible slipway was not as stable as the walls encountered in Trench 1. The three wooden planks (007) were in relatively good condition but the lime mortar (008) was loose and crumbling. The flagstones (009) were set into firm brown grey clay (010) with the remains of lime mortar identified between the stones. Further random flagstones were scattered over a deposit (012) located to the north of this. These additional flagstones had clearly separated from the main stone slipway. This is possibly due to the high moisture content in this deposit (012).

The exposed remains of both walls (005) and (006) located in Trench 1 were in extremely good condition with the upper part of the walls undisturbed. This strengthens historical documentary sources that indicated the canal branch and harbour were infilled rather than removed (Delaney 1992; Nolan 2001). To substantiate this even further was a deposit (003) that was identified in all three trenches. It overlay both walls in Trench 1, the possible slipway in Trench 2 and formed the main deposit in Trench 3. It possibly represented the main infill of the canal and harbour. Artefacts were recovered from deposits in Trench 1 and Trench 2. A total of 10 post medieval finds were recovered from the infill deposit (003) in Trench 1. A further two post medieval artefacts were recovered from a small deposit (010) identified in Trench 2.

There was no evidence for a canal embankment or obvious clay sealant layer within the three trenches excavated. This is possibly due to the fact that all three trenches did not exceed a depth of 1.25m and the infill (003) was quite a significantly deep deposit. Evidence of a grey clay deposit (004) was observed in Trench 1. This may possibly represent a sealant layer or potential embankment yet this is purely speculative as only the upper part of this deposit was encountered.

The remains of a bonded rubble limestone wall truncated by the insertion of a utility pipe, was identified during archaeological monitoring of a utility slit trench (ST-021C) by RPA Archaeologist Emer Dennehy. Trench 1 was excavated to the immediate west of ST-021C and the same utility pipe was identified; however the bonded rubble limestone wall identified in ST-021C did not continue into Trench 1 and was in fact the remains of a large section of building rubble and not *in situ*.

## 7. IMPACT ASSESSMENT

Archaeological material assets are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context any change to the environment, such as construction activity and ground disturbance works, can adversely affect these sites resulting in irreversible damage or removal. As such, all archaeological and cultural heritage material assets are considered to have very high sensitivity. In accordance with the EIS, the magnitude of this impact on the infilled harbour and section of the Royal Canal, prior to mitigation is high and the impact affects a site with a high baseline rating.

Archaeological testing in Broadstone has confirmed the presence of features associated with the Broadstone Branch of the Royal Canal, and as such they represent the subsurface remains of an Industrial Heritage site. The testing alone does not reveal the full scale of the canal remains but the good condition of the wall portions exposed (005) and (006), as well as the information gleaned from historical maps demonstrate that the remains are likely to be extensive.

Construction works required to facilitate a new access route to the Broadstone Bus Depot, as well as construction of an underpass which will require excavations to a maximum depth of 8m, will have a direct impact on the southern side of the canal only and any associated features between the southern bank of the canal and the southern side of the area of investigation (as depicted in Figures 1 and 2)

Wall (006) which was identified in Test Trench 1 is to the north of the proposed construction works and will not be impacted by the development. Neither is it anticipated that the sub-surface continuation of this wall will be impacted.

Wall (005) is also just north of the edge of the proposed underpass, where it appears from the 1877 map (Figure 2) that the canal narrows. The portion of wall (005) exposed in Test Trench 1 will not be directly impacted by the development but it will be in very close proximity to the works and may be indirectly affected by removal of supporting material.

The MGWR map of 1877 seems to suggest that wall (005) stepped out to the west of Test Trench 1 but this was not confirmed by Test Trench 2 where no wall was

identified. This may be the result of parts of the wall being removed in the past or it could be due to inaccuracy or misinterpretation of the map. However there is still potential for more subsurface wall remains along this line, between test trenches 1 and 2 and to the west of Test Trench 2. Any such remains would be impacted upon by the proposed underpass, either directly through the removal of parts of the wall or indirectly while construction work was being carried out in very close proximity.

The possible slipway associated with a floating pontoon identified in Test Trench 2 would be directly impacted upon by construction works associated with the underpass. Due to the delicate nature of the remains (timber, loose flagstones, and poorly preserved mortar) they are very vulnerable to construction works of any kind. Also any additional subsurface continuation of this structure would be directly impacted upon by the development.

The walls encountered during testing were substantial, undisturbed and well built. Based on the results of archaeological testing it is highly likely that further remains associated with the Broadstone Branch of the Royal Canal and Harbour will be encountered in the area during Luas Broombridge construction works. Ground disturbance required to facilitate utility diversion works, track, stop platform and OCS construction works and construction of the proposed cut -and- cover underpass which will require excavations to a maximum depth of 8m, will have a direct impact on any other sub-surface which may exist outwith the Test Trenches.

## 8. MITIGATION RECOMMENDATIONS

In accordance with the policies of the Department of the Environment, Heritage and Local Government (DoEHLG) as provided in the Framework and Principles for the Protection of the Archaeological Heritage (DoEHLG, 1999) which favours the preservation *in situ* of archaeological sites and monuments, it is recommended that, where practical, preservation *in situ* of the subsurface archaeological remains be implemented.

Where this is not practical, an ameliorative strategy will have to be decided upon and implemented by the RPA project archaeologist in consultation with the DoEHLG and in accordance with the National Monuments Acts 1930, and its amendment acts of 1954, 1987 and 1994 and 2004.

In order that preservation *in situ* be maximised, any element of the construction design that has not been finalised should be reviewed with an aim to avoid or incorporate the canal wall as revealed by the test trenching.

- If preservation *in situ* is possible but wall surfaces will be exposed during the construction works the wall will be vulnerable to impact from the works. Measures should be taken to ensure the integrity of the walls are preserved such as a structural assessment of any exposed portions which would dictate whether temporary or permanent supports are required. Where practicable archaeological walls should be covered by sturdy hoarding during construction to protect them form falling debris.
- If any wall faces are to be permanently exposed or incorporated they should assessed for conservation requirements by a conservation specialist.
- If any of the walls or features associated with the canal identified in the test trenching, or depicted on the historic maps, cannot be avoided or incorporated by the construction design, preservation by record will be required. In this case the footprint of all areas proposed for construction works within the vicinity of the canal should be stripped of overburden under archaeological supervision and any archaeological features identified should be fully excavated and recorded. This will need to be to the depth of the proposed subsurface works which in the case of the underpass is 8 m but is less in other areas.
- In the case of walls where preservation *in situ* is not possible a full measured, drawn, written and photographic record will be compiled for sections of the walls that require removal.
- The possible slipway remains in Test Trench 2 would not be suitable for preservation in situ given their fragile nature and it is recommended that these remains be fully exposed, recorded and excavated prior to construction commencing. As the extent of this feature is currently unknown it is recommended that the area for excavation extend at least from Test Trench 1 on the east side to where the edge of the proposed underpass narrows on the west side.
- Any areas outwith the test trenches were there is no known archaeology but where the potential for subsurface archaeology remains high should be monitored by a fully qualified archaeologist for the duration of construction

works. Archaeological monitoring of groundworks is a technique whereby ground disturbance associated with construction is carried out under the direct supervision of an archaeologist. The purpose of this mitigation measure is to identify and protect any subsurface archaeological stratigraphy revealed which can then be preserved (either *in situ* or by record). It is recommended that all monitoring will be carried out under an excavation license so that where any archaeological stratigraphy is encountered it can be dealt with in an appropriate manner. Responses to encountering archaeological remains during archaeological monitoring will firstly seek to preserve the remains in their entirety *in situ* if this is not practical then preservation *in situ* of part of the remains will be sought. Where preservation *in situ* is not possible (either in whole or in part) then steps will be taken to carry out an archaeological excavation of the identified remains in their entirety or in part and to preserve the excavated remains by record.

- Monitoring of works including demolition, removal, storage, relocation/reinstatement, rebuilding, repair and rehabilitation works to upstanding archaeology and cultural heritage monuments will be carried out by a suitably qualified archaeologist and/or conservation architect during the construction phase of the scheme to ensure the appropriate treatment of these features.

The proposed mitigation measures provided above will be further developed and detailed by the RPA project archaeologist in an archaeological strategy for the proposed scheme in consultation with the DoEHLG

*Resources required for mitigation*

As the construction design has not been finalised it is not possible to determine the exact requirements for carrying out the mitigation measures. However it is envisaged that at least the following will be required:

1 Senior Archaeologist

1 Conservation Architect

2 Surveyors

1 licence eligible archaeological director with urban and industrial heritage experience

1 archaeological site supervisor

A team of experience archaeological assistants, depending on the sizes of the areas to be resolved between 5 and 20

There will also be requirements to have experienced logistic and Health and Safety crew on the project at all times.

# 8 REFERENCES

## 8.1 Documentary Sources

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Delaney, R. 1992. *Ireland's Royal Canal 1789-1992*. Lilliput Press, Dublin

Nolan, C. 2001. Off the beaten track. *Inland Waterways News*, Vol. 28, No. 3

Lyons, D. (2010a) *Luas Broombridge Material Assets: Archaeology and Cultural Heritage.* Draft unpublished chapter of Luas Broombridge EIS (Book 1, Chapter 23) prepared by Headland Archaeology (Ireland) Ltd for the Rail Procurement Agency.

Lyons, D. (2010b) *Luas Broombridge Material Assets: Archaeology and Cultural Heritage.* Draft unpublished chapter of Luas Broombridge EIS (Book 2, Chapter 14) prepared by Headland Archaeology (Ireland) Ltd for the Rail Procurement Agency.

## 8.1 Cartographic sources

| Author | Year Drawn | Subject/Title |
|---|---|---|
| Rocque, J. | 1756 | Dublin City |
| Duncan, W. | 1821 | Dublin City |
| Ordnance Survey | 1843 | Dublin City and County |
| Ordnance Survey | 1864 | Dublin City and County |
| Ordnance Survey | 1875 | Dublin City and County |
| MGWR | 1877(a) | Plans and Sections: No. 1 Section of new approach road to Broadstone Station |
| MGWR | 1877(b) | Plans and Sections: No. 4 Filling up Harbour |
| Ordnance Survey | 1911 | Dublin City and County |
| Ordnance Survey | 1925 | Dublin City and County |
| Ordnance Survey | 1948 | Dublin City and County |

## 8.2 Electronic Sources

Dublin City Archives. 2010. WSC/Maps/071. [online] Available at: http://www.dublincity.ie/SiteCollectionDocuments [Accessed 20 April 2010]

Turrell, S. 2004. 1-3 Royal Canal Bank, Dublin, 04E0620. *Database of Irish excavation reports*. [online] Available at: http://www.excavations.ie/Pages/Details.php?Year=&County=Dublin&id=11510 [Accessed 20 April 2010]

## Appendix 1: Context Register

| Context No | Trench No. | Type | Description | Interpretation |
|---|---|---|---|---|
| 001 | Trenches 1-3 | Deposit | Asphalt surface of car park. It measured 0.03m – 0.05m in thickness. | Asphalt surface |
| 002 | Trenches 1-3 | Deposit | Hardcore underlying asphalt surface. It consisted of sub-angular medium to small sized pebbles and stones. Found in all three trenches. It measured 0.20m – 0.35m in thickness. | Hardcore deposit |
| 003 | Trenches 1-3 | Deposit | Firm medium brown clay silt with frequent small to medium sized stone and occasional brick, oyster shell, charcoal and rubble inclusions. Found in all three trenches. Trenches were excavated to a depth of 1.25m. This deposit had a thickness of 0.60m – 1.10m to this depth (1.25m). In Trench 1 it overlay both canal walls (005) and (006). In trench 2 it overlay the possible slipway (007) (008) (009) and deposits (010) and (012). | Imported/infill soil deposit |
| 004 | Trench 1 | Deposit | Firm grey clay with occasional stone inclusions. Underlying (003) and abutting 005 in the southeast end of Trench 1. Within the trench it measured 2m long by 1.55m wide with unknown depth. | Deposit |
| 005 | Trench 1 | Masonry feature | Underlying 003 and abutting 004. This wall did not appear to be disturbed and was situated at a depth of 0.60m below current ground level. It was orientated in a southwest/northeast direction. Within the trench it measured 1.90m wide and spanned the width of the trench (2m). Approximately 0.55m of the wall was exposed to a depth of 1.25m. It clearly continued below this depth and beyond the width of | Southernmost canal wall of the Broadstone Branch of the Royal Canal |

| Context No | Trench No. | Type | Description | Interpretation |
|---|---|---|---|---|
| | | | trench to the east and west. Two separate wall faces were recorded. The northwest facing wall was ashlar built and comprised of large fine cut, roughly hammer dressed square or rectangular blocks of limestone. The mortar between the stones was less than 3mm thick and possibly consisted of firm hydraulic lime mortar. The southeast facing wall comprised of random rubble. Between both wall faces was a core fill that possibly comprised of small calp limestones. | |
| 006 | Trench 1 | Masonry feature | Underlying 003. A second wall (006) was identified approximately 5.30m to the northwest of the first wall (005) and orientated on the same alignment. This wall was not as thick as the first wall (005). It measured 0.75m wide and extended the width of the trench (2m). It was located at a depth of 0.60m below current ground level and approximately 0.70m of the wall was exposed to a depth of 1.25m. It clearly continued below this depth and beyond the width of trench to the east and west. The wall was structurally similar to the larger wall (005). The second wall (006) had a southeast facing wall that was ashlar built and comprised of large fine cut, roughly hammer dressed or punch dressed rectangular blocks of limestone. The mortar between the stones was less than 3mm thick and consisted of possible hydraulic lime mortar. The ashlar wall was backed by a northwest facing wall that comprised of random rubble. It rose above the ashlar wall by about 0.10m. The limestone blocks on this random rubble wall were smaller | Northernmost canal wall of the Broadstone Branch of the Royal Canal. |

| Context No | Trench No. | Type | Description | Interpretation |
|---|---|---|---|---|
| | | | and were mostly square-cut with small angular stones or pinnings inserted between. The mortar on this side of the wall varied in thickness and possibly comprised of hydraulic lime mortar. | |
| 007 | Trench 2 | Wooden feature | Shallow wooden revetment. Three horizontal wooden planks, possibly forming revetment. One plank formed a lower layer while two separate planks placed directly on top, no bonding material, tool marks, joints or fixings identified. This feature abutted 007 and within trench 2 measured 2m long by 0.20 m wide and was 0.25 m deep. | Possible wooden plank revetment associated with possible canal slipway (008 and 009) |
| 008 | Trench 2 | Deposit | Underlying 003 and abutting (007). This mortar was relatively weak and loose and was wet to touch. It was light cream/brown to orange/brown in colour with coarse gravel, small stones aggregates and lumps of lime throughout. The mortar deposit extended the width of the trench (2m) and was approximately 0.20m wide with unknown thickness. | Mortar deposit forming part of possible canal slipway with 009 |
| 009 | Trench 2 | Surface | Underlying 003 and abutting 008. The flagstones comprised of flat sub-angular, sub-square and sub-rectangular limestone that were bonded in a random fashion. They were set into firm brown grey clay (011) and the remains of loose weak wet mortar were identified between the stones. The flagstone surface extended the width of the trench (2m) and gradually sloped into the trench to the north for 1.28m. At this point the surface did not appear to be truncated but had separated and drifted apart into a wet deposit of moderately compact mottled brown | Flagstone surface forming part of possible canal slipway with 008 |

| Context No | Trench No. | Type | Description | Interpretation |
|---|---|---|---|---|
| | | | grey clay silt (012) with inclusions of large stones and occasional flagstones inclusions. | |
| 010 | Trench 2 | Deposit | Loose black organic clay with red brick inclusions was located at the edge of the flagstone surface to the west of the trench. It measured approximately 0.30 m long by 0.25 m wide with unknown depth | Waste deposit |
| 011 | Trench 2 | Deposit | Underlying 009. Firm brown grey clay situated under flagstones | Deposit |
| 012 | Trench 2 | Deposit | Moderately compact mottled brown grey clay silt with inclusions of medium to large stones and occasional flagstones similar to those from surface (009), these were not *in situ* in this deposit. Located at the northern end of trench 2. It measured 1.40 m long by 2.00 wide with unknown depth. It lay directly under the flagstone surface (009). | Deposit |

## Appendix 2: Finds Register

| Find No. | Trench No. | Material | Type | Description | Habitat |
|---|---|---|---|---|---|
| 10E90:003:001 | Trench 1 | Ceramic | Rim sherd | Black glazed red earthen ware, post medieval | Headland Office, Cork |
| 10E90:003:002 | Trench 1 | Ceramic | Body sherd | Black glazed red earthen ware, post medieval | Headland Office, Cork |
| 10E90:003:003 | Trench 1 | Ceramic | Base sherd | Red earthen ware, post medieval | Headland Office, Cork |
| 10E90:003:004 | Trench 1 | Ceramic | Rim sherd with handle | North Devon tempered earthen ware, handle coarsely applied to exterior, dark green glazed interior. Possible bowl | Headland Office, Cork |
| 10E90:003:005 | Trench 1 | Metal | Iron | Heavily corroded metal plate, unknown use. | Headland Office, Cork |
| 10E90:003:006 | Trench 1 | Metal | Iron | Heavily corroded metal fragment, unknown use. | Headland Office, Cork |
| 10E90:003:007 | Trench 1 | Ceramic | Rim sherd | Red earthen ware, post medieval | Headland Office, Cork |
| 10E90:003:008 | Trench 1 | Stone | Masonry fragment | Faced square cut limestone block, roughly punched with drafted margins. It measured 0.35 m long by 0.30 m wide and was 0.25 m deep. | Headland Office, Cork |
| 10E90:003:009 | Trench 1 | Stone | Masonry fragment | Faced square cut limestone block fragment, roughly punched with drafted margins. It measured 0.43 m long by 0.37 m wide and was 0.32 m deep. | Headland Office, Cork |
| 10E90:003:010 | Trench 1 | Stone and Metal | Masonry fragment | Large masonry fragment with Iron bolt. Too heavy to remove from site. | Reburied in Trench 2 |

| Find No. | Trench No. | Material | Type | Description | Habitat |
|---|---|---|---|---|---|
| 10E90:010:001 | Trench 2 | Glass | Bottle | Green glazed base of possible nursery bottle, post medieval | Headland Office, Cork |
| 10E90:010:002 | Trench 2 | Ceramic | Bowl | Fragment of tobacco pipe bowl, post medieval | Headland Office, Cork |

## Appendix 3: Photographic Register

| Photo | Location | Direction Facing | Description |
|---|---|---|---|
| 10E90:001 | Broadstone, Trench 1 | Northwest | Mid-excavation of Trench 1, showing wall (005) |
| 10E90:002 | Broadstone, Trench 1 | Northwest | Mid-excavation working view of Trench 1, |
| 10E90:003 | Broadstone, Trench 1 | Northeast | Mid-excavation working view of Trench 1 and wall (005) |
| 10E90:004 | Broadstone, Trench 2 | Northwest | Mid-excavation of Trench 2 |
| 10E90:005 | Broadstone, Trench 2 | Northwest | Mid-excavation of Trench 2 with Broadstone Railway Terminal |
| 10E90:006 | Broadstone, Trench 2 | Northwest | Mid-excavation of Trench 2 with Broadstone Railway Terminal |
| 10E90:007 | Broadstone, Trench 2 | Northwest | Mid-excavation of Trench 2 with Broadstone Railway Terminal |
| 10E90:008 | Broadstone, Trench 3 | Northwest | Post-excavation of Trench 3, showing deposit (003) and utilities |
| 10E90:009 | Broadstone, Trench 3 | Southeast | Post-excavation of Trench 3, showing deposit (003) and utilities |
| 10E90:010 | Broadstone, Trench 3 | Southwest | Post-excavation of Trench 3, showing deposit (003) and utility (eircom) pipe |
| 10E90:011 | Broadstone, Trench 3 | Southwest | Post-excavation of Trench 3, showing deposit (003) and utility |
| 10E90:012 | Broadstone, Trench 1 | Southeast | Post-excavation of Trench 1 showing possible inner face of wall (005) |
| 10E90:013 | Broadstone, Trench 1 | Southeast | Post-excavation of Trench 1 showing possible inner face of wall (005) |
| 10E90:014 | Broadstone, Trench 1 | Southeast | Post-excavation of Trench 1 showing possible outer face of wall (006) |
| 10E90:015 | Broadstone, Trench 1 | Southwest | Post-excavation of Trench 1 showing wall (006) |
| 10E90:016 | Broadstone, Trench 1 | Southwest | Post-excavation of Trench 1 showing wall (006) |
| 10E90:017 | Broadstone, Trench 1 | Southwest | Post-excavation of Trench 1 showing wall (006) |
| 10E90:018 | Broadstone, Trench 1 | Southwest | Post-excavation of Trench 1 showing wall (006) |
| 10E90:019 | Broadstone, Trench 1 | Southeast | Post-excavation of inner wall face (005) |
| 10E90:020 | Broadstone, Trench 1 | Southeast | Post-excavation of inner wall face (005) |

| Photo | Location | Direction Facing | Description |
|---|---|---|---|
| 10E90:021 | Broadstone, Trench 1 | Northwest | Post-excavation of outer wall face (006) |
| 10E90:022 | Broadstone, Trench 1 | Northeast | Post-excavation overview of wall (005) |
| 10E90:023 | Broadstone, Trench 1 | Northeast | Post-excavation overview of wall (005) |
| 10E90:024 | Broadstone, Trench 1 | Northeast | Post-excavation overview of wall (005) |
| 10E90:025 | Broadstone, Trench 1 | Northwest | Mid-excavation view of Trench 1 |
| 10E90:026 | Broadstone, Trench 2 | Northwest | Mid-excavation view of Trench 2 |
| 10E90:027 | Broadstone, Trench 2 | Northeast | Mid-excavation of (003) within trench 2 |
| 10E90:028 | Broadstone, Trench 2 | Southeast | Mid-excavation of possible slipway |
| 10E90:029 | Broadstone, Trench 2 | Southeast | Mid-excavation of wooden planks associated with slipway |
| 10E90:030 | Broadstone, Trench 2 | Southeast | Mid-excavation of possible slipway |
| 10E90:031 | Broadstone, Trench 2 | North | Pre-excavation of deposit (010) |
| 10E90:032 | Broadstone, Trench 2 | Southwest | Mid-excavation of possible slipway |
| 10E90:033 | Broadstone, Trench 2 | Southwest | Mid-excavation of possible slipway |
| 10E90:034 | Broadstone, Trench 2 | Northeast | Mid-excavation of possible slipway |
| 10E90:035 | Broadstone, Trench 2 | Northeast | Mid-excavation of possible slipway |
| 10E90:036 | Broadstone, Trench 2 | Southeast | Mid-excavation of possible slipway |
| 10E90:037 | Broadstone, Trench 2 | Southeast | Mid-excavation of possible slipway |

## Appendix 4: Drawing Register

| Draw No. | Sheet No. | Type | Scale | Description |
|---|---|---|---|---|
| 1 | 1 | Section | 1:20 | Elevation of ashlar wall (005), Trench 1 |
| 2 | 1 | Section | 1:20 | Elevation of random rubble wall (005), Trench 1 |
| 3 | N/A | Plan | N/A | Penmap ground plan of Trench 1 |
| 4 | N/A | Plan | N/A | Penmap ground plan of Trench 2 |
| 5 | N/A | Plan | N/A | Penmap ground plan of Trench 2 |
| 6 | 2 | Plan | 1.20 | Ground plan of possible slipway |

## Appendix 5: Trench Register

| Trench No. | Location | Trench dimensions | Trench comments |
|---|---|---|---|
| Trench 1 | Broadstone | Length:12 m<br>Width: 2.00 m<br>Max depth: 1.25 m | Northwest-southeast direction. Two limestone walls (005) and (006) and two deposits (003) and (004) were identified in this trench. The walls were orientated in a northeast-southwest direction. An eircom utility pipe was located at an upper level between both walls. Modern overburden hardcore (002) and Asphalt (001) formed the upper layers. |
| Trench 2 | Broadstone | Length:12 m<br>Width: 2.00 m<br>Max depth: 1.25 m | Northwest-southeast direction. A possible slipway was identified within this trench. This comprised of a wooden plank revetment (007), a lime mortar surface (008) and a flagstone surface (009). Two deposits were located to the north of the trench (010) and (012). The flagstones were set into brown grey clay (011). An infill deposit (003) was identified throughout the upper level of the trench. Modern overburden hardcore (002) and Asphalt (001) formed the upper layers. |
| Trench 3 | Broadstone | Length:10 m<br>Width: 2.00 m<br>Max depth: 1.25 m | Northwest-southeast direction. Two metal/iron utility pipes were identified within this trench. One of these was located to the extreme north. This prevented the full excavation of approximately 1 m length of the trench. An infill deposit (003) was identified throughout the upper level of the trench. Modern overburden hardcore (002) and Asphalt (001) formed the upper layers. No archaeological features were identified. |

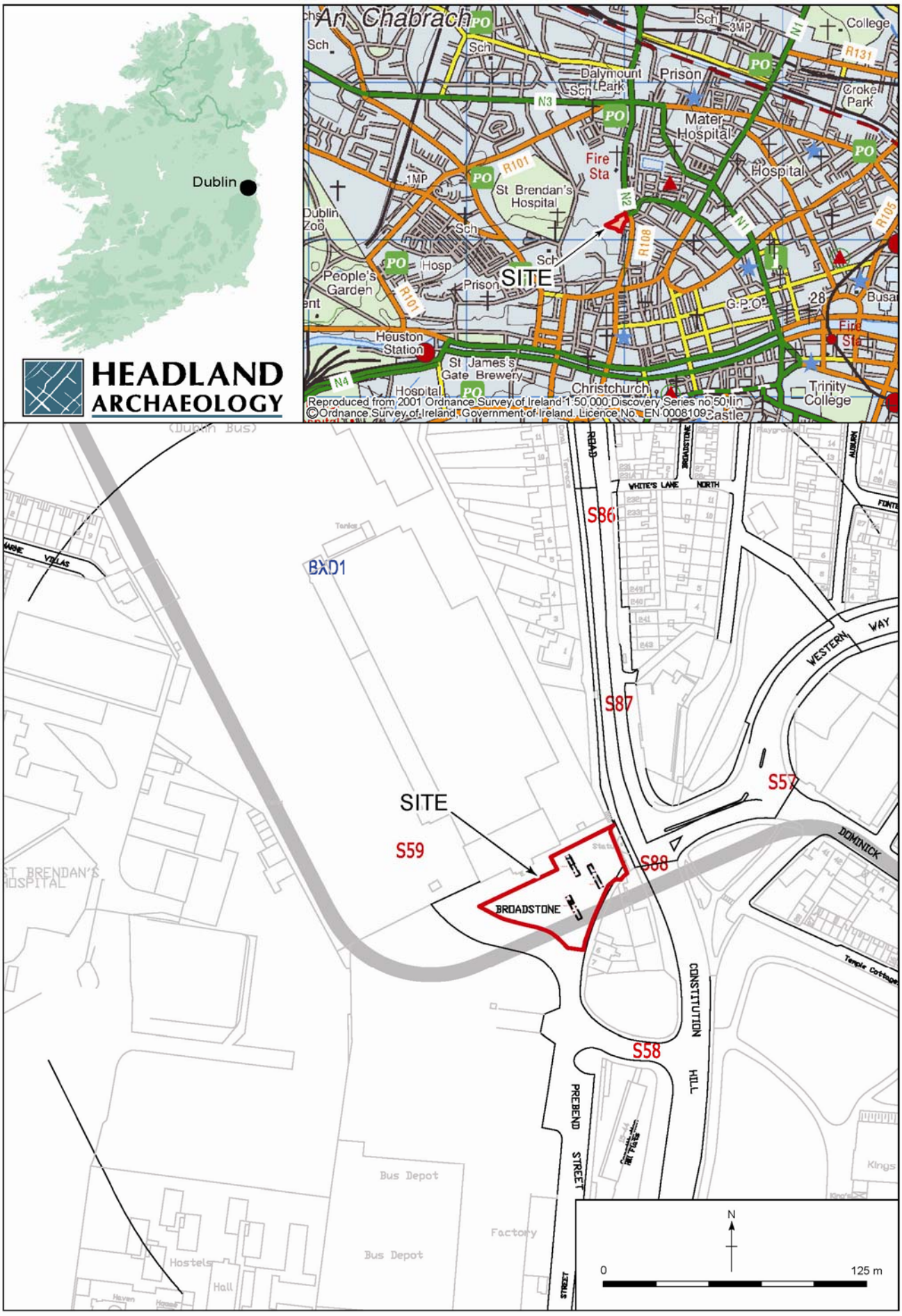



Figure 1 - RPA, Luas Line BXD 710: Broadstone, 10E90, Location Map.

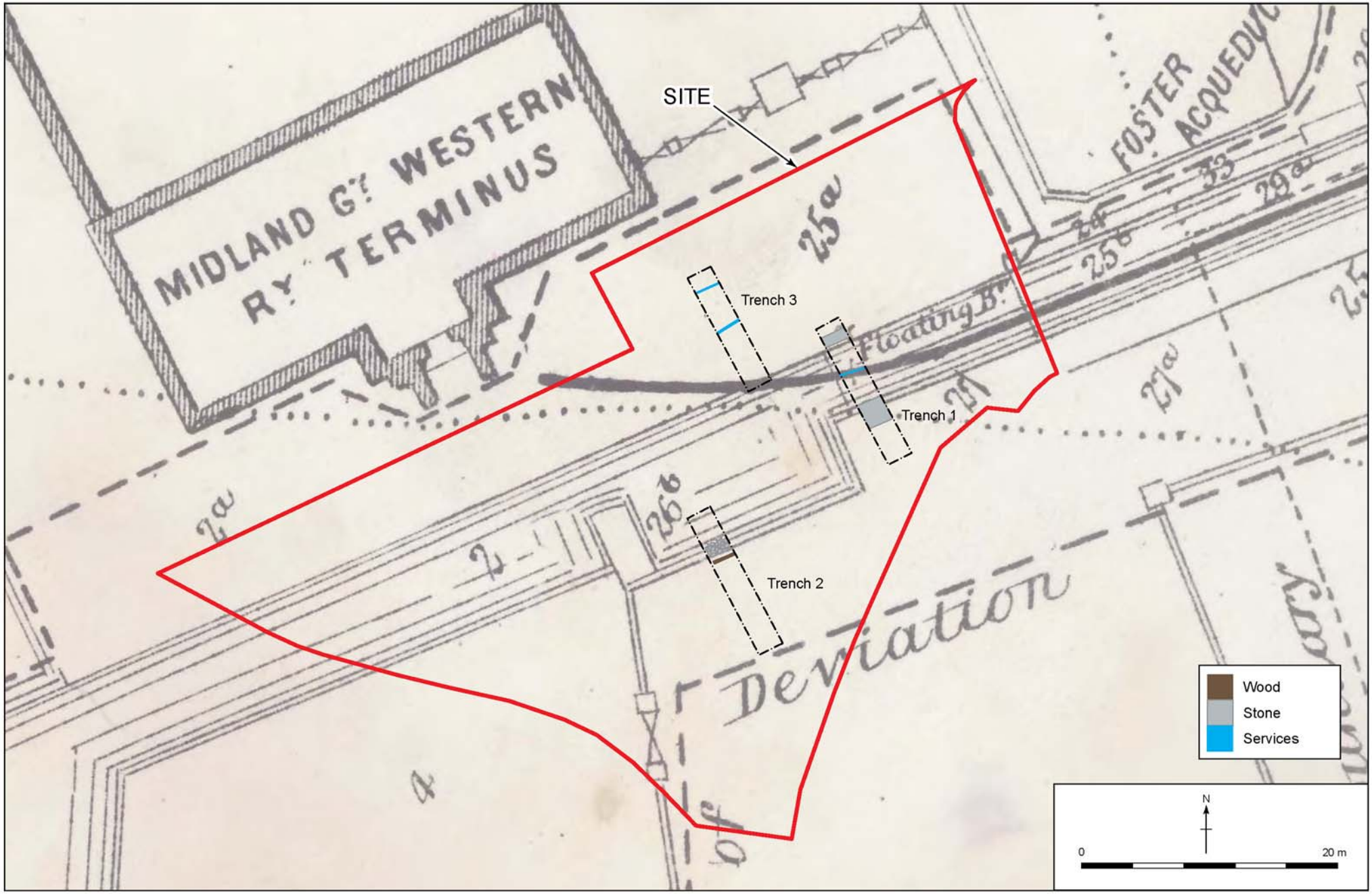
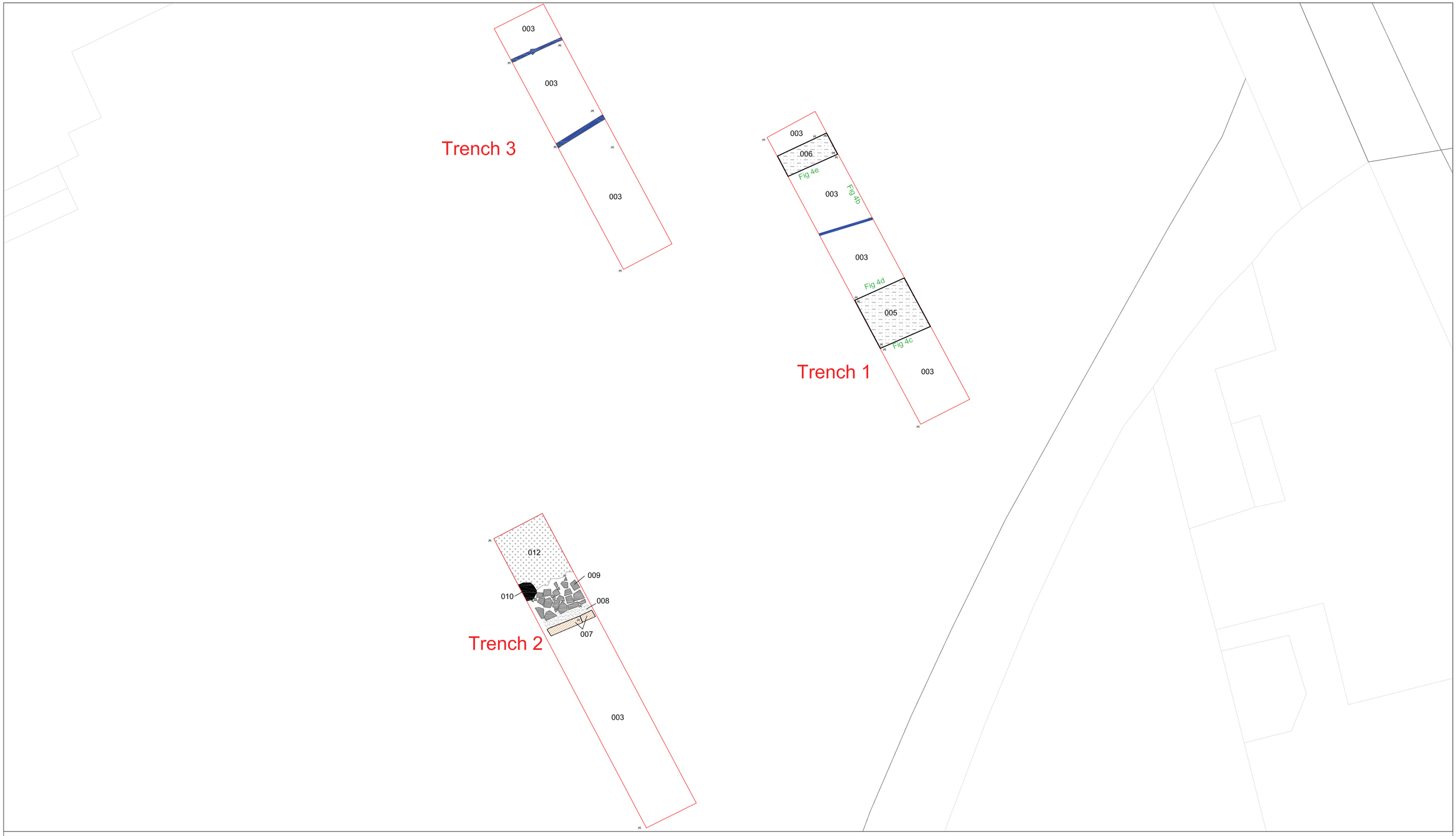



Figure 2 - : RPA, Luas Line BXD 710: Broadstone, 10E90, Trench 1-3 location superimposed on extract from Midland Great Western Railway (MGWR) plan, dating to 1877




LEGEND

Scale: 1:150

North

- Services
- Paving Stones
- Timber
- Wall
- Trench
- Mortar
- Organic Clay
- Silt

HEADLAND ARCHAEOLOGY

| REV | DATE | DESCRIPTION | BY | CHK | APD |
|---|---|---|---|---|---|
| | 28.04.10 | Figure 3 RPA Luas Line BXD 710: Broadstone, 10E90 | BMD | | |



Oifig Bhainistíocht Um Fháil Iarnród
Parkgate Business Centre
Parkgate Street,
Dublin 8, Ireland
Phone +353 1 646 3400
Fax +353 1 646 3401
www.rpa.ie

RPA Railway Procurement Agency

LUAS

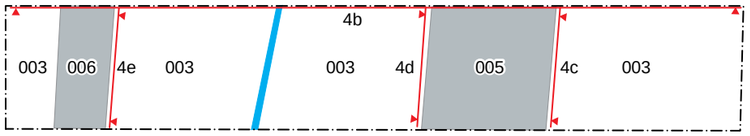
| PREPARED: | DESIGNED BY: | APPROVED BY: |
|---|---|---|
| CHECKED: | CHECKED: | AS BUILT BY: |
| DATE: | SCALES: | SHEET A3 |

| CONTRACT NO | AREA | CHAINAGE |
|---|---|---|
| | | |

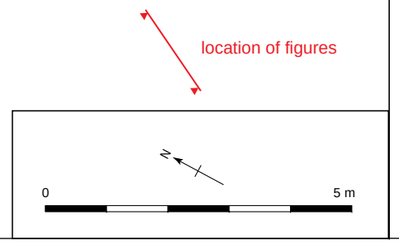
LOCATION: RPA Luas Line BXD 710: Broadstone, 10E90

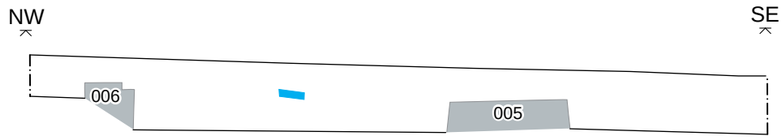
DRAWING TITLE: Figure 3 Trench 1-3, ground plan

| STAGE | LINE | CONTRACT | ELEMENT | DRW NO | DRW REV |
|---|---|---|---|---|---|
| | | | | Figure 3 | |

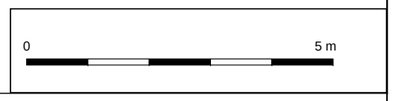


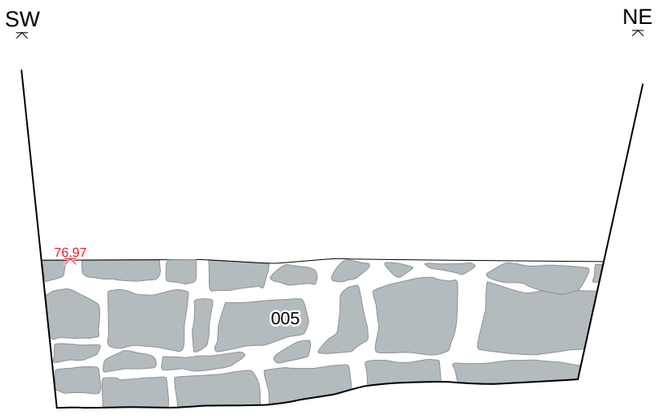

a) Trench 1 ground plan



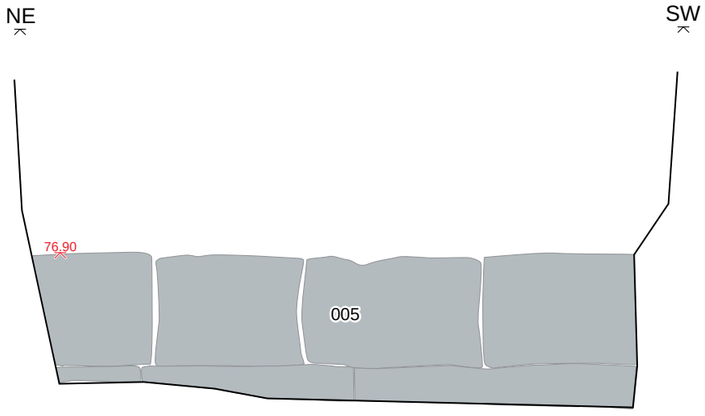




b) Trench 1 profile

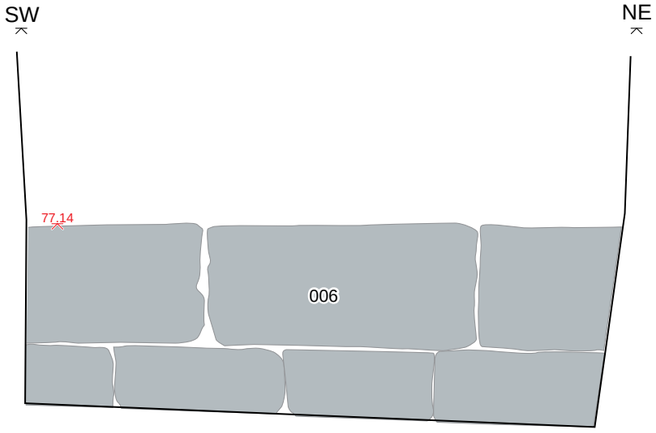



c) Exterior wall elevation of (005)




d) Interior wall elevation of (005)




e) Interior wall elevation of (006)

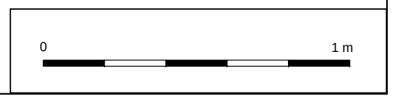




Figure 4 - : RPA, Luas Line BXD 710: Broadstone, 10E90, a) Trench 1, ground plan, b) Trench 1, profile, c) Trench 1, exterior wall elevation of (005), d) Trench 1, interior wall elevation of (005), e) Trench 1, interior wall elevation of (006)

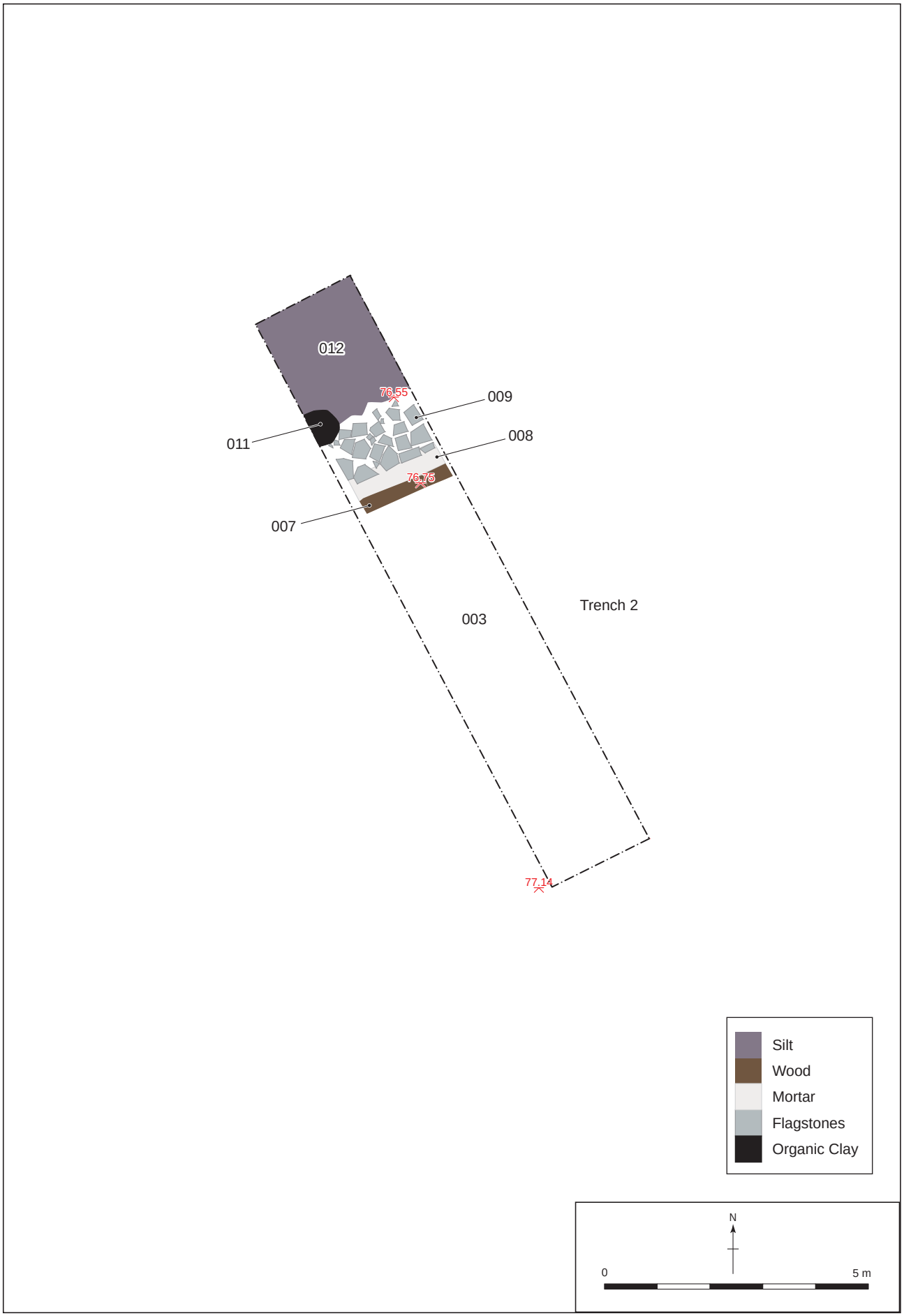



Figure 5 - : RPA, Luas Line BXD 710: Broadstone, 10E90, Trench 2 ground plan with detail of possible slipway

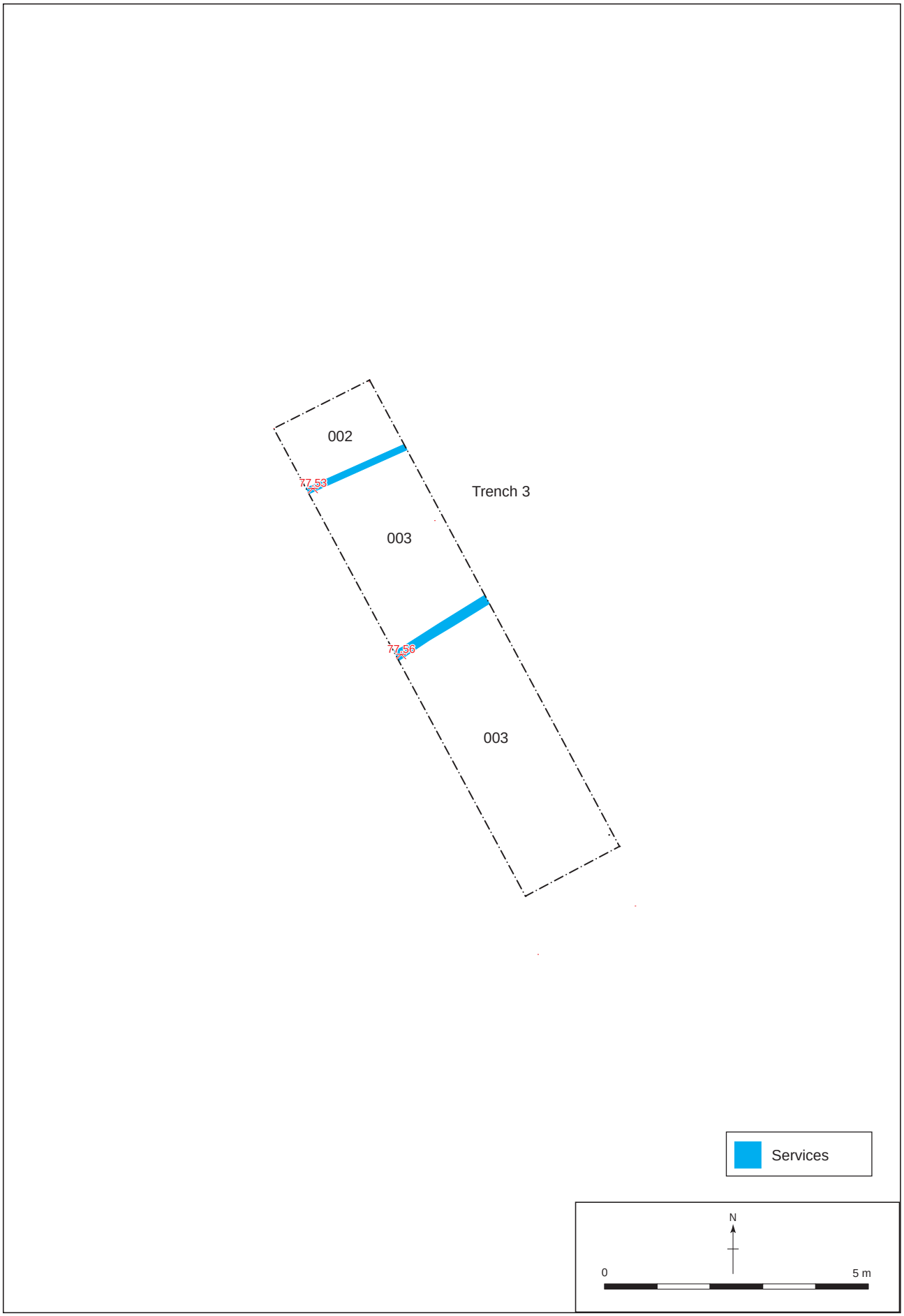



Figure 6 - : RPA, Luas Line BXD 710: Broadstone, 10E90, Trench 3 ground plan with location of utilities

Plate 9 - Mid-excavation ofTrench 2, showing possible slipway, northeast facing

Plate 10 - Mid-excavation of Trench 2, showing possible slipway, southwest facing

Plate 11 - Mid-excavation of Trench 2, showing possible slipway, southeast facing

Plate 12 - Mid-excavation of Trench 3, showing modern utilities, southeast facing

Plate 1 - Mid-excavation of Trench 1, northwest facing

Plate 2 – Mid-excavation of Trench 1, ashlar wall (005), southeast facing

Plate 3 - Mid-excavation of Trench 1, random rubble wall (005), northwest facing

Plate 4 - Mid-excavation of Trench 1, wall (005), northeast facing

Plate 5 – Trench 1, ashlar wall (006), northwest facing

Plate 6 - Trench 1, wall (006), southwest facing

Plate 7 - Mid-excavation of asphalt removal Trench 2, northwest facing

Plate 8 - Mid-excavation of Trench 2 looking towards the former Broadstone station terminal building in the background, northwest facing