Appendix A21.4
Conservation Report

APPENDIX A21.4 – CONSERVATION REPORT

ABSTRACT

Irish Archaeological Consultancy Ltd has prepared this report on behalf of Iarnród Éireann, to study the impact on the bridges of the proposed DART+ West Project between Connolly Station, Dublin 1 and Maynooth, Co. Kildare and at a proposed station at Sheriff Street Upper. The report was undertaken by Rob Goodbody of IAC Ltd.

The DART+ West Project involves the electrification of the railway between Conolly Station and Maynooth, with a branch line leading to a new station at Sheriff Street Upper. The works will include new facilities at Connolly Station including a new access from Preston Street and will also include the provision of a major new depot to the west of Maynooth. The work is to be undertaken along two existing railway lines known as the MGWR line and the GSWR line, as well as incorporating land at Sheriff Street where the former track has been lifted and new track will be laid on a slightly different layout to a new station to be called Spencer Dock Station. The project will also involve a new line of track running to the south of the existing track near the western end of the project to bypass a historic bridge known as Jackson Bridge and to provide access to the new depot.

The MGWR line is the former railway that was constructed by the Midland Great Western Railway Company and for the most part runs alongside the Royal Canal. The section to the west of Glasnevin was laid out in the mid-1840s, while the section to the east was a later development. The GSWR line was laid out between Glasnevin and North Wall in the late 1890s and connected to Connolly Station in 1906. Most of the track affected by the works is currently in use as commuter lines, while also accommodating other rail traffic.

Along the MGWR route most of the roads that cross the line run over the railway on bridges, some of which are original masonry arch bridges. In a few instances roads cross the railway on level crossings. These roads also cross the adjacent canal on bridges, most of which are the original masonry arch bridges built in the 1790s. The necessity to erect overhead line equipment (OHLE) to carry the cables for the electrification creates a problem at many of the original bridges due to the additional space above trains that is needed for the overhead lines. Some of the bridges are concrete beams and these can be raised sufficiently to gain sufficient clearance for the cables. In some cases where there is a masonry arch bridge, it is possible to lower the level of the track to gain the necessary height, while in other cases this is not possible due to constraints such as potential for flooding or the proximity of stations that would have to be rebuilt at a lower level if the track were lowered. In those cases, which will involve four historic bridges along the route, it will be necessary to demolish the arch of the bridge and to construct a new arch at a higher level.

Wherever a bridge crosses over a railway line that is to be electrified it is necessary to ensure that no-one on the bridge can reach the electric cables either directly or with an object such as a rod or stick. In most cases it would be necessary to raise the parapet of the bridge to avoid this scenario, with consequent implications for the appearance of the bridge, particularly if the bridge is of historic significance. In some cases, the problem can be addressed by means of a guard projecting from the side of the bridge just above the cables, though this is not usually a viable solution.

Along the GSWR route the line is elevated except for a small section at the western end, at Glasnevin, where the line descends below ground level and is crossed by a single bridge at Prospect Road. The installation of the overhead line equipment will have a minor effect on the structure of the bridge due to the need to fix the uprights for the cables, though the greater effect will be the on the appearance of the bridge.

There are four level crossings along the route, and it will be necessary to close these for safety reasons and to allow for greater frequency of trains. In most cases a new bridge to carry pedestrians and cyclists will need to be provided and these will be large structures as they need to be high enough to clear the overhead lines and will need ramps on both sides for accessibility and for cyclists. A new road is to be built beneath the railway and canal at Ashtown and new bridges over the canal and railway at Barberstown, to the west of Clonsilla and at Laraghbryan East, to the west of Maynooth.

The new station at Spencer Dock will involve the demolition of part of the seven-span bridge carrying Sheriff Street Upper over the former railway lines leading to the cross-channel station that was operated by the London North Western Railway.

The proposed works will affect structures other than bridges including a series of vaults beneath Connolly Station, which are to be brought into use to provide a new access to the station through Preston Street in order to cater for the expected increase in the number of passengers using the line. This work will involve piercing some of the vaults in order to provide for staircases, lifts and escalators, while other areas of the vaults will be fitted out for retail use and for ancillary purposes.

The provision of the new station at Spencer Dock will require the laying down of new track to access the station and this will necessitate the removal of a signal box that dates from the 1870s.

Further to the west, at Ashtown, the works will require the construction of a new road to pass beneath the Royal Canal and the existing railway line and this will have impacts on the demesne and gateway at Ashton House while also impacting the former millpond and headrace leading to Ashtown Oil Mill. The works may also have an impact on the tail race. Also at Ashtown, it is proposed to erect a bridge for pedestrians and cyclists. While other similar foot and cycle bridges are proposed along the route, the bridge at Ashtown is the only one that would have a direct impact on the Royal Canal, as the proximity of the canal will necessitate the temporary use of the canal bed during the construction of the bridge. It will be necessary to drain part of the canal above and below the 10th lock at Ashtown in order to allow for the construction of the new road and the pedestrian bridge, though the canal will be fully restored on completion of the works.

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1. INTRODUCTION

1.1 General

This appendix examines those bridges along the proposed DART+ West project that are potentially of architectural heritage significance and where there will be a direct impact on the bridge, including the installation of OHLE. It includes all bridges that are protected structures, those that are included in the National Inventory of Architectural Heritage (NIAH) and in the Dublin City Industrial Heritage Record (DCIHR). Some bridges that are not included in those records and inventories are also included to ensure that no bridge of potential heritage significance is excluded. As the route runs close to the Royal Canal along much of its length there are places where bridges over the canal are protected or in the NIAH, while the railway bridge is not protected, or it is not clear whether it is protected. In these cases, the bridge is included in the survey as there is potential for works to the railway bridge to have a direct or indirect impact on the character of the canal bridge. There are other instances where the canal bridge is protected or in the NIAH while there is no railway bridge, the road crossing the railway by means of a level crossing. These canal bridges are also included due to the potential for direct or indirect impact on their character. Finally, there are some cases where neither the railway bridge or the canal bridge is included in the record of protected structures or the NIAH, though the reason for the exclusion is not clear, the bridges being of comparable quality to those that are protected.

While the majority of structures of architectural heritage significance that would be directly affected by the works are bridges, some other structures will be impacted to a greater or lesser degree and are also included in the scope of this appendix. This includes the vaults beneath Connolly Station, a railway signal box and the boundary wall to the demesne of Ashton House, Ashtown. Due to the proximity of the proposed works the gate lodge of Ashton House and the disused Ashtown Mill are also included.

The National Inventory of Architectural Heritage has been carried out on a phased basis since the 1990s and is not yet complete, though all of the DART+ West route has been included by now. The surveys have been carried out by or on behalf of the government department responsible for built heritage, currently the Department of Culture, Heritage and the Gaeltacht. The NIAH surveys assign significance to those structures that are included in the surveys, rating them as being of international, national, regional or local significance. Where a structure has been rated as of regional significance or higher the minister writes to the planning authority requesting that the structure be added to the record of protected structures (RPS). For this reason, any of the bridges examined in this report that are included on the NIAH may become protected structures. While these buildings have no statutory protection unless and until they are added to the RPS their likely future addition should be assumed.

In view of the common origin of the bridges in this study, arising from the construction of a canal and three railway routes, a general historical background to the canal and railways is given, while the section devoted to each bridge or other structure includes a brief history specific to that structure. In each case the report notes whether the bridge or other structure is a protected structure or is included in the NIAH, giving details as relevant. A description is given of each structure, including details of any alterations over time.

1.2 The Development

It is proposed to electrify the commuter rail line between Connolly Station in Amiens Street, Dublin 1, and Maynooth Station, County Kildare. At the eastern end of the project the electrification will include to separate rail lines, one running on the former Great Southern and Western Railway line (GSWR) through Drumcondra Station and the other on the former Midland Great Western Railway line (MGWR) alongside the Royal Canal, the two lines joining to the west of Glasnevin. An additional spur line will run eastward to a new station at Spencer Dock, Sheriff Street, Dublin 1. The works will require the installation of overhead line electrification (OHLE) supports and cables along each of the lines with a consequent need to raise the height of some bridges where there is insufficient headroom to accommodate the cables. In all cases where a road or pedestrian bridge crosses over the railway it will be necessary to provide for raised parapets to ensure that the power lines cannot be reached by any person on the bridge. The works will also require new facilities at Connolly Station to cater for the expected increase in passenger numbers and to this end it is proposed to avail of a series of existing vaults beneath the station to provide for lift and staircase access, entrance and exit routes and some services including toilet accommodation and some retail units. As part of that element of the project it is proposed to upgrade the public realm at Preston Street, where a new access to the station will be provided. At the western end of the project a substantial new railway depot will be provided on farmland between Maynooth and Kilcock.

2. HISTORICAL BACKGROUND

2.1 Royal Canal

While the origin of the Royal Canal is somewhat hazy, it is believed that it may have sprung from a disgruntled director of the Grand Canal who set out to establish his own canal in opposition to his former company. The two routes had been discussed for some years as alternatives, each connecting Dublin with the Shannon, but reaching the river at a considerable distance apart. As it happened, there was no great disadvantage from having the two lines, as their customer bases did not overlap by much. Nonetheless, the Royal Canal was never profitable, and having made mistakes in the original choice of route it cost massively more to construct than the original estimates.[1]

The act of parliament that established the Royal Canal was passed in 1789 and the first stone was laid in the following year by the Lord Lieutenant, the earl of Westmoreland.[2] This took place at the lock at Phibsborough, and the lock and the adjacent bridge were named in his honour. Westmoreland Bridge was later replaced and is now better known as Cross Guns Bridge, as the area was known as Cross Guns long before the canal was constructed. From this beginning, the canal construction proceeded in both directions, and hence the dates on the bridges get gradually later as the route progresses both westwards and eastwards. At Cross Guns the route passed between the small villages of Glasnevin and Phibsborough along one of the routes into the city.

The line of the Royal Canal was chosen so as to reach the terminus at Broadstone. Initially the terminus was to have been at Bolton Street, but the cost of land resulted in a rethink and a redesign. To take the most advantageous route in terms of the topography, and to avoid the built-up areas around the outskirts of the city, the line ran to Cross Guns and shortly afterwards turned southwards to the terminus. The desire to connect with the Liffey led to the circular route to Spencer Dock, just as the Grand Canal was also doing on its line to the south of the city.

From Cross Guns the route ran eastwards, skirting the northern section of the Circular Road around the city, though there was as yet not much building taking place along that road. The canal descended significantly to the east of Cross Guns, and passed under the great north road, where a new bridge was constructed, named Binns Bridge after John Binns, one of the principal promoters of the canal. There was a significant amount of development along what was then known as Drumcondra Lane, and later as Dorset Street, but it was not so much that Thomas Campbell thought it worth including the area on his map of the city, produced in 1811.

The route ran on from Binns Bridge, turning gradually southward, and reaching its next road crossing at the road to Ballybough. Here the ground was also reasonably free of development, and the alignment of the canal caused no problems. The village of Ballybough was of ancient origin, based around the mouth of the Tolka and a reclaimed area of land known as Mud Island. This had always been an impoverished area, as its name, which translates as “Poor town”, suggests, and hence new development did not tend to move in this direction. Where the canal crossed the road to Ballybough the land was relatively low-lying and hence the road had to be ramped up to cross the canal, though with no pre-existing buildings in the vicinity this was not a problem. Clarke Bridge was constructed to carry the road over the canal.

A few years later, as the area developed, new streets sprung up in the vicinity of the canal. Russell Street had been laid out in the opening years of the nineteenth century and in about 1815 it was continued over the canal as Jones Road, at the initiative of Frederick E Jones of Clonliffe, manager of the Theatre Royal. This required the construction of a new bridge over the canal, though this time at Jones’s expense rather than at the expense of the canal company.

The canal swung further south from Clarke Bridge, meeting the North Strand Road, where another bridge was erected, and named Newcomen Bridge after one of the directors of the canal. There were problems in the construction of this bridge and a collapse during construction led to the deaths of several of the workers. As

[1] Delany and Bath, pp. 34, 27-30.
[2] *An Act for the Promotion and Encouragement of Inland Navigation*, 29 Geo III c.33.

with Clarke Bridge, North Strand Road had to be ramped up to cross the canal due to the difficulties with levels, but again the land was relatively clear of buildings and the process was relatively simple.

The time elapsed between the laying of the first stone at Cross Guns in 1790 and the construction of Newcomen Bridge had been five years. It was a great deal longer before the canal was complete, however, and it was never a financial success. Nonetheless, it remained open. It was bought out by the Midland Great Western Railway Company in the 1840s with a view to closing the canal and using the alignment as the basis for the railway line to Mullingar and beyond. The Board of Trade forbid the closure of the canal, however, and the railway company had to fall back on constructing its railway alongside the canal. The Broadstone branch of the canal was closed in the early twentieth century and was backfilled in 1929.[3] The circular route to the Liffey remained navigable until the 1950s, by which time it was in public ownership, but it was closed in 1961. Over the past forty years it has gradually been brought back into a usable condition and is now navigable again.

There were lock-keepers' cottages all along the route originally, one at each lock. Over the years most of these have disappeared within the Dublin city area, though one survives at North Strand on the spur of land between the Royal Canal and the railway cutting. The cottage came close to being destroyed in the bombing of the North Strand during the Second World War, when bombs landed very close to it. The cottage was repairable, however, and remains in reasonable condition, though with its windows closed with steel roller shutters.

2.2 Midland Great Western Railway Company

As noted above, the Midland Great Western Railway Company (MGWR)was established with a view to acquiring the Royal Canal, closing it, and laying a railway line along its route. When this was not permitted by the Board of Trade the company modified its plans to a proposal that would see the railway built alongside the canal. The act of parliament that permitted the establishment of the company, and which gave it the powers to build the railway, was passed in July 1845 and gave the company power to build a railway to Mullingar and Longford and also to acquire the Royal Canal. Tenders for the construction of the railway were sought in November 1845 and the first sod was turned on 12th January 1846.[4]

The new railway's terminus at the Dublin end was to be at the Royal Canal terminus at Broadstone, though it needed a new route from that terminus, as the canal turned a right angle at Phibsborough, which could not be done with a railway. From Broombridge, however, the line ran alongside the canal, except for a few minor digressions, throughout the route covered in this study, to Maynooth and beyond. Because of the proximity of the railway to the canal, roads crossing canal bridges had to be accommodated in crossing the railway and this frequently meant building new bridges that were close to canal bridges or, in many cases, effectively added a second arch to the bridge.

In 1859 the MGWR obtained an act of parliament to allow it to construct a branch line running off its main line near Broombridge Road, at a junction that was to become known as Liffey Junction and running to North Wall. The purpose of this branch was primarily the carriage of goods traffic, including cattle for export. The new line opened to North Wall in 1864 and as with the original line, it ran alongside the Royal Canal, its eastern end running alongside the final section of the canal that would later become Spencer Dock and with a goods station close to the River Liffey on the site now occupied by the Convention Centre.[5]

In 1924 the MGWR amalgamated with the Great Southern and Western Railway Company (GSWR) and the Cork, Bandon and South Coast Railway to form a new company, Great Southern Railways (GSR). This new company began to gradually reduce the MGWR lines to single track, with the section between Clonsilla and Ballinasloe being singled between 1928 and 1931.[6]

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[3] *Irish Times,* 24th September 1929.
[4] Shepherd, p. 9.
[5] Shepherd, p. 36.
[6] Shepherd, pp. 64-65.

The MGWR line between Broadstone and Liffey Junction closed to passengers in 1937, closed to all traffic in 1961 and the track was lifted in 1977.[7] The route has since been incorporated in the Green Line Luas between Broadstone and Broombridge, with its terminus adjacent to the railway at Broombridge.

2.3 Dublin and Meath Railway

The railway lines between the major towns and cities in Ireland were generally operational by the end of the 1840s, but the emergence of new railway companies continued, each planning connections to the more populous towns and districts that were not yet served by the railway system. Other companies aimed to provide lines to areas already on the railway system, but which might benefit from more efficient or more direct routes. One such case was the Dublin and Meath Railway Company, which was incorporated by act of parliament in 1858 with the intention of building a direct line between Dublin and Navan with a branch to Trim and Athboy. This was opposed by the Midland Great Western Railway, which owned the line between Dublin and Clonsilla that would be used as part of the route, and the Dublin and Drogheda Railway Company, which already ran a service to Navan, as a branch off its line from Dublin to Drogheda. Parliament agreed to the construction of this line, from Clonsilla to Navan, provided the new company also ran trains to Kells, which would involve using the track belonging to the Dublin and Drogheda company.[8]

Work began on the construction of the line in October 1858 and the railway between Clonsilla and Navan opened in August 1862.[9] However, the company did not last long, and it was taken over by the MGWR in 1869.[10] Passenger services were discontinued in 1947 following the establishment of CIÉ as the state transportation body, while the ending goods services brought the line to a close in 1963.[11] The line was subsequently refurbished and reopened in 2010 as far as Dunboyne and subsequently to the M3 Parkway.[12]

2.4 Great Southern and Western Railway

The Great Southern and Western Railway was established in 1842 to build a railway between Dublin and Cashel, subsequently running to Cork, adopting its name in 1843. Ultimately this became the largest railway company in Ireland with more than 1,800 kilometres of railway lines.[13]

In the late 1870s the GSWR decided to make a connection from its Dublin to Cork line to the port area at North Wall. This involved crossing the River Liffey and constructing a tunnel beneath Phoenix Park to connect with the MGWR line at Glasnevin. From there to North Wall the company made use of the MGWR line, for which it paid a significant fee. At West Road the GSWR constructed a junction, with a new line running eastward to another junction at Church Road and the construction was completed in 1877.[14]

This project was backed by the London and North Western Railway (LNWR), which ran steamships between North Wall and Britain, with a passenger station and a hotel adjacent to North Wall Quay. As part of the construction of the GSWR line to North Wall the LNWR was enabled to take a spur line from this to its station at North Wall, immediately to the east of the MGWR goods station on the eastern side of Spencer Dock.[15] The MGWR line had involved the construction of new bridges on Sheriff Street over the Royal Canal and the railway branch, and a further new bridge was built to the east of this to facilitate the LNWR connection to its North Wall station.

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[7] Johnson, p. 87.
[8] Shepherd, p. 49.
[9] Johnson, p. 92.
[10] Mulligan, p. 80.
[11] Johnson, p. 92.
[12] *Meath Chronicle,* 10th April 2010.
[13] Murray and McNeill, p. 11.
[14] Johnson, p. 125-126.
[15] Murray and McNeill, pp. 49-50.

In 1886 the GSWR opened a new line leading from the Church Road junction to a new goods depot adjacent to East Wall Road – the building now converted to the 3 Arena.[16]

In 1894 an act of parliament was passed to provide for the construction of a new suburban route from Glasnevin, through Drumcondra, to North Wall. This railway, known as the Drumcondra and North Dublin Link Railway, though the backers could not raise the necessary finance and the project was abandoned. Construction proceeded, however, following the transfer to the GSWR of the powers to construct the line.[17] Construction began in late 1897 and the line opened to Church Road junction at North Wall in 1901. This Drumcondra Line was connected to the Loop Line at Connolly Station in 1906 by a spur that left the original line at North Strand Road and curved southward, crossing Oriel Street and the Royal Canal to join the Loop Line platforms at Connolly Station.[18]

2.5 Loop Line

The Loop Line railway, as commonly known, linked the terminus of the Dublin Wicklow and Wexford Railway at Westland Row, now Pearse Station, with the Great Northern Railway terminus at Amiens Street, now Connolly Station. The formal title of the line was the City of Dublin Junction Railway, and this was one of a number of projects that aimed to provide connections between the various lines run by different companies in the Dublin area.

A primary reason for the line was to connect the mail port at Kingstown, now Dun Laoghaire, with the trunk railway lines to Belfast, Galway, Cork and other destinations for both passengers and mails, though there were other advantages to be gained from the connectivity. The necessary act of parliament was passed in 1884 providing for two railways, the first of which would connect the station at Westland Row with that at Amiens Street, while the second would run from there to link into the MGWR line by crossing the Royal Canal just to the east of Newcomen Bridge. The Dublin Port and Docks Board refused to allow the railway to cross the Liffey to the east of the Custom House and the route selected ran to the west, looping around the Custom House to a new station added on the north-western side of the existing station at Amiens Street.[19]

The first of the two lines, connecting Westland Row with Amiens Street was completed in 1891. However, the second section was opposed by the MGWR as the company had never backed the plan for the City of Dublin Junction Railway. After lengthy disputes and arbitration, referred to at the time as the Battle of Newcomen, the MGWR reluctantly agreed not to obstruct the project any further and the line opened in May 1891.[20]

[16] Johnson, p. 125.
[17] Murray and McNeill, p. 75.
[18] Johnson, p. 125.
[19] Shepherd and Beesley, pp. 41-42.
[20] Shepherd, pp. 37-39.

3. OSSORY ROAD BRIDGES (OBD227, 227A AND 227B)

Built heritage reference in EIAR: BH-67

ITM grid reference: 717005, 735323

3.1 Historical Summary

When the Royal Canal was constructed its Liffey branch included a dock near the southern end, between Sheriff Street and North Wall, with a sea lock to allow boats to enter the Liffey from the canal and vice versa. Between this dock and Newcomen Bridge the canal was wider than in most parts of the canal but was without quays or docking facilities. Due to the limited capacity of the dock for loading and unloading, together with a desire to make the canal dock available for shipping coasters the quays and docking facilities were extended northward along the canal in 1873 and named Spencer Dock.[21]

The first passenger railway in Ireland was opened between Dublin and Dun Laoghaire, then called Kingstown, in 1834, though this was a relatively short line. The construction of railways over longer distances commenced in the 1840s and this included the Dublin and Drogheda Railway. Work had begun on this line in 1838 but paused for two years before getting under way in earnest in 1840. The line opened in 1844 with a temporary terminus, following which the present terminus was built at Amiens Street. [22] The railway was later extended to Belfast and was taken over by the Great Northern Railway. As part of the upgrading of the Dublin suburban railway system a new single-track bridge was constructed over the Royal Canal and its adjacent land in 1981.

From 1840 the engineer responsible for the Dublin and Drogheda Railway was John MacNeill. To carry the railway over the broad expanse of the Royal Canal and the low-lying land on either side of it MacNeill opted for masonry-arch bridges at either end, between which were iron-latticed girders spanning forty metres, which was the largest span of this type in the world at the time of construction. These girders were suited to the trains of the 1840s, but as locomotives got larger and heavier and were able to pull larger loads the bearing capacity of the trusses became insufficient over this span and an intermediate pier was constructed in the canal in 1862. The original girders were replaced in 1912.[23]

In 1894 a proposal for a railway to be known as the Drumcondra and North Dublin Link Railway was authorised by parliament. The powers to construct this railway were transferred to the Great Southern and Western Railway Company and work commenced in 1897. The line opened in 1901, running between the company's existing line at Glasnevin and freight yards at North Wall. This was of use for carrying cattle to the cross-channel ships at North Wall and in 1906 an additional branch opened to carry the line to Amiens Street Station – now Connolly Station. This section of the line necessitated the construction of a new bridge to span the Royal Canal and the low-lying land at Ossory Road and to the south.[24]

3.2 Conservation Status

The railway bridges are not included in the record of protected structures.

The National Inventory of Architectural Heritage has included these bridges under reference 50060481; they have been assigned a Regional significance for their technical, architectural, historical and social interest. The description of the bridges reads:

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[21] Delany and Bath, p. 192.
[22] Mulligan, pp. 86-87.
[23] Cox et al, p. 119.
[24] Murray et al, pp. 75-76.

Two railway bridges, eastern carrying Dublin and Drogheda Railway, built 1842, and western carrying Great Southern and Western Railway (and now, the DART line) built 1903, both spanning Ossory Road and Liffey Line of Midland Great Western Railway and Royal Canal.

The bridges built for the Dublin and Drogheda Railway and for the Great Southern and Western Railway are included in the Dublin City Industrial Heritage Record, while the later concrete bridge is not included.

3.3 Survey

Figure 1 Railway bridges at Ossory Road

Three railway bridges cross the Royal Canal and the Midland Great Western Railway's Liffey line. The three bridges have twelve spans between them including masonry arches, steel trusses and concrete beams.

In this survey the three bridges are considered in turn from east to west, while each bridge is examined from north to south.

Figure 2 Western side railway bridges seen from the south

Figure 3 Concrete bridge at Royal Canal

The concrete bridge crosses the valley in a number of stages, with the concrete beams resting on a series of mass concrete piers. These include a pier on each side of the Midland Great Western Railway's Liffey line and another pier in the canal, lined up with the pre-existing pier from the central bridge on the Great Northern line.

Figure 4 Concrete bridge crossing Ossory Road

The span of the bridge that crosses Ossory Road is a skew bridge, as it spans a bend in the roadway such that the northern abutment of the bridge is not at right angles to the span of the bridge.

Figure 5 Northern abutment of concrete bridge

The northern abutment of the concrete bridge is constructed with rock-faced limestone ashlar at the base of which is a semicircular arch. This abutment is clearly a remnant of some earlier structure on the site. The 1889 Ordnance Survey map shows a railway siding terminating at this point, while no siding was depicted on the 1864 map. The deck of the concrete bridge is a series of concrete beams seen overhead in the figures above and below. The figure below shows the northern arch of the 1840s bridge, seen from within the span of the concrete bridge at Ossory Road.

Figure 6 Northern arch of 1840s bridge at Ossory Road

Figure 7 Northern arch of 1840s bridge at Ossory Road

The bridge built for the Dublin and Drogheda Railway in the 1840s crosses Ossory Road via a masonry arch. This section of the bridge is constructed of limestone. The chamfered limestone voussoirs extend out into the spandrels of the bridge, terminating at a string course that crosses just above the crown of the arch. Above this the stonework is quite different and is constructed of coursed limestone rubble capped with mass concrete. In the barrel of the arch the abutment is faced with large blocks of rock-faced ashlar, above which the arch is faced with channelled limestone ashlar.

Figure 8 Detail of spandrel and barrel of arch

Figure 9 Pier of bridge in canal

The steel deck of the 1840s bridge is supported on two piers, one set in the canal and the other on the bank of the canal adjacent to the Midland Great Western Railway's Liffey line. The piers are constructed with coursed limestone in relatively slender blocks. The piers themselves are slender, having to contend with little more than dead weight as the canal has no appreciable current, in contrast to a river bridge and hence there is little chance of scour. The ends of the piers were battered, with cutwaters at the base, though the cutwater at the eastern end of the canal pier has been removed to facilitate the construction of the concrete bridge.

Figure 10 Pier of bridge in canal

Figure 11 Beam of bridge

The spans of the steel bridge are constructed with deep steel beams at either side that carry cross beams supporting the permanent way. The lateral beams are plate girders, fabricated with a series of plates and angled pieces.

Figure 12 Detail of beam in bridge span

Figure 13 Southern abutment of steel spans

The steel bridge is supported at each end by a substantial abutment faced with channelled rock-faced limestone ashlar. At each side of the railway a pier of squared limestone rubble rises from the abutment. These abutments also carry the thrust of the masonry-arches that form the northern and southern spans of the railway bridge.

Figure 14 Barrel of masonry arch at southern end of bridge

The masonry arch at the southern end of the 1840s railway bridge is similar to that at the northern end, with the barrel of the arch faced with channelled limestone ashlar.

Figure 15 Southern arch of 1840s bridge

The southern arch of the 1840s bridge is similar to that seen to the north. The arch is elliptical and with a low ratio of rise to span. The voussoirs run out into the spandrels and terminate at a heavy string course above the crown of the arch ring. Above this is a parapet of squared limestone rubble. The parapet is capped with concrete. At the southern end of this arch on the western side a broad pier projects from the abutment and is constructed of rock-faced limestone ashlar.

Figure 16 Eastern side of arch

Figure 17 Northern span of Drumcondra line

The bridge that was built for the Drumcondra and North Dublin Line crosses Ossory Road with a steel beam bridge. This bridge is supported at each end with an abutment of rock-faced limestone ashlar with a string course marking the top of the abutment and above which a pier of rock-faced granite rises on either side of the railway.

Figure 18 Abutment of bridge beneath deck

In the figure above the steel cross beams can be seen as they run between the lateral beams that carry the load.

Figure 19 Abutments of railway bridges

The abutments of the Dublin and Drogheda line and the Drumcondra line are seen in the figure above where they stand to the north of the Midland Great Western Liffey line. Both abutments are constructed with rock-faced limestone ashlar.

Figure 20 Steel span of bridge

The span of the Drumcondra line that crosses the Midland Great Western line and part of the canal is seen in the above figure. This is a Pratt truss with a mix of vertical and diagonal members, the diagonal pieces sloping towards the centre of the span. There are crosses near the centre to assist in carrying the live load.

Figure 21 Abutment at southern end of bridge

At the southern end of the bridge there is an abutment of rock-faced limestone similar to that seen adjacent to the Midland Great Western Liffey line. This marks the northern end of a series of brick arches that support the railway on its route from here to Connolly Station. The figure below shows the part of the abutment that runs beneath the bridge deck.

Figure 22 Abutment at southern end of bridge

Figure 23 Detail of cast-iron pier

The two spans of the steel bridge meet in the canal where they are supported on a pair of cast-iron piers set into the bed of the canal. These piers are aligned with the adjacent earlier pier from the Dublin and Drogheda line.

Figure 24 Cast-iron piers in Royal Canal

3.4 Analysis

The concrete bridge is not of heritage significance. It is dominated by the other two bridges and is less prominent in the local landscape.

The central of the three bridges is the most significant of the three, having a historical back story that is of significance. As noted in the historical summary above, the original wrought-iron lattice girder bridge was the longest of its type in the world when first built, though its designer did not anticipate the increased loads that would need to be carried within a relatively short time. Nonetheless, he was knighted on the occasion of the opening of the railway. Although the construction of a pier in the canal reduced the span to half its original length the original lattice girder lasted only seventy years before it was replaced with the present steel deck. This deck is of much lesser significance than the earlier wrought iron deck. In effect, the only parts of this bridge that survive from the original bridge designed by Sir John MacNeill are the two masonry arches at the northern and southern ends of the bridge.

The westernmost of the three bridges is the one that was built early in the twentieth century to carry the Drumcondra and North Dublin Link Line. This bridge dominates the other two, more or less hiding them from view from the west, which is the most important angle from which they are seen. Apart from being the westernmost of the three, the substantial Pratt trusses obstruct any view of the central bridge from the west.

As was noted above, none of these three bridges is included in the record of protected structures. The two steel-decked bridges are included in the National Inventory of Architectural Heritage (NIAH) where they are rated as being of Regional significance for their architectural, historical, social and technical interest. The descriptions of the bridges in the NIAH does not take account of the later modifications to the 1840s bridge and the replacement of the deck.

3.5 Predicted Impacts

Predicted direct construction impacts:

None

Predicted indirect construction impacts:

None

Predicted operational impacts:

None

3.6 Mitigation

No mitigation required.

4. NEWCOMEN BRIDGE (OBD226, 226A AND OBD233A)

Built heritage reference in EIAR: BH-72 and BH-73

ITM grid reference: 716876, 735474

4.1 Historical Summary

As the construction of the Royal Canal moved along the northern outskirts of Dublin city towards the Liffey, a bridge was constructed to carry North Strand Road over the canal and the bridge was named Newcomen Bridge in honour of Sir William Gleadowe Newcomen, proprietor of Newcomen's Bank and director of the Royal Canal Company.

The first lock on the canal, other than the sea lock near the Liffey, was located to the east of North Strand Road and this meant that Newcomen Bridge crossed the canal at the upper end of the lock and had to climb up to ensure that there was sufficient clearance for canal boats.

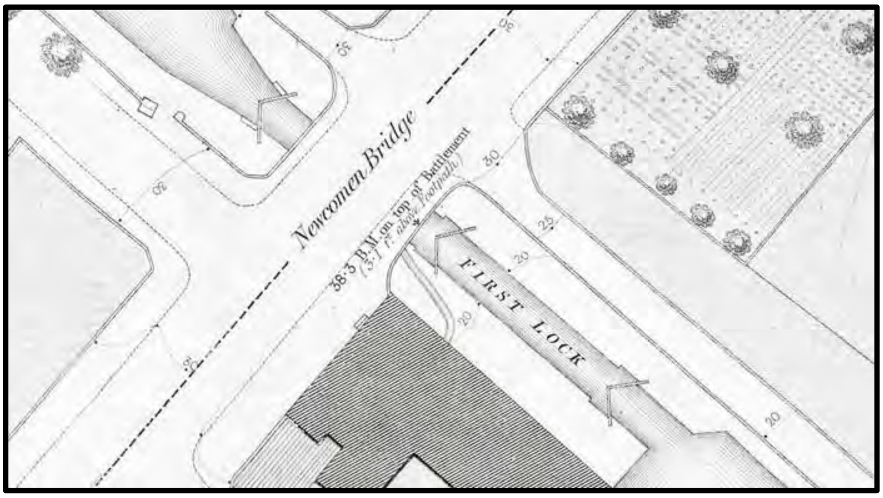

Figure 25 Ordnance Survey map of 1847 showing Newcomen Bridge

The large-scale Ordnance Survey map published in 1847 shows the first lock as a double lock with Newcomen Bridge straddling the upper chamber. The rise in the road required to achieve this clearance was significant and in 1797, two years after the bridge was completed, the Commissioners for Wide and Convenient Streets drew up a proposal to commence the ramps leading to the bridge from further back in order to reduce the gradient approaching the bridge, at the expense of a longer, but shallower climb.[25] The surveyor Thomas Sherrard produced three drawings showing sections of the bridge and its approach ramps, all dated 1797 after the bridge was complete, and while two of them show the bridge as having a segmental arch, one shows it as semicircular.[26]

Despite the regrading of the approach ramps the bridge continued to present problems due to the gradients. The spot height and benchmark data shown on the 1847 map suggest that there was a gradient of 1 in 10 onto the bridge.

It was not until 1872 that matters became serious enough for action to be taken and this was spurred by the construction of a railway junction, with a new line leading off from Newcomen Bridge towards Sheriff Street. The works were significant, including the relocation of the canal lock further to the west, on the opposite side of the bridge, which allowed the road bridge over the canal to be rebuilt at a lower level. The city council passed

[25] Sherrard, Thomas, 1797, *A Section of Newcomen Bridge on the Royal Canal showing the present line of improvement by reducing the ascent one foot in 25 feet,* Dublin City Library and Archive reference WSC/Maps/66.
[26] Sherrard, Thomas, 1797, *Section of the Canal Bridge on the North Strand,* Dublin City Library and Archive reference WSC/Maps/265.

a motion to allow for the construction of a temporary footbridge across the canal to ensure that local people were not cut off from the city during the works.[27]

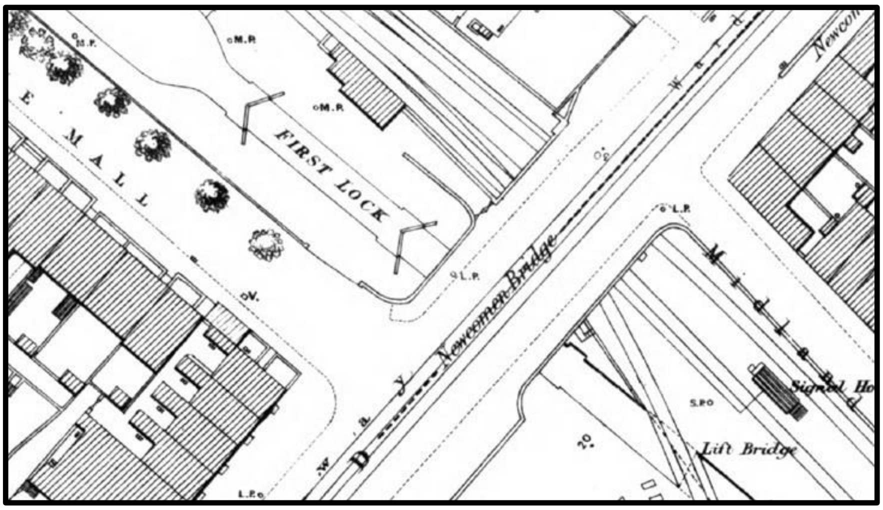

Figure 26 Ordnance Survey map of 1889 showing canal lock relocated

The Ordnance Survey's map of 1889 shows Newcomen Bridge in its new form with the canal lock relocated to the western side of the bridge. The railway is also shown on this map, with the new branch crossing the canal to run to Sheriff Street and Guild Street. The earlier Ordnance Survey map of 1864 had shown the line running along the northern bank of the canal, but without the branch.

4.2 Conservation Status

Newcomen Bridge is a protected structure and is included in the record of protected structures for Dublin city under reference 911. The address is given as "Bridges: Royal Canal, Dublin 3" and the description is "Newcomen Bridge, North Strand".

The National Inventory of Architectural Heritage has included Newcomen Bridge under reference 50010063; it has been assigned a Regional significance for its architectural, technical and social interest. The description of the bridges reads:

> Granite canal bridge, built c.1790, carrying North Strand Road over Royal Canal, lowered and altered c.1873.

Both the canal bridge and the railway bridge are included in the Dublin City Industrial Heritage Record.

[27] *Freeman's Journal,* 22nd June 1872, p. 8.

4.3 Survey

Figure 27 Newcomen Bridge and railway bridge seen from the east

The view of the eastern side of Newcomen Bridge and the adjacent railway bridge has been occluded since 2017 when a pedestrian bridge was erected parallel to the bridges on the eastern side, at a relatively close distance. For this reason some of the figures included below were taken in 2015 prior to the erection of the pedestrian bridge.

Figure 28 View of Newcomen Bridge and railway bridge in 2015

The two bridges are adjacent within a broad levelled area beneath street level. The bridges have services attached on the eastern side, obstructing part of the view of the bridges on this side. In the figure above the view of Newcomen Bridge is further obstructed by the lift mechanism for a lifting bridge that allows a railway track crossing the canal to be raised to facilitate the passage of canal traffic.

Figure 29 Western face of Newcomen Bridge

Newcomen Bridge is unusual among the bridges on the Royal Canal in having three arches, two of which are pointed segmental arches. The central arch spans the canal and is a segmental arch with a classical archivolt for an arch ring, with a vermiculated keystone. The side arches were originally pedestrian arches but are now blocked off; they have similar archivolts despite the gothic rather than classical form of the arch. The bridge faces, including the spandrels, parapets and wing walls, are of fine granite ashlar without string courses.

Figure 30 Eastern face of Newcomen Bridge, 2015

Figure 31 Ramp to north of Royal Canal

On the western side of Newcomen Bridge there is a canal lock and a lock keeper's cottage, and access is gained to this via a ramp that leads down to the north of the bridge. The granite ashlar masonry of the bridge and its wing wall gives way at an awkward junction to a limestone rubble retaining wall at the edge of the access ramp. The ramp is sufficiently wide to allow for vehicles to approach the cottage and on the northern side of the ramp the wall is the parapet of the retaining wall on the southern side of the railway cutting. In the figure below the ramp is seen, with the wall of the canal to the left and the retaining wall of the railway cutting on the right and the pier at the end of the parapet of the railway bridge at far right.

Figure 32 Ramp to canal lock and lock keeper's cottage

Figure 33 Plaque on western side of canal bridge

On each side of the canal bridge there is a plaque set into the parapet over the centre of the canal. The plaques are of a fine-grained, pale limestone, probably Portland stone. Both plaques are badly weathered and difficult to read, but they appear to give the date, 1795, with the name Newcomen Bridge. The erosion of the surface makes it impossible to see whether the name of the canal engineer, Richard Evans, is included at the bottom of the inscription, as it is on similar plaques elsewhere along the route of the canal.

Figure 34 Plaque on eastern side of canal bridge

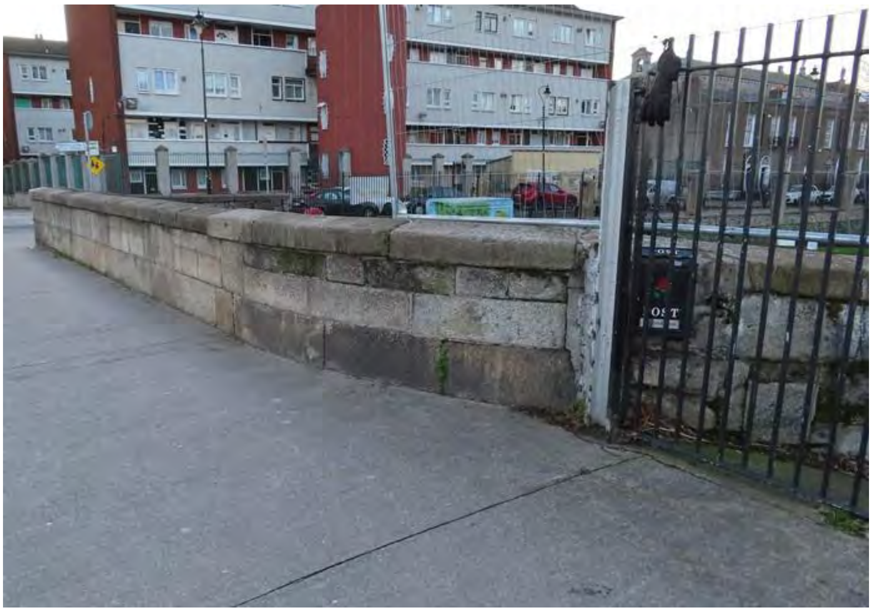

Figure 35 Parapet of Newenham Bridge

The parapets of Newenham Bridge are of granite ashlar, similar to the faces of the ridge. These are capped with ridged granite copings. The parapets are level and horizontal in the centre, sloping away as the parapet bends around at either end. Beyond the curve the granite ashlar gives way to walls of squared calp limestone.

Figure 36 Southern end of western parapet

Figure 37 Railway bridge at North Strand Road

The bridge that carries North Strand Road over the railway is a beam bridge of concrete. The earlier abutments survive on either side of the railway, constructed with rock-faced limestone rubble and with large hammer-dressed limestone blocks as copings. Three tracks cross under the bridge, two running directly ahead toward the east, while the other, on the southern side, divides off from the other tracks beneath the bridge before crossing the canal at a lifting bridge. There are concrete piers between the two principal tracks, off centre in the width of the bridge. The bridge parapets bear the date 1921 cast into the concrete on the track sides.

Figure 38 Western face of railway bridge

Figure 39 Parapet of wing wall of railway bridge

The original parapets over the abutments and wing walls were described above as being built with squared limestone rubble and with a limestone coping. At the junction between the wing walls and the bridge deck there are saddle-back copings of limestone, though these give way to the later parapet of concrete. The parapets over the span of the bridge are comprised of concrete panels separated by concrete piers, each panel having a central section faced with pink pebbles. The parapets are terminated by concrete piers with pyramidal capping.

Figure 40 Parapet of railway bridge

4.4 Analysis

While a bridge was built in 1795 to carry North Strand Road over the Royal Canal the present bridge is of a later date and was built in 1872. In fact, this was the third bridge on the site. The original bridge, under construction in 1795, had collapsed when almost complete, killing four workers and it was then rebuilt.[28] The late date of construction of the present bridge involved the relocation of the canal lock and hence was a major operation, designed to reduce the gradient of the road as it crossed the bridge.

It is probable that the reconstruction of Newcomen Bridge in the 1870s. It is noted that the next bridge along the canal, Clarke Bridge, which carries Ballybough Road, is of similar materials, incorporating granite ashlar spandrels and parapets, with classical archivolts on the arches and a vermiculated keystone. The voussoirs on the canal arch would have had to be recut to fit the tighter curve of the segmental arch adopted in 1872. It is notable that the archivolts over the side arches are out of place on pointed segmental arches and that the uppermost stones on each side of the apex of each arch are of limestone, in contrast to the granite through the rest of the archivolt and this indicates that the voussoirs of the side arches are reused from the original bridge, but that through insufficient numbers or the differing geometry the reconstruction resorted to the provision of new stone, though stopping short of using granite.

The side arches are unusual in a canal bridge, and they would have originally had flights of steps leading down into them. These arches allowed for pedestrian access for the use of canal personnel and canal users.

The form of the original railway bridge is unknown, though the full height abutments suggest that it was a beam bridge. It is possible that the original bridge was a masonry arch bridge, with one three-centred arch or two semicircular arches such as those at Binns Bridge. The higher abutments may have been a result of the reconstruction of 1872 when the bridge needed to be widened to allow for the new track leading off the main line and crossing the canal. At that period a beam bridge would have been more common, particularly as the opportunity arose during this reconstruction to reduce the hump on North Strand Road as it crossed the bridges. It is not known what brought about the need to reconstruct the bridge in concrete in 1921.

The two bridges that bring North Strand Road over the Royal Canal and the railway are of totally different construction. The bridges abut each other, but with no real continuity. For this reason, there can be no doubt that the railway bridge is not included as part of Newcomen Bridge in the record of protected structures.

4.5 Predicted Impacts

Predicted direct construction impacts:

The parapets of the railway bridge will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Newcomen Bridge over the canal will be altered through the raising of the parapets of the adjacent railway bridge.

[28] Clarke, 1992, p. 40.

4.6 Mitigation

The excavations to lower the track bed are to be designed and carried out in accordance with a method statement prepared by the Grade 1 conservation architect, to ensure that the foundations of the bridge are not undermined.

There is no opportunity to mitigate the impact on the setting of the canal bridge arising from the raising of the parapets of the railway bridge.

5. CLARKE BRIDGE (OBD225)

Built heritage reference in EIAR: BH-86 and BH-87

ITM grid reference: 716661, 735655

5.1 Historical Summary

The route along Summerhill and Ballybough Road is an ancient road leading from the crossing point of the River Liffey towards Clontarf, Howth and Malahide. Although somewhat eclipsed by North Strand Road, that latter route did not lead from the city and had no bridge over the Tolka until 1792, when an act of parliament provided for the construction of Annesley Bridge.[29] Even then, there was no direct route from the city to Amiens Street and North Strand Road until the early nineteenth century when Eden Quay and Store Street were opened.[30]

Clarke Bridge is one of the original bridges on the canal, built in 1794. It was significantly wider than Westmoreland Bridge at Cross Guns and there has been no need to widen it in the intervening period of more than two centuries. The bridge is probably named in honour of Charles Clarke, who was a significant shareholder of the Royal Canal Company, though not a director. Edward Clarke was a director, though not until 1798, after Clarke Bridge was built, and he held only half as many shares as Charles Clarke, making it more likely that the latter gave his name to the bridge.[31]

The adjacent railway bridge was built in the early 1860s as part of the construction of the Liffey Branch of the Midland Great Western Railway Company. It was probably a wrought-iron beam bridge originally, though the span has been replaced. The present parapets were built in about 2010.

5.2 Conservation Status

Clarke Bridge is a protected structure and is included in the record of protected structures for Dublin city under reference 910. The address is given as “Bridges: Royal Canal, Dublin 3” and the description is “Clarke’s Bridge, Ballybough”.

The National Inventory of Architectural Heritage has included Clarke Bridge under reference 50060476, where it has been assigned a Regional significance for its architectural, social and technical interest. The description of the bridge reads:

> Single elliptical-arch canal bridge, built c.1790, carrying road over Royal Canal.

Both the canal bridge and the railway bridge are included in the Dublin City Industrial Heritage Record.

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29 Broderick, p. 264.
30 Goodbody, 2018, p. 330.
31 Clarke, p. 160; Delany, p. 317.

5.3 Survey

Figure 41 Railway bridge and canal bridge at Ballybough Road

Ballybough Road is one of the ancient roads leading out from Dublin city to the north-east. With the construction of the Royal Canal the bridge carrying this road across the canal was named Clarke Bridge. The figure above shows the bridge with the later railway bridge at far left. The figure below shows a view from the east, with the railway bridge at right and with Croke Park in the background.

Figure 42 View of bridges from the east

Figure 43 Western side of Clarke Bridge

Clarke Bridge has an elliptical arch with a classical archivolt and a vermiculated keystone. The abutments, spandrels, parapet and southern wing wall are faced with granite ashlar and a granite string course runs across the bridge just above the top of the keystone. The bridge spans the canal and the towpath, which is on the southern side of the canal, with a narrow shelf between the canal and the spring of the vault on the northern side. Due to the low rise of the arch the headroom over the towpath is poor.

Figure 44 Eastern side of Clarke Bridge

Figure 45 Vault of Clarke Bridge

The ellipse of the arch rings carries through the vault consistently. The masonry of the vault from the spring to the crown is of limestone ashlar, the courses being of irregular height and the stones of irregular length. The choice of ashlar rather than the more common squared limestone rubble would have been on account of the low ratio of rise to span, as ashlar will provide a stronger vault.

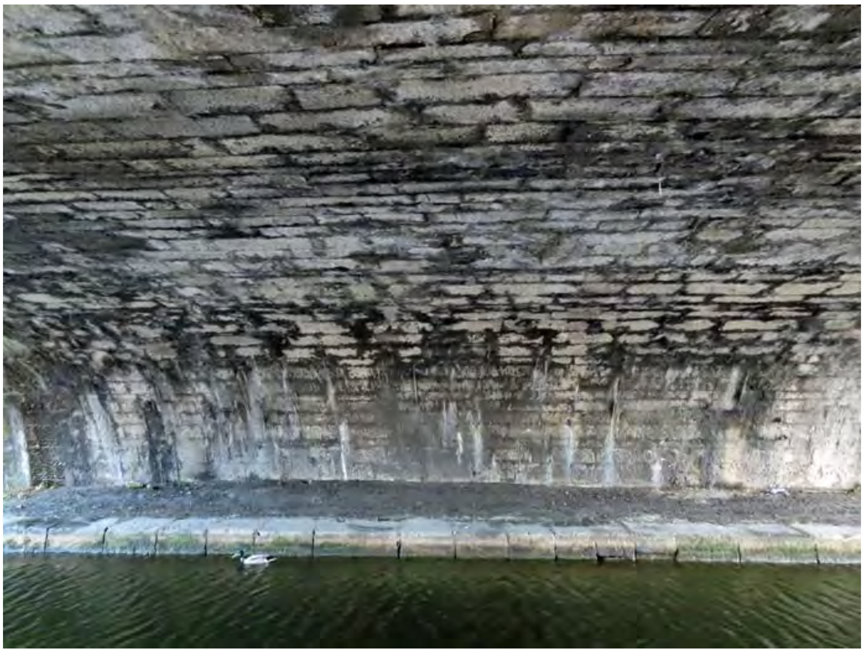

Figure 46 Masonry in the vault of Clarke Bridge

Figure 47 **Plaque on western side of Clarke Bridge**

Above the string course on the outer face on each side of the bridge there is a rectangular limestone plaque with an elliptical frame. These bear the caption “1794 / CLARKE / BRIDGE”.

Figure 48 **Plaque on eastern side of Clarke Bridge**

Figure 49 Abutment and wing wall on western face of Clarke Bridge

Beyond the abutment on the southern side of Clarke Bridge the masonry curves out from the bridge to form wing walls, the courses of ashlar continuing through the curves. Once the wing walls have completed their turn, they give way to walls of limestone rubble that retain ramped roadways that descend from Ballybough Road to the canal side. The string courses on either side of the bridge continue through the wing walls and down the length of the retaining walls. The granite ashlar is keyed into the limestone rubble of the retaining walls.

Figure 50 Junction between wing wall and retaining wall on eastern side of bridge

Figure 51 Parapet on eastern side of Clarke Bridge

The granite ashlar on the outer faces of the parapets of Clarke Bridge continues through the wall and is expressed on the side facing the road. The parapet is capped with cut granite coping stones that run across the thickness of the wall with an overhang on each side. Each coping stone is ridged. At the southern end of the bridge the parapets curve around to meet the walls of the ramps that descend from the road. The upper surfaces of the parapets rise to the crown of the bridge and descend again beyond the crown.

Figure 52 Curve of parapet at top of ramp

Figure 53 Railway bridge at Ballybough Road

The bridge that carries Ballybough Road over the railway is a beam bridge. The soffit of the bridge deck has not been seen in the survey for this report but is likely to be of concrete or steel. The figure above shows clearly the original stone abutments on which the beam bridge is carried and the concrete parapet. These parapets have been erected within the past ten years or so.

Figure 54 Western side of railway bridge

Figure 55 **Northern abutment of railway bridge**

As has been noted, the original abutments of the railway bridge are still in place and in use to support the deck. The abutments are of rock-faced limestone ashlar and this continues to the parapets on either side of the concrete bridge parapet.

Figure 56 **Southern abutment of railway bridge**

Figure 57 Parapet of railway bridge at side of road

On the side facing Ballybough Road the parapet on the bridge deck is faced with squared limestone rubble and, being newer, this is fresher looking than the walls on either side of the span. In the figure above the original parapet on the eastern side of the bridge is seen at right, with the more recent parapet over the span seen in the middle distance at left. The original parapet is capped with large blocks of cut limestone. The junction between the newer parapet and the original on the western side of the bridge is seen in the figure below.

Figure 58 Parapet on western side of railway bridge

Figure 59 Junction between parapets of canal bridge and railway bridge

On the eastern side of the bridges the granite ashlar parapet of the canal bridge is well coursed into the limestone parapet of the railway bridge, as seen in the figure above, though the limestone copings on the railway bridge are higher than the granite copings on the canal bridge and there is a discontinuity where they join. On the western side of the bridges the junction is less successful, with squared limestone fitting uncomfortably into the granite ashlar. The same issue of different ridge heights in the copings occurs on that side.

Figure 60 Junction between parapets on western side of bridges

Figure 61 Junction of abutments of canal bridge and railway bridge

The junctions between the abutments of the two bridges are well defined. There is a straight vertical joint, to one side of which is the granite ashlar of the canal bridge while on the other side are rock-faced limestone quoins that mark the termination of the abutments of the railway bridge. The figure above shows the eastern side of the bridges, while the western side is shown below.

Figure 62 Junction of abutments on western side of bridges

Figure 63 Kerbing on eastern side of Ballybough Road

The footways on either side of Ballybough Road where it crosses the canal bridge and the railway bridge are bordered by broad granite kerbstones. On the eastern side of the road there is a double line of kerbing, while there is just a single line on the western side of the road. Until recently there were areas of stone setts in parts of the road deck on the bridges, but these have been removed.

Figure 64 Kerbing on western side of Ballybough Road

5.4 Analysis

Clarke Bridge is very finely built, with granite rather than the limestone that is prevalent in the canal bridges further to the west along the DART+ West project. The design is to a higher quality also, with ashlar facings and the use of a classical archivolt rather than a plain arch ring. While the use of ashlar in the vaulting would have been for greater strength, as would be necessary for such a low ratio of rise to span, it also suggests a greater degree of care in the design and construction.

In its original form Clarke Bridge had curved wing walls on both sides and both ends. The construction of the railway in the 1860s necessitated the removal of the northernmost part of the canal bridge and, incidentally, also involved narrowing the canal to the west of Clarke Bridge to achieve the radius of curvature required for the railway. The causeway to the north of the canal bridge was straightened to line it up with the abutment of the railway bridge and the granite ashlar was salvaged from the wing walls and repurposed in the facing of the causeway. In view of the difference in material between the granite ashlar and the rock-faced limestone of the railway bridge the designers opted for a straight vertical joint between the abutments of the two brides rather than attempting to key the masonry of the bridges together.

It is probable that the railway bridge was built as a beam bridge rather than utilising arches and this would have made it simpler to span the track without introducing a hump back to the bridge. It is noticeable that the slight hump in the canal bridge was retained, and this is reflected in the rise of the parapets to a high point over the crown of the bridge.

The entry in the record of protected structures for Clarke Bridge appears to clearly relate to the canal bridge only and does not include the railway bridge. The entry in the NIAH is unambiguous, describing the bridge as a single-arch canal bridge.

5.5 Predicted Impacts

Predicted direct construction impacts:

The parapets of the railway bridge will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Clarke Bridge over the canal will be altered through the raising of the parapets of the adjacent railway bridge.

5.6 Mitigation

The excavations to lower the track bed are to be designed and carried out in accordance with a method statement prepared by the Grade 1 conservation architect, to ensure that the foundations of the bridge are not undermined.

There is no opportunity to mitigate the impact on the setting of the canal bridge arising from the raising of the parapets of the railway bridge.

6. CLONLIFFE BRIDGE (OBD224)

Also known as Russell Street Bridge.

Built heritage reference in EIAR: BH-108 and BH-109

ITM grid reference: 716239, 735858

6.1 Historical summary

Clonliffe Bridge is not one of the original bridges built by the Royal Canal Company and there was no road at this location at the time that the canal was constructed through that part of the city.

The construction of Clonliffe Bridge resulted from the acquisition of Clonliffe House by Frederick E Jones, also known as Buck Jones, a Dublin theatre manager. He had run the Music Hall in Fishamble Street from 1793 and in 1796 took over the management of the Theatre Royal in Crow Street.[32] Difficulties in the business and opportunities elsewhere led him to London in 1807 to manage and part-own Drury Lane Theatre, returning to Dublin in 1809, and moving again to London in 1814 before returning in 1815. He lost the contract for Crow Street Theatre in 1819 and was bankrupted.

The first evidence for the existence of Russell Street, connecting North Circular Road to the Royal Canal, appears on the street map in Wilson's Directory in 1809, though directory maps at that time did not extend as far as the northern end of Russell Street. Thomas Campbell's map of Dublin, produced in 1811, shows Russell Street terminating at the canal, with no bridge extant. The first map to show Clonliffe Bridge was John Taylor's map of *The Environs of Dublin*, published in 1816, and this also shows Jones Road leading from the bridge to Clonliffe Road. That Jones Road and Clonliffe Bridge were new at the time is indicated in their absence from the map in Warburton, Whitelaw and Walsh's *History of the City of Dublin*, dated 1st January 1817.

6.2 Conservation Status

Clonliffe Bridge is not a protected structure and is not included in the National Inventory of Architectural Heritage.

Both the canal bridge and the railway bridge are included in the Dublin City Industrial Heritage Record.

[32] Geoghegan, Patrick M, 2009, 'Jones, Frederick Edward', *DIB.*

6.3 Survey

Figure 65 View westward toward Clonliffe Bridge and railway bridge

Clonliffe Bridge carries Russell Street over the Royal Canal and close by, to the north, the railway bridge brings Russell Street to meet Jones Road. The two bridges are close together, though differences in their style and construction ensure that they may be considered to be two separate bridges.

Figure 66 View eastward toward Clonliffe Bridge and railway bridge

Figure 67 View westward toward Clonliffe Bridge

Clonliffe Bridge is an elliptical masonry arch bridge that has been widened on its eastern side by the addition of a concrete beam bridge. The original bridge springs directly from ground level on either side of the canal, with a towpath running beneath the arch on the southern side of the canal and a margin projecting out into the canal on the northern side. The towpath and the projecting margin are both defined by large blocks of cut limestone at the edge of the canal. The concrete beam bridge rests on vertical concrete abutments on either side.

Figure 68 Eastern elevation of Clonliffe Bridge, showing masonry arch

Figure 69 Western elevation of Clonliffe Bridge

On the western side of Clonliffe Bridge the bridge has not been widened, though the original parapets have been replaced with a concrete base above which are metal railings, running between concrete piers at either end.

Figure 70 Detail of voussoirs and spandrel on eastern side of Clonliffe Bridge

The voussoirs of the bridge are of cut granite, while the spandrels are of calp limestone rubble.

Figure 71 Barrel of the vault beneath Clonliffe Bridge

The vault of Clonliffe Bridge is constructed with squared limestone blocks, with large blocks in the lower courses, as seen in the figure below, while the greater part of the span is comprised of smaller blocks, laid in courses.

Figure 72 Detail of base of arch on southern side of bridge

Figure 73 Spandrel and abutment on western side of bridge, on southern side of canal

As noted above, the spandrels of the bridge are of calp limestone rubble, roughly squared along its natural bedding. This masonry continues into the faces of the abutments.

Figure 74 Detail of abutment of Clonliffe Bridge and abutment of railway bridge

On the northern side of the canal bridge the stonework of the abutment has been altered to bring it up to full height to suit the level of the adjacent railway bridge, the abutments of which are of rock-faced limestone ashlar.

Figure 75 Pedestrian access to south of canal on eastern side of bridge

To the west of Clonliffe Bridge a ramp carries pedestrians up from the towpath to street level, while to the east there is a flight of concrete steps leading to a concrete ramp, followed by another flight of steps to street level. To the south of the canal bridge the parapets on both sides are of concrete.

Figure 76 Pedestrian route to towpath from street

Figure 77 Eastern elevation of railway bridge

The railway bridge is a beam bridge, formed with concrete spans. This is a replacement for the original bridge and the beams rest on the original limestone abutments on either side of the railway. The parapet is of red brick, terminating at either end with a concrete pier, the piers at the southern end of the bridge also serving as the terminals for the railings of the canal bridge.

Figure 78 Western elevation of railway bridge

Figure 79 Bridge deck, looking from Clonliffe Bridge toward Jones Road

The deck carrying over the canal and railway bridges has an asphalt surface on the carriageway, while the footways are partly of mass concrete, with some asphalt covering on the western side, over the canal, while on the eastern side part of the footway is paved with concrete paviours. There is a section of stone setts in the rainwater channel to the north of the bridges on the western side, though this does not continue onto the bridges. To the south there are some granite kerbstones, though these are also away from the bridge deck. There are decorative lamps on either side of the bridge, rising from the concrete piers at the southern end of the canal bridge and at the northern end of the railway bridge.

Figure 80 Parapet and lamp on eastern side of Clonliffe Bridge

6.4 Analysis

Clonliffe Bridge was built to a high quality, though without the classical detailing seen on Clarke Bridge to the east or Binns Bridge to the west. As with those bridges, the rise of the bridge was minimised to avoid an excessive gradient or extent of the approach ramps, and this was achieved through the use of an elliptical arch. This form also provided a steep rise from the spring of the arch, as compared with the shallower rise that would have resulted in a segmental arch and this facilitated the provision of a towpath beneath the bridge. The use of ashlar in the vault would have increased the bearing capacity of the bridge, given that the ratio of rise to span is relatively small, while the spandrels and the sides of the abutments did not require the same strength and were built with poorer quality limestone, laid as rubble.

The original form of the railway bridge is not known, though it was probably a beam bridge as this would have been necessary in order to achieve clearance for a double track railway without raising the road deck excessively. The surviving original abutments seem to confirm that the original bridge was a beam. At some time in the twentieth century the bridge was replaced with concrete beams, and it is probable that this occurred at the same time that the canal bridge was widened. While the canal bridge has railings on the parapets and the railway bridge has a brick parapet, the uniform concrete piers indicate that the parapets were designed and built at the same time.

6.5 Predicted impacts

Predicted direct construction impacts:

The parapets of the railway bridge will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Clonliffe Bridge over the canal will be altered through the raising of the parapets of the adjacent railway bridge.

6.6 Mitigation

The excavations to lower the track bed are to be designed and carried out in accordance with a method statement prepared by the Grade 1 conservation architect, to ensure that the foundations of the bridge are not undermined.

There is no opportunity to mitigate the impact on the setting of the canal bridge arising from the raising of the parapets of the railway bridge.

7. BINNS BRIDGE (OBD223)

Built heritage reference in EIAR: BH-115 and BH-116

ITM grid reference: 715840, 735998

7.1 Historical summary

The road now known as Dorset Street and Drumcondra Road is an ancient route leading out of the city to Santry, Swords and onward to Drogheda and was probably in existence long before the first written reference to it in 1326.[33] As a significant road, this was one of the first to be given over to a turnpike trust, by act of parliament in 1731, and from that date was a toll road as far as Dunleer.[34]

Binns Bridge was built in 1793 along with the double lock beneath it.[35] In line with the policy of naming bridges after directors of the Royal Canal Company the bridge was named in honour of John Binns, who is generally believed to have been the principal promotor of the canal, and this bridge was selected to bear his name as it was the nearest to his home.[36] Of the five canal bridges built on the fringes of the city, this was the second widest, only slightly narrower than Blacquiere Bridge on the Circular Road. In view of this it has not needed to be widened over the years.

The adjacent railway bridge was built in the early 1860s as part of the construction of the Liffey Branch of the Midland Great Western Railway Company.

7.2 Conservation status

Binns Bridge is a protected structure and is included in the record of protected structures for Dublin city under reference 908. The address is given as "Bridges: Royal Canal, Dublin 9" and the description is "Binns Bridge, Drumcondra".

The National Inventory of Architectural Heritage has included Binns Bridge under reference 50060189; it has been assigned a Regional significance for its architectural, social and technical interest. The description of the bridge reads:

> The canal bridge is well executed with good quality masonry. Together with the adjacent canal lock and railway bridge it forms an important group of transport-related structures.

The railway bridge adjacent to Binns Bridge is not a protected structure, however it is included in the National Inventory of Architectural Heritage under reference 50060296. The NIAH assigns the bridge a Regional rating for its architectural, technical and social interest. The survey describes the bridge as a "Double-arch stone bridge, erected 1864, carrying road over railway line.

[33] Gilbert, vol. i, p. 158.
[34] Broderick, p. 251.
[35] Plaque on bridge.
[36] Clarke, p. 22.

7.3 Survey

Figure 81 Binns Bridge and railway bridge viewed from a distance

Drumcondra Road and Dorset Street meet at the Royal Canal, where Binns Bridge and the adjacent railway bridge carry these roads over the canal and the railway respectively. The two bridges are very different in height, style and dimensions, but are joined together.

Figure 82 Eastern side of Binns Bridge and railway bridge

Figure 83 Eastern side of Binns Bridge

Binns Bridge has a single elliptical arch spanning the canal, but not a towpath. The bridge is complicated by its location above one of the lock chambers from the 2nd lock on the canal, the other chamber being upstream from the canal, with the gates close to the western face of the bridge. The abutments and spandrels of the bridge are constructed with squared calp limestone rubble. There are granite string courses on each face, though these are largely obscured by pipework crossing the faces of the bridge. The arch rings are classical archivolts of dressed granite, with vermiculated keystones.

Figure 84 Western side of Binns Bridge

Figure 85 View into the barrel of the vault of Binns Bridge

The barrel of the vault of Binns Bridge has been sprayed with a cementitious material that covers up the masonry such that it is not possible to examine or describe the nature of the construction of the vault. Material of this type was sprayed onto the undersides of bridges for a time during the twentieth century as a cost-effective means of sealing the masonry. The technique is no longer practiced.

Figure 86 View into arch from southern side

Figure 87 Plaque on western side of Binns Bridge

There are plaques on the outer faces of each of the parapets on Binns Bridge. These are rectangular limestone blocks with a raised elliptical frame inside which is the inscription “1795 / Binns / Bridge & Lock”. The number 5 is stylised and at an angle such that it can resemble a 3, given the degree of erosion of the surface of the plaque, though close examination shows that the date is 1795.

Figure 88 Plaque on eastern side of Binns Bridge

Figure 89 Parapet on eastern side of Binns Bridge

The parapets of Binns Bridge are constructed with limestone rubble. The rubble is squared in some parts of the parapets and irregular in other parts. The parapets are capped with copings of cut granite with the upper surfaces rising to a central ridge. The parapets slope upward toward a peak at the crown of the arch. At each end the western parapet terminates at a drum constructed with limestone rubble and with a circular capstone. There is a similar ending on the southern end of the eastern parapet, while at the northern end the parapet is continuous with the parapet of the railway bridge.

Figure 90 Detail of parapet on western side of Binns Bridge

Figure 91 Eastern face of railway bridge

The railway bridge adjacent to Binns Bridge is twin arched, with each arch accommodating a single railway track. The arches are semicircular with parallel arch rings of rock-faced limestone with tooled margins at the intrados. The spandrels and parapets are constructed with squared uncoursed rock-faced limestone rubble.

Figure 92 Western face of railway bridge

To the east of the railway bridge the railway is bounded on the northern side by a high retaining wall. To the west of the bridge the railway is in a distinct cutting and has high retaining walls on both sides of the cutting.

Figure 93 Eastern end of central pier of railway bridge

The two arches of the railway bridge are separated by and supported on a comparatively narrow central pier that is constructed of squared rock-faced limestone rubble. The abutments are of similar rock-faced limestone and the quoins are rock-faced with tooled margins at the arrises.

Figure 94 Eastern end of southern abutment of railway bridge

Figure 95 Parapet of railway bridge facing the road

As noted above, the parapets of the railway bridge are constructed of limestone rubble that is partly squared and partly random. The parapets are capped with large rectangular blocks of limestone with hammer-dressed faces and tooled margins. The tops of the parapets are gently curved, being at their highest at the crown of the bridge.

Figure 96 Parapet on western side of railway bridge

Figure 97 Area between canal bridge and railway bridge

The canal bridge and the railway bridge abut one another, end to end. On the eastern side the junction between the two abutments is occluded by a large brick buttress that supports a pipe that crosses the faces of the bridges. The buttress appears to be larger than would be necessary to carry the pipe and it may be that there was a structural issue with the wall of the bridges at this point. There is a noticeable difference in quality of the stonework on either side of the buttress, that of the railway bridge being of a better quality limestone in larger, more regular blocks.

Figure 98 Opening to ramp between canal bridge and railway bridge

On the western side the two bridges are separated by a broad ramp that leads down to the canal side, such that the two bridges are distinct entities.

7.4 Analysis

Binns bridge is an elegant bridge, though built with a lesser quality of stonework in comparison with some of the other bridges. It is of a similar style to Clarke Bridge, but uses very poor calp limestone as a facing material rather than the fine granite ashlar on Clarke Bridge. This is all the more surprising in that the bridge is named in honour of John Binns, who appears to have been one of the principal movers behind the scheme to build the Royal Canal.

The presence of the lock at the bridge, with one chamber cluttering the western side of the bridge and the other beneath the vault, does nothing to improve the quality of the bridge.

Despite these drawbacks, Binns Bridge is an imposing feature when seen from the east and the location above the lock raises its elevation and its profile, underscoring the visual impact.

The railway bridge is also unusual, but for different reasons. It is the only twin-arched railway bridge on the route of the DART+ West project, though there are others in the vicinity, on the line between Islandbridge junction and Glasnevin junction where it passes beneath the Luas and the Royal Canal and nearby where it crosses beneath the Maynooth line. In both of those cases the reason for the twin bore appears to be to avoid the complications of a skew bridge where the lines do not cross at right angles. It is more than likely that the twin bore approach was adopted on this bridge as a means of minimising the rise of the bridge while avoiding a shallow arch with a large span.

On the western side of the two bridges there is a clear separation due to the presence of the ramp leading down to the canal, big enough for a vehicle to use. On the eastern side, however, the masonry of the two bridges joins together in the middle of the pier that stands between the two bridges. The parapets adjoin each other, with a slight difference in levels between the tops of the coping stones, leaving a noticeable ramp at the junction.

The entry in the record of protected structures for Dublin city appears to be clear in that the bridge protected is the canal bridge, while the railway bridge is not included.

The National Inventory of Architectural Heritage, however, is clear in that it includes entries for both bridges. In that survey both bridges are accorded a Regional significance for their architectural, social and technical interest.

7.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Binns Bridge over the canal will be altered through the raising of the parapets of the adjacent railway bridge.

7.6 Mitigation

There is no opportunity to mitigate the impact on the setting of the canal bridge arising from the raising of the parapets of the railway bridge.

8. CROSS GUNS TUNNEL (OBD222 AND OBD221))

Built heritage reference in EIAR: BH-124, BH-125 and BH-126

ITM grid reference: 715023, 736320

8.1 Historical summary

Work on the construction of the Royal Canal commenced on 12th November 1789, when the Lord Lieutenant, the earl of Westmoreland, laid the first stone of the lock that is now known as 5th Lock, at Phibsborough. The lock and the bridge adjoining it were named Westmoreland Lock and Bridge, though the bridge later became known as Cross Guns Bridge. From this starting point the construction of the canal and its bridges and locks proceeded in both directions.[37]

Westmoreland Bridge would have been a stone-arched bridge when first constructed, similar to the others along the route. However, with increasing traffic levels it would have been too narrow for the road traffic, and it was replaced by the present iron bridge in the twentieth century. This bridge was manufactured by Ross and Walpole, which had its foundry at the North Wall. This company had its origins in the early 1860s, though the name Ross and Walpole was not used until the 1870s. The company ceased trading in 1897, but its business was taken on by another company that was formed under the same name and traded until it went into liquidation in 1931.[38] This bridge was built by the latter company and completed in October 1912.[39]

In the early 1860s the construction of the Liffey Branch of the Midland Great Western Railway commenced, running alongside the Royal Canal leading toward the North Wall. As part of this project a decision was taken to construct a tunnel beneath the land to the west of Prospect Road, rather than continuing the railway cutting up to the road and having the road cross on a more conventional bridge. This facilitated the Royal Canal and also allowed for access to a number of houses that were built to the north of the railway at this time, including a terrace of three houses. This group of houses included Prospect Lodge, which is the only surviving house from that group. The terrace was demolished in about 1900 to facilitate the construction of the railway branch to Drumcondra, which opened in 1901 and runs alongside the Liffey Branch to the north.

8.2 Conservation status

The tunnel adjacent to Cross Guns Bridge is not a protected structure, however it is included in the National Inventory of Architectural Heritage under reference 50060112. The NIAH assigns it a Regional significance due to its architectural, technical and social interest. The description of the tunnel reads:

> Railway tunnel, opened 1864, on branch line from former Broadstone Station to Connolly Station, via North Wall.

Westmoreland Bridge, commonly known as Cross Guns Bridge, stands adjacent to the eastern end of the tunnel and, while not a protected structure, is also included in the NIAH. The NIAH record, under reference 50060185, assigns the bridge a Regional significance for its architectural and technical interest. The description, which is incorrect, as is noted by comparison with the historical summary above, reads:

> Single-span canal bridge, likely rebuild of c.1864 at same time as construction of railway bridge to north, carrying Phibsborough Road over Royal Canal.

[37] Delany and Bath, p. 41.
[38] Sweeney, 2010, p. 47; https://www.gracesguide.co.uk/Ross_and_Walpole; *Irish Press,* 11th January 1932.
[39] *Irish Independent*, 6th January 1908, *Belfast Newsletter*, 12th October 1912.

8.3 Survey

Figure 99 Canal bridge and railway bridge at Cross Guns

Phibsborough Road runs northward to the Royal Canal, beyond which the street becomes Prospect Road. These roads are carried over the Royal Canal by a bridge formally known as Westmoreland Bridge, but popularly known as Cross Guns Bridge. To the north of this the road runs over the Liffey branch of the railway over the eastern end of the Cross Guns Tunnel.

Figure 100 Western side of Cross Guns Bridge

Cross Guns Bridge is a cast-iron bridge erected in the early twentieth century to replace the original masonry arch bridge on the site. The bridge lies immediately to the east of the fifth lock on the canal.

Figure 101 Eastern face of Cross Guns Bridge, seen from the southern bank

The lock chambers on the canal are comparatively narrow and immediately to the east the canal widens to its normal width, with splayed wing walls of limestone ashlar forming the transition. Cross Guns Bridge spans across this splayed section of the canal and as a result has a much greater span on the eastern side of the bridge than on the western. The bridge parapets are of cast iron, cast in sections and bolted together, with curved brackets at the rear to strengthen the parapet. The beams appear to be of rolled steel.

Figure 102 Eastern face of Cross Guns Bridge, seen from the northern bank

Figure 103 Parapet of Cross Guns Bridge on western side

The cast-iron central sections of the canal bridge parapet terminate at walls of limestone ashlar with broad copings of dressed limestone.

Rising from each of the limestone walls on the bridge parapet is a cast-iron lamp.

Figure 104 Maker's name on bridge parapet

Figure 105 Lamp standard on bridge parapet

The maker's name is cast into the iron parapet on each side of the bridge.

Figure 106 Eastern parapet of Cross Guns Tunnel

The Cross Guns Tunnel has been widened at some time, with a section of concrete beam bridge added on the eastern end of the tunnel. The parapet at this end of the tunnel is of precast concrete sections.

Figure 107 Eastern entrance to Cross Guns Tunnel

Beneath the later concrete section, the original portal of the tunnel is visible. This has a three-centred arch ring with parallel voussoirs of rock-faced limestone. Within the tunnel the abutments are of squared rock-faced limestone rubble and this form continues into the vault. The tunnel runs for 170 metres.

Figure 108 View along railway cutting towards western face of tunnel

At the western end the tunnel has a similar portal, with three-centred arch ring comprised of parallel rock-faced limestone voussoirs. The spandrels and parapet are constructed with squared rock-faced limestone rubble. The parapet is capped with saddle-backed limestone copings, which continue down the parapets on either side of the railway cutting. The interior of the tunnel curves slightly to the left in moving towards the eastern end to adapt the alignment of the railway to the width of the canal beyond the canal harbour to the west of the fifth lock.

Figure 109 Western portal of Cross Guns Tunnel

Figure 110 Eastern face of accommodation bridge at Cross Guns

Eighty metres to the west of Cross Guns Tunnel there is a smaller tunnel or bridge. This bridge spans the track to connect the northern and southern sides for no reason that is obvious today. However, facilitated access to a number of houses were built to the north of the railway that was mentioned in the historical summary above, including a terrace of three houses that faced this bridge. These houses included Prospect Lodge, which is seen at top right in the figure below, and which is the only surviving house from that group. The terrace was demolished in about 1900 to facilitate the construction of the railway branch to Drumcondra, which opened in 1901. This bridge is similar to the Cross Guns Tunnel, with rock-faced limestone arch ring and squared limestone rubble spandrels and parapets, with saddle-backed copings.

Figure 111 Detail of parapets at accommodation bridge

8.4 Analysis

As has been seen in the survey section above, the canal bridge at Cross Guns was replaced with a beam bridge in the early twentieth century. The tunnel that carries the Liffey branch railway through Cross Guns is physically separated from the canal bridge by a ramp on the eastern side of the bridge and tunnel, while to the west of Prospect Road there is a roadway running alongside the canal between the canal lock and canal harbour and the land beneath which the tunnel runs.

The accommodation bridge to the west of Cross Guns Tunnel is also separated from the canal by the roadway and no traffic crosses that bridge in the direction of the canal.

Neither Cross Guns canal bridge nor the Cross Guns Tunnel are included in the record of protected structures for Dublin city at present, though Cross Guns Bridge is a proposed protected structure. Both are included in the National Inventory of Architectural Heritage where they are assigned a Regional rating.

8.5 Predicted impacts

Predicted direct construction impacts:

The parapet of Cross Guns Tunnel will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the tunnel.

The parapet of the accommodation bridge will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

8.6 Mitigation

The excavations to lower the track bed at both the bridge and the tunnel are to be designed and carried out in accordance with a method statement prepared by the Grade 1 conservation architect, to ensure that the foundations of the bridge and tunnel are not undermined.

9. BROOME BRIDGE (OBG5)

Built heritage reference in EIAR: BH-139

ITM grid reference: 713125, 737197

9.1 Historical summary

Prior to the construction of the Royal Canal there was a road that ran from near the Cabra Gate of Phoenix Park along what is now Nephin Road and Broombridge Road, and the northward along Farnham Drive to Finglas. This was not a major road and there were alternative, more direct, routes to Finglas through Glasnevin and along a more westerly route that has since more or less disappeared. By the 1790s the route along what is now Broombridge Road had deteriorated and appears not to have run northward to Finglas. Nonetheless it was a local road, and it was necessary to provide a bridge over the canal so as to keep the right of way open.

The road that is now called Broombridge Road runs at an angle to the canal, though the bridge was built at right angles, necessitating the introduction of slight bends in the road at either side of the bridge. The bridge was named Broome Bridge in honour of one of the directors of the Royal Canal Company, William Broome, who served on the board from 1792 to 1801.

The most significant historical event associated with the bridge is an act of justifiable vandalism carried out in 1843 by William Rowan Hamilton. Hamilton had been appointed Andrews Professor of Astronomy and Royal Astronomer of Ireland in 1827 at the age of 21. His scientific achievements at that time were in the realm of optics, but he also had a strong interest in algebra. One problem that he wrestled with for ten or fifteen years was the possibility of using algebra in three or four dimensions and on 16th October 1843, while walking from his home at Dunsink Observatory to the Royal Irish Academy along the towpath of the Royal Canal he had a flash of inspiration, resulting in him devising the equation that he had long sought, relating to a concept he called quaternions. Conscious that he may not remember it, he used his penknife to carve the equation into one of the stones of Broome Bridge. The long-term significance of this discovery has led, among other things, to three-dimensional physics and computer technology, ranging from 3D modelling to video games.

Even as Hamilton was carving the formula on the bridge abutment the directors of the Midland Great Western Railway Company was negotiating with the directors of the Royal Canal Company for the acquisition of the canal with a view to constructing a railway along its route toward Mullingar and beyond. Work commenced on the construction of the railway in January 1846 and the line opened between Broadstone and Enfield in June 1847. In the interval between these two dates the canal bridge known as Broome Bridge was extended to include a second arch spanning the new railway line. The extension of the bridge directly southward from the canal bridge at right angles to the railway would have exacerbated the bend in the road at the southern end of the bridge and to avoid this the railway arch was built at as a skew bridge at an angle to the alignment of the canal bridge.

9.2 Conservation status

Broome Bridge is a protected structure and is included in the record of protected structures for Dublin city under reference 909. The address is given as “Bridges: Royal Canal, Dublin 7” and the description is “Broombridge Road”.

While the entry in the record of protected structures implies that only the canal bridge is protected, the National Inventory of Architectural Heritage has included the railway and canal bridges under reference 50060126 and they have been assigned a National significance for their architectural, historical, social and technical interest. The description of the bridges reads:

> Two-arch limestone canal bridge of c.1790 and railway bridge of c.1845, carrying Broombridge Road on north-south axis over Royal Canal (north) and Dublin-Sligo railway line (south).

Both the canal bridge and the railway bridge are listed in the Dublin City Industrial Heritage Record. The description of the canal bridge reads:

> Single-arch masonry bridge, built c.1790, carrying Broombridge Road over the Royal Canal. Squared coursed limestone walls with ashlar stringcourse and dressed voussoirs to segmental-arch with central keystone. Deck is humped. Parts of parapet walls rebuilt with some replacement coping. Limestone walls flank the canal beneath the bridge. Limestone plaque to northwest of bridge

The description of the railway bridge is:

> Single-arch masonry bridge, built c.1847, to carry Broombridge Road over the Royal Canal. Coursed squared limestone walls with dressed stone string course. Tooled limestone voussoirs to elliptical arch. Terminating piers. Curved deck with ramped approach from south. Forms a single unit with canal bridge to north.

9.3 Survey

Figure 112 Broome Bridge and railway bridge, western face

The canal bridge known as Broome Bridge and the adjacent railway bridge are both masonry arch bridges, but are very different in character, with differing rise and span. However, with the construction of the railway bridge great effort was made to unify the two bridges and this was achieved by carrying the string course through, adopting continuous parapet with a similar capping as on the original bridge.

Figure 113 Broome Bridge and railway bridge, eastern face

Figure 114 Canal bridge, eastern face

The canal bridge has a semicircular arch with parallel arch ring and dressed limestone voussoirs, the keystone rising above and sinking below the voussoirs. The spandrels and the sides of the abutments are of coursed squared limestone rubble, topped by a projecting string course of squared limestone above the keystone. The only original portion of the parapet is the northern half of the eastern parapet, built in squared limestone rubble and capped with squared limestone copings. The northern parapet on the western side has been rebuilt in recent years in random rubble with a cast concrete coping; on both sides the parapets end in a small pier. The parapets on either side to the south of the centre line were rebuilt as part of the railway bridge. On the northern side of the bridge wing walls retain the embankment flanking the approach ramp. The walls on either side of the northern ramp are of squared limestone and have rounded tops with a covering of sand and cement render. There is fire damage to the masonry of the abutments on both faces on the northern side.

Figure 115 Canal bridge, western face

Figure 116 Vault of canal bridge

The abutment rises vertically from the canal for five courses, with putlog holes set into the stones of the top course. Above this the vault springs and the soffit is formed with squared limestone rubble brought to courses, the stones generally smaller than those on the faces of the bridge.

Figure 117 Plaque on canal bridge

A plaque fixed to the northern spandrel on the western side commemorates the discovery of the formula for quarternions by Sir William Rowan Hamilton, which he scratched into the masonry of the bridge.

Figure 118 Railway bridge, eastern face

The railway bridge has a three-centred arch with a parallel arch ring of chamfered dressed limestone. A projecting string course of dressed limestone rests on the crown of the arch ring. The spandrels are of squared limestone rubble, brought to courses, as is the parapet. The parapet has copings of dressed limestone and these continue to the crown of the canal bridge. The abutments have projecting piers, set back from the arch ring and rising to the top of the parapet. Wing walls on either side of the bridge, south of the railway, retain the embankment of the approach ramp. The eastern parapet is breached to provide an entry to a pedestrian walkway leading to the railway station below.

Figure 119 Railway bridge, eastern face

Figure 120 Arch of railway bridge

Broombridge Road is not perpendicular to the canal and when the canal bridge was built it crossed the canal at right angles, resulting in bends in the road on each approach ramp. The railway is parallel to the canal and the bridge was built in line with the approach road rather than as a continuation of the alignment of the canal bridge. As a result, the railway bridge crosses the railway at an angle of approximately twenty degrees. To carry the thrust of the vault to abutments at this angle to the span of the arch the engineers adopted skew vaulting or rifle vaulting, twisting the coursing of the masonry in the vault to ensure that the coursing is perpendicular to the arch ring.

Figure 121 Vault of railway bridge

Figure 122 Southern ramp, to railway bridge

The northern approach ramp leading to the bridge is flanked by walls of random limestone rubble, partially brought to courses, and with a capping of vertically laid limestone rubble. This terminates at the piers that flank the railway bridge arch, giving way to the parapet with dressed limestone copings.

Figure 123 Northern ramp, to canal bridge

To the north of the railway bridge the parapet coping has been replaced over part of the distance by mass concrete, punctuated by the access to the pedestrian access to the station. To the north of the canal bridge the walls flanking the ramp have been described above. The northern end of the eastern wall has been rebuilt in concrete blockwork.

9.4 Analysis

As was noted in the historical background, Broome Bridge was built as part of the construction of the Royal Canal in the 1790s and the railway bridge was added to it in 1846.

The much greater span of the railway bridge, to cross the double track, together with the need greater height for trains to pass beneath, meant that the crown of the arch had to be significantly higher than for the canal bridge, even with the choice to use a three-centred arch. With the bridges close together this necessitated modification to the canal bridge, including the amalgamation of the masonry of the two bridges and the reconstruction of the parapets on the southern side of the canal bridge.

Comparison with other bridges on the canal, together with examination of the present parapet of Broome Bridge, suggests that the original parapet had a shallow angle at the crown of the bridge. The contractors for the railway took this angle as the point from which the new parapet would join, continuing the northern slope of the parapet southward to meet the crown of the railway bridge. As part of this reconstruction new coping stones were provided on the reconstructed wall and these are noticeably larger than the original coping stones seen on the northern section of the canal bridge parapet on the eastern side. On the western side the parapet has been rebuilt. In the figure below the original coping stones are seen toward the right, while the 1840s copings are seen to left of centre – further to the left the coping has been replaced with mass concrete.

Figure 124 Original copings and later replacements on eastern side of canal bridge

In the southern spandrels of the canal bridge the joint between the new masonry and the old may be discerned, illustrating the degree of reconstruction. The extent of the reconstruction would have been driven by the presence of wing walls on the southern side of the canal, projecting from the bridge abutments. With the removal of the wing walls and cutting back of the embankment which carried the road up the ramp to the canal bridge from the southern side there would have been no wall running back in line with the canal bridge and hence new masonry would have been required to join the bridges.

The figure below shows a detail of the canal bridge on the eastern side, while the red line on the second figure indicates the junction between the original 1790s masonry and the 1840s masonry.

Figure 125 Southern spandrel of canal bridge on eastern side

Figure 126 Approximate line of junction between 1790s masonry and 1840s masonry

The entry in the record of protected structures for Dublin city appears to be clear that only the canal bridge is protected.

The National Inventory of Architectural Heritage (NIAH) clearly includes both bridges and it assigns a National significance, which is very unusual for a bridge of this type. It seems clear that the reason for this is the association with Sir William Rowan Hamilton and the discovery of the formula for quaternions. It might be noted that that event took place in 1843, three years prior to the construction of the railway bridge and it would have been on the northern side of the canal, away from the future site of the railway bridge, as Hamilton was walking on the towpath at the time.

9.5 Predicted impacts

Predicted direct construction impacts:

The arch of the railway bridge is to be removed and replaced with a concrete arch with higher parapets and the road over the canal bridge is to be raised.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of the canal bridge will be altered trough the raising of the adjacent bridge and its parapets.

9.6 Mitigation

The replacement arch is to be designed and built to a high quality in association with the Grade 1 conservation architect. The works to raise the deck level of the canal bridge will use a light flexible fill to minimise the possibility of damage to the bridge structure.

There is no opportunity for mitigating the impact on the setting of the canal bridge through the raising of the adjacent railway bridge.

Also see Appendix A21.5 Broome Bridge Architectural Heritage Impact Assessment which provides a separate AHIA for Broome Bridge prepared by Blackwood Associates Architects and Building Conservation Consultants.

10. H S REILY BRIDGE

Built heritage reference in EIAR: BH-140

ITM grid reference: 712555, 737395

10.1 Historical summary

In the eighteenth century the route out of the city along Prussia Street led to Cabra and onward over Cardiffs Bridge on the River Tolka and onward toward Ratoath. The presence of the road necessitated the construction of a bridge over the canal, though it was probably not expected to carry large amounts of traffic and hence was modest in width. The alignment of the road was modified to a minimal extent, necessitating sharp bends at either side of the canal bridge to ensure that the bridge crossed the canal at right angles.

The bridge was named in honour of Henry Stevens Reily, who was one of the largest shareholders of the original Royal Canal Company and who served as a director from the inception of the company in 1789 until 1801.

In the early nineteenth century it was proposed to construct a new road into Meath from Cardiffs Bridge, and this would have resulted in a significant increase in traffic over H S Reily Bridge. However, the route for this road was redesigned to run further to the west.

When the railway was constructed alongside the canal in the 1840s the line was at grade and did not require a railway bridge. A level crossing was provided on the existing alignment of the road to the south of the canal bridge and this crossing was operated manually until 2014, when a new bridge further to the east bypassed H S Reily Bridge and the level crossing, following which the road to the south of the canal bridge was closed off.

10.2 Conservation status

H S Reily Bridge is a protected structure and is included in the record of protected structures for Dublin city under reference 913. The location is “Bridges: Royal Canal, Dublin 7” and the description is “H S Reilly Bridge, Ratoath Road”.

The National Inventory of Architectural Heritage has included H S Reily Bridge under reference 50060125 and has assigned it a Regional significance for its architectural, technical and social interest. The description of the bridges reads “Single-arch humpbacked limestone canal bridge, dated 1792, carrying Ratoath Road on north-south axis over Royal Canal.”

The canal bridge and the former level crossing are listed in the Dublin City Industrial Heritage Record.

10.3 Survey

Figure 127 View eastward toward H S Reily bridge

H S Reily bridge crosses the Royal Canal at Pelletstown and originally carried the R508 Ratoath Road over the canal. In 2014 a new bridge was built across the canal and railway to the east of the old crossing and the former Ratoath Road is now closed on the southern side of the canal. Prior to the closure there was a manned level crossing over the railway to the south of the canal bridge. Immediately to the west of the bridge is the 8th lock, a single-chamber canal lock.

Figure 128 View westward toward H S Reily bridge

Figure 129 Western side of bridge

The bridge spans the canal with an elliptical arch with a low rise to span ratio and with the spring of the arch on the western side of the bridge below ground level. The arch ring is parallel, with cut limestone voussoirs and with raised and dropped keystones. The span is short, without accommodation for a towpath and the ground to the east of the bridge on the northern side is ramped down to allow access back to the towpath eastward of the bridge.

Figure 130 Eastern side of bridge

Figure 131 Abutment on southern side of bridge

The abutments are of limestone ashlar, continuing the ashlar of the canal lock chamber. The vault is of squared limestone, in smaller blocks than those in the abutments, and laid in courses. On the eastern side of the bridge the abutments splay out from the bridge to permit the widening of the canal as it progresses eastward. The splays continue the limestone ashlar of the abutments and rise to the springs of the arches.

Figure 132 Vault on southern side of bridge

Figure 133 Plaque on western side of bridge

On the outer faces of the parapets there are plaques recording the name and date of construction of the bridge and lock. Each plaque reads '1792 / H S REILY / BRIDGE & LOCK'. The plaques are on rectangular limestone blocks with a raised elliptical border. The lettering is crude, the spacing suggesting that the date was an afterthought, while '8th' has been added below the text on the western plaque. The 'R' of Reily has been corrected on the eastern plaque.

Figure 134 Plaque on eastern side of bridge

Figure 135 Southern side of eastern parapet

The parapets on either side of the bridge rise from string courses of dressed limestone that in turn rest on the crown of the arch ring. The parapets turn away from the alignment of the bridge face at either end, terminating in a masonry drum.

Figure 136 Northern end of western parapet

Figure 137 Southern end of western parapet

The parapets are constructed with limestone ashlar, though in places there are repairs that have been roughly carried out with random limestone rubble, as seen in the figure above, at the southern end of the western parapet. The spandrels of the bridge are also constructed with limestone ashlar.

Figure 138 Northern end of western parapet

Figure 139 Inner face of western parapet at northern end

For the most part the parapets are capped with mass concrete copings, though some limestone copings survive in the southern part of the eastern parapet. The circular limestone copings survive on the drums at either end of the eastern parapet. The upper part of the drum at the southern end of the western parapet has been rebuilt with mass concrete.

Figure 140 Inner face of eastern parapet

10.4 Analysis

H S Reily bridge is a relatively simple canal bridge that survives relatively unchanged since its construction in 1792, except for damage and reconstruction of sections of the parapets and their copings.

10.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

10.6 Mitigation

No mitigation necessary.

11. LONGFORD BRIDGE

Built heritage reference in EIAR: BH-145

ITM grid reference: 710933, 737443

11.1 Historical summary

As part of the design of the Royal Canal a double lock was required at Ashtown to bring the level of the canal down. It was also necessary to provide a bridge to carry Ashtown Road over the canal. For reasons that are unclear today it was decided to locate the lock to the east of Ashtown Road rather than to the west, which necessitated either the construction of substantial ramps to bring the road over the canal on its original alignment or diverting the road to cross the canal at its lower level to the east of the lock. It is possible that this occurred not through rational choice but through bad planning. Peter Clarke relates how the Royal Canal Company saved money by not engaging a resident engineer, relying instead on the consultant engineer, Richard Evans, who was preoccupied with the construction of the Boyne Navigation at Navan during the critical first two years of the construction of the Royal Canal from 1790, with the result that many bad decisions were made and, in several places, completed work had to be demolished and rebuilt.[40] Longford Bridge at Ashtown was one of the bridges constructed in this period, being completed in 1792 and the location of the lock may have been determined without an assessment of the consequences.

The original diversion of Ashtown Road is plainly visible on the first edition of the Ordnance Survey's six-inch map, published in 1843, shortly prior to the construction of the Midland Great Western Railway's line along the southern bank of the canal. It was probably at this time that a more direct route from Navan Road to the level crossing at Ashtown was laid out and this is visible on the second edition Ordnance Survey six-inch map, published in 1871. The original Ashtown Road survives as the road leading southward to the gate of Ashton House and, to the south, the present line of Mill Lane.

11.2 Conservation status

Longford Bridge is on the boundary between Fingal and Dublin city and is in the records of protected structures of both planning authorities. The entry for Dublin city is under reference 907, where the address is given as "Bridges: Royal Canal, Dublin 7" and the description is "Ashtown Road". The record of protected structures for Fingal includes the bridge under reference 693 with the description:" late 18th century single-arched stone road bridge over Royal Canal at Ashtown train station.

The National Inventory of Architectural Heritage has included the bridge under reference 11362066 and has assigned it a Regional significance for its architectural, technical and social interest. The description of the bridge reads:

> Single-arch humpbacked canal bridge, built 1792, carrying Ashtown Road over Royal Canal.

[40] Clarke, pp. 38-41.

11.3 Survey

Figure 141 View northward along Ashtown Road toward bridge

Longford Bridge carries Ashtown Road over the Royal Canal at Ashtown. There is no railway bridge at this location as the crown of Longford Bridge is at a similar level to the track on the railway. The level crossing that carries Ashtown Road over the railway is manually operated.

Figure 142 View southward along Ashtown Road over bridge

Figure 143 View of Longford Bridge from the east

Longford Bridge is a masonry-arch bridge and is located immediately to the east of the 10th lock of the Royal Canal. The bridge deck is comparatively narrow, allowing two lines of vehicular traffic, but without space to accommodate footways. For this reason a separate cable-stayed steel footbridge has been erected close to Longford Bridge on the eastern side.

Figure 144 View of Longford Bridge from the west

Figure 145 Western face of Longford Bridge

Longford Bridge has an elliptical arch. This is less obvious from the western side, as the spring of the arch is obscured by the coping stones on the edge of the canal lock and the arch resembles a segmental arc. The walls of the canal beneath the bridge are parallel and the spring of the arch is horizontal, though it is more visible from the eastern side, where the elliptical shape is more apparent. The arch ring is parallel and is comprised of dressed limestone voussoirs with a raised keystone. The spandrels and parapet are constructed with squared limestone rubble and are separated by a projecting string course of dressed limestone. On the western side of the bridge steel cables are anchored into the masonry; these are part of a system for opening and closing the lock gates by means of winches.

Figure 146 Eastern face of Longford Bridge

Figure 147 Abutment and spring of arch on southern side

Beneath the bridge arch the abutment is constructed with limestone ashlar in courses of varying heights; this is a continuation of the walls on either side of the canal lock. The soffit of the arch is comprised of squared limestone rubble laid in relatively slender courses, commencing at the spring of the arch and progressing upward.

Figure 148 Abutment on eastern side of bridge

To the east of the bridge the walls of the canal splay outward and are constructed with limestone ashlar in courses of varying height. The coursing of the walls of the lock and abutment are carried through, though sometimes with two courses in the splayed wall taking the place of a single course in the abutment.

Figure 149 Plaque on eastern side of bridge

At the centre of the outer face of each parapet there is a rectangular block of limestone on which is an elliptical frame in relief, within which is the legend “1792 / Longford / Bridge & Lock / R Evans Engineer”. The plaque on the western side is more worn than that on the eastern side.

Figure 150 Plaque on western side of bridge

Figure 151 Northern end of western parapet

The bridge parapets are of squared limestone rubble and are capped with copings of dressed limestone. The parapets rise to a crest at the crown of the bridge. At each end the parapets curve away from the road and are terminated with a drum of limestone rubble with a disk-shaped capstone. At the southern end of the bridge the deck has been raised on the approach to the level crossing, burying much of the height of the parapets. The parapet on the eastern side of the bridge has been raised by the laying of new masonry on top of the original copings and adding new copings of dressed limestone.

Figure 152 Raised parapet at southern end of eastern side

11.4 Analysis

Longford Bridge is a bridge of modest size as it crosses the canal immediately adjacent to the 10th lock, where the canal is well below the level of its banks and hence the bridge did not need to be raised above ground level with significant approach ramps. The short span of the bridge between the walls of the lock also reduced the height of the arch. Along this stretch the canal is running along the contour with the adjacent land falling away to the north and rising to the south. For this reason, the road rises in its run southward toward the bridge.

Level of the canal below ground is not as great as in some other locations and hence it was necessary for the bridge to bring the road above the prevailing ground level by means of an elliptical arch, resulting in a hump in the bridge deck. This hump has been reduced on the southern side to bring the road up to the level crossing, with the result that the parapets were partially buried.

11.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The bridge is to be closed to vehicular traffic with a resultant significant positive impact.

11.6 Mitigation

No mitigation necessary.

12. RANELAGH BRIDGE

Built heritage reference in EIAR: BH-152

ITM grid reference: 709027, 738193

12.1 Historical summary

Ranelagh Bridge carried a minor road over the Royal Canal. In the eighteenth century the main road from Dublin to Dunboyne and on through Meath and beyond led through Castleknock and Blanchardstown. A spur running northward from a point on the main road to the west of Castleknock led to large houses in substantial demesnes at Abbotstown, Hillbrook and Elm Green, as well as serving the local area in the vicinity of those houses.

The bridge was named in honour of Charles Jones, 4th Viscount Ranelagh, who was one of the original subscribers to the Royal Canal Company in 1789, though his investment was relatively modest. He served as director of the company from its inception in 1789 until 1795 and he died in 1798.[41]

With the construction of the Midland Great Western Railway in the mid-1840s a second bridge was erected to the south of Ranelagh Bridge to carry the road over the new railway. When the junction between the M50 motorway and the N3 national primary road was being constructed in the mid-1990s the section of road that passed over Ranelagh Bridge was extinguished, and the railway bridge was demolished. Ranelagh Bridge was retained as a pedestrian bridge over the Royal Canal within a public park in the midst of the motorway junction.

12.2 Conservation status

Ranelagh Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0694. The description is “Late 18th century single-arched stone road bridge over Royal Canal, just before crossing over M50 (original road over of Dunsink Lane now re-routed and this part closed off)”.

The National Inventory of Architectural Heritage has included Ranelagh Bridge under reference 11354004 and has assigned it a Regional significance for its architectural and technical interest. The description of the bridges reads “Single-arch humpback road bridge over Royal Canal, c.1810, now pedestrianised.”

[41] Clarke, p. 160, Delany and Bath, p. 317, Burke, p. 629-630.

12.3 Survey

Figure 153 Eastern side of Ranelagh Bridge

Ranelagh Bridge is located in a public park in the middle of the junction between the M50 motorway and the N3 national primary road. The bridge crosses the Royal Canal, which runs through this motorway junction, as does the MGWR railway line between Dublin and Maynooth and, a little to the north, the River Tolka. The space in the centre of a large roundabout is landscaped and serves as a public park, while Ranelagh Bridge provides access across the canal within the park.

Figure 154 Western side of Ranelagh Bridge

Figure 155 Western elevation of Ranelagh Bridge

The bridge spans the canal and its towpath via an elliptical arch. The arch ring is comprised of dressed limestone voussoirs of differing lengths, with a raised keystone rising higher than the adjacent voussoirs. Above the arch ring a string course crosses the bridge on either face, rising to a crest over the keystone, on which it sits, and turning at the outer margin of each spandrel to run a short distance into the wing walls.

Figure 156 Eastern elevation of Ranelagh Bridge

Figure 157 Barrel of the vault beneath the bridge, on the northern side

The bridge abutments are faced with limestone ashlar, while above the spring of the vault the masonry is of smaller blocks of calp limestone, squared and laid in courses. The ashlar of the abutments continues around to the faces of the bridge.

Figure 158 Base of abutment and spring of the arch at the south-west corner

Figure 159 Northern wing wall on western side of bridge

Beyond the arches the bridge is flanked by wing walls that run at an angle to the canal, serving as retaining walls to hold back the embankments on either side of the canal. The wing walls are battered, and the full thickness of the walls is displayed at the ends of the wings, which are squared. The wing walls descend from the full height of the parapets to a lower level at the ends of the wings.

Figure 160 Southern wing wall on western side of bridge

Figure 161 Northern wing wall on eastern side of bridge

The wing walls are constructed with squared calp limestone rubble laid in courses, with two courses abutting each single course of the ashlar where they meet the abutments

Figure 162 Southern wing wall on eastern side of bridge

Figure 163 Parapet on western side of bridge

The parapets are constructed of squared calp limestone laid in courses. Parts of the parapets are capped with mass concrete, while some dressed limestone copings remain in place. The parapets rise to a gentle crest in the centre of the bridge.

Figure 164 Crown of western parapet

Figure 165 Plaque on western side of bridge

On the outer face of the bridge on the western face is a plaque, consisting of a rectangular block of limestone with a raised elliptical border in which is inscribed '1792 / RANELAGH / BRIDGE'. There is no plaque on the eastern face and it appears that the upper part of the eastern parapet has been rebuilt, it being probable that there was a plaque on that side originally.

Figure 166 Southern abutment of former railway bridge

The MGWR railway line runs close to the Royal Canal on its southern side and while the railway bridge is no longer extant, the southern abutment remains in place. The top of the abutment has a covering of ivy, and it appears that this ivy may cover surviving sections of the parapets. The abutment rises vertically, suggesting that the railway bridge had been a beam bridge, rather than a masonry arch.

12.4 Analysis

Ranelagh Bridge is an attractive and useful feature in the park, despite the surrounding roads, most of which are elevated on concrete flyovers. The bridge has managed to retain its essential character and most of its original fabric, with the exception of limited sections of the parapets.

12.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

12.6 Mitigation

No mitigation necessary.

13. TALBOT BRIDGE (OBG9)

Built heritage reference in EIAR: BH-153 and BH-154

ITM grid reference: 708714, 738164

13.1 Historical summary

The road from Dublin to Navan was one of the first in Ireland to be established by act of parliament, in 1729, to be a turnpike road, operated by a turnpike trust and on which users would be required to pay a toll. That road ran along Blackhorse Lane, skirting Phoenix Park, and running through the village of Castleknock before crossing the Royal Canal at Granard Bridge.

A new act of parliament passed in 1796 recognised that the "road leading from Blanchardstown to Glasnevin is very narrow and out of repair". To address this problem the act provided that the turnpike trust would have the authority to negotiate with the directors of the Royal Canal, which was then under construction, to widen the towpath alongside the canal to provide a new alignment for the road. The act also gave the trustees the authority to acquire land to lay out a new alignment of the road "in all cases where the road between Dublin and Navan shall be shortened".[42]

The trustees for the Navan Road favoured the option to provide a new alignment, rather than running alongside the canal and had a proposal drawn up, but they were unable to proceed due to lack of funds. It wasn't until twenty years later, in 1817, that the trustees felt that they were in a position to service a loan sufficient to carry out the works. The loan from public funds was approved by the Lord Lieutenant in February 1818 and work commenced on the laying out of a new alignment of the Navan Road.[43]

The new road was laid out to run in an almost straight line from Cabra to Blanchardstown. The only significant deviation from this alignment was on the approach to the Royal Canal, where the road ran somewhat to the south of the optimal alignment before turning through a broad sweep to approach the canal at right angles, turning back on to its original alignment on the northern side of the canal. This deviation was adopted to ensure that the road did not cross the canal at an angle. Talbot Bridge was built as part of the construction of the new alignment of the Navan Road.

13.2 Conservation status

Talbot Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0695. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal at 12th Lock."

The National Inventory of Architectural Heritage has included the bridge under reference 11354003 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge refers to it as a "single-arch ashlar granite and limestone humpback rad bridge over canal, built 1819."

[42] 36 Geo III, c.59, 1796, sections 57, 58 and 59.
[43] Broderick, pp. 138-140.

13.3 Survey

Figure 167 Western face of Talbot Bridge

Talbot Bridge formerly carried the Navan Road over the Royal Canal at the 12th lock. Being close to the lock on the lower side, the water level is well below ground level at this point and the road crosses with minimal rise. On the western side of the bridge the canal is still as narrow as the lock and the span of the bridge is short. The arch on this side is shallow segmental, the parallel arch ring having cut limestone voussoirs with the keystone projecting slightly. Above the arch ring is a string course of dressed limestone. The parapet is constructed of limestone ashlar, in large blocks that span the thickness of the wall.

Figure 168 Western face of Talbot Bridge

Figure 169 Eastern side of Talbot Bridge

The walls on either side of the canal splay out on the eastern side of the lock and the bridge spans this splay. The eastern span is significantly wider than the western and the bridge is formed with two separate arches, the crown of the eastern arch rising above that of the western arch. The eastern arch is segmental and springs from platforms on top of the splayed canal wall, rather than having an angled spring. The arch ring is similar to that on the western side, having parallel voussoirs of dressed limestone. There are protecting corbels below the spring of the western arch to carry the centring for the bridge, but not on the eastern arch, which would have used the shelf of the canal wall to support the centring. The spandrels on the eastern side of the bridge are constructed with squared limestone blocks, not brought to courses. The bridge has been widened on the eastern side with the addition of a concrete beam bridge alongside the arch, on which the parapet is also of concrete.

Figure 170 Eastern side of Talbot Bridge

Figure 171 Parapet on western side of Talbot Bridge

The parapet on the western side of the bridge is short, in accordance with the span of the bridge. It is capped with limestone copings that rise in straight lines, turning in an arc at the crown. The southern end of the parapet has been rebuilt.

Figure 172 Plaque on western side of Talbot Bridge

There are limestone plaques on either side of the western parapet of the bridge bearing the name Talbot Bridge. The stone has weathered badly, and the date is difficult to read, but it appears to record the date as 1819.

Figure 173 Wall between eastern and western sections of bridge

The western section of the bridge is in use as a pedestrian bridge and is separated from the road and the eastern part of the bridge by a wall. The wall is built with limestone rubble brought to courses. The wall is not in good condition and has been heavily repaired with sand and cement mortar. The northern section has been rebuilt with concrete blockwork. The wall is capped with sand and cement.

Figure 174 Dividing wall and western part of bridge

On the side of this wall that faces the road there is a strip of grass retained by concrete kerbing. The road level is higher than the deck of the western section of the canal bridge.

Figure 175 Road deck of bridge seen from the north

The roadway crossing the bridge is broad, though in part this is the result of road widening in the twentieth century. It is clear that in its original form the bridge was wider than most of the original canal bridges and the later railway bridges built in line with the canal bridges. The road is no longer a through road for vehicles, though there is a pedestrian bridge crossing the M50 motorway to the south of the bridge over the railway and canal. The separation between the canal bridge and the railway bridge is of the order of 25 metres, sufficient to allow space for a hotel and a large car park between the railway and the canal.

Figure 176 Road deck of the bridge, seen from the south

Figure 177 Western side of bridge over railway

The bridge over the railway on the Old Navan Road is a beam bridge. The present deck is of concrete. It rests on abutments of rock-faced squared limestone, the upper section of which has been augmented with concrete. On the eastern side of the bridge the abutments have been widened with concrete, with faux quoins moulded into surfaces. The additional width is greater on the southern side as the widening of the bridge was in part carried out to reduce the bend on the approach road, making the eastern side of the bridge into a skew bridge. The parapet on the eastern side is of concrete panels.

Figure 178 Eastern side of bridge over railway

Figure 179 Western parapet of railway bridge

The parapet on the western side of the railway bridge is a more recent replacement in mass concrete, moulded to suggest coursed masonry.

Figure 180 Eastern parapet of railway bridge

The road-side parapet of the railway bridge on the eastern side is faced with fair-faced concrete blockwork.

13.4 Analysis

The historical summary has shown that Talbot Bridge was built in 1818-1819 to serve the new road being laid out between Cabra and Blanchardstown as part of the Navan Road turnpike. Hence it is not part of the original series of bridges built by the Royal Canal Company.

The bridge is unusual in a number of ways. The most striking factor is that it was built partly over the lock chamber and partly over the splay in the walls of the canal lock as the canal exits from the lock on the downstream side. This resulted in the need for a varying span of the arch, the solution to which was to build two separate arches, one with a very short span and the other with a much greater span, the latter springing from platforms on the splayed walls of the canal.

A second difference from other bridges is the separation of the deck into two sections divided by a wall. The western section gives access to the island between the railway and the canal, though this could have been achieved via a ramp down from the road to the south of the canal, as is the case now with the access to the hotel and its car park. The eastern section is the public roadway that was the Navan Road.

One question that might arise is whether the two arches of the canal bridge were built at different times, one as the original bridge and the other to widen the bridge. This does not seem likely. The first edition of the Ordnance Survey's six-inch map was published in 1843, twenty-four years after Talbot Bridge was built and it shows the bridge to have a reasonable width, while the 1907 edition of the 1:2500-scale map shows the bridge as having the same width. As the latter map is at a larger scale it clearly shows the two sections of the bridge, with the western section crossing the canal only, while the larger eastern section crosses both canal and railway. A further indicator that the two canal bridge arches were present in 1843 is the notation of heights above sea level on the map, which show a height of 187 feet at the "Bottom of Lower Keystone". Usually, the keystones on either side of a bridge would be at the same level and the fact that the map specifies the lower keystone shows that the crowns of the arches on either side of the bridge were at different levels.

The vertical abutments of the railway bridge indicate that the bridge was built as a beam bridge rather than an arched bridge. This is most unusual amongst the original bridges on this line and, indeed along any railway built in the 1840s where the expense of beam bridges was only incurred where the span was such that a single arch was not possible and multiple arches were impractical. It must raise a question as to whether this bridge was rebuilt at some period. It is notable, and very obvious, on the 1907 Ordnance Survey map that the railway bridge crossed the railway at right angles but was not aligned on the canal bridge, such that vehicles crossing the railway bridge would make a left-hand turn and then immediately straighten up back to the right over the second bridge. This would be a dangerous feature with motorised traffic, with the greater speeds leading to a tendency to cut the corners. Probably for this reason as much as for road widening the bridges were effectively turned into skew bridges by adding concrete beam bridges on the eastern sides of the bridges so as to align the two decks.

Whether or not the stone abutments of the railway bridge are original and date from the 1840s, the deck is clearly of a later period and rests on concrete additions to the top of the stone abutments. The bridge is not of particular architectural heritage significance, the abutments being the only survivor from an earlier period.

The unusual layout of the canal bridge means that the road does not approach near to the western arch and the western deck of the bridge, while on the eastern side the bridge has been widened with a concrete beam and the parapet is also of concrete.

It was noted above that there is a separation of some twenty-five metres between the railway bridge and the canal bridge. This is an adequate distance to ensure that any works to the railway bridge will have no direct impact on the canal bridge, which is a protected structure.

13.5 Predicted impacts

Predicted direct construction impacts:

The deck of the railway bridge on the Old Navan Road is to be raised and the parapets increased in height.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

13.6 Mitigation

No mitigation necessary and the impact will not be significant.

Also see Appendix A21.6 Castleknock Bridge Architectural Heritage Impact Assessment which provides a separate AHIA for Castleknock Bridge (Talbot Bridge) prepared by Blackwood Associates Architects and Building Conservation Consultants.

14. GRANARD BRIDGE (OBG11)

Built heritage reference in EIAR: BH-156 and BH-157

ITM grid reference: 708418, 738096

14.1 Historical summary

Castleknock Road was part of the main road leading from Dublin to Navan and onward toward the north. The route skirted the northern side of Phoenix Park, along Blackhorse Avenue, and passed through Castleknock and Blanchardstown on its way northward. This road was of such importance that it was one of the first in the country to be declared a turnpike by act of parliament, in 1729, with the establishment of a turnpike trust charged with the responsibility for the upkeep and improvement of the road and its bridges. Funds for this purpose were to be raised by means of tolls collected from those using the route at toll gates or turnpikes, established at intervals along the route.

By the end of the eighteenth century the turnpike trust was having difficulty keeping the road between the city and Castleknock in good repair and, furthermore, it was narrow and winding. This was recognised by parliament and a new act was passed in 1796 authorising the trustees of the Navan Road to construct a new alignment of the road. Due to difficulties in raising the necessary funds this project did not go ahead for more than twenty years and finally, in 1818, the present Navan Road was laid out as a more direct, straighter and wider route. The original route was not closed off and remains in use, combined with the traffic that passes along Chesterfield Avenue through the Phoenix Park and which meets the former Navan Road, now Castleknock Road, just outside the park gates.

At the time that the Royal Canal was constructed through the Castleknock area in the 1790s Castleknock Road was still a turnpike road. The Royal Canal Company provided a new bridge to carry the road over the canal and named it in honour of the earl of Granard, who was a major shareholder in the company and who served as director from the time that the company was founded in 1789 until 1803.

The construction of the Midland Great Western Railway in 1846-47 necessitated the addition of a new bridge to the south of Granard Bridge. The road did not meet the canal at a right angle, though the difference in angle was small and the resulting bend in the road on the southern side of the canal bridge was slight. The additional of the railway bridge in line with the canal bridge would have increased the bend in the road significantly and to avoid this the railway company ran the new bridge across at an angle to the railway as a skew bridge.

14.2 Conservation status

Granard Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0696. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal at Castleknock Train Station."

The National Inventory of Architectural Heritage has included the bridge under reference 11354002 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge refers to it as a "single-arch ashlar granite humpback road bridge over canal, built c.1810."

The adjacent railway bridge is not included in the record of protected structures or in the NIAH but is very close to the canal bridge.

14.3 Survey

Figure 181 Western side of canal bridge

The canal bridge is a masonry arch bridge carrying Castleknock Road over the Royal Canal. The canal narrows as it approaches the bridge on either side, leaving room for just one boat to pass beneath at a time. The towpath passes beneath the bridge on the southern side of the canal. Adjacent to the towpath on the western side of the bridge a ramp descends through a gentle gradient, carrying a pedestrian and vehicular access to Castleknock railway station. On the eastern side a steeper, narrower path descends to give access to and from the towpath. The road is embanked on each approach to the bridge, rising about two metres to the crown of the bridge. The railway lies to the south of the canal and the railway bridge is separated from the canal bridge by a high embankment, with a distance of little more than twenty metres between the faces of the abutments of the two bridges.

Figure 182 Eastern side of canal bridge

Figure 183 Western face of canal bridge

The arch of the canal bridge is elliptical, with a block and start arch ring of chamfered granite voussoirs. On the western face the spandrels are of squared limestone rubble with small brick-sized stones. There is some failure in the pointing on this side, with one stone missing. The spandrels on the eastern face of the bridge are of limestone ashlar. Above the spandrels a string course of dressed limestone projects, resting on the keystone. The parapet above the string course if of limestone ashlar, the stone being darker than that on the eastern spandrels. On the western side a metal pipe emerges from the wing wall and slopes upward, turning horizontally to cross the bridge at the level of the string course and supported on steel set into the masonry. The northern end of the pipe is concealed behind a dense growth of ivy. On the eastern face a metal pipe emerges from the wing walls and crosses in a straight line, just below the crown of the arch; this is supported by hangers suspended from projecting steel brackets.

Figure 184 Eastern face of canal bridge

Figure 185 Soffit of bridge on northern side

The face of the abutment beneath the arch is of limestone ashlar. At the spring of the vault the masonry changes to small, squared limestone blocks laid in courses.

Figure 186 Plaque on western face of bridge

Set into the parapet on the western face of the bridge is a rectangular limestone block with an oval plaque standing proud of the surface. The plaque is badly worn, with part of the face missing, but enough of the inscription survives to discern the words "1792/GRANARD/BRIDGE/Richd Evans Engr." On the eastern face of the bridge there would have been a similar plaque, now missing and replaced with a rectangle of concrete, apparently dating from the time that the steel bracket was inserted to support the pipe that crosses the arch.

Figure 187 Southern wing wall on western side of canal bridge

The wing wall to the south of the canal on the western side of the bridge curves from the spandrel and runs alongside the towpath for a distance. This is in similar small limestone blocks to that seen in the spandrels on this side of the bridge, while above this wall the parapet of the bridge turns to run down alongside the ramp, terminating in a small pier that does not run down below the string course.

Figure 188 Wall between towpath and ramp to railway station

Beyond the pier the wall continues as a retaining wall to the ramp, with masonry that differs from that in the wing wall, being constructed with large limestone rubble blocks and capped with a soldier course of rough limestone slabs.

The wing wall and any continuation of it on the northern bank of the canal on the western side of the bridge is not visible due to vegetation overgrowth.

Figure 189 Wing wall on northern side of canal to the east of the bridge

On the eastern side of the canal bridge the northern wing wall joins to the spandrel with a curve, though there is a change in character of the masonry, the regular limestone ashlar giving way to smaller squared limestone blocks, though not as small as those on the ramp to the station. Above the wing wall is a parapet wall similar to that seen on the station ramp, with a string course of limestone topped by a wall of limestone ashlar. This is capped with large, dressed limestone copings with rounded arrises. The parapet terminates in a small pier that does not extend below the string course. The wing wall on the southern side is similar to that on the northern side, while beyond it a retaining wall continues to allow for the ramp down to the towpath. This retaining wall has a rounded capping of sand and cement.

Figure 190 Wing wall and retaining wall on southern side of canal to the east of the bridge

Figure 191 Parapet of canal bridge on western side

As noted above, the parapets of the canal bridge are capped with large copings of dressed limestone with rounded arrises on the upper surface. The parapets crossing the bridge turn through curves at either end to continue along the wing walls.

Figure 192 Parapet of canal bridge on western side

The tops of the parapets rise in straight lines, in contrast to the bridge deck, which curves through the crown. As a result, the parapets have shallow points at the crown of the bridge.

Figure 193 View of railway bridge from Castleknock station

The railway bridge carries Castleknock Road over the railway to the south of the canal bridge and to the east of Castleknock station. The station platforms extend eastward to points relatively close to the bridge on either side of the track. The view of the bridge below is seen from the pedestrian bridge in the station.

Figure 194 Railway bridge

Figure 195 Eastern face of railway bridge

The railway bridge has a three-centred arch spanning the two tracks. The parallel arch ring is composed of chamfered dressed limestone voussoirs rising from chamfered limestone quoins in the abutment. The spandrels are of squared limestone rubble and are flanked by projecting piers of squared limestone, with the quoins of the abutment running back to meet the piers. Metal pipes pipe crosse each side of the bridge, the pipe on the western face cranking up to cross at the crown of the arch ring.

Figure 196 Oblique view of western face of railway bridge

Figure 197 Abutment and soffit of bridge on northern side

Castleknock Road turns slightly, the bend being between the two bridges. As the railway is parallel to the canal this bend results in the railway bridge crossing at an angle of approximately fifteen degrees off a right angle. To cater for this angle the bridge was built with a rifled or skew vault. The abutment rises from the track with squared limestone rubble brought to courses that match the heights of the quoins. From the spring of the vault the masonry is of small, squared limestone laid to a twist so as to ensure that the courses of stonework meet the arch ring at right angles. The voussoirs are relatively long and are coursed, coinciding with the coursing of the stonework in the vault.

Figure 198 Abutment and soffit of bridge on southern side

Figure 199 Southern abutment and pier on western side of railway bridge

On each side of each abutment of the railway bridge a simple pier of rectangular section projects from the masonry adjacent to the quoins in the lower part of the arch. These piers rise to parapet level, where they are capped with copings similar to those on the parapets. The piers are constructed with squared limestone.

Figure 200 Northern abutment and pier on eastern side of railway bridge

Figure 201 Wing wall to north of railway bridge on western side

The ramp to the railway station runs to the north of the railway bridge on its western side and a wing wall runs from the bridge to retain this ramp. The wing wall is faced with squared limestone rubble brought to courses and is capped with large, squared limestone blocks.

Figure 202 Retaining wall to north of railway bridge on western side

To the north of the railway bridge the ramp leading to the bridge is supported on the western side by a high retaining wall of limestone rubble, stiffened with buttresses of squared limestone that rise to road level. Above this retaining wall is a wall that abounds the roadway and which is built with limestone rubble and capped with a course of rough limestone slabs set vertically.

Figure 203 Parapet of railway bridge on western side

The parapets of the railway bridge are constructed of squared limestone rubble brought to courses and capped with large blocks of squared limestone. This coping runs out to form capping to the piers on either side of the bridge arch.

Figure 204 Parapet of railway bridge on eastern side

14.4 Analysis

While in some cases along the line of this railway and canal the railway bridge has clearly been built onto the canal bridge, in effect creating a single, two-arched bridge built in two phases, in this instance there is no physical connection between the two bridges, and they may be treated as separate structures. With the coming of the railway the ramp leading up to the bridge on the southern side was removed and the railway bridge erected in its place. The only impact on the canal bridge appears to have been the removal of the ramp.

The record of protected structures is clear in its description that the canal bridge is protected, while there is no reference to the railway bridge. Similarly, the NIAH refers to the canal bridge only and, in case of doubt, describes it as a single-arched bridge. The implication is that the railway bridge is not a protected structure.

14.5 Predicted impacts

Predicted direct construction impacts:

The road deck over Granard Bridge will be raised slightly using a lightweight fill.

The arch of the railway bridge is to be removed and replaced with a concrete arch with higher parapets.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Granard Bridge will be altered through the raising of the parapet of the adjacent railway bridge.

14.6 Mitigation

The works to Granard Bridge will utilise a light flexible fill to minimise the possibility of damage to the bridge structure.

The replacement arch of the railway bridge is to be designed and built to a high quality in association with a Grade 1 conservation architect.

15. KIRKPATRICK BRIDGE

Built heritage reference in EIAR: BH-158

ITM grid reference: 706968, 737595

15.1 Historical summary

At Kirkpatrick Bridge the Royal Canal runs through an extremely deep cutting. This cutting caused the canal company great trouble and expense due to the necessary depth and the hardness of the limestone that needed to be quarried out. Costs were minimised by cutting out a narrow channel with insufficient space for two boats to pass and with the towpath provided high above the canal. The bridge is named in honour of Alexander Kirkpatrick, who was a shareholder in the canal company and who served as director from the formation of the company in 1789 through to 1804.[44]

The railway did not need to be at the same low level as the canal and was constructed in the 1840s at ground level. As a result of the depth of the canal cutting and the ground-level railway there is hardly any change of levels when crossing the canal bridge.

15.2 Conservation status

Kirkpatrick Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0697. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal at Coolmine Train Station."

The National Inventory of Architectural Heritage has included the bridge under reference 11351032 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge refers to it as a "single-arch stone road bridge over river (sic), built 1795, with ashlar parapet walls, cut stone keystones and voussoirs, having stone date and name plaques."

[44] Delany and Bath, p. 317.

15.3 Survey

Figure 205 Kirkpatrick Bridge and level crossing seen from the north

Kirkpatrick Bridge carries a local road across the Royal Canal at grade, the canal being in deep cut, obviating the need for a hump in the bridge. Close to the bridge on the southern side the railway passes at ground level, with a level crossing to close the road. There is a substantial drop to canal level beneath the bridge. Kirkpatrick Bridge is relatively narrow, being wide enough for two-way traffic, but not a footway. Pedestrians cross the canal by means of a steel bridge running parallel to the canal bridge on the eastern side.

Figure 206 View down to canal from bridge

Figure 207 Western side of Kirkpatrick Bridge

The canal bridge has a high segmental arch rising from abutments. The arch ring is parallel with hammer-dressed limestone voussoirs with chamfered margins, except at the intrados. The masonry of the spandrels and wing walls is of squared rock-faced limestone rubble in relatively small stones, brought to courses of varying height. The faces of the bridge are very overgrown with ivy.

Figure 208 Eastern arch of Kirkpatrick Bridge

Figure 209 View down eastern side of arch and abutment

The figures above and below show the eastern face of the bridge, with sections of the arch ring, the spandrels and the parapet visible.

Figure 210 Eastern keystone and parapet

The keystone is nested, rising higher than the parallel arch ring and projecting forward, while those on either side are of intermediate height and projection. The keystone is visible in both of these figures.

Figure 211 Abutment and vault beneath bridge

The canal is cut out of solid limestone and the canal banks rising on either side are cut into the stone. Beneath the arch the greater part of the two abutments is comprised of bedrock, cut back to the faces of the abutments. Only in the upper section of the abutments is the top surface of the rock evened off with blocks of squared limestone. Above the spring of the vault the stonework is of squared limestone rubble of modest size laid in courses of varying height.

Figure 212 Detail of abutment and vault beneath bridge

Figure 213 Eastern parapet

The parapets of Kirkpatrick Bridge on either side of the road are constructed with three courses of rock-faced limestone ashlar. The parapets were originally capped with large blocks of squared limestone and this survives in many parts of the parapets, while in some places the copings have been replaced with concrete and in one place by newer limestone copings.

Figure 214 Detail of western parapet

Figure 215 Roadside plaque on eastern side of parapet

The name of the bridge is carried on plaques set on both sides of each parapet. Those on the outsides of the parapets are not sufficiently visible for the inscription to be read due to the overgrowth of ivy. Those that face the road are comprised of elliptical plaques of dressed limestone bearing the legend “1795 / Kirkpatrick / Bridge / R^{d} Evans Eng^{r}”. Each plaque is held in a rectangular frame comprised of four corners of a rectangle, with an elliptical moulding on the inner margins, while the surfaces of the stones are decorated with radial lines running out to the edges. The bases of these two stones are partly buried in the road surface.

Figure 216 Roadside plaque on western side of bridge

15.4 Analysis

Kirkpatrick Bridge is little appreciated because of its low profile. On the road it is visible through the presence of its parapets, which narrow the road. Unlike most canal bridges there is no broad towpath running along the canal side and beneath the bridge, while the deep cut of the canal also minimises the size of the bridge through the elimination of approach ramps and the reduction in the extent of wing walls. The dense growth of ivy on both sides of the bridge and the presence of trees along the banks of the canal further reduce the visibility of the bridge. Even those crossing the canal by the adjacent footbridge do not get much of a view of the bridge.

It appears that except for the replacement of the road surface and some repairs to the parapets this bridge has changed little in two and a quarter centuries since it was built. It has a fine arch ring, embellished by the nested keystone and the presence of four plaques, rather than the more usual two, further adds to the qualities of the bridge.

15.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

Potential damage to the bridge from construction traffic during the construction of the footbridge.

Predicted operational impacts:

The bridge is to be closed to vehicular traffic with a resultant significant positive impact.

15.6 Mitigation

No mitigation is necessary.

16. KENNAN BRIDGE

Built heritage reference in EIAR: BH-160

ITM grid reference: 706088, 737791

16.1 Historical summary

The construction of the Royal Canal necessitated the provision of a bridge to allow a local road between Coolmine and Porterstown to cross the canal. John Taylor's map of the Environs of Dublin, published in 1816, shows the road running south across the bridge and then stopping, suggesting that it may have been an accommodation bridge to access local property only. However, John Rocque's map of County Dublin, published in 1760, shows the road running south to Porterstown and then turning west to Kellystown and Luttrelstown. It is safe to assume that Taylor's map is misleading, and that the road did continue southward.

More intriguingly, Taylor's map gives the name Neville Bridge. This is not an error on the map. The bridge was named in honour of Brent Neville, who was a director of the Royal Canal Company from 1789 to 1798, when the bridge was built. Subsequently, following the dissolution of the original Royal Canal Company and the establishment in 1818 of a new company, John Kennan Jnr became a director of this new company in 1823. Some of the bridges were renamed in the 1820s and there is an obvious difference in style of the rectangular name plaques erected in the 1820s as compared with the elliptical plaques, with dates, erected with the bridges in the 1790s.

When the Midland Great Western Railway was laid out in the 1840s it ran at ground level, whereas the canal was in a cutting and hence the road crossed the railway at a level crossing, without the need for a bridge.

16.2 Conservation status

Kennan Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0698. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal."

The National Inventory of Architectural Heritage has included the bridge under reference 11351004 and has assigned a Regional significance for its architectural, historical and technical interest. The description of the bridge refers to it as a "Single-arch limestone bridge over canal, c.1800, with plaque over arch."

16.3 Survey

Figure 217 View northward towards the level crossing and Kennan Bridge

As noted above, the railway crosses the road by means of a level crossing, with only a slight rise in the road as it crosses. By contrast, there is no rise in the road as it crosses Kennan Bridge as the low level of the canal beneath the road ensures that the bridge provides sufficient clearance for boats on the canal without rising above road level.

Figure 218 View southward across Kennan Bridge toward level crossing

Figure 219 View of Kennan Bridge from the east

The deep cutting for the canal is flanked by sloping banks. At the canal level the canal is of sufficient width to allow two boats to pass, except at the bridge, though not broad enough to allow for a towpath. The towpath is at a higher level, on the side of the sloped embankment, and horses using the towpath would rise up to road level to cross and then continue down the sloping path to the prevailing level of the towpath.

Figure 220 Western side of Kennan Bridge

There are four pattress plates on each face of the bridge, one on each side high up in the spandrel next to the arch ring and the others set back in the spandrel near to its junction with the abutment.

Figure 221 Arch of Kennan Bridge on western side

The bridge crosses the canal with a semicircular arch. A semicircular arch is easier to build than an elliptical arch and is stronger, though this arch shape was usually avoided by the canal company as it rises higher and causes a greater humpback on the road. In this case height was not an issue. The arch ring is parallel and is comprised of limestone voussoirs. The spandrels, abutments and parapets are faced with squared limestone rubble brought to courses. A string course of dressed limestone runs across the bridge just above the arch ring.

Figure 222 Eastern side of Kennan Bridge

Figure 223 Detail of voussoirs on arch ring

The voussoirs are of hammer-dressed limestone with chamfered margins on three sides, the intrados having a plain arris. The keystone is nested, rising higher and projecting forward more than other voussoirs and those that flank it rise and project to an intermediate extent. A detail of the keystone on the eastern side of the bridge is seen in the figure below.

Figure 224 Detail of keystone on eastern side of bridge

Figure 225 Detail of vault on southern side of bridge arch

Beneath the arch the abutments rise with large squared limestone blocks laid in courses. Above the spring of the vault the masonry is similar to that on the faces of the bridge, with squared limestone of more modest size laid in courses. The vault has been heavily repointed with what appears to be sand and cement, and the staining on the masonry suggests that this is sealing in moisture that should have been able to weep out through the lime mortar on the joints.

Figure 226 Detail of vault on northern side of bridge arch

Figure 227 Name plaque on eastern side of bridge

There are name plaques on the outer faces of each of the parapets. These of the rectangular form of plaques that were inserted in the 1820s on bridges that were renamed at that time. Each of the plaques has a raised frame with a scotia moulding on the inner side of the frame. The lettering is in lower case except for the capitalised initial letters. At each corner of the plaque there is a scallop moulding.

Figure 228 Name plaque on western side of bridge

Figure 229 Parapet on western side of Kennan Bridge

The parapets are generally intact and consist of two courses of squared limestone rubble capped with substantial blocks of dressed limestone with rounded upper arrises. The parapets run straight and level across the bridge before curving away from the road and sloping down to terminate a short distance from the road.

Figure 230 Detail of eastern parapet

16.4 Analysis

Kennan Bridge is a relatively simple bridge, with its semicircular arch, which is unusual on this stretch of the canal. The absence of significant wing walls is also unusual. The lack of space for a towpath beneath the bridge is also not normal, though it is seen elsewhere where the canal is in deep cut.

There is some stress on the masonry in the southern spandrel on the eastern side and the dip in the level of the courses suggests some settlement and perhaps some distortion of the arch ring in this location. The mortar between some of the stones in that area has leached out and this may have been a result of the use of sand and cement in repointing the vault, causing build up of water in the abutment and concentrating its exit at weak points in the pointing. Some work has been carried out to stabilise the bridge in the past and this is seen in the four pattress plates on each face of the bridge, indicating the presence of a tie bar to prevent outward movement of the faces of the bridge.

16.5 Mitigation

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

Potential damage to the bridge from construction traffic during the construction of the footbridge.

Predicted operational impacts:

The bridge is to be closed to vehicular traffic with a resultant significant positive impact.

16.6 Mitigation

Protect parapets of bridge from damage and set load limits consistent with the bearing capacity of the bridge.

17. CLONSILLA FOOTBRIDGE

Built heritage reference in EIAR: BH-167

ITM grid reference: 704948, 738125

17.1 Historical summary

The station at Clonsilla opened in 1847, when the line itself was opened. The station was closed in 1963 and reopened in 1981. In the initial years of rail travel footbridges were not generally provided. In some instances, such as where the line was in a cutting, pedestrians were provided with footbridges, but for the most part the lines were crossed at grade, including at stations, much as is the case with the Luas lines in Dublin today.

With increasing speeds of trains hence stopping distances, and with greater emphasis on safety, pedestrian bridges began to be provided later in the nineteenth century. Some were erected in the late 1870s, others in the 1880s, while many date from the early years of the 1890s.

The pedestrian bridge at Clonsilla Station was manufactured by George Smith of the Sun Foundry in Glasgow. This company had been founded in 1858 and became a substantial business by the 1870s before it entered into a decline in the late 1890s and it closed in 1899. This indicates that the bridge dates from the nineteenth century, probably erected in the 1890s.

When first erected the bridge was at the eastern end of the railway station, adjacent to the level crossing. It is probable that it was moved to its present location at the time that the station was prepared for reopening in 1981 and this is also likely to be the time that the height of the bridge was raised.

17.2 Conservation status

The pedestrian bridge over the railway at Clonsilla Railway Station is a protected structure and is included in the record of protected structures for Fingal, along with the signal box at the station, under reference 0707. The description is given as "Mid 19^{th} century signal box and cast-iron pedestrian overbridge at Clonsilla Train Station."

The National Inventory of Architectural Heritage has not included the bridge in its survey.

17.3 Survey

Figure 231 Footbridge at Clonsilla, seen from the east

The pedestrian footbridge at Clonsilla railway station is a late-nineteenth century structure of wrought iron with cast-iron elements. Stairways connect the bridge deck to ground level on either side of the track, both being located on the eastern side of the bridge. The bridge crosses the railway in a single span, with space between the stairways and the edge of the platforms to allow for walkways. The bridge beams are arched at either end such that a short flight of steps rises to the upper deck at each end of the span.

Figure 232 Footbridge at Clonsilla, seen from the west

Figure 233 Foot of stairway at northern side of bridge

Each stairway is comprised of two flights, separated by a half-landing. At the top of the upper flight is a second landing, located on the top of a trestle that supports the upper end of the stairway and one end of the bridge span.

Figure 234 Top flight of stairway and top of trestle

Figure 235 Bridge deck

The bridge deck is comprised of two wrought-iron T-section beams, each of which arches downward at each end. The beams are fabricated in two parts, which are rivetted together in the centre of the span, with a connecting plate crossing the junction. The top rail is constructed in a similar manner, with T-section wrought-iron beams in two halves, rivetted together in the centre, though with the profile inverted with the horizontal flange on the upper surface.

Figure 236 Bridge deck and parapets

Between the top and bottom beams, the sides of the parapets are formed with a lattice of wrought-iron flat bars, each rivetted at the crossing points and rivetted at each end to the main beams, with the diagonals in one direction fixed at one side of the beam and those with the opposite slope on the other side. The parapets are braced at intervals by curved T-section iron braces, each of which is rivetted to a cross beam that continues beneath the deck to support the deck plates and tie the two sides of the bridge together.

Figure 237 Parapet, seen from bridge deck

Figure 238 Outer face of parapet on bridge deck

Figure 239 Braces on outer face of parapet

Figure 240 Plating on bridge deck

The surface of the bridge deck is comprised of a number of cast-iron plates that span between the lower beams on either side. Each plate is curved to provide a camber to throw off rainwater and the surface has an array or raised rectangles with curved ends to ensure that the surface is non-slip. The plates are braced beneath by flanges at either side and cross flanges cast as part of the plate. The side flanges are cast with holes to provide for bolts to secure each plate to the next.

Figure 241 Underside of deck plating

The bridge deck is supported at each end by a trestle comprised of four decorative cast-iron columns, each of which sits on a plain concrete plinth. The columns support and are tied together by cast-iron bracket with pierced decorative spandrels that in turn support the deck and stairway. The ends of the deck beams sit on two of the columns, while the top flight of the stairway also sits on two columns, with decorative brackets in the angle beneath the strings of the stairway.

Figure 242 Trestle on northern side

Figure 243 Cast-iron capital on column of trestle

Figure 244 Cast-iron bracket on trestle

Figure 245 Top landing on stairway

At the top of each stairway is a landing, with the short flight leading off to one side onto the bridge deck. The landings have square-section newels at each corner, three of which are topped by ball finials. The landings are enclosed on two sides by parapets comprised of T-section frames infilled with latticed wrought-iron bars, each rivetted at the ends and at each crossing point.

The deck of each landing is a cast-iron plate similar to those found on the deck above.

Figure 246 Newel at top of stairs

Figure 247 Stairway on northern side of bridge

The stairways on each side of the bridge are comprised of two flights. The lower flight is of mass concrete, forming the front face of a substantial concrete plinth that supports the lower flight and the bottom end of the upper flight. The upper flight spans between this concrete base and the trestle at the end of the bridge deck.

Figure 248 Upper flight of northern stairway

Figure 249 Detail of stair risers

The treads and risers of the upper flights on the two stairways are comprised of cast-iron risers and treads. The risers are pierced with a series of diagonal members, between which are quatrefoils. The upper surfaces of the treads carry the same pattern of raised rectangles as was seen on the deck of the bridge, to provide a non-slip surface.

Figure 250 Detail of stair treads

Figure 251 Parapet on stairway

The parapets on either side of the upper flight are similar to those on the bridge deck, comprised of T-section upper and lower beams infilled with a lattice of wrought-iron flat bars rivetted to the top and bottom beams and rivetted at the crossing points. The lattice bars are set symmetrically in relation to the horizontal, with the intersections in line vertically, rather than being angled with the top and bottom beams.

Figure 252 Parapet on stairway

Figure 253 Manufacturer's plate on newel

The newels at the foot of each stairway carry a cast-iron maker's plate bearing the maker's name, "George Smith & Co".

Figure 254 Manufacturer's name cast into stair riser

Each of the cast-iron risers carries the maker's name on the front of the base, reading "Geo Smith & Co Sun Foundry Glasgow".

Figure 255 Lower flight of northern stairway

The lower flight on each stairway has newels on the second step, to the front of which are short framed panels infilled with lattice work. Above the newels the parapets are similar to those on the upper flights, though not identical. They are fabricated in steel rather than wrought iron and are welded rather than rivetted. At the half landings between the lower and upper flights there are similar steel parapets comprised of an outer frame of T-section steel infilled with latticework.

Figure 256 Landing at top of lower flight

Figure 257 Steps on lower flight

The steps on the lower flights are off mass concrete, which is part of the large mass-concrete base beneath the lower flight.

Figure 258 Bottom of lower flight on northern platform

17.4 Analysis

The footbridge at Clonsilla Station was fabricated in Glasgow and transported to Clonsilla in sections to be erected on site. As was noted in the historical summary, the bridge was originally located next to the level crossing. It was probably moved in 1981, when the station was reopened following a period of closure. The survey has shown that the lower flight sits on a concrete plinth and that this flight is of steel rather than wrought iron, with welding rather than rivets. It is evident that the bridge was raised in height, with the addition of the lower flight, and this probably occurred at the time that the bridge was moved in 1981. The survey noted that the columns of the trestles site on mass-concrete plinths; these plinths are the same height as the concrete base beneath the lower flight and are also part of the additional height.

17.5 Predicted impacts

Predicted direct construction impacts:

Panels are to be fitted beneath the bridge deck to ensure that the overhead cables cannot be reached.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

17.6 Mitigation

There is no opportunity for mitigation other than to produce a photographic record of the bridge prior to the installation of the panels and the overhead cabling.

18. CALLAGHAN BRIDGE

Built heritage reference in EIAR: BH-169

ITM grid reference: 704926, 738136

18.1 Historical summary

The construction of the Royal Canal cut through the existing road leading between Luttrelstown and Clonsilla, necessitating the construction of a bridge. John Taylor's map of the Environs of Dublin, published in 1816, labels the bridge as "Carhampton Bridge". This naming would be logical, as Earl Carhampton was a director of the canal company at the time that these bridges were being constructed, whereas there was no director or shareholder named Callaghan. The Royal Canal Company was dissolved in 1813 and work on the construction of the canal was continued by the Directors General of Inland Navigation. In 1818, following the completion of the construction of the canal a new company was incorporated and one of the directors of that company, who joined the board in 1820, was Ignatius Callaghan.[45] It appears that the bridge was initially named Carhampton Bridge and was renamed Callaghan Bridge in about 1823.

When the Midland Great Western Railway was constructed in the 1840s the levels were such that the railway could run at ground level, rather than in the deep cutting through which the canal ran. As a result, a level crossing was provided adjacent to the canal bridge, the crossing being somewhat lower than the crown of the canal bridge.

18.2 Conservation status

Callaghan Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0706. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal at Clonsilla Train Station."

The National Inventory of Architectural Heritage has included the bridge under reference 11353003 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge refers to it as a "single-arch limestone humpback road bridge over canal, c.1820."

[45] Delany and Bath, pp. 317-319.

18.3 Survey

Figure 259 View northward across level crossing toward Callaghan Bridge

As noted above, the railway crosses the road at grade via a level crossing. The road runs at an angle to the direction of the railway. To the north of the crossing the road rises up to run over the humpback bridge, turning eastward as it does so in order to cross the canal at right angles. To the north of Callaghan Bridge the road turns back onto its original alignment to meet the R132 as it runs through Clonsilla.

Figure 260 View southward along road to Callaghan Bridge

Figure 261 Western side of Callaghan Bridge

The Royal Canal runs through Clonsilla in a cutting that is deep enough that a pedestrian bridge crosses without the need for access ramps while leaving ample headroom over the canal. The towpath runs along the northern bank of the canal and the bridge span is sufficient to allow for the towpath as well as the canal.

Figure 262 Eastern side of Callaghan Bridge

Figure 263 Western arch of bridge

The bridge arch is elliptical with a parallel arch ring comprised of hammer-dressed limestone voussoirs, chamfered at the joints but not at the intrados or extrados. This stonework does not continue down into the abutment as quoins. The keystone rises higher than the other voussoirs and stands proud of the surface. The spandrels, wing walls and original sections of parapet are faced with random limestone rubble, with a poor quality calp limestone. The abutments and wing walls show some degree of coursing, though less so in the spandrels and parapets.

Figure 264 Eastern arch of bridge

Figure 265 Southern wing wall on eastern side of bridge

Being in a cutting, the wing walls of the bridge extend to the full height of the bridge as they run away to the east and west. These walls are joined to the abutments, spandrels and parapets by gentle curves.

Figure 266 Southern wing wall on western side of bridge

Figure 267 Abutment and barrel of arch

Beneath the bridge arch the abutment rises in well-coursed, good quality squared calp limestone. From the spring of the vault the stonework is comprised of slender calp limestone rubble with coursing based more on the shape of the stones than on any formal alignment. The voussoirs return into the vault alternately to key into the masonry of the barrel.

Figure 268 Plaque on eastern face of parapet

On the outer face of the parapet on the eastern side of the bridge is a plaque that carries the legend “Callaghan Bridge”. The plaque is rectangular with a raised frame and scalloped mouldings in the corners. The composition of the stone is uncertain but may be sandstone. There is no plaque on the western side of the bridge.

Figure 269 Eastern parapet of canal bridge

The eastern parapet of the bridge gives an indication of the original form of the parapets, though it is in poor condition. Part of the southern end of the eastern parapet has been rebuilt with concrete blocks. Many of the coping stones are missing and those surviving are of mediocre quality squared limestone blocks. The western parapet appears to have been entirely rebuilt. At the northern end a large section has been reconstructed with concrete blocks and capped with mass concrete. The remainder was rebuilt using rubble limestone and capped with precast concrete copings. The parapets rise with the humpback of the bridge, reaching a maximum height over the crown of the arch.

Figure 270 Western parapet of canal bridge

18.4 Analysis

The survey has shown that the stones used in the construction of the walling of the bridge are generally of poor quality calp limestone. The exceptions are the well-cut voussoirs in the arch rings and the good quality masonry of the abutments beneath the arch.

It is perhaps inevitable that a narrow bridge such as this that is situated on a double bend would be damaged by vehicles. It is unfortunate, however, that some of the repairs to the parapets have been carried out without due regard to conservation techniques or the historic qualities of the bridge.

18.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

The setting of the bridge will be affected and there could be potential damage to the bridge from construction traffic during the construction of the adjacent footbridge.

Predicted operational impacts:

The bridge is to be closed with a significant positive impact for the fabric of the bridge.

18.6 Mitigation

The parapets of the bridge are to be protected from damage and load limits are to be set consistent with the bearing capacity of the bridge.

19. PAKENHAM BRIDGE

Built heritage reference in EIAR: BH-171

ITM grid reference: 703760, 738225

19.1 Historical summary

Pakenham Bridge was built to facilitate a local road that connected the road along the northern side of the River Liffey between Chapelizod and Lucan with a road leading northward from Lucan Bridge. Other local roads also connected into this route across the canal, though none would have carried a substantial amount of traffic. Both John Taylor's map of 1816 and William Duncan's of 1821 label it 'Packenham Bridge'.

When the Midland Great Western Railway was constructed in the mid-1840s the line was almost at grade and a level crossing was provided instead of a bridge over the railway.

19.2 Conservation status

Pakenham Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0711. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal."

The National Inventory of Architectural Heritage has included the bridge under reference 11352002 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge refers to it as a "single-arch limestone humpback road bridge over canal, c.1820, with ashlar parapet walls."

19.3 Survey

Figure 271 View to north-west across railway toward Pakenham Bridge

To the east of Leixlip the Royal Canal turns to run north-eastward, turning again to run eastward toward Clonsilla. Pakenham Bridge crosses the north-eastward section of the canal shortly before the eastward turn. The railway company avoided the tight radius of curvature of the canal by cutting the bend, taking the track away from the canal for a short distance. At Pakenham Bridge the railway has not yet rejoined the canal and the level crossing on the railway is about thirty metres from the canal at this point.

Figure 272 View toward Pakenham Bridge from the south-east

Figure 273 View to north-east toward bridge

Pakenham Bridge crosses the canal and towpath and is flanked by substantial wing walls projecting from the four corners at angles to the bridge. On the northern side of the bridge ramps rise up to road level, the ramp on the eastern side running for a distance from the bridge and separated from the towpath by a retaining wall of limestone rubble.

Figure 274 View to south-west toward bridge

Figure 275 South-western face of Pakenham Bridge

The canal narrows at this point to minimise the span of the bridge and hence its rise. The arch is elliptical, and this arch shape would have been selected as an elliptical arch rises steeply from the springs, in contrast to a segmental arch, thereby allowing greater headroom for horses on the towpath. The arch ring is parallel and is comprised of dressed limestone voussoirs, with a projecting raised and dropped keystone. A string course of dressed limestone projects from each face of the bridge, rising in straight lines to an apex that rests on the keystone.

Figure 276 North-eastern face of Pakenham Bridge

Figure 277 South-western abutment of bridge

The abutments of the bridge are faced with limestone ashlar. Above the spring of the vault the stonework is comprised of smaller squared limestone blocks laid in courses.

Figure 278 Barrel of vault

Figure 279 Wing wall at south-western side of bridge

From the corners of the abutments on the south-eastern side of the bridge the masonry curves away from the bridge abutments, parapets and spandrels to run into the wing walls. On this side of the bridge the wing walls are high and extend a distance from the bridge, serving as retaining walls for the higher ground beyond. The terminals of the wing walls are cylindrical. The top of the south-western wing wall is lacking its coping stones and some of the masonry from the top of the wall.

Figure 280 Wing wall at north-eastern side of bridge

Figure 281 End of north-western wing wall

On the north-western side of the bridge the masonry of the parapets, spandrels and abutments curve around to the wing walls, as on the other side of the bridge, terminating with cylindrical stonework, though to the north-east the wing wall abuts the lower retaining wall alongside the ramp that was noted above. The spandrels of the bridge are faced with squared limestone random rubble.

Figure 282 Detail of spandrel and parapet

Figure 283 Plaque on south-western side of bridge

Cast-iron water mains cross the bridge on either side, just above the string course and following the angles of the string courses to the apex, where there is a valve on each pipe. This valve obscures the view of plaques on the outer faces of the parapets. Each of the plaques consists of a rectangular block of limestone with a raised elliptical border surrounding the text, which reads ‘1792 / PAKENHAM / BRIDGE’.

Figure 284 Plaque on north-eastern side of bridge

Figure 285 Parapet on south-western side of bridge

The parapets on either side of the bridge are constructed with squared limestone blocks laid in courses and capped with copings of squared limestone. At each corner of the bridge the parapets curve away from the road. The parapets are painted in alternating blocks of black and yellow on the sides facing the road. A mass concrete footway crosses the bridge on the south-western side of the road, while a narrow brush kerb runs alongside the north-eastern parapet.

Figure 286 Parapet on north-eastern side of bridge

19.4 Analysis

Pakenham Bridge remains in good condition as a fine example of a canal bridge that is not attached to a railway bridge. There have been few alterations to the bridge, other than some minor repairs where damage has occurred to the parapets. The masonry has been repointed in places. There is some deterioration of limestone blocks due to the poor quality of the stone with a high content of mud.

19.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

Potential damage to the bridge from construction traffic during the construction of the adjacent footbridge.

Predicted operational impacts:

The bridge is to be closed, with a significant positive impact on the fabric of the bridge.

19.6 Mitigation

The parapets of the bridge are to be protected from damage and load limits are to be set consistent with the bearing capacity of the bridge.

20. COLLINS BRIDGE (OBG 13)

Built heritage reference in EIAR: BH-174

ITM grid reference: 702678, 736808

20.1 Historical summary

At the time of the construction of the Royal Canal there was a crossroads at Westmanstown, with a road going northward from Lucan meeting a local road travelling westward across the county boundary from Dublin into Kildare and leading to Confey and beyond. Rather than build two bridges over the canal close together the canal company had the eastern arm of the local road diverted to run along the canal bank to the bridge carrying the north-south route. This road curved around a widened section of the canal, which appears to have facilitated a small harbour. This work was carried out in the 1790s and the canal bridge was built in 1794 and named Collins Bridge in honour of John Collins, one of the shareholders in the company and a director between 1792 and 1798.

When the railway was constructed in the 1840s it was following the southern bank of the canal along this stretch and this necessitated the diversion of the local road again, this time linking it to the north-south route a little further to the south. The widened section of the canal was backfilled such that the canal was now of a more constant width. As this was the closest point of access between the railway and Lucan the company opened Lucan Station on the eastern side of the bridge and the southern side of the railway line in 1847. The station remained open until 1941.

20.2 Conservation status

Collins Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0713. The description is given as "Late 18th century single-arched stone road bridge over Royal Canal."

The National Inventory of Architectural Heritage has included the bridge under reference 11360002 and has assigned a Regional significance for its architectural, artistic and technical interest. The description of the bridge refers to it as a "single-arch limestone road bridge over canal, built 1904, with oval limestone name and date plaque above arch."

20.3 Survey

Figure 287 Eastern face of Collins Bridge

Collins Bridge is a canal bridge on the Royal Canal to the north of Lucan. The bridge spans the canal and its towpath, which runs on the northern side of the canal. On the northern side of the bridge ramps run down to the towpath, ensuring access between the road and the canal.

Figure 288 Western face of Collins Bridge

Figure 289 Eastern face of bridge arch

The bridge arch is elliptical, with a parallel arch ring comprised of dressed limestone voussoirs with chamfered margins. The arch ring terminates at the spring of the arch, without matching quoins on the abutments. The masonry of the spandrels, the wing walls and the parapet on each side of the bridge is continuous, not interrupted by string courses or angles and is formed with coursed squared limestone rubble. There are extensive remnants of harling on the faces of the masonry.

Figure 290 Western face of bridge arch

Figure 291 **Southern wing wall on eastern side of bridge**

The wing walls at each corner of the bridge turn through a gentle arc from the face of the bridge. Each wing wall meets the bridge at full height, with the parapets of the bridge continued onto the wing wall, the top of which descends in a straight line from the bridge. The southern wing wall on the eastern side of the bridge has masonry of very even quality and stone size in the lower section, while the face of the upper section has deteriorated significantly, particularly towards its eastern end. A crack rises through the masonry about 1.5 metres from the free end of the wing wall. The copings on the southern wing wall on the western side of the bridge have been replaced with mass concrete and the western end of this wing wall is separating from the remainder of the wall.

Figure 292 **Southern wing wall on western side of bridge**

Figure 293 View into bridge showing masonry of barrel

Beneath the bridge span the abutment is faced with limestone ashlar, while above the spring of the vault the stonework is smaller and is comprised of rectangular limestone rubble laid in varying courses.

Figure 294 Barrel of vault

Figure 295 Plaque on western face of bridge

On the outer face of each parapet is a rectangular block of limestone with an elliptical frame in relief, within which is the legend "1794 / Collins Bridge / R Evans Eng". The limestone is of very high quality and has resisted weathering over more than 125 years, with the horizontal tooling within the frame still clearly defined, as are the radial tool marks outside the frame and the tooled margins.

Figure 296 Plaque on eastern face of bridge

Figure 297 Parapet of canal bridge on western side

On the western side of the canal bridge the parapet is virtually unchanged since its original construction, except for some small areas of reconstruction and the addition of paint. The parapet along the roadside is horizontal and the slopes commence at the turn into the wing walls. On the eastern side the parapet is largely unchanged, though at the southern end it has been continued southward to join the parapet of the railway bridge. The parapets and wing walls, with the exception of the south-western wing wall as noted above, are capped with dressed limestone copings.

Figure 298 Parapet of canal bridge on eastern side, with railway bridge in distance

Figure 299 Eastern face of railway bridge

The railway bridge spans the double track in a single three-centred arch. The bridge is located at a point where the railway is turning from its south-westerly direction toward a more westerly, to follow the course of the adjacent canal. In the figure above the canal is to the right, separated by an embankment, while in the figure below it is to the left, also behind an embankment. The former Lucan station is seen at the left-hand side of the arch in the figure below.

Figure 300 Western face of railway bridge

Figure 301 Detail of western face of bridge on southern side

The arch ring is parallel and is comprised of voussoirs of dressed limestone with chamfered margins and hammer-dressed faces. Each voussoir returns into the barrel of the arch where they alternate long and short to key in with the masonry of the vault. The voussoirs continue down into the abutments as quoins in the same style. The keystone is not expressed and immediately above it is a string course of dressed limestone.

Figure 302 Detail of arch ring on eastern side of bridge

Figure 303 Spandrel on eastern side of bridge, northern end

The spandrels, parapets, abutments and wing walls are faced with squared limestone random rubble, not coursed, except in the parapets. The pointing is raised above the face of the stonework. Adjacent to the back of the quoins on the faces of the abutment there are piers projecting from the masonry. These are executed in similar style to the other walling and the string course continues through the piers. On the eastern side of the bridge the parapets continue in a straight line to connect with the wall at the side of the approach ramp. On the western side the face of the bridge to the rear of the abutment curves to form wing walls, the tops of which slope downward from the bridge.

Figure 304 Spandrel and pier on western side of bridge, northern end

Figure 305 Barrel of arch of railway bridge

The road crosses the railway at an angle of slightly more than twenty degrees off square. As a result, the barrel of the arch is rifle vaulted to allow for the direction of thrust. The masonry of the abutment beneath the arch is of squared limestone brought to regular courses in line with the quoins. At the spring of the arch there is a distinct horizontal line, above which the masonry is angled to form the twist of the rifle vaulting. The masonry of the barrel between the voussoirs is of rectangular courses of slender limestone blocks in irregular courses.

Figure 306 Detail of vaulting of railway bridge

Figure 307 Parapet on western face of railway bridge

As noted above, the parapets are constructed with squared limestone, brought to courses. These continue down the wing walls on the western side of the bridge, while on the eastern side the northern end of the parapet continues so as to join with the parapet of the canal bridge. The parapets are capped with large limestone copings with hammer-dressed faces and tooled margins. There is a slight overhang of the copings on the outer faces of the bridge, but not on the road side.

Figure 308 Parapet on deck of railway bridge

20.4 Analysis

The canal bridge and the railway bridge both have similar arches, though the scale of the bridges differ, particularly in the span of the railway bridge, which results in a higher rise. The two are built as individual unconnected bridges, separated by a high bank. On the western side where there is a gap between the parapets of the two bridges there is a ramp leading down, gated at the roadside. However, this ramp is now overgrown and clearly has not been used for a considerable period. On the eastern side the parapets of the two bridges are continuous and there is no access to the bank between the canal and the railway.

Collins Bridge, which is the canal bridge, is a protected structure. The description of the bridge in the record of protected structures refers to it as a single-arched bridge over the canal and this clearly excludes the railway bridge. Similarly, the NIAH also refers to a single-arched bridge and makes no reference to the railway bridge.

20.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of the bridge will be altered through the raising of the parapet of the adjacent railway bridge.

20.6 Mitigation

There is no opportunity for mitigation.

21. COPE BRIDGE (OBG14)

Built heritage reference in EIAR: BH-179

ITM grid reference: 700809, 737069

21.1 Historical summary

Cope Bridge was constructed in 1794 to carry the local road between Leixlip and Confey. The bridge was named in honour of William Cope, who was a director of the Grand Canal Company in 1784-85 and of the Royal Canal Company from 1789 to 1802. He is thought to have been the instigator of the project to build the Royal Canal.[46]

To the west of the bridge the canal bank curves to allow for a short length of broader canal to allow boats to pull in away from the main navigation channel. It is likely that this was provided as part of a project for cutting turf for transportation to markets along the canal. Cope Bridge was one of the locations where turf was saved for this purpose, part of an industry that grew up in various locations along the canal route.[47]

With the coming of the Midland Great Western Railway a new bridge was required alongside Cope Bridge and was built in about 1846. In 1990 Leixlip Confey Station was opened on the western side of the railway bridge.[48]

21.2 Conservation status

Cope Bridge is not included in the National Inventory of Architectural Heritage.

While the bridge is not currently included in the record of protected structures, the Draft Kildare County Development Plan 2023-2029 has included Cope Bridge as a proposed protected structure under reference PPS 20. The description is:

> Single-arch eighteenth century stone rubble road bridge over canal, with ashlar voussoirs and stringcourse, with attached single-arch stone rubble railway bridge, added in mid-nineteenth century.

The status as proposed protected structure affords the bridge full protection as if it were a protected structure and the presumption is that it will be added to the record of protected structures when the development plan is adopted.

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[46] Delany and Bath, pp. 29-31.
[47] Clarke, p 95.
[48] Shepherd, p. 118.

21.3 Survey

Figure 309 Eastern side of Cope Bridge and railway bridge

The railway bridge adjacent to Leixlip Confey railway station is close to Cope Bridge that spans the Royal Canal and a slender pier shared between the bridges is all that separates the two arches. The bridge is humpbacked and carries the local road that runs between Leixlip and Confey.

Figure 310 Western side of Cope Bridge and railway bridge

Figure 311 Western side of canal bridge

Cope Bridge spans the canal and its towpath with an elliptical arch, with parallel arch rings comprised of hammer-dressed limestone voussoirs with margins chamfered, except at the intrados. The keystone stands higher than the other voussoirs and is slightly proud of the surface of the arch ring. The spandrels are faced with squared limestone rubble brought to slender courses, while the parapets are faced with larger blocks of squared limestone, not coursed. The spandrels and the parapet are separated by a string course of dressed limestone.

Figure 312 Eastern side of canal bridge

Figure 313 Vault of canal bridge

Beneath the arch the abutments are faced with limestone ashlar in courses of varying heights. Above the springs of the arch the vault is faced with squared limestone rubble laid in relatively shallow courses.

Figure 314 Vault of canal bridge

Figure 315 Western wing wall on northern side of canal bridge

On the northern side of the canal wing walls extend on either side of the bridge, departing from the spandrels in a gentle curve and faced in similar masonry of coursed squared limestone rubble. The tops of the wing walls slope down away from the bridge and the eastern wing wall terminates in a pier of limestone. There is a gap in the masonry at the end of the western wing wall and there may have been a pier here, now missing. Beyond the ends of the wing walls the bank sloping down from the bridge is faced with a battered wall of limestone rubble.

Figure 316 Eastern wing wall on northern side of canal bridge

Figure 317 Western parapet of canal bridge

The masonry of the outer side of the parapet has been discussed above. The parapets on the canal bridge are at their highest where they meet the railway bridge, at the southern end of the canal bridge parapet. At the northern end the parapets curve away from the roadway and terminate at drum piers. The masonry on the sides of the parapets facing the road is of uncoursed squared limestone similar to that on the opposite face. The parapets are capped with substantial copings of hammer-dressed limestone. To the north of the parapets stone walls run along the roadside to protect users of the road from the drop on the far side of the wall. On the western side of the bridge there is a gap between this wall and the parapet, acting as a stile to permit the passage of pedestrians. On the eastern side of the bridge the wall and the parapet abut each other.

Figure 318 Northern end of western parapet of canal bridge

Figure 319 Eastern side of railway bridge

The railway bridge has a three-centred arch with a parallel arch ring of hammer-dressed limestone voussoirs with chamfered margins except at the intrados. The spandrels, abutments and parapets are faced with squared limestone, not brought to courses. At the base of the parapet a string course of dressed limestone crosses the bridge and merges into the similar string course of the canal bridge. At the abutments piers project from the masonry as pilasters, constructed with the same masonry as the adjacent spandrels, abutments and parapets and with the string course running through.

Figure 320 Western side of railway bridge

Figure 321 Vault of railway bridge

Beneath the arch the lower parts of the abutments have been obscured by the addition of the ramped ends of the station platforms. Above these ramps the abutments are faced with squared limestone rubble brought to courses that align with and key into hammer-dressed limestone quoins with chamfered margins. Above the spring of the vault the barrel of the arch is faced with squared limestone rubble laid in courses of varying height, though aligning with and keying into the voussoirs. The alternating longer voussoirs and quoins are longer than would be encountered in more usual quoins.

Figure 322 Western wing wall on southern side of railway bridge

At the southern end of the railway bridge wing walls curve away from the abutments to run at right angles to the bridge. These are faced with squared limestone rubble brought to courses. The tops of the walls slope steeply down from the bridge and are capped with copings of dressed limestone with chamfered arrises on the upper faces.

Figure 323 Pier at junction of canal bridge and railway bridge

At the meeting of the railway bridge with the canal bridge the pier of the railway bridge abutment forms the point of transition. The masonry of the spandrels on either side of the pier differs, in line with the difference in construction of the two bridges, while above the string course the parapets are of a similar style of masonry, the slope of the parapet is continuous, and the copings are the same. The parapets slope up to the crown of the bridge, which is at the centre of the arch of the railway bridge and more than five metres above the canal towpath. The approaches to the bridge on either side are long steep ramps flanked by stone walls. The parapets on both sides of the bridges are capped with copings of dressed limestone, which project on the outer side of the parapets, though not on the inner side.

Figure 324 Western parapet or railway bridge

21.4 Analysis

The railway bridge adjacent to Leixlip Confey railway station is typical of many of the bridges along this stretch of the former Midland Great Western Railway line. The canal bridges vary somewhat in style, though Cope Bridge is in keeping with styles found along this part of the canal. The proximity of the two bridges is such that they share a central pier; the width of this pier is such that the voussoirs of each arch almost touch the pilasters on the pier.

The construction of the railway bridge had an impact on the canal bridge, both indirectly in terms of the overall character and also directly through the need to join the two bridges and allow for the greater height of the railway bridge. The canal bridge would have had an approach ramp on the southern side to match that on the northern side, with the parapets rising to a high point at the crown of the arch and curved away from the roadway at the southern end, as they do at the western side of the northern end. This is the form of the parapets that is depicted, somewhat diagrammatically, on the Ordnance Survey's first edition six-inch map, published prior to the construction of the railway.

The style of the masonry of the parapets of the canal bridge is identical to that of the railway bridge and it is clear that as part of the construction of the railway bridge the parapets were taken down and rebuilt to fit the altered vertical alignment of the roadway. The absence of plaques on the parapets, as found on most of the canal bridges, is noted and would be a result of the reconstruction of the parapets, with the plaques not reinstated. The construction of the railway bridge also involved the removal of the wing walls and much of the abutment on the southern side of the canal bridge. The masonry of the spandrels on the southern side of the canal bridge would have been partially rebuilt where it abuts the projecting pier or pilaster and a slight discontinuity in the masonry next to the pilaster can be discerned on the western side of the bridge, suggesting that only a narrow vertical strip was rebuilt and not the entire northern spandrels.

21.5 Predicted impacts

Predicted direct construction impacts:

The arch of the railway bridge is to be removed and replaced with a concrete arch with higher parapets and the deck of the canal bridge is to be raised using a lightweight fill. New cycle/pedestrian bridges are to be erected on either side of the bridge.

Predicted indirect construction impacts:

The works to construct pedestrian and cycle bridges on either side of Cope Bridge and a substation to the east of the bridge will have a negative indirect effect on the setting of the bridge.

Predicted operational impacts:

The setting of the canal bridge will be altered through the raising of the parapet of the adjacent railway bridge and through the provision of new cycle/pedestrian bridges on either side of the existing bridge.

21.6 Mitigation

The replacement arch is to be designed and built to a high quality in association with a Grade 1 conservation architect. The works to raise the deck level of the canal bridge will utilise a light flexible fill to minimise the possibility of damage to the bridge structure.

The impact of the cycle/pedestrian bridges has been minimised through design.

Also see Appendix A21.7 Cope Bridge Architectural Heritage Impact Assessment which provides a separate AHIA for Cope Bridge prepared by Blackwood Associates Architects and Building Conservation Consultants.

22. RYE WATER AQUEDUCT

Built heritage reference in EIAR: BH-180

ITM grid reference: 699537, 736874

22.1 Historical summary

The decision to route the Royal Canal through Maynooth rather than further north through Meath necessitated crossing the wide and deep valley of the Rye Water, a tributary of the Liffey. The crossing was attained by means of a massive embankment, thirty metres high and more than 250 metres long, requiring some 115,000 cubic metres of earth. The embankment and aqueduct were designed by the canal company's engineer, Richard Evans, with an estimated cost of £8,500, though the company directors rejected the tender submitted for the work, priced at £8,950 and decided to build it by direct labour. This approach was not successful, and the foundations collapsed on two occasions. It was not until 1795, four years after the commencement of the works, was the aqueduct completed, with a final cost of £28,230 – more than three times the original estimate and original tender.

Part of the cost of the works was the sheer volume of earth that had to be sourced and used to form the embankment, in addition to the masonry work to construct the tunnel beneath the embankment through which the Rye Water would flow. The potential stresses arising from the weight of water on the embankment and on the tunnel beneath had also to be taken into account and the solution was to construct an inverted arch to form the channel for the canal and the masonry for this arch was almost a metre thick.

With the construction of the Midland Great Western Railway in the 1840s the Rye Water embankment had to be widened substantially to allow for the provision of the double track for the railway alongside the canal, while the tunnel for the Rye Water was extended toward the east to a total length of about sixty-five metres.

22.2 Conservation status

The Rye Water aqueduct is not included in the National Inventory of Architectural Heritage.

The Draft Kildare County Development Plan 2023-2029 has included the Rye Water Aqueduct as a proposed protected structure under reference PPS 9. The description is:

> Cut stone single-arch eighteenth century aqueduct bridge carrying the Royal Canal over the Rye River Valley, with attached nineteenth century railway bridge extension to east. The overflow weir and waterfall to the immediate north add to the interest of the aqueduct.

This text implies that it is not the aqueduct itself that is protected, but the tunnel that runs beneath it to facilitate the passage of the Rye Water.

The status as proposed protected structure affords the aqueduct full protection as if it were a protected structure and the presumption is that it will be added to the record of protected structures when the development plan is adopted.

22.3 Survey

Figure 325 Arch at entrance to Rye Water tunnel

As described in the historical summary above, the Rye Water Aqueduct is a massive earth embankment more than 250 metres in length and 30 metres in height. A tunnel was provided through the aqueduct to facilitate the passage of the Rye Water and following the widening of the embankment to provide for the construction of the railway line the extended tunnel is sixty-five metres long, indicating that the width of the embankment at the base is in excess of that distance. The tunnel has a semi-cylindrical vault lined with limestone ashlar. The face of the tunnel is largely obscured by vegetation but may be seen more clearly in a figure taken by Ruth Delany in 1973. The vault is faced with an archivolt with a projecting keystone. The spandrels and wing walls are of squared rubble, with a string course running from the spring of the arch.

Figure 326 Entrance to Rye Water tunnel in 1973 (Ruth Delany)

Figure 327 Towpath, canal and railway on aqueduct

The towpath running along the embankment is broad, with a grass verge alongside, ensuring that the canal was well back from the margin of the aqueduct. At surface level the lining of the canal is of limestone though, as described in the historical summary, the floor of the canal is an inverted brick vault. The railway is at a slightly higher level than the canal at this location, with a sloped embankment running down to the canal wall.

Figure 328 Canal margins on Rye Water Aqueduct

22.4 Predicted impacts

Predicted direct construction impacts:

It is proposed to erect OHLE on the railway line, including the section that crosses the embankment of the aqueduct. There will be no direct impact on the canal, its towpath or the Rye Water tunnel.

Predicted indirect construction impacts:

There will be a slight impact on the setting of the aqueduct arising from the construction works to erect the OHLE.

Predicted operational impacts:

There will be a slight impact on the setting of the aqueduct at operational phase due to the presence of the OHLE.

22.5 Mitigation

Due to the nature of the OHLE it is not possible to mitigate the impacts on the aqueduct or its setting.

23. LOUISA BRIDGE (OBG16)

Built heritage reference in EIAR: BH-185 and BH-186

ITM grid reference: 699322, 736549

23.1 Historical summary

The road that runs east-west through Leixlip was the main road between Dublin and Sligo until comparatively recently, with a branch off it at Kinnegad that led to Athlone and Galway. This was one of the more important roads running from the city and in 1731 an act of parliament was passed to establish a turnpike trust to maintain and improve the road and its bridges between the city and Kinnegad. A further act of parliament two years later extended the remit of the turnpike trust to include the road as far as Mullingar and in the same year another turnpike trust was established with responsibility for the road between Kinnegad and Athlone.

To the north-west of Leixlip the Royal Canal turned toward the south-west and crossed the line of the main road between Dublin and Galway. The towpath was to be slightly above the prevailing ground level and so to cross the canal the road was ramped up over a distance to cross the bridge that was built to carry the road. A slight bend was introduced into the road and also in the canal so that the road would cross the canal at right angles. The bridge was named in honour of Lady Louisa Conolly of nearby Castletown House, who was very wealthy and influential and carried out many projects to improve the lives of the inhabitants of the area.

With the arrival of the railway a second bridge was built in line with the canal bridge, though it was not possible for the railway to cross the road at right angles and a skew bridge was built to accommodate the angle of crossing. Leixlip railway station opened adjacent to the railway bridge in 1847. It closed in 1963 and was reopened eighteen years later.

23.2 Conservation status

Louisa Bridge is not a protected structure and is not included in the National Inventory of Architectural Heritage.

While the canal bridge is not currently included in the record of protected structures, the Draft Kildare County Development Plan 2023-2029 has included Louisa Bridge as a proposed protected structure under reference PPS 6. The description is:

> Single-arch rubble stone road bridge over canal, with ashlar voussoirs and cut-stone plaques.

The status as proposed protected structure affords the bridge full protection as if it were a protected structure and the presumption is that it will be added to the record of protected structures when the development plan is adopted.

23.3 Survey

Figure 329 Southern side of Louisa Bridge and railway bridge

At the point where the Royal Canal passes beneath the R148, which was formerly the main road between Sligo and Dublin, the canal is taking a long turn from running in a south-south-westerly direction north of the road to a little north of due west on the southern side of the road. The railway line remains close to the canal throughout this turn, with only a slight deviation on the norrthern side of the R148, where there is sufficient space for a railway station platform between the railway and the canal. The canal and railway bridges are separated by a pier, though this pier is broad.

Figure 330 Southern face of Louisa Bridge with railway bridge at right

Figure 331 Louisa Bridge, seen from the north

The canal bridge has a single elliptical arch that spans the canal and its towpath, which runs on the western side of the canal. The arch ring is parallel and is comprised of hammer-dressed limestone voussoirs, chamfered on either side and at the extrados, though not at the intrados, where there is a square arris. The keystones were raised proud of the rest of the arch ring and rose above the extrados, though the face of the keystone on the southern side has been lost, as have the faces of the flanking voussoirs. The masonry of the spandrels and parapet on the southern side is of random limestone rubble, while on the northern side the lower parts of the spandrels are of random limestone rubble, while the upper parts and the parapet are in uncoursed squared limestone rubble.

Figure 332 Southern face of Louisa Bridge

Figure 333 Eastern wing wall on northern side of Louisa Bridge

The wing walls of Louisa Bridge vary in length and height. That on the eastern side to the north of the bridge rises virtually to parapet level and slopes gently away from the bridge, terminating in a projecting pilaster or pier, beyond which a high retaining wall holds back the high ground to the east of the bridge. The wing wall on the opposite side slopes at a greater angle and beyond it the retaining wall is relatively low.

On the southern side of the bridge the wing wall on the western side rises almost to parapet height, though the parapet is lower on this side of the bridge and the wall is no so high. The wing wall ends at a pier of limestone ashlar, beyond which is a battered retaining wall with an asymmetrical relieving arch at its base.

On the eastern side to the south of the bridge the wing wall is low, rising only to the spring of the arch.

Figure 334 Western wing wall on southern side

Figure 335 Abutment and spring of vault on eastern side of bridge

Beneath the bridge the abutments rise in limestone ashlar. Above the spring of the vault the barrel is comprised of slender limestone rubble laid in courses. There are two large areas of repairs to the vault, both with plank-centred mass concrete, one being adjacent to the northern arch ring and stretching from the spring to the crown, though narrowing back into the vault, where it extends for about three metres. The second repair is in line with the first, just south of the centre of the bridge, to the east of the crown of the vault.

Figure 336 Barrel of vault

Figure 337 Plaque on northern face of northern parapet

There are four plaques on Louisa Bridge, one on either side of the northern parapet and one on the either side of the southern parapet. Each is comprised of an oval panel recessed into a rectangular block of dressed limestone and having a scotia moulding around the margin of the oval. The northern plaques and the plaque on the outer face of the southern parapet bear the legend "1794 / Louisa / Bridge". The plaque on the southern face of the bridge carries the additional words "Rich[d] Evans Engineer". The bottom of the plaque on the northern side facing the road is buried and it is not possible to determine whether the engineer is celebrated on that plaque, while only the very top of the plaque on the southern side facing the road is visible. The quality of the limestone in the plaques is high and they have not suffered noticeable weathering in 128 years, the guide marks for the engraver still being discernible.

Figure 338 Plaque on road side of northern parapet

Figure 339 Parapet on northern side of Louisa Bridge

On the northern side of Louisa Bridge the parapet rises up toward the east and toward the railway line, terminating at an access route to the railway station, where the dressed limestone copings of the parapet continue onto the wing wall. The rise of the parapet and the squared limestone masonry indicate that this parapet was rebuilt, probably when the railway bridge was built in the 1840s.

Figure 340 Parapet on southern side of Louisa Bridge

On the southern side of Louisa Bridge the parapet rises from the west to the crown of the bridge, with a slight fall-off toward the east beyond the crown. The road-side face of the parapet is of squared limestone, while on the outer face the limestone is unsquared rubble, with some concrete blockwork. The copings are of dressed limestone on part of the parapet and of mass concrete to the east of the crown.

Figure 341 Northern face of railway bridge

The railway bridge on the R148 is a beam bridge, the deck being supported on a number of steel beams spanning between two abutments. The deck is comprised of precast reinforced concrete panels laid side by side across the span of the beams. The parapets are of concrete blockwork with projecting piers.

Figure 342 Eastern abutment on northern side of bridge

Figure 343 Western abutment on northern side of bridge

The abutments are of an earlier period than the deck and are comprised of rock-faced limestone ashlar with tooled margins. On either side of each parapet is a projecting pier of rock-faced limestone ashlar rising to a moulded string course level with the deck. Above the string course the piers are of dressed limestone ashlar and are capped with dressed limestone copings. On the road side of the bridge the piers are seen as parts of the parapet marking the termination of the concrete block parapets on the span of the bridge.

Figure 344 Eastern abutment on southern side

23.4 Analysis

Louisa Bridge follows the general pattern of the bridges that were erected in the 1790s at the time that the canal was constructed. The arch is elliptical and spans the canal and its towpath and in its original form it was approached along the roadway by ramps that carried the road up to the bridge with a gentle gradient.

There are some elements of Louisa Bridge that are unlike most of the other canal bridges of the period. Firstly, the bridge crosses a bend in the canal, which could have caused construction difficulties, though no such difficulties arose due to the large radius of curvature of the canal. As the canal generally narrowed in order to pass beneath a bridge the slight curvature of the canal did not have an impact on the arch or abutments of the bridge. A second unusual feature is the width of the deck between the parapets, and this would have been due in part to the significance of the road, but also to allow the road to cross the bridge at a slight angle – a feature that is still apparent today, with the distance between the parapets of the order of 11 metres, while the carriageway and cycle lanes crossing the bridge are closer to 7 metres in width. The footways on either side are narrower at one end of the bridge than at the other.

The railway bridge differs from most of the bridges along the line in that it is a beam bridge running between stone abutments, rather than an arched bridge. It is not clear whether this arrangement dates from the 1840s or whether the bridge was rebuilt at a later date. Wrought-iron beam bridges or trussed bridge were used in the 1840s and notable examples were to be found on the viaduct at Drogheda and the Dublin Drogheda Railway crossing of the Royal Canal that is discussed above. However, wrought-iron beams were costly and transportation to site was both costly and difficult and hence masonry-arch bridges were preferred at that time. It is likely that the choice of beam bridge was selected due to the angle at which the road was to cross the railway, which is of the order of twenty-five degrees off a right angle, and which is significantly greater than the angle found at other skew bridges along this line such as at Broombridge, Granard Bridge or Collins Bridge. The construction of skewed abutments was relatively simple, while spanning between them with beams obviated the need for the difficult geometry of a rifle-vaulted arch at this kind of angle.

While the canal bridge and the railway bridge are not integrated in the same way as other bridges along this line and are separated by an embankment, it is evident that the parapets of the canal bridge were altered at the time of the construction of the railway bridge, as they rise up to the crown of the canal bridge from the west, but do not fall away again to the east. This change would have been necessitated by the replacement of the eastern approach ramp by the railway bridge, the deck of which is at a slightly higher level. It is also noted that the road level over the canal bridge has been raised and there is a significant slope down from the northern side of the carriageway to the parapet of the bridge, with the lower part of the plaque buried as a result of this increase.

23.5 Predicted impacts

Predicted direct construction impacts:

The road deck over Louisa Bridge will be raised slightly using a lightweight fill.

The deck of the railway bridge is to be raised ad the parapets increased in height.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of Louisa Bridge will be altered through the raising of the parapet of the adjacent railway bridge.

23.6 Mitigation

The works to raise the deck level of Louisa Bridge will utilise a light flexible fill to minimise the possibility of damage to the bridge structure.

24. DEEY BRIDGE

Built heritage reference in EIAR: BH-187

ITM grid reference: 697873, 736968

24.1 Historical summary

The R148, which is the road between Dublin and Maynooth, runs from east to west and until the late twentieth century this was the main road from Dublin to Galway and Sligo. At Blakestown a small local road runs southward from the R148. At the time of the construction of the Royal Canal this was a minor road, though at the beginning of the eighteenth century it may have led to Celbridge, before being diverted to allow for the laying out of the demesne of Castletown.

The construction of the Royal Canal necessitated the construction of a bridge to carry this road over the canal. William Duncan's map of County Dublin, published in 1821, shows this bridge, though it is not named on the map, while another bridge shown a little to the east at Collinstown was labelled 'Deey Bridge'. John Taylor's map of the Environs of Dublin, published in 1816 also shows a bridge at Collinstown, though without naming it, while the margin of the map is just to the west of that bridge and the map does not extend far enough to the west to show Deey Bridge. It would appear that both maps are incorrect, and one author may have copied the other. While the first-edition Ordnance Survey map shows the road at Collinstown running northward to the canal bank, it seems unlikely that there was a bridge at this location and that it was subsequently removed prior to the Ordnance Survey's examination of the area. It is noted that John Taylor showed a road running from north-west to south-east in between Collins Bridge and Pakenham Bridge, crossing the canal on a bridge, though that road seems to have never existed and it is not shown on John Rocque's map of 1760 or William Duncan's of 1821 and there is no hint of its former existence on the Ordnance Survey maps. A revised edition of Alexander Taylor's map of County Kildare, originally published in 1783, names Louisa Bridge and Deey Bridge in their correct locations, though without actually portraying either the bridges or the canal.

The Ordnance Survey also included an error on its first-edition map, where it labelled Deey Lock as 9th lock, while naming those east and west of it as 12th and 14th lock respectively. The lock is officially the 13th lock.

Christopher and Robert Deey were each substantial shareholders in the Royal Canal Company at the time of its establishment in 1789, though Christopher Deey was not a director of the company and Robert Deey became a director in 1794, shortly before the bridge and lock had been built in 1795 and presumably the bridge and lock are named in his honour rather than in honour of Christopher Deey.

With the construction of the Midland Great Western Railway in the mid-1840s a level crossing was provided adjacent to Deey Bridge.

24.2 Conservation status

Deey Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B06-14 along with the adjacent canal lock. The description is "Deey Bridge (and Lock)".

The National Inventory of Architectural Heritage has included the bridge and lock under reference 11900602; they have been assigned a Regional significance for their architectural, historical, social and technical interest. The description of the bridge reads:

> Single-arch rubble stone road bridge over canal, dated 1793, with ashlar voussoirs and cut-stone date stone/plaque.

24.3 Survey

Figure 345 View southward across Deey Bridge

Deey Bridge is located adjacent to the level crossing on the L81206, seventy metres south of the junction with the R148. There is a slight rise in the road as it crosses the bridge.

Figure 346 View northward across level crossing toward Deey Bridge

Figure 347 View of Deey Bridge from the east

Deey Bridge lies adjacent to and to the east of the 13th Lock, which was named Deey Lock. On the western side the canal enters beneath the bridge between parallel walls, while to the east the walls splay to permit the canal to widen. The parapet walls curve away from the road at each corner of the bridge.

Figure 348 View of Deey Bridge and lock from the west

Figure 349 Eastern side of Deey Bridge

Deey Bridge has a shallow segmental arch, which is possible because of the canal being in a cutting at the exit from the lock, without accommodating a towpath. The shallow segmental arch minimises the rise of the bridge to keep the hump back to a minimum rise. The arch rings are parallel and are comprised of dressed limestone voussoirs without an emphasised keystone.

Figure 350 Western side of Deey Bridge

Figure 351 Southern abutment of Deey Bridge

The abutments beneath the bridge are faced with limestone ashlar, which is a continuation of the ashlar on the sides of the lock chamber. The masonry of the vault above the canal is of smaller squared limestone blocks laid in courses.

Figure 352 Vault of Deey Bridge

Figure 353 Southern splay of abutment to east of bridge

The abutments of the bridge are continued to the east, faced with limestone ashlar, and these walls splay away from the bridge to allow for the widening of the canal beyond the lock. The splays reduce in height as they run from the bridge and are capped with dressed limestone copings.

Figure 354 Northern wing wall to east of bridge

Figure 355 Outer face of parapet on western side of bridge

The parapets are constructed of rubble limestone, and this is continuous from the spandrels, without an intervening string course. The stonework on much of the eastern parapet is random and appears to have been rebuilt, as has a small section of the southern end of the western parapet. At ends of each of the parapets there is a cylindrical pier. The parapets and piers are capped with dressed limestone copings, except for an area of mass concrete coping over the repair at the southern end of the western parapet.

Figure 356 Inner face of parapet on western side of bridge

Figure 357 Wall to north of eastern parapet

On the northern side of the bridge an access road leads to the canal bank and the lock to the west of the road, while on the eastern side the area between the bridge parapet and the pathway down to the towpath there is a short stretch of stone wall caped with semi-cylindrical limestone copings and ending at a short square pier. There are narrow footpaths on either side of the road over the bridge.

Figure 358 Eastern parapet

Figure 359 Plaque on outer face of western parapet

There are four plaques on Deey Bridge, located on the centre on both sides of each parapet. Each plaque is a rectangular block of dressed limestone with a recessed elliptical panel in the centre, surrounded with a scotia moulding. The recessed panel on each plaque carries the legend ‘1795 / DEEY / Bridge & Lock / R. Evans Eng^{r}’. In all cases the layout of the lettering appears to have been planned without the date, which was added in the limited space above the name Deey. The condition of the plaques varies, with some delamination. The stone at the bottom left of the plaque in the figure below has fallen off within the past two years.

Figure 360 Plaque on inner face of western parapet

Figure 361 Plaque on inner face of eastern parapet

As the figures show, there is some growth of lichen on the plaques and some cracking, and the inscriptions are easier to read on some than on others.

Figure 362 Plaque on outer face of eastern parapet

24.4 Analysis

Deey Bridge is relatively intact, having not been altered through the addition of a railway bridge. The only apparent changes have been the reconstruction of parts of the parapets, possibly due to impact with vehicles, and the delamination and cracking of some of the plaques.

24.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The bridge is to be closed to traffic with a significant positive impact on the fabric of the bridge.

24.6 Mitigation

No mitigation is necessary.

25. PIKE BRIDGE (OBG18)

Built heritage reference in EIAR: BH-189

ITM grid reference: 696070, 737385

25.1 Historical summary

Pike Bridge carries the L5053 local road over the Royal Canal and the MGWR railway line. This road ran to the southern end of the town of Celbridge and crossed the road from Maynooth to the northern end of Celbridge, on which was one of the gates of Castletown. As Pike Bridge is located across the road from the Dublin Gate at Carton, the road over the bridge would have been the principal route connecting the two great houses.

Pike Bridge was named for William Pike, who was one of the largest shareholders in the Royal Canal Company from its inception in 1789 and was a director of the company from 1794 to 1800[49]. The name 'Pike Bridge' appears on an amended reprint of Alexander Taylor's map of County Kildare first published in 1783 and on William Duncan's map of County Dublin published in 1821. However, the first edition Ordnance Survey map of Kildare, published in 1837, labels the bridge 'Wharton Bridge'. George Wharton was a director of the New Royal Canal Company between 1822 and 1828[50] and while some of the bridges are named in honour of directors of the new company in the 1820s, such as Kennan, Callaghan and Mullen bridges, those bridges have a different style of name plaque, while Pike Bridge retains its original name plaque and its original name, despite the Ordnance Survey's assertion to the contrary.

When the MGWR railway line was laid in the mid-1840s it necessitated the construction of a new bridge over the railway and this was integrated into the southern end of the original Pike Bridge over the canal.

25.2 Conservation status

Pike Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B06-13. The description is "Pike Bridge".

The National Inventory of Architectural Heritage has included the bridge under reference 11900601; it has been assigned a Regional significance for its architectural, historical, social and technical interest. The description of the bridge reads:

> Two-arch rubble stone hump back road bridge over canal and railway line, dated 1793, with ashlar voussoirs and cut-stone date stone/plaque.

[49] Clarke, p. 160; Delany and Bath, p. 318.
[50] Delany and Bath, p. 319.

25.3 Survey

Figure 363 Western face of Pike Bridge and railway bridge

Pike Bridge is a bridge that carries a local road over the Royal Canal, with a second arch added to take the road over the railway. The road was originally known as Green Lane and connected Carton with Celbridge, though the road is now divided in two by the M4 motorway. The ramp descending from the northern side of the bridge splits into two, each side descending to meet the R148 leading between Leixlip and Maynooth. A narrow strip of land separates the canal from the railway at this location and is embanked above the level of the canal and railway. The canal towpath is on the northern side of the canal and passes beneath the bridge. The canal narrows as it approaches the bridge from each direction.

Figure 364 Eastern face of Pike Bridge and railway bridge

Figure 365 Western face of canal bridge

The canal bridge has a single elliptical arch with a parallel arch ring of dressed limestone voussoirs with hammer-dressed faces. The spandrels are faced with squared limestone rubble laid in courses and with relatively small stones. The parapet is faced with squared limestone with hammer-dressed faces and not laid in courses. The top of the parapet rises in a straight line from north to south to meet the railway bridge.

Figure 366 Eastern face of canal bridge

Both faces of the bridge have ivy growing up the southern side, covering the southern spandrel and rising to the top of the parapet. The masonry elsewhere on both faces have extensive vegetation growing from within the joints in the masonry.

Figure 367 Western wing wall of canal bridge

On either side of the canal bridge a wing wall runs back from the bridge, following a curve from the junction with the spandrel and parapet and running alongside the towpath. The stonework of the wing walls follows the style of the adjacent face of the bridge, with small, squared limestone in the lower section and larger hammer-dressed limestone above. Beyond the wing walls the embankment is bounded by retaining walls of limestone rubble and with a distinct batter. These walls reduce in height with distance from the bridge.

Figure 368 Eastern wing wall and retaining wall of Canal bridge

Figure 369 Abutment and barrel of canal bridge

The abutment within the canal bridge is faced with rectangular blocks of hammer-dressed limestone laid in courses. The size of stones and the coursing become more irregular as the masonry rises up. From the spring of the vault the stonework is squared limestone without surface dressing and laid as random rubble.

Figure 370 Plaque on canal bridge

On the western face of the canal bridge a limestone plaque is set into the parapet above the crown of the arch. This records the date of the bridge, 1795, the name Pike Bridge and the name of the engineer, R[ichard] Evans. There is no plaque on the eastern face of the bridge.

Figure 371 Western face of railway bridge

The arch of the railway bridge is three-centred, with a parallel arch ring comprised of dressed limestone voussoirs with chamfered margins, except at the extrados. The spandrels are randomly laid squared limestone. A string course of hammer-dressed limestone runs across the faces of the bridge at deck level and above it the parapet is constructed with hammer-dressed limestone ashlar in three courses, topped by a coping. The bridge is confined at its margins by pilasters of limestone ashlar through which the string course and coping continue.

Figure 372 Eastern face of railway bridge

Figure 373 Barrel of vault of railway bridge

The abutment of the railway bridge facing the railway is comprised of limestone ashlar, terminating at quoins of chamfered hammer dressed limestone. The barrel of the vault is of squared limestone in small stones laid in courses. The bridge crosses the railway slightly off a right angle though the angle is so slight that rifle vaulting was not necessary and the thrust of the forces at the faces of the bridge are taken up by longer quoins than usual.

Figure 374 Pier between canal bridge and railway bridge

The railway bridge shares a pier with the canal bridge and the pilasters on the northern end of the railway bridge run down the centre of this pier. The string course stops at the pier and does not continue onto the canal bridge.

Figure 375 Pier and wing wall on western side of railway bridge

On the southern side of the railway the road turns toward the west as it descends the ramp from the bridge deck. The wing wall of the bridge follows this curve and is faced with limestone ashlar on the side away from the road, while on the roadside face it is of squared limestone random rubble. On the eastern side of the bridge the wall running from the bridge is turning in the opposite direction and there is no wing wall, the roadside face being of squared limestone random rubble. On both sides of the road this wall is capped with solder course of alternating tall and short stones.

Figure 376 Pier and retaining wall on eastern side of railway bridge

Figure 377 Deck of bridge

The road crosses the bridge with a distinct hump, more pronounced on the southern side due to the splitting of the road into two on the northern side. The parapets on either side are relatively low, particularly on the eastern side where a high concrete footway has been added. The parapets have been supplemented with steel railings. The stonework of the parapets on the roadside faces are of squared hammer-dressed limestone, brought to courses.

Figure 378 Parapet on eastern side of bridge

Figure 379 Coping stones on wing wall of canal bridge

The parapets are uniform across the bridges, with no distinction between the parapet of the canal bridge and that of the railway bridge. On the northern side this parapet is continued around the bend onto the wing walls of the canal bridge. The parapets are capped with substantial copings of limestone, hammer dressed and with tooled margins. On the outer faces of the parapets, over the canal and railway, the coping stones are chamfered, the chamfered faces being tooled.

Figure 380 Outer face of coping stones

25.4 Analysis

The original canal bridge would have had a ramp on the southern side to carry the road back to ground level. With the coming of the railway this ramp was removed and a new ramp constructed further south, beyond the new railway bridge. The clearance required for trains was greater than that needed at the canal and the crown of the arch of the railway bridge is higher than that of the canal bridge. In order to marry the two bridges together the contractors for the railway bridge needed to rework the parapets of the canal bridge, changing the shape of the southern side from a downward slope to an upward slope. This was achieved not by adding to the top of the parapet, but by removing the entire parapet and rebuilding it. This is seen in the nature of the masonry, as the stonework of the spandrels of the railway bridge is quite different to that in the parapet, while that in the parapet matches the stonework in the spandrels of the railway bridge. The coping stones follow through the entire length of both parapets, including the wing walls of the canal bridge and this is clearly due to the reconstruction of the parapets in the 1840s. Most of the canal bridges have plaques on both faces while Pike Bridge has only one, on the western face, and this is probably also a result of the reconstruction of the parapets. Other than the parapets, the bridges are separate structures, though physically joined and this is facilitated by the pilasters on the central pier, which provide a natural break in the masonry.

The record of protected structures for Kildare includes Pike Bridge, though without specifying whether this is the original canal bridge or the combined canal and railway bridge. The entry in the NIAH is more specific and clearly includes the railway bridge and the canal bridge as a single entity with two arches and built in two phases.

25.5 Predicted impacts

Predicted direct construction impacts:

The parapets of the bridge will be raised for safety reasons. The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The setting of the bridge will be altered through the increase in height of the railway bridge.

25.6 Mitigation

Excavations to lower the track are to be designed and carried out in accordance with a method statement prepared by a Grade 1 conservation architect to ensure that the foundations of the bridge are not undermined.

There is no opportunity for mitigating the impact of the raising of the parapet other than through design.

26. MULLEN BRIDGE

Built heritage reference in EIAR: BH-190

ITM grid reference: 693928, 737430

26.1 Historical summary

Noble and Keenan's map of County Kildare shows the road that leads south from the Square in Maynooth to run toward the south-east, while a T-junction leading to the west connected to the road running southward to Straffan. John Rocque's map of the Manor of Maynooth, prepared in 1757, shows a similar layout. The road to the south-east was later extended further and became the Celbridge Road. By 1783, when Alexander Taylor published his map of County Kildare, the Straffan Road appears to have become the more direct route.

In 1795, during the construction of the Royal Canal, a bridge was erected over the canal to carry the Straffan Road. The bridge was named Power Bridge, though it is not clear in whose honour, as none of the original shareholders of the company were of that name.[51] Following the formation of the second Royal Canal Company the bridge was renamed Mullen Bridge in the 1820s in honour of Joseph Dennis Mullen, one of the directors of the new company.[52] With the construction of the Midland Great Western Railway between Dublin and Enfield in 1846-47, a railway bridge was erected in line with Mullen Bridge to carry Straffan Road over the railway.

As the population of Maynooth increased in the later twentieth century and, in particular, the opening of the M4 Motorway to bypass the town in December 1994, the need arose to improve the road connection between Maynooth and the motorway.[53] Design work for the upgrading of the Straffan Road was under way at the beginning of the 1990s, the CPO was confirmed in June 1993 and construction began in the following year.[54] The upgrading of the road included its realignment to avoid the bridges over the canal and the railway. The railway bridge was demolished following the opening of the realigned road, while Mullen Bridge was retained for the use of pedestrians.

26.2 Conservation status

Mullen Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B05-60. The description is "Mullen Bridge, Maynooth, Co. Kildare".

The National Inventory of Architectural Heritage has included the bridge under reference 11803103; it has been assigned a Regional significance for its architectural, historical, social and technical interest. The description of the bridge reads:

> Single-arch rubble stone road bridge over canal, c.1795, with ashlar voussoirs, cut-stone plaque and cut-stone coping. Irregular coursed squared rubble stone walls.

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[51] Sherrard, Brassington and Greene, 'Survey of the town and town-parks of Maynooth', c1821, NLI MS 22,004; Clarke, pp. 160-164.
[52] Plaque on bridge; Delany and Bath, p. 319.
[53] *City Tribune,* 30th December 1994.
[54] *Irish Independent,* 30th May 1991, *Irish Press,* 17th June 1993, 23rd June 1994.

26.3 Survey

Figure 381 View of modern bridges from the east

The diversion of Straffan Road resulted in the erection of a new railway bridge and a new canal bridge, each of which were constructed as modern replicas of the older bridges. The arches are of precast concrete and the spandrels, parapets and wing walls are faced with limestone rubble. A string course of dressed limestone crosses above the spandrels, separating them from the parapets.

Figure 382 Western side of modern railway bridge

Figure 383 Eastern side of modern canal bridge

The figures above and below illustrate the mass concrete barrel of the vault of the canal bridge, while the ends of the vault are faced with dressed limestone voussoirs to form an arch ring.

Figure 384 Western side of modern canal bridge

Figure 385 Western side of Mullen bridge

Mullen Bridge is the original canal bridge and crosses the canal and towpath with an elliptical arch. In its original form the bridge would have had wing walls on both sides of the canal to the east and west. However, the coming of the railway and the diversion of Straffan Road have changed this, introducing a ramp down to the station adjacent to the canal and resulting in continuous high walls running between the new canal bridge and the old.

Figure 386 Eastern side of Mullen bridge

Figure 387 Western face of Mullen Bridge

The elliptical arch ring on Mullen Bridge is parallel and is comprised of voussoirs of dressed limestone. The spandrels and parapets are faced with random limestone rubble, with no string course to separate the spandrels from the parapets.

Figure 388 Eastern face of Mullen Bridge

Figure 389 Abutment of Mullen Bridge

The abutments and the barrel of the vault are constructed with limestone rubble laid in courses, with relatively small stones. At the crown of the vault, in the centre of the bridge, there is a repair, possibly resulting from damage to the vault while laying services in the road above.

Figure 390 Vault of Mullen Bridge

Figure 391 Southern wing wall on western side of Mullen Bridge

As noted above, the walls running from the bridge on either side are high. On the southern side the wall continues westward, gradually descending over a distance of about fifty metres. On the northern side, to the west of the bridge, the parapet is high for about ten metres, beyond which the ramped land is separated from the towpath by a lower retaining wall. The walls on both sides of the canal are battered.

Figure 392 Northern wing wall on western side of Mullen Bridge

Figure 393 Southern wing wall on eastern side of Mullen Bridge

As noted above, the canal between the new and old canal bridges is enclosed on either side by high walls. These walls rise up from the parapet of Mullen Bridge to the parapet of the newer canal bridge, the parapet of the latter being at a higher level. The new walls are capped with round-backed limestone blocks.

Figure 394 Parapets of Mullen Bridge and modern canal bridge

Figure 395 Eastern parapet of Mullen Bridge

The original parapets of Mullen Bridge are constructed with coursed limestone rubble and are capped with large blocks of limestone copings. The parapet on the eastern side runs in a straight line, while that on the western side curves at the ends toward the wing walls. Both parapets rise toward the centre.

Figure 396 Western parapet of Mullen Bridge

Figure 397 Deck of Mullen Bridge

Mullen Bridge is now a pedestrian bridge, the motor traffic having been moved off it when the new bridges on the realigned Straffan Road were built. At that time the original railway bridge was demolished. A footway runs across the centre of the bridge, flanked by grass strips.

Figure 398 Plaque on eastern face of Mullen Bridge

In the centre of the outer face of the eastern parapet is a rectangular plaque bearing the name 'Mullen Bridge'. This is similar to the plaques on Kennan Bridge and Callaghan Bridge, all three of them commemorating directors of the New Royal Canal Company in the 1820s.

26.4 Analysis

The original arch, spandrels and parapets of Mullen Bridge survive, thought the wing walls have been altered and the setting and use of the bridge have changed significantly. Nonetheless, Mullen Bridge is still a surviving representative of the canal bridges dating from the early years of the canal.

26.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

26.6 Mitigation

No mitigation is required.

27. BOND BRIDGE

Built heritage reference in EIAR: BH-194

ITM grid reference: 693389, 737181

27.1 Historical summary

Parson Street leads to the south-west from Maynooth past the campus of the university, becoming Newtown Road, which is the R408. While Parson Street is of some antiquity, it was originally no more than an access road to the lands at Rowanstown and Newtown, just outside the town, and the road is shown in this form on Noble and Keenan's map of County Kildare, published in 1752. Shortly after this the construction of a new road was laid out leading off from the original road toward the west, though still serving a localised area; this road was depicted on John Rocque's map of the Manor of Maynooth, compiled in 1757. Later again another new road was constructed, leading off the newer section of the road and running toward the south-south-west. The northern section of this road had been completed as far as Rathcoffey by 1783, when Alexander Taylor published his map of County Kildare. At that time, it was intended that the road would continue to Prosperous, but while the southern section was laid out a portion of the road at Rathcoffey was never built.

When the Royal Canal was constructed to the south of Maynooth in 1795 a bridge was built to carry this road across the canal at the end of Parson Street, before the road split into its local and regional spurs. Construction of the Midland Great Western Railway between Dublin and Enfield began in 1846 and the line opened in 1847. As part of this work a railway bridge was added to the southern side of Bond Bridge with about sixteen metres between the abutments of the two bridges and with a ramp leading down to the east from between the bridges to provide access to Maynooth Station.

The road over the canal at Bond Bridge was narrow, without space for footways, and the approach roads curved, leading to a local campaign in the late twentieth century for the bridge to be replaced to facilitate the levels of vehicular traffic and the significant pedestrian footfall.[55] Tenders were advertised for the construction of a new bridge in February 2003 and after further delays the work got under way late in 2005.[56] Bond Bridge and its companion railway bridge were demolished, and the present replacement bridges were constructed in 2006.[57]

27.2 Conservation status

Bond Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B05-74. The location is "Bond Bridge, Maynooth, Co. Kildare" and the description is "Bridge". The National Inventory of Architectural Heritage has included Bond Bridge under reference 11803133 and has assigned it a Regional significance for its architectural, historical, social and technical interest. The description of the bridges reads "Single-arch rubble stone hump back road bridge over canal, dated 1795, with ashlar voussoirs, cut-stone date stones/plaques and cut-stone coping."

[55] *Evening Herald*, 16th October 2000.
[56] *Irish Independent,* 12th February 2003; *Cork Examiner*, 2nd February 2005.
[57] Plaque on bridge.

27.3 Survey

Figure 399 Eastern face of Bond Bridge

Bond Bridge is a modern bridge, built in 2006. The vault is elliptical and is constructed with mass concrete and faced at either end with voussoirs of cast concrete. The spandrels and parapets are faced with random squared limestone and the parapets are topped with squared limestone blocks laid alternatively vertically and on the flat. The towpath runs beneath the bridge.

Figure 400 Western face of Bond Bridge

Figure 401 Barrel of the vault of Bond Bridge

The figure above shows the vaulting of the modern Bond Bridge, with the abutments faced with squared limestone rubble.

Figure 402 Wing wall to south of canal on eastern side of Bond Bridge

To the east of the bridge the wing walls are high. These are modern and are faced with random limestone rubble.

Figure 403 Plaque on eastern side of Bond Bridge

On the eastern side of the bridge is a plaque salvaged from the original canal bridge. This is a rectangular limestone block with a raised elliptical border surrounding the legend ‘1795 / BOND / BRIDGE / Rich^{d} Evans Eng^{r}’.

Figure 404 Plaque on western side of Bond Bridge

On the western face of the bridge is a rectangular plaque with a raised elliptical border surrounding the inscription ‘Kildare County Council / BOND BRIDGE / 2006 / HGL O’Connor Engrs.’.

Figure 405 Photograph of original Bond Bridge from NIAH

While the original Bond Bridge has been demolished, the NIAH surveyed the Maynooth area in 2003 and two photographs are included in the buildingsofireland.ie website. These show that the bridge had an elliptical arch with a parallel arch ring spanning the canal and towpath. The abutments and vaulting were of coursed limestone rubble, while the spandrels and parapet were of random squared limestone rubble. The second figure shows one of the plaques on the bridge, while the text makes it clear that there had been two. The parapets were capped with dressed limestone copings.

Figure 406 Plaque and parapet of original Bond Bridge from NIAH

27.4 Analysis

The modern replacement bridge is considerably wider than the original bridge and repeats the geometry of the vault and arch rings, with limestone rubble facings on the spandrels, parapets and wing walls to emulate the style of the original bridge.

The original bridge was surveyed for the National Inventory of Architectural Heritage on 7th February 2003, some three years prior to its demolition. The description given for the bridge was:

> Single-arch rubble stone hump back road bridge over canal, dated 1795, with ashlar voussoirs, cut-stone date stones/plaques and cut-stone coping. Irregular coursed squared rubble stone walls. Cut-stone date stones/plaques. Cut-stone coping to parapet walls. Single elliptical arch with ashlar voussoirs. Rubble stone soffits with remains of lime render over. Sited spanning Royal Canal with tow path running underneath to north.

The survey also included the following appraisal of the bridge:

> Bond Bridge is a fine rubble stone bridge that forms an imposing feature on the Royal Canal and is one of a group of bridges on the section of that canal that passes through County Kildare. The construction of the arch that has retained its original shape is of technical and engineering merit. The bridge exhibits good quality stone masonry and fine, crisp joints. The bridge is of considerable historical and social significance as a reminder of the canal network development in Ireland, which brought about many technical advances and developed commercial activity in Maynooth in the late eighteenth/early nineteenth centuries.

27.5 Predicted impacts

Predicted direct construction impacts:

None

Predicted indirect construction impacts:

None

Predicted operational impacts:

None

27.6 Mitigation

No mitigation necessary.

28. JACKSON BRIDGE (OBG23)

Built heritage reference in EIAR: BH-195

ITM grid reference: 691728, 737647

28.1 Historical summary

At the time of the construction of the Royal Canal in the late eighteenth century a local road, now designated the L5041, ran northward across the line of the proposed canal. This road was an amalgamation of two road, one running northward and the other eastward, the latter joining the northbound road at a T-junction to the south of the proposed line of the canal. The combined roads ran northward, crossing a stream by means of a ford, before joining the main road running between Maynooth and Kilcock, which was then the main road between Dublin and Sligo. The Royal Canal Company built a bridge to carry this local road over the canal and named it Jackson Bridge in honour of Henry Jackson, one of the original shareholders in the company and a director of the company between 1793 and 1798. His directorship came to a sudden end when his membership of the United Irishmen was discovered, and he fled the country to Pennsylvania to avoid being arrested.

By the time of the publication of the first Ordnance Survey map of the area in 1837 the alignment of the northbound local road had been changed and it now turned north-westward to join the eastbound road, leaving the original junction as a tight bend in the road. The stream was now crossed by a bridge and this may have been built by the Royal Canal Company to facilitate the ramp up to the canal bridge. At the top of the ramp the road turned to cross the canal bridge, to ensure that the bridge crossed the canal at right angles so as to simplify construction.

With the coming of the Midland Great Western Railway, it was necessary to build a bridge to carry the local road over the new railway line and the crown of this bridge needed to be higher than that of the canal bridge. This necessitated changes in the ramp leading to the bridge on either side and while this was straight forward to the north of the bridge, the alignment of the road to the south of the canal created problems for the construction of the ramp. It was probably for this reason that the road to the south of Jackson Bridge was realigned to run more directly to the bridge, eliminating the tight bend and shortening the route. Certainly, this realignment had taken place by the time that the second-edition Ordnance Survey map was published in 1870. The railway company realigned the stream to run northward alongside the southern approach ramp and to turn beneath an arch in the new bridge that was provided for it. An additional arch at the southern end of the bridge is likely to have been built as an accommodation arch to connect the farmland on either side of the road.

The original alignments of both local roads were subsequently cut by the M4 motorway and replaced by a new road crossing the motorway, though this has not had any impact on Jackson Bridge or the road in its vicinity.

28.2 Conservation status

Jackson Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B05-36 along with the adjacent canal lock. The description is “Jackson’s Bridge (and Lock)”.

The National Inventory of Architectural Heritage has included the bridge and lock under reference 11900505; they have been assigned a Regional significance for their architectural, historical, social and technical interest. The description of the bridge reads:

> Three-arch cut-stone road bridge over canal, railway line and stream, dated 1793, with ashlar voussoirs, cut-stone date stone plaque, and single-arch pedestrian bridge to north over stream.

28.3 Survey

Figure 407 Jackson Bridge, viewed from the east

Jackson Bridge is comprised of five arches carrying a local road, the L5401. The original bridge had a single arch, carrying the road over the Royal Canal. In the 1840s the bridge was extended to take the road over the Midland Great Western Railway line and as the embankment leading to the bridge was to cross a watercourse two further arches were built to bring water through and to provide an accommodation arch for access between fields. A further arch was added at the northern end to allow those using the canal towpath to cross beneath the road. Immediately to the west of the bridge is a canal lock and this was built at the same time as the canal bridge, the two forming an integrated structure.

Figure 408 Jackson Bridge, viewed from the west

Figure 409 Western face of canal bridge

As the canal bridge is at the lower end of the canal lock the canal is at a significant depth below the ground level on the western side of the road. For this reason, the arch of the canal bridge could have a low rise. The levels meant that the towpath could cross the road rather than pass under the bridge, thereby ensuring that the road did not have to rise so much to cross the canal and the humpback on the bridge was kept to a minimum. The arch of the canal bridge is a shallow segmental arch with a low ratio of rise to span. The arch ring is parallel, and the voussoirs are of hammer-dressed limestone. The abutments of the canal bridge are a continuation of the masonry of the canal lock and are constructed with similar limestone ashlar. The barrel of the arch is formed with small, squared limestone rubble. The parapet and spandrels are of squared limestone rubble. There are no wing walls.

Figure 410 Eastern face of canal bridge

Figure 411 Western face of towpath arch

When the railway bridge was built it required a significantly higher arch, necessitating bringing the commencement of the approach ramp further back to the north, with the result that the towpath could no longer cross the road at grade. The road was raised up to a height sufficient to allow for an archway to accommodate the towpath, located to the north of the canal bridge. The arch over the towpath is semicircular and is comprised of hammer-dressed limestone voussoirs forming a parallel arch ring. The masonry of the causeway at this point is of squared limestone rubble, similar to that on the parapet of the canal bridge.

Figure 412 Eastern face of towpath aarch

Figure 413 Barrel of vault of towpath arch

The vault of the towpath arch is constructed of squared limestone rubble, with one long axis. This limestone, in contrast to the stone seen elsewhere in the bridge, contains black seams of chert.

Figure 414 Remnant of original wing wall

In its original form the parapet of the canal bridge descended on the northern side, turning away from the bridge as it did so to avoid the towpath. When the road was regraded these wing walls were redundant as the walls of the causeway and ramp continued further to the north. The remains of the wing wall to the north of the canal bridge on the eastern side may still be seen to the left of the towpath arch.

Figure 415 Stile adjacent to canal bridge

Immediately to the north of the canal bridge on the western side there is a gap in the parapet wall acting as a stile and giving access to a small flight of stone steps leading down to the area adjacent to the canal and its towpath. On the southern side of the gap a short section of the parapet has been reconstructed with concrete blockwork.

Figure 416 Plaque on western side of canal bridge

On the outer face of each parapet of the canal bridge there is a limestone plaque bearing the inscription “1796 / Jackson / Bridge & Lock / R^{d} Evans Engineer.

Figure 417 Western face of railway bridge

The railway bridge carries the road over the railway in a single three-centred arch. The arch ring is parallel and is comprised of chamfered dressed limestone voussoirs with tooled margins. Above the arch ring is a projecting string course of dressed limestone. The arch is flanked on either side by projecting piers or pilasters of limestone ashlar. The spandrels and parapets are of limestone ashlar. The string course and the ashlar masonry continue to the south of the southern pilaster into the southern two arches, while to the north the string course and ashlar do not run beyond the pilaster into the canal bridge.

Figure 418 Eastern face of railway bridge

Figure 419 Barrel of vault of railway bridge

Within the arch of the railway bridge the parapet rises in coursed squared rock-faced limestone blocks and this continues up into the vault.

Figure 420 Island between railway bridge and canal bridge on eastern side

There is a broad space between the railway bridge and the canal bridge, sufficient to allow for adequate access to the side of the canal lock to facilitate use of the lock. On the western side, adjacent to the lock, this is a broad level area with a covering of grass. As a result, there is an island on the eastern side of the bridge between the railway and the canal. Adjacent to the canal this island is retained by a wall of squared limestone rubble, the top of which slopes toward the east.

Figure 421 Eastern side of arches to the south of railway bridge

The two arches to the south of the railway bridge are of similar construction, though of lesser span. While the rise of these arches is less than that of the railway arch, the significantly lesser span means that the arches are semicircular rather than three-centred. The string course and limestone ashlar continue into the spandrels and parapets of these arches and the arch rings are similar to those of the railway bridge, being parallel and comprised of chamfered limestone voussoirs. The southern extremities of this part of the bridge are covered with ivy and it is not possible to see whether there are pilasters to define the ends of the bridge.

Figure 422 Western side of arches to south of railway bridge

Figure 423 Deck of bridge, seen from southern side

The road rises significantly in crossing the bridge, with causeways to the north and south of the bridge to carry the extreme ends of the approach ramps. The flanking walls on either side of the road and at either end of the bridge, beyond the bridge itself, are of rubble limestone and capped with large irregular blocks of limestone set vertically.

Figure 424 Wall at side of causeway on southern side of bridge

Figure 425 Parapet on western side of bridge

The bridge parapet is uniform across the four main arches, being capped with large blocks of squared limestone with right-angled arrises on the side facing the road and with chamfered edges on the side facing the canal and railway. These blocks are hammer dressed with tooled margins.

Figure 426 Pier between railway and canal on western side, with string course and coping stones

Figure 427 Repair to north of canal arch

Immediately to the north of the canal bridge on the western side there is a slight change in direction of the parapet and spandrel, defined by vertical joints in the masonry, with a mass concrete coping at the top of the angled masonry. When seen from the top the three coping stones to the south of the concrete coping are secured with iron cramps and there is a distinct slope on the parapet. It appears that the parapet to the west of the canal bridge began to move out of alignment at some time in the past and work was carried out to repair and stabilise the masonry.

Figure 428 Repaired section of parapet

28.4 Analysis

Jackson Bridge was built in 1796 as the construction of the Royal Canal moved westward from its starting point and the railway bridge was added in 1846.

As was noted in the survey above, the depth of the canal below the road meant that the canal bridge is a shallow segmental with a low rise. As it did not rise much above ground level adjacent to the canal lock the towpath crossed the road at grade. The railway, however, was not at such a low level and the need to span a double track while leaving headroom for the trains meant that the arch had to be higher. The minimum headroom of the railway bridge had to apply in two locations, over the centre of each of the two tracks. These requirements, together with the need to minimise the height to which the road would have to rise, determined that a three-centred arch would be the most effective solution. Nonetheless, the crown of this arch was significantly above that of the canal bridge, necessitating a greater climb. To minimise the gradient the ramps had to start from further back and this meant raising the level of the road to the north of the canal bridge. The level was raised sufficiently to allow for the accommodation of the towpath arch. The construction of the new ramp rendered the original wing walls of the canal redundant and they were removed. The lower section of the wing wall on the eastern side of the road, to the north of the canal, may still be seen, while on the western side of the bridge the steps down from the stile are probably on the site of the western wing wall.

As part of the construction of the railway bridge and the regrading of the road a new line of coping stones was provided on the parapets and it seems likely that the parapets of the canal bridge were rebuilt to a different height. The plaques were built back into the new parapets. The coping stones are of uniform style throughout the length of the parapets over all four of the principal arches.

The entry in the record of protected structures for County Kildare states that “Jackson’s Bridge and Lock” are protected, but without making it clear whether this includes the railway bridge and other arches as well as the canal bridge. Despite its somewhat inaccurate description the NIAH makes it more clear that its survey includes all arches. In the context of the nature and style of this bridge it would be unreasonable to consider that the railway bridge was not included in the protection intended in the record of protected structures.

During the construction of the railway bridge the new work became an integral part of the structure with the canal bridge, with unified parapets continuing along the entire length of the bridge and a direct connection in the masonry between the new and the old bridges.

28.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

The setting of the bridge will be affected by the works to construct the new railway alignment and the new depot.

Predicted operational impacts:

The presence of the new depot will have a negative effect on the setting of the bridge and lock.

28.6 Mitigation

There is no opportunity for mitigating the impact on the setting of the bridge during construction and screen planting in the vicinity of the depot will reduce the impact on the setting of the bridge at operation phase.

29. CHAMBERS BRIDGE

Built heritage reference in EIAR: BH-196

ITM grid reference: 689958, 738771

29.1 Historical summary

Alexander Taylor's map of County Kildare, published in 1783, shows a stream or river to the south of Kilcock and running eastward along a winding path and ultimately joining the Lyreen River near the future site of Jackson Bridge. The map shows a road or laneway leading southward from what was then the main Dublin to Sligo road, crossing the stream with a ford and continuing a short distance to the south before stopping without joining any other road. This would indicate a local access road connecting to lands beyond the stream. The line of the stream can be traced on the first edition Ordnance Survey map of 1837, though it is depicted as two lines extremely close together, suggesting little more than a very small stream or ditch. The local access road is also shown on that map, precisely where shown by Taylor, though by that time the Royal Canal had been constructed and the access road was carried across the canal on Chambers Bridge. Later Ordnance Survey maps at a larger scale indicate that the stream was diverted along straight ditches and, having joined another watercourse, still feeds into the Lyreen close to Jackson Bridge.

Chambers Bridge was named for John Chambers, who was one of the original subscribers to the Royal Canal Company and who served as director of the company from its inception in 1789 until 1798. His subscription to the company was more modest than that of many of his fellow directors, which is probably why he was allocated this bridge which, while being of no less quality than others along the route, carried a less significant thoroughfare.

With the construction of the Midland Great Western Railway in the mid-1840s the laneway was closed off at the railway and Chambers Bridge provided access only to the southern bank of the canal and to railway maintenance operatives.

29.2 Conservation status

Chambers Bridge is a protected structure and is included in the record of protected structures for Kildare under reference B05-35. The location is "Chambers Bridge (and lock)" and the description is "Bridge".

The National Inventory of Architectural Heritage has included Chambers Bridge under reference 11900504 and has assigned it a Regional significance for its architectural, historical, social and technical interest. The description of the bridges reads "Single-arch rubble stone road bridge over canal, dated 1793 (sic), with ashlar voussoirs, cut-stone date stones/plaque."

29.3 Survey

Figure 429 View of Chambers Bridge from the east

Chambers Bridge is located a little more than a kilometre from Kilcock and carries a small laneway over the canal. The bridge is immediately to the east of Chambers Lock, which is the 15th lock and a single-chamber lock – this is unfortunate, as the name of the bridge surely suggests more than one lock chamber!

Figure 430 View of Chambers Lock from the bridge

Figure 431 Western face of Chambers Bridge

The bridge has a segmental arch with a low ratio of rise to span, arising from the low level of the water beneath the bridge and the narrow span due to the towpath running over the road beside the bridge and not beneath the arch. The low rise of the arch minimised the hump of the bridge and the lock would have been site deliberately at this location to allow for a lower bridge of less complicated construction than if it had to cross a canal closer to the prevailing ground level. The arch rings are parallel and comprised of dressed limestone voussoirs with keystones proud of the face of the arch ring and rising slightly above.

Figure 432 Eastern face of Chambers Bridge

Figure 433 Southern abutment of bridge

The bridge abutments are faced with limestone ashlar, continuing the stonework in the faces of the lock chamber. The masonry of the vault is of smaller squared limestone blocks laid in courses.

Figure 434 Barrel of vault of Chambers Bridge

Figure 435 Splay of abutment to east of bridge on northern side

Beyond the arch, to the east of the bridge, the abutments splay outward to allow the canal to widen. The splays are faced with limestone ashlar and the tops slope downward away from the bridge, capped with dressed limestone copings.

Figure 436 Splay of abutment to east of bridge on southern side

Figure 437 Western parapet of bridge

The spandrels, parapets and wing walls are constructed with random limestone rubble, much of it squared, including some large square stones, particularly near the base of the wing walls. The parapets and wing walls curve away from the road at each end and descend toward their terminals, which are marked with drum piers. The parapets are capped with sand and cement flaunching, presumably replacing coping stones that are now missing. In places the stonework of the parapet is less horizontal than the prevailing orientation of the stones, suggesting reconstruction following damage.

Figure 438 Southern end of eastern parapet

Figure 439 Plaque on eastern face of Chambers Bridge

There are plaques on the outer faces of each parapet, consisting of a rectangular block of limestone with a raised elliptical frame surrounding an inscription reading '1795 / CHAMBERS / LOCK & BRIDGE / Rich^{d} Evans Engr'. In contrast to some plaques on other bridges the layout of the inscription suggests that the date was part of the original intent and was not added afterward.

Figure 440 Plaque on western face of Chambers Bridge

29.4 Analysis

Chambers Bridge is relatively intact, having not been altered through the addition of a railway bridge. The only apparent changes have been the reconstruction of parts of the parapets, possibly due to impact with vehicles, and the use of flaunching to cap the parapets rather than coping stones.

29.5 Predicted impacts

Predicted direct construction impacts:

None.

Predicted indirect construction impacts:

The setting of the bridge and lock will be affected by the works to construct the new depot.

Predicted operational impacts:

The presence of the new depot will have a negative effect on the setting of the bridge and lock.

29.6 Mitigation

Screen planting in the vicinity of the depot will reduce the impact on the setting of Chambers Bridge.

30. BARNHILL BRIDGE (OBCN286)

Built heritage reference in EIAR: BH-170

ITM grid reference: 703157, 738857

30.1 Historical summary

Work began on the construction of the railway between Clonsilla and Navan in October 1858 and it opened in August 1862. Amongst the roads that were crossed by this line was one that had run northward from Lucan toward Clonee and Dunboyne, now the R149, originally leading directly into the village of Lucan at its southern end. The bridge to Lucan had been lost many years before the nineteenth century and was replaced a number of times before the present Lucan Bridge was built in 1814.

As the Dublin and Meath Railway ran on relatively level ground the number of embankments and cuttings was small and bridges carrying roads over the line had to incorporate substantial approach ramps on either side. The railway line was to cross the road at a significant angle and to avoid the necessity of constructing a more complicated skew bridge the railway company opted to introduce a bend into the road as it reached the bridge from the southern side, bending back again on the northern side and returning to its original alignment a little further to the north.

Following the closure of this railway line in 1963 the bridge remained in place, carrying the road over a disused track for more than forty years. In the year 2000 the Dublin Transportation Office recommended that the line be reopened as far as Navan and a few years later construction began. The line opened as far as Dunboyne in 2010.[58]

30.2 Conservation status

Barnhill Bridge is a protected structure and is included in the record of protected structures for Fingal under reference 0712. The description is:

> Mid 19th century stone road bridge with single arch over former Dublin to Navan railway line. Stone parapet walls have been removed at start of 21st century and replaced with reinforced walls but original stone arch remains.

The National Inventory of Architectural Heritage has included the bridge under reference 11352001 and has assigned a Regional significance for its architectural and technical interest. The description of the bridge reads "single-arch stone bridge over river (sic), c.1900."

[58] Meath Chronicle, 10th April 2010.

30.3 Survey

Figure 441 Barnhill Bridge, viewed from the east

Barnhill Bridge is located to the west of Hanbridge Station, where the track curves toward its northerly route to Dunboyne and Navan. The track is slightly below the prevailing ground level and the road approaches the bridge from each side on earthen ramps.

Figure 442 Barnhill Bridge, viewed from the west

Figure 443 Eastern elevation of Barnhill Bridge

Barnhill Bridge crosses the railway in a single three-centred arch. The arch rings are parallel and are comprised of voussoirs of rock-faced limestone.

Figure 444 Western elevation of Barnhill Bridge

Figure 445 Spandrel at northern end of western arch

The spandrels are faced with squared limestone rubble and a string course of dressed limestone runs across the bridge faces along the top of each spandrel.

Figure 446 Detail of arch ring

Every second voussoir has a circular plug of limestone in the centre, indicating that anchors have been drilled into the masonry to ensure that the arch rings are adequately bonded to the rest of the bridge masonry.

Figure 447 Southern wing wall on western side of Barnhill Bridge

The wing walls to the north and south of the bridge on each side act as retaining walls for the embankments behind them. Each wing wall is faced with squared limestone random rubble. The upper surfaces of the wing walls descend to a low pier at the end and the walls and piers are capped with rock-faced limestone ashlar coping stones.

Figure 448 Northern wing wall on western side of Barnhill Bridge

Figure 449 Southern abutment of Barnhill Bridge

The abutments are faced with squared limestone random rubble, terminating beneath each arch with rock-faced limestone quoins. The abutments are not keyed into the wing walls, which simply abut the quoins. The abutments are topped with projecting string courses of rock-faced limestone. The vault springs from the string course and is comprised of squared limestone random rubble.

Figure 450 Barrell of vault of Barnhill Bridge

Figure 451 Parapet on western side of Barnhill Bridge

The parapets are of mass concrete, with vertical ribbing on the side facing the track, while on the side facing the road, they have been faced with squared limestone random rubble. The parapets are capped with precast concrete cappings with a high ridge.

Figure 452 Western parapet of Barnhill Bridge, at roadside

30.4 Analysis

Barnhill Bridge is a typical mid-nineteenth century railway bridge, with its three-centred arch, its parallel arch ring of rock-faced limestone and its stone vaulting. The bridge was repaired during the works to bring the railway back into use and the parapets were replaced at that time, raising them to ensure that the OHLE was not accessible from the bridge deck. The use of squared random rubble on the roadside face of the parapets has been very successful.

30.5 Predicted impacts

Predicted direct construction impacts:

The track beneath the bridge will be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

30.6 Mitigation

Excavations to lower the track bed are to be designed and carried out in accordance with a method statement prepared by a Grade 1 conservation architect to ensure that the foundations of the bridge are not undermined.

31. DUNBOYNE BRIDGE (OBCN287)

Built heritage reference in EIAR: BH-177

ITM grid reference: 702071, 741769

31.1 Historical summary

The Dublin and Meath Railway opened its line from Clonsilla to Navan in August 1862, with the rights to run trains along the Midland Great Western Railway line from Broadstone. In 1869 the MGWR bought out the Dublin and Meath Railway in 1869 and operated trains on the line until 1947, except for goods traffic, which ran until 1963.[59]

The railway passed to the east of Dunboyne and where the line crossed the road from Clonee to Dunboyne a station was built to the north of the road and Dunboyne Bridge was built to carry the road over the railway. Up to that time the road from Clonee ran almost due west to meet a northbound road running along the eastern flank of the demesne of Dunboyne Castle. At this time the road was realigned to run from its original location at Dunboyne Bridge on a more northerly course to run directly into Main Street in Dunboyne.

Following the closure of this railway line in 1963 the bridge remained in place, carrying the road over a disused track for more than forty years. In the year 2000 the Dublin Transportation Office recommended that the line be reopened as far as Navan and a few years later construction began. The line opened as far as Dunboyne in 2010.

31.2 Conservation status

Dunboyne Bridge is not a protected structure.

The National Inventory of Architectural Heritage has included Dunboyne Bridge under reference 14341002 and has assigned it a Regional significance for its architectural and technical interest. The description of the bridges reads “Single-arch railway bridge over tracks, built c.1862, with squared rubble stone walls.”

[59] Mulligan, p. 80; Johnson, p. 92.

31.3 Survey

Figure 453 View of Dunboyne Bridge from Dunboyne Station

Dunboyne Bridge lies close to Dunboyne Station, to the south. The bridge is relatively narrow on the road deck and for safety reasons a pedestrian bridge has been provided close to the railway bridge, on the northern side, partly obscuring the view of the bridge on this side. The southern side of the bridge is not visible from any public area.

Figure 454 Northern face of Dunboyne Bridge

Figure 455 Western spandrel on northern side of bridge

The spandrels of the bridge are faced with squared random rubble and a string course of rock-faced limestone runs across the bridge immediately above the spandrels. The arch ring is parallel and comprised of voussoirs of rock-faced limestone. The centre of every second voussoir has been drilled to insert fixings to tie the arch ring into the masonry of the bridge. The abutments are of squared limestone random rubble and are topped with a string course of rock-faced limestone. The vault rises from this string course and is comprised of limestone random rubble.

Figure 456 The arch ring and the barrel of the vault of Dunboyne Bridge

Figure 457 Western wing wall on southern side of bridge

Wing walls project from each side of the bridge, faced with random rubble and capped with copings of rock-faced limestone. There is a slight batter on each of the wing walls. The wing walls differ in size, depending on the nature of the earth embankment at the rear that needs to be supported by the wing walls serving as retaining walls.

Figure 458 Western wing wall on northern side of bridge

Figure 459 Concrete parapet facing pedestrian bridge

The parapets have been replaced with mass concrete, vertically ribbed on the side facing the track and faced with limestone random rubble on the side facing the road. The parapets are capped with high-ridged precast **concrete copings.**

Figure 460 Roadside elevation of western parapet

31.4 Analysis

Dunboyne Bridge is a typical mid-nineteenth century railway bridge, with its three-centred arch, its parallel arch ring of rock-faced limestone and its stone vaulting. The bridge was repaired during the works to bring the railway back into use and the parapets were replaced at that time, raising them to ensure that the OHLE was not accessible from the bridge deck. The use of squared random rubble on the roadside face of the parapets has been very successful.

31.5 Predicted impacts

Predicted direct construction impacts:

The track beneath the bridge is to be lowered, with the potential to undermine the foundations of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

31.6 Mitigation

Excavations to lower the track bed are to be designed and carried out in accordance with a method statement prepared by a Grade 1 conservation architect to ensure that the foundations of the bridge are not undermined.

32. SHERIFF STREET BRIDGE

Built heritage reference in EIAR: BH-6

ITM grid reference: 717377, 734790

32.1 Historical summary

At the beginning of the eighteenth century the shore of Dublin Bay to the north of the River Liffey lay along the appropriately named North Strand Road. The Ballast Office committee of Dublin Corporation, established in the opening years of the century, commenced the construction of a new wall along the northern side of the Liffey and this wall, known as North Wall, was completed in 1717. The Ballast Office then presented a proposal to continue this wall northward along what is now East Wall Road with a view to continuing to the to the River Tolka and back westward to meet North Strand Road again at Ballybough. The area enclosed by these walls was to be allocated to tenants who would infill the ground to bring it above the water level and provide useful land. As this project was carried out by Dublin Corporation the new streets were given appropriate names, including Sheriff Street, Mayor Street, Guild Street and Commons Street.[60]

In the early nineteenth century the Royal Canal Company constructed the canal around the northern edge of Dublin city, curving southward to meet the River Liffey. In the early 1870s MGWR, now the owners of the canal, widened the canal to form a linear dock, with a new lifting bridge to carry Sheriff Street over the canal and the dock was named Spencer Dock in honour of the viceroy of the day.[61] Prior to this the MGWR had laid a new railway line across the north of the city to North Wall, with a goods station at North Wall to the east of the canal.[62] and this had involved the construction of a bridge of eight arches to carry Sheriff Street over the various branch tracks to the goods station.

In 1877 the GSWR completed its link from its terminus at Kingsbridge, now Heuston Station, to North Wall via the Phoenix Park tunnel. In the same year the London North Western Railway Company constructed a spur from this line leading to the passenger station for its cross-channel steamers on North Wall.[63] This spur crossed Sheriff Street, where a nine-span bridge was constructed to carry Sheriff Street over the various tracks leading to the station and a number of sidings. Several of the tracks beneath this bridge were closed in the late twentieth century, though the rail yards to the south of Sheriff Streets remained in use until the opening years of the twenty-first century. The tracks were lifted by 2005.

The bridge was depicted on the Ordnance Survey five-foot map that was published in 1887, ten years after the bridge was built. This depicts the nine spans of the bridge clearly with railway track running through the 3rd, 5th ,6th and 7th spans, reading from left to right on the map, taking the westernmost span as the first.

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[60] Nairn, Jeffrey and Goodbody, pp. 188-189.
[61] Delany and Bath, p. 192.
[62] Shepherd, p. 36.
[63] Murray and McNeill, pp. 49-50.

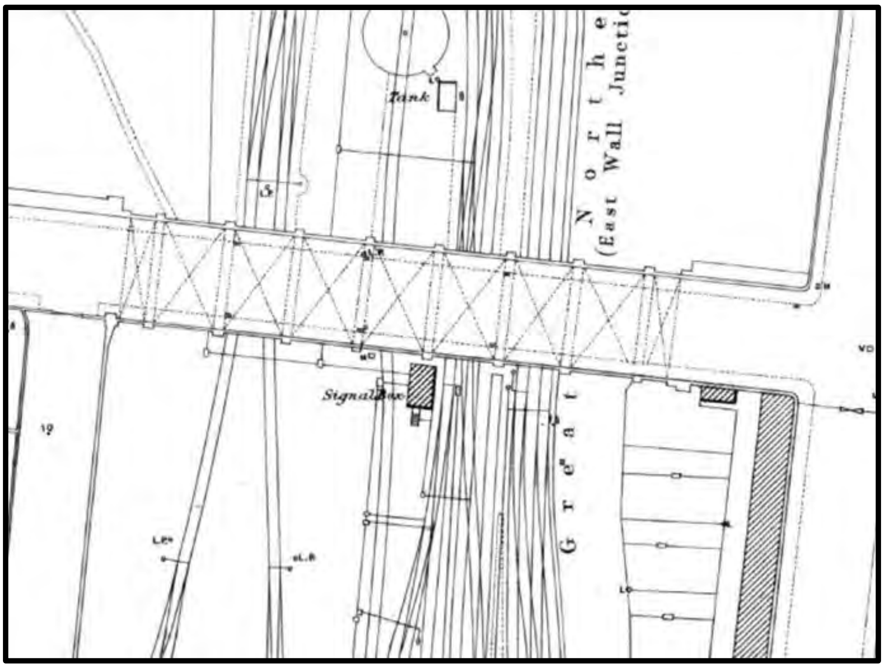

Figure 461 Detail of Ordnance Survey map of 1887 showing bridge at Sheriff Street Upper

32.2 Conservation status

The LNWR bridge carrying Sheriff Street Upper over the site of the former railway line is not a protected structure and is not included in the NIAH. The bridge is included in the Dublin City Industrial Heritage Record.

32.3 Survey

This survey examines only seven of the bridge spans. Only the westernmost six spans are on land occupied by Irish Rail, while the seventh, eighth and ninth are on an adjacent property. Enough is visible of the seventh span to include some description of it in the text.

Figure 462 Northern face of LNWR bridge at Sheriff Street Upper

The bridge carrying Sheriff Street Upper over the former lines and sidings of the LNWR goods station is a beam bridge consisting of eight spans resting on brick piers and with brick parapets capped with granite copings.

Figure 463 Southern face of LNWR bridge at Sheriff Street Upper

Figure 464 Western span on northern side of bridge

The spans at the eastern and western ends of the bridge are narrower than the other seven, at 3.2 metres. The western span is blocked up with sand and cement faced masonry and with a door on the northern side, while the southern side has a pair of timber garage doors, above which is a mass concrete slab, the infill above which is of red brick laid in stretcher bond. Four pattress plates are placed just beneath the iron beams on either side. To the west of this span on the northern side is a substantial pier of squared limestone, terminating the retaining wall to the east. The pier is built off a plinth with cut granite course forming the base for the pier above. This pier is faced with brick on its elevation to the road. The southern side of the wall has been faced with limestone random rubble, thickening the original wall.

Figure 465 Western span on southern side of bridge

Figure 466 Detail of iron beam

The bridge deck is 17 metres in width and is comprised of nine iron beams supporting brick jack arches. Each beam is fabricated with wrought iron plates in the web, joined with cast-iron flanged plates rivetted to the plates on either side, while a base plate is joined to the web plates with angle irons secured with rivets. The top plates are only visible on the beams at either side of the bridge but appear to be of similar construction. The jack arches are constructed of red brick of a lower quality than those in the piers. The archs are secured together with two tie bars. Steel strips fastened to the undersides of the iron beams appear to be later additions.

Figure 467 Jack arches on soffit of bridge deck

Figure 468 Southern face of sixth span from the west

Each of the seven spans consists of a pair of brick piers supporting a beam deck, above which is a brick parapet. The brick is a dark red highly vitrified brick and is laid in English bond. The piers are expressed as pilasters at the ends, with dressed granite at the base of the deck and above the beams, as the base for the parapet. The seven central spans measure approximately 7.3 metres each, varying slightly. The soffits of the beams are approximately 4.55 metres above ground, while the crowns of the jack arches are approximately 5 metres above ground.

Figure 469 Northern side of seventh and part of sixth span from the west

Figure 470 Typical top of pier

The beams of the bridge rest on dressed granite padstones that extend to the ends of the piers where they project to form a strong course. The brick piers continue above the string course across the ends of the beams, above which is another course of cut granite forming a plinth for the parapet above and projecting as a string course. The brickwork to the front of the iron beams is half a brick thick, except for a full brick in the topmost course, where it supports the granite string course above.

Figure 471 Detail of side of pier adjacent to beam

Figure 472 Eastern side of typical pier

Figure 473 Padstones and string course beneath beams

The figure above shows the dressed granite string course beneath the beams, with the padstones having a greater depth than the string course between the padstones. A tie bar is seen toward the top left, penetrating the brick of the jack arches, beneath which it would pass through the web of the beam.

Figure 474 Parapet at northern side of Sheriff Street Upper

The parapets are constructed the same dark, highly vitrified brick as found in the piers and they are laid in English bond, standing approximately 1.25 metres above the footway. The parapets rise from a brick plinth and are capped with dressed granite copings. At each end the parapets terminate in a pier that is capped with a granite coping measuring 2050mm by 850mm.

Figure 475 Detail of side of parapet facing the road

Figure 476 View to eastern end of northern parapet

The road deck slopes down toward the eastern end, dropping about 1.8 metres over a distance of about 60 metres. This is reflected in the parapets of the bridge, as seen in the figure above. The bridge spans at the eastern end of the bridge were not seen for this survey, but it appears that they are lower than those at the western end.

Figure 477 Crack in sixth pier from the western end

The sixth pier from the western end of the bridge has a substantial crack running the full height of the pier and separating one of the padstones from the adjacent string course stone. The crack is wider at the top than at the bottom.

32.4 Analysis

The LNWR bridge at Sheriff Street Upper is unusual in the Dublin city context, being of brick – while this not unique, the majority of railway bridges in the city are either stone arches or metal beams carried on stone piers or abutments. The use of jack arches in bridges in the city is also uncommon. Many of the jack arch bridges on railways around the country have been replaced with steel or concrete decks because of the inherent weakness in jack arch bridges resulting from rusting of the tie rods within the masonry, where it is not possible to inspect them for damage. In the event of rusting through of the tie rods the possibility of catastrophic failure cannot be ruled out.

32.5 Predicted impacts

Predicted direct construction impacts:

The work for the construction of Spencer Dock Station will involve the demolition and reconstruction of several spans of the bridge.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

32.6 Mitigation

The bridge is to be recorded by figures, written description and measured drawings prior to demolition. The brick in the piers and parapets and the granite are to be removed and reused in the reconstructed bridge; the works are to be carried out to best conservation practice in accordance with a method statement to be prepared by a Grade 1 conservation architect.

33. NORTH STRAND ROAD UNDERBRIDGE (UBO 33)

Built heritage reference in EIAR: BH-99

ITM grid reference: 717086, 735725

33.1 Historical summary

The Great Southern and Western Railway (GSWR) opened a link between its terminus at Kingsbridge (now Heuston Station) and North Wall. This involved the construction of a new route between Kingsbridge and Glasnevin and a second one between Newcomen Bridge and North Wall, with the intervening section using the Midland Great Western Railway route, for which a fee was paid. A proposal to construct a suburban line across the north of the city by the Drumcondra and North Dublin Link Railway in 1894 failed to attract financial backing, though the rights to build this line were acquired by the GSWR, enabling the company to have its own line along the entire route between Kingsbridge and North Wall. Construction of the new line commenced in 1897 and the line opened in 1901 with stations at Glasnevin and Drumcondra.[64]

From its western end the route ran beneath Prospect Road before climbing to ground level and continuing upward to cross streets from St Patrick's Road, Drumcondra, to North Strand Road and Northbrook Avenue.

Following the opening of the City of Dublin Junction Railway, commonly known as the Loop Line, between Westland Row and Connolly Station, with an additional track connecting to the MGWR line at Newcomen Bridge, the GSWR decided to construct a link between its Drumcondra line and the Loop Line and this opened in 1906.[65] This spur was taken from the original line on the eastern side of North Strand Road, necessitating alterations to the end of the bridge where it crossed Northbrook Avenue.

33.2 Conservation status

The northern elevation of the underbridge at North Strand Road is a protected structure, reference 888 in the record of protected structures for Dublin city.

The bridge is included in the National Inventory of Architectural Heritage (NIAH), reference 50120209, where it has been assigned a Regional significance for its architectural, artistic and technical interest.

The bridge is included in the Dublin City Industrial Heritage Record.

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[64] Murray and McNeill, pp. 75-76.
[65] Johnson, p. 125.

33.3 Survey

Figure 478 Western side of bridge at North Strand Road

The underbridge at North Strand Road carries the GSWR railway from north-north-west to south-south-east in two spans, the first crossing North Strand Road and the second crossing Northbrook Avenue Lower. The bridge crosses the roads diagonally. The section across North Strand Road has a span of approximately forty metres and is constructed with pairs of wrought-iron Pratt box trusses carrying a wrought-iron deck. The outer faces of the trusses are faced with cast-iron panels.

Figure 479 Eastern side of bridge at North Strand Road

Figure 480 Eastern side of bridge span over Northbrook Avenue Lower

The bridge span over Northbrook Avenue Lower has a similar truss on the eastern side, without the cast-iron ornamentation. On the western side the truss is formed with solid wrought-iron panels rivetted together, with flanges.

Figure 481 West side of bridge span over Northbrook Avenue Lower

Figure 482 Abutment at northern end of bridge, on eastern side

On the north-western side of North Strand Road, the bridge is supported on an abutment of rock-faced ashlar. The abutment rises above the bridge deck on either side of the track. On the south-eastern side of North Strand Road, the trusses are supported on two fluted cast-iron columns on the footway adjacent to the carriageway. On the inner side of the footway an abutment runs at an angle between the two streets and is of rock-faced ashlar. On the southern side of Northbrook Avenue Lower the bridge rests on an abutment of rock-faced ashlar and due to the extreme angle with which the bridge meets this side of the road the abutment is in excess of thirty metres in length.

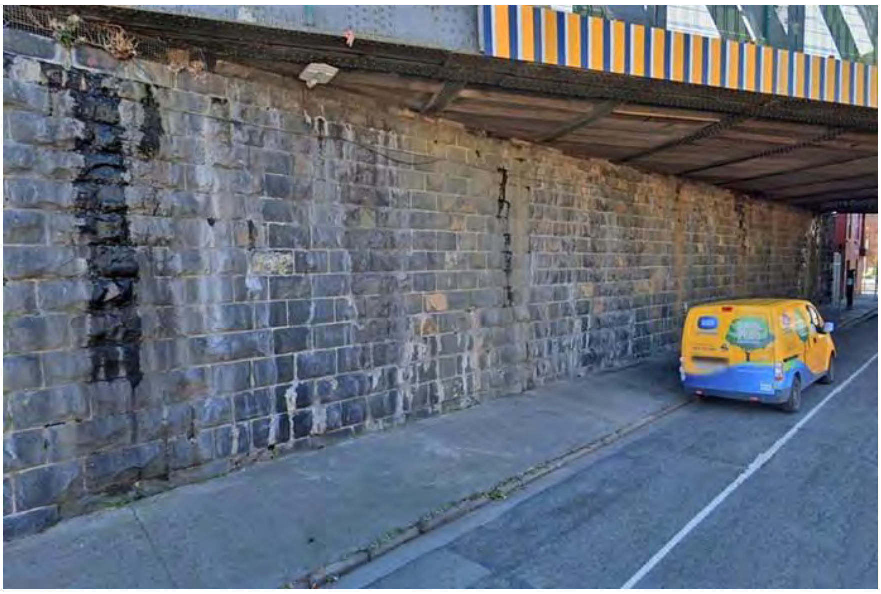

Figure 483 Abutment at Northbrook Avenue Lower

Figure 484 Detail of cast-iron panels

On either side of the bridge across North Strand Road the trusses facing the street are faced with pierced rectangular decorative cast-iron panels, located between the top and bottom chords of the trusses.

Figure 485 Cast-iron column between the two spans

The figure above shows one of the cast-iron columns at the corner of North Strand Road and Northbrook Avenue Lower. The second column is out of view to the left.

33.4 Analysis

The underbridge at North Strand Road crosses the street with a substantial forty-metre span, utilising two boxed Pratt trusses. The use of cast-iron panels on either face of the bridge may have been a requirement imposed on the railway company, as had been the case when the City of Dublin Junction Railway crossed Westland Row.[66]

The bridge span across Northbrook Avenue Lower was less visible to the general public and while its original trusses were similar to those on North Strand Road, they lacked the decorative panels. The truss on the north-eastern side of this span is the original truss, while the solid face of the south-western side is a later addition, accommodating the line connecting to Connolly Station that was added in 1906.

The level of protection afforded to the bridge is puzzling; the record of protected structures limits the protection to the north elevation for reasons unexplained, though the similar bridges at Ballybough Road and Jones Road are not subject to any such limitation.

33.5 Predicted impacts

Predicted direct construction impacts:

Gantries and other equipment will be erected on the bridge to facilitate the OHLE.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The appearance of the bridge will be altered due to the provision of the OHLE.

33.6 Mitigation

No mitigation is possible other than careful siting of the stanchions for the OHLE, though the scope to vary the locations is very limited. No other opportunity for mitigation is available other than to produce a photographic and written description of the bridge prior to the installation of the OHLE.

[66] Shepherd and Beesley, p. 42.

34. BALLYBOUGH ROAD UNDERBRIDGE (UBO 25)

Built heritage reference in EIAR: BH-101

ITM grid reference: 716912, 735937

34.1 Historical summary

The Great Southern and Western Railway (GSWR) opened a link between its terminus at Kingsbridge (now Heuston Station) and North Wall. This involved the construction of a new route between Kingsbridge and Glasnevin and a second one between Newcomen Bridge and North Wall, with the intervening section using the Midland Great Western Railway route, for which a fee was paid. A proposal to construct a suburban line across the north of the city by the Drumcondra and North Dublin Link Railway in 1894 failed to attract financial backing, though the rights to build this line were acquired by the GSWR, enabling the company to have its own line along the entire route between Kingsbridge and North Wall. Construction of the new line commenced in 1897 and the line opened in 1901 with stations at Glasnevin and Drumcondra.[67]

From its western end the route ran beneath Prospect Road before climbing to ground level and continuing upward to cross streets from St Patrick's Road, Drumcondra, to North Strand Road and Northbrook Avenue.

34.2 Conservation status

The underbridge at Ballybough Road is a protected structure, reference 877 in the record of protected structures for Dublin city.

The bridge is listed in the NIAH, reference 50120208, where it is assigned a Regional rating for its architectural, artistic and technical interest.

The bridge is included in the Dublin City Industrial Heritage Record.

34.3 Survey

Figure 486 Southern side of underbridge on Ballybough Road

[67] Murray and McNeill, pp. 75-76.

The underbridge at Ballybough Road carries the GSWR railway across Ballybough Road in a single span. In the original form, a second span crossed a side street leading off Ballybough Road to the east, known as Courtney's Place. The bridge crosses Ballybough Road at right angles, on an orientation slightly off directly east-west. The section across Ballybough Road has a span of approximately thirty metres and is constructed with pairs of wrought-iron Pratt box trusses carrying a wrought-iron deck. The outer faces of the trusses are faced with cast-iron panels. Both sides of the bridge carry advertising.

Figure 487 Northern side of underbridge on Ballybough Road

Figure 488 Western abutment of bridge on Ballybough Road

On the western side the bridge deck and trusses rest on an abutment of rock-faced limestone ashlar, with walls rising on either side of the bridge deck. The walls continue on either side of the abutment, that to the south sloping down to a pier, while that on the northern side continues about three metres to the north without reducing in height. On the eastern side of the bridge the northern truss is supported on an abutment of rock-faced ashlar, while the southern truss rests on a fluted cast-iron column. Part of the space between the deck is infilled with later brickwork and painted with a mural.

Figure 489 Eastern abutment of bridge on Ballybough Road

Figure 490 Former bridge span at Courtney Place

The former road at Courtney's Place ran diagonally beneath the eastern span of the bridge, resulting in an offset between the locations of the two trusses. The eastern end of the southern truss rests on the cast-iron column that supports the bridge over Ballybough Road, while the northern truss is at a distance up a laneway, with a stretch of retaining wall between this span and the bridge at Ballybough Road.

Figure 491 Retaining wall and bridge truss to north of Courtney Place

The trusses on either side of the bridge at Ballybough Road have decorative cast-iron panels fixed onto their outer faces. These are pierced and display a similar pattern to the cast-iron panels of the bridge over North Strand Road, though this bridge lacks the cast-iron rosettes fixed to the chords of the trusses, as seen at North Strand Road.

Figure 492 Decorative cast-iron panels on bridge at Ballybough Road

The cast-iron column is fluted and is similar to that on the bridge at North Strand Road, and it supports an octagonal capital bearing the date 1898.

Figure 493 Cast-iron column supporting two spans of the bridge

34.4 Analysis

The underbridge at Ballybough Road crosses the street in a thirty-metre span with two boxed Pratt trusses. The use of cast-iron panels on either face of the bridge may have been a requirement imposed on the railway company, as had been the case when the City of Dublin Junction Railway crossed Westland Row.68

The bridge span across Courtney's Place was less visible to the general public and while its trusses were similar to those on Ballybough Road, they lacked the decorative panels.

34.5 Predicted impacts

Predicted direct construction impacts:

Gantries and other equipment will be erected on the bridge to facilitate the OHLE.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The appearance of the bridge will be altered due to the provision of the OHLE.

[68] Shepherd and Beesley, p. 42.

34.6 Mitigation

No mitigation is possible other than careful siting of the stanchions for the OHLE, though the scope to vary the locations is very limited. No other opportunity for mitigation is available other than to produce a photographic and written description of the bridge prior to the installation of the OHLE.

35. JONES ROAD UNDERBRIDGE (UBO20)

Built heritage reference in EIAR: BH-106

ITM grid reference: 716301, 736055

35.1 Historical summary

The Great Southern and Western Railway (GSWR) opened a link between its terminus at Kingsbridge (now Heuston Station) and North Wall. This involved the construction of a new route between Kingsbridge and Glasnevin and a second one between Newcomen Bridge and North Wall, with the intervening section using the Midland Great Western Railway route, for which a fee was paid. A proposal to construct a suburban line across the north of the city by the Drumcondra and North Dublin Link Railway in 1894 failed to attract financial backing, though the rights to build this line were acquired by the GSWR, enabling the company to have its own line along the entire route between Kingsbridge and North Wall. Construction of the new line commenced in 1897 and the line opened in 1901 with stations at Glasnevin and Drumcondra.[69]

From its western end the route ran beneath Prospect Road before climbing to ground level and continuing upward to cross streets from St Patrick’s Road, Drumcondra, to North Strand Road and Northbrook Avenue.

35.2 Conservation status

The underbridge at Jones Road is a protected structure, reference 884 in the record of protected structures for Dublin city.

The bridge is listed in the NIAH, reference 50120269, where it is assigned a Regional rating for its architectural, artistic and technical interest.

The bridge is included in the Dublin City Industrial Heritage Record.

[69] Murray and McNeill, pp. 75-76.

35.3 Survey

Figure 494 Southern side of bridge crossing Jones Road

The underbridge at Jones Road carries the GSWR railway across Jones Road almost at right angles in a single span on an orientation slightly off directly east-west. The bridge has a span of approximately thirty-one metres and is constructed with pairs of wrought-iron Pratt box trusses carrying a wrought-iron deck. The outer faces of the trusses are decorated with cast-iron panels. Both sides of the bridge carry advertising.

Figure 495 Northern side of bridge crossing Jones Road

Figure 496 Abutment at western side of Jones Road

Th bridge is supported at either end on an abutment of rock-faced limestone ashlar with a projecting string course of the same material at the top of the abutments. On each side of the bridge a parapet rises alongside the ends of the span. There is a slight batter on the face of each abutment. The abutments are set back from the road margins, the area between the footway and the abutment on the western side being surfaced with asphalt, while that on the eastern side is enclosed with iron railings and landscaped.

Figure 497 Abutment at eastern side of Jones Road

Figure 498 Cast-iron decorative panels at eastern end of bridge

The triangular spaces between the verticals and diagonals of the trusses are infilled with cast-iron decorative panels.

Figure 499 Cast-iron decorative panels at western end of bridge

35.4 Analysis

The underbridge at Jones Road crosses the street in a thirty-one-metre span with two boxed Pratt trusses. The use of cast-iron panels between the verticals and diagonals of the trusses on either face of the bridge may have been a requirement imposed on the railway company, as had been the case when the City of Dublin Junction Railway crossed Westland Row.[70]

35.5 Predicted impacts

Predicted direct construction impacts:

Gantries and other equipment will be erected on the bridge to facilitate the OHLE.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

The appearance of the bridge will be altered due to the provision of the OHLE.

35.6 Mitigation

No mitigation is possible other than careful siting of the stanchions for the OHLE, though the scope to vary the locations is very limited. No other opportunity for mitigation is available other than to produce a photographic and written description of the bridge prior to the installation of the OHLE.

[70] Shepherd and Beesley, p. 42.

36. OTHER STRUCTURES AFFECTED BY OHLE

36.1 Introduction

This section includes Drumcondra Station and the bridges on the GSWR line between North Strand Road and Claude Road that are not protected structures and bridges on the GSWR and GNR extensions to North Wall. Two of the bridges and Drumcondra Station are included in the National Inventory of Architectural Heritage, while the station and eleven of the bridges are included in the Dublin City Industrial Heritage Record. None of the other four bridges are listed in neither of these sources. Only one bridge is included in both the NIAH and DCIHR – the bridge across Drumcondra Road. These structures have been listed together in this section as they would all be affected by the OHLE, mostly with the OHLE erected above, while in three cases it would run beneath. There is a broad similarity in the type of bridges on the GSWR – all but the Claude Road footbridge are underbridges, most of them being metal beam bridges, and in all cases except Claude Road it is proposed to instal OHLE on the deck of the bridges. The bridge styles are similar, with the exception of the pedestrian underpass at Jones Road, and the proposed interventions are similar.

Two bridges on the route between Connolly Station and Drumcondra, at Bessborough Avenue (UBLL 4) and Strandville Avenue (UBLL 2) are not included in this appendix as OHLE has already been erected on their decks.

Of the other bridges included here, all are beam bridges with concrete decks, except UBO 34 at Strandville Avenue, which has a steel deck.

The three underbridges on the GSWR section of the line from Connolly through Drumcondra that are protected structures are at North Strand Road, Ballybough Road and Jones Road and are considered individually above.

The footbridge at Claude Road is a concrete overbridge but it is included here for the sake of completeness on this stretch of the line and because it is included in the Dublin City Industrial Heritage Record. However, as noted in the description of the bridge below, the surviving element of the original bridge is insignificant in the context of the present proposal and the potential impacts on the bridge are not discussed further here.

36.2 Historical summary

The Great Southern and Western Railway (GSWR) opened a link between its terminus at Kingsbridge (now Heuston Station) and North Wall. This involved the construction of a new route between Kingsbridge and Glasnevin and a second one between Newcomen Bridge and North Wall, with the intervening section using the Midland Great Western Railway route, for which a fee was paid. A proposal to construct a suburban line across the north of the city by the Drumcondra and North Dublin Link Railway in 1894 failed to attract financial backing, though the rights to build this line were acquired by the GSWR, enabling the company to have its own line along the entire route between Kingsbridge and North Wall. Construction of the new line commenced in 1897 and the line opened in 1901 with stations at Glasnevin and Drumcondra.[71]

From its western end the route ran beneath Prospect Road before climbing to ground level and continuing upward to cross streets from St Patrick's Road, Drumcondra, to North Strand Road and Northbrook Avenue.

Following the opening of the City of Dublin Junction Railway, commonly known as the Loop Line, between Westland Row and Connolly Station, with an additional track connecting to the MGWR line at Newcomen Bridge, the GSWR decided to construct a link between its Drumcondra line and the Loop Line and this opened in 1906.[72] This spur was taken from the original line on the eastern side of North Strand Road, necessitating alterations to the end of the bridge where it crossed Northbrook Avenue.

[71] Murray and McNeill, pp. 75-76.
[72] Johnson, p. 125.

The stations at Glasnevin and Drumcondra closed in 1906, though the line remained open for goods traffic and transfer of rolling stock. The line is now used for suburban services and Drumcondra Station has reopened.

36.3 Potential impacts and mitigation

There will be a direct impact on the eleven underbridges included in this section through the need to fix OHLE to the deck of each bridge.

There will be an impact on the character and setting of each of the bridges arising from the presence of OHLE on the bridge deck.

No mitigation is possible in these cases other than careful siting of the stanchions for the OHLE, though the scope to vary the locations is very limited.

36.4 Spring Garden Street (UBO 30)

Figure 500 Eastern side of bridge in Spring Garden Street

BH No.	BH-100
Location	Railway underbridge at Spring Garden Street and Annesley Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	n/a
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717035, 735824
Classification	Railway underbridge

Dist. From Development	Within proposed development area
Description	Double-span bridge with iron decks supported on rock-faced ashlar abutments, the two spans being separated by a brick viaduct with a single arch
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.5 Annesley Avenue (UBO 28)

Figure 501 Southern side of bridge at Annesley Avenue

BH No.	BH-100
Location	Railway underbridge at Spring Garden Street and Annesley Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	n/a
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717035, 75824
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Double-span bridge with iron decks supported on rock-faced ashlar abutments, the two spans being separated by a brick viaduct with a single arch
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.6 Clonliffe Avenue (UBO 24)

Figure 502 Southern side of bridge at Clonliffe Avenue

BH No.	BH-102
Location	Railway underbridge, Clonliffe avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East
Parish	St. Georges
Barony	Coolock
I.T.M.	716720, 736005
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span railway bridge with deck of wrought iron and cast iron supported on rock-faced ashlar abutments
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.7 St James's Avenue (UBO 23)

Figure 503 Southern side of bridge at St James's Avenue

BH No.	BH-103
Location	Railway underbridge, St James's Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East
Parish	St. Georges
Barony	Coolock
I.T.M.	716624, 736017
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span railway bridge with deck of wrought iron and cast iron supported on rock-faced ashlar abutments
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.8 St Joseph's Avenue (UBO 22)

Figure 504 Southern side of bridge at St Joseph's Avenue

BH No.	BH-104
Location	Railway underbridge, St Joseph's Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East
Parish	St. Georges
Barony	Coolock
I.T.M.	716555, 736027
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span railway bridge with deck of wrought iron and cast iron supported on rock-faced ashlar abutments; bridge extended on southern side with mass concrete
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.9 Jones Road underpass (UBO 21)

Figure 505 Southern side of pedestrian underpass at Jones Road

BH No.	BH-105
Location	Pedestrian underbridge at Jones's Road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	n/a
Statutory Protection	No
Townland	Clonliffe East/Lovescharity
Parish	St. Georges
Barony	Coolock
I.T.M.	716358, 736048
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Brick vault on rock-faced ashlar abutments and with rock-faced ashlar spandrels and parapets
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.10 Mabel Street (UBO 18)

Figure 506 Southern side of bridge in Mabel Street

BH No.	BH-107
Location	Railway underbridge, Mabel Street
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East
Parish	St. Georges
Barony	Coolock
I.T.M.	716203, 736071
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span railway bridge with deck of wrought iron and cast iron supported on rock-faced ashlar abutments
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.11 George's Avenue (UBO 17)

Figure 507 Southern side of bridge in George's Avenue

BH No.	BH-110
Location	Railway underbridge, St George's Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East
Parish	St. Georges
Barony	Coolock
I.T.M.	716025, 736126
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span railway bridge with deck of wrought iron and cast iron supported on rock-faced ashlar abutments
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.12 Drumcondra Road (UBO 16)

Figure 508 Southern side of bridge at Drumcondra Road

BH No.	BH-111
Location	GSWR railway underbridge at Drumcondra Road
RPS No.	n/a
NIAH Ref.	50120207
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe East/Clonliffe West
Parish	St. Georges
Barony	Coolock
I.T.M.	715922, 736165
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Single-span iron truss bridge supported on rock-faced ashlar abutments
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.13 Drumcondra Station

Figure 509 Southern side of Drumcondra Station

BH No.	BH-112
Location	GSWR railway station at Drumcondra Road
RPS No.	n/a
NIAH Ref.	50130208
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe West
Parish	St. Georges
Barony	Coolock
I.T.M.	715898, 736174
Classification	Railway station
Dist. From Development	Within proposed development area
Description	Red brick station building facing Drumcondra Road with concrete-faced viaduct on St Anne's Road, topped with red-brick curtain wall
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.14 St Joseph's Avenue (UBO 14)

Figure 510 Southern side of bridge at St Joseph's Avenue

BH No.	BH-113
Location	GSWR railway underbridge at St Joseph's Avenue
RPS No.	n/a
NIAH Ref.	50130202
DCIHR	n/a
Statutory Protection	No
Townland	Clonliffe West
Parish	St. Georges
Barony	Coolock
I.T.M.	715818, 736211
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Central iron brick deck flanked by mass concrete bridges, all supported on rock-faced ashlar abutments
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.15 St Patrick's Road (UBO 13)

Figure 511 Southern side of bridge in St Patrick's Road

BH No.	BH-114
Location	GSWR railway underbridge at St Patrick's Road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Clonliffe West
Parish	St. Georges
Barony	Coolock
I.T.M.	715771, 736231
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Iron bridge supported on rock-faced ashlar abutments
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.16 Claude Road

Figure 512 Pedestrian Bridge at Claude Road

Description:

The pedestrian bridge at Claude Road is included in the DCIHR, despite it being a modern bridge, on the basis that parts of the original footbridge survive. Examination of the bridge has identified only the bottom step of the original bridge surviving on the southern side, beneath the present lower flight of steps and close to the point where the modern steps reach the ground.

BH No.	BH-123
Location	Pedestrian bridge at Claude Road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Daneswell
Parish	St. Georges
Barony	Coolock
I.T.M.	715463, 736346
Classification	Footbridge
Dist. From Development	Within the proposed development area
Description	Surviving fragments of bridge beneath later concrete bridge
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.17 Strandville Avenue (UBO 34)

Figure 513 Pedestrian underpass at Strandville Avenue

Description:

The pedestrian underpass at Strandville Avenue is not included in the NIAH or the DCIHR. The bridge has a steel deck supported on abutments of a well vitrified deep red brick with rock-faced limestone quoins. The parapets are clad in corrugated metal and run between piers of deep red brick. The embankments on either side of the bridge are supported by concrete retaining walls with buttresses of cast concrete.

BH No.	BH-69
Location	Pedestrian underpass on GSWR North Wall Extension at Strandville Avenue
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	n/a
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717142, 735528
Classification	Railway underbridge
Dist. From Development	Within the proposed development area
Description	Brick viaduct and abutments with rock-faced limestone quoins supporting a replacement steel deck
Reference	Historic Ordnance Survey maps/Aerial Imagery & site visit

36.18 Overbridge at Ossory Road (OBO 36)

Figure 514 Overbridge at Ossory Road

Description:

Ossory Road is carried over the GSWR North Wall extension on a skewed beam bridge with abutments of well vitrified red brick. The parapets have been replaced with modern steel parapets with woven steel mesh panels. These run between brick piers at either end. There is adequate clearance for the OHLE to run beneath the bridge without the need to raise the deck, while the parapets have already been raised to a sufficient height to ensure safety. No works are proposed to the bridge.

BH No.	BH-62
Location	Bridge on GSWR North Wall extension, Ossory Road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717184, 735362
Classification	Railway overbridge
Dist. From Development	Within proposed development area
Description	Railway bridge with cast-iron deck supported on brick piers and with replacement steel parapets
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.19 Ossory Road and West Road (UBB 1 (EW))

Figure 515 Underbridge at Ossory Road and West Road

Description:

The underbridge crossing Ossory Road at its junction with West Road has a replacement concrete deck supported on abutments of rock-faced limestone ashlar and with splayed wing walls of squared rock-faced limestone rubble.

BH No.	BH-63
Location	Railway underbridge on GNR North Wall Extension, Ossory Road and West road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717255, 735445
Classification	Railway underbridge
Dist. From Development	Within proposed development area
Description	Railway bridge with concrete deck supported on rock-faced ashlar abutments and with rock-faced ashlar wing walls
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

36.20 East Road

Figure 516 Overbridge at East Road

Description:

The overbridge at East Road has a concrete deck supported on piers and abutments that are partly of concrete and partly of rubble stone. It is proposed to run the OHLE beneath the bridge and as there is adequate clearance there will be no need to raise the deck. The parapets will be raised to meet the requirements of safety.

BH No.	BH-5
Location	Railway overbridge, East Road
RPS No.	n/a
NIAH Ref.	n/a
DCIHR	DCIHR
Statutory Protection	No
Townland	Dublin City - North
Parish	Saint Thomas's
Barony	Dublin City
I.T.M.	717615, 734925
Classification	Railway bridge
Dist. From Development	Within proposed development area
Description	Single-span bridge with original masonry piers and replacement concrete deck
Reference	DCIHR/historic Ordnance Survey maps/Aerial Imagery & site visit

37. OTHER STRUCTURES

37.1 Introduction

A number of structures in addition to those listed above will be affected to a greater or lesser extent by the proposed works. The following structures will be directly affected, in whole or in part, and are discussed individually in this section:

- Vaults at Connolly Station
- Signal box at East Wall
- Royal Canal at Ashtown
- Features relating to Ashtown Mill
- Gate lodge and boundary wall at Ashton House, Ashtown

In each of these cases the text below provides a brief history and records the conservation status of the structure. This is followed by a summary survey, an analysis and an assessment of the predicted impacts of the proposed works on the structure with mitigation measures.

38. VAULTS AT CONNOLLY STATION

Built heritage reference in EIAR: BH-23 and BH-32

ITM grid reference: 716655, 735046

38.1 Historical summary

The proposal to construct a railway between Dublin and Drogheda originated in the 1830s and an act of parliament to allow for this project was passed in 1838. Construction commenced but was brought to a halt pending a possible decision to adopt an alternative route. Construction recommenced in 1840 and at this time it was decided that the terminus would be located at Amiens Street. The design of the railway was carried out by John MacNeil, an engineer from County Louth, who had already worked on the Dublin, Carlow and Kilkenny Railway. He was knighted on the completion of the Dublin and Drogheda Railway (DDR) in 1844.

At the time that the DDR was completed a proposal was put forward to connect this railway northward from Drogheda to connect with an existing line between Belfast and Portadown so as to complete a route between Dublin and Belfast.

The station building at Amiens Street was designed by William Deane Butler, though this relates to the substantial granite building facing the street, while the extensive works to the rear of this and along the railway lines were designed by John MacNeil and Robert Mallet, a Dublin engineer. The line rose up above ground in the Clontarf area to cross the River Tolka and the Royal Canal, continuing southward to the terminus on seventy-five brick vaults to the station, allowing for uninterrupted traffic on the roads that crossed the line. MacNeil's concept for the vaults was that they could be used for business purposes, bringing and additional income to the railway company.

By the 1850s, Dublin had five railway termini serving different parts of the country, with no connection between them. Later in the century works to connect the lines and to connect them to Dublin port got under way. In 1884 the discussions began on the possibility of connecting the terminus of the Dublin and Kingstown Railway at Westland Row with the line that was now known as the Great Northern Railway at Amiens Street. Apart from connecting this railway with the overall rail network, such a connection would greatly facilitate the transit of the mails and passengers to and from the mail boats based at Kingstown (Dun Laoghaire).

Following extensive discussions and arguments relating to the possible routes for this connection, including opposition from Dublin Port to any link eastward of the Custom House, construction finally began in the late 1880s and was completed in May 1890. This line crossed Amiens Street to the north of the existing station building and ran alongside the existing track, allowing for a new branch running northward to connect into the Midland Great Western Railway line at Newcomen Bridge. The extension to the station at Amiens Street was built up on vaults of brick and stone.

38.2 Conservation status

Connolly Station is a protected structure, reference 130 in the record of protected structures for Dublin city. The description in the record of protected structures is "all 19th century elements of main railway station complex" and hence it is clear that the Dublin Junction Railway, otherwise known as the Loop Line, is considered to be part of this protected structure.

The City of Dublin Junction Railway Terminus, or Loop Line station, is listed in the NIAH, reference 50011009, where it is assigned a Regional rating for its architectural, artistic, social and technical interest. The original part of Connolly Station is included separately in the NIAH under reference 50010119 and this would include part of the vaults that are considered in this assessment.

The station is included in the Dublin City Industrial Heritage Record.

38.3 Survey

Figure 517 View northward in vaults beneath Connolly Station

The vaults beneath the platforms and tracks at Connolly Station vary in the height, length and geometry, some having elliptical vaults and other semi-cylindrical. The vaults are divided by a central passageway, shown in the figure above, viewed northward toward Seville Place. To the right in the figure the vaults are part of the original Dublin and Drogheda Railway, while the vaults to the left were built as part of the Loop Line railway in the late 1880s. The central passage would also have been built as part of the Loop Line. This central corridor is roofed with a continuous semi-cylindrical brick vault. Further to the north the corridor is spanned by jack arches running across the span, with iron beams infilled with brick. The surface beneath the vaults is generally bare earth, though a concrete walkway has been laid down along the spine route.

Figure 518 Vaulting in central spine corridor

Figure 519 Typical vault beneath DDR

The original vaults constructed as part of the DDR are of brick, with brick piers supporting brick arches, many of which are elliptical, though some are semi-cylindrical. At the ends of each vault, adjacent to the central corridor, the brick changes to a more regular, machine-made brick. Drainage from the railway and platforms above is via square-section downpipes set into the face of each pier to the side of the central corridor.

Figure 520 Typical vault beneath Loop Line

The typical vault beneath the Loop Line has piers of limestone that continue into the springs of the vaults, above which the vaults are semi-cylindrical and of red brick. The ends of the piers are entirely constructed of brick. The piers and vaulting is similar in construction to the various arches and vaults along the length of the Loop Line railway from Westland Row, other than at the bridges.

Figure 521 Blocked vault at Preston Street, seen from within vaulted area

One of the vaults is closed with a wall of rubble limestone beneath an elliptical brick arch and this wall is pierced by a doorway approached via a set of steel steps. Beyond this wall is a vault that opens at the end of Preston Street and has been let to tenants for use as storage. The doorway at the back of the vault has been blocked up.

Figure 522 Vault at Preston Street in use as store, viewed to rear

Figure 523 Doorway to vault at Preston Street

The Loop Line railway is retained on its western side by a high retaining wall faced with red brick laid in English bond. This is pierced by an archway leading into the store that was mentioned above. To the south of the arch the retaining wall continues, though with a window with a segmental brick head.

Figure 524 Wall to the south of the store at Preston Street

Figure 525 Platform 5 on Loop Line

On the upper level there are three platforms serving the Loop Line. Platform 5 is to the east and has retained its original canopy from 1890, with cast-iron columns and beams and wrought-iron trusses supporting a canopy with roof lights above and with fascias of pierced timber. The platform level has been raised and this may have buried the original bases of the columns.

Figure 526 Platforms 6 and 7 on Loop Line

Platforms 6 and 7 are island platforms and the shared canopy dates from the 1980s electrification of the line, with sloping steel stanchions supporting a glazed steel roof.

38.4 Analysis

The vaulted area beneath the platforms at Connolly Station constitute a significant collection of vaults on a substantial scale, both in the area covered and the scale of the vaults. Sir John MacNeil's vision of these vaults being used for commercial purposes has never been brought to fruition and the railway company may as well have opted for the cheaper option of raising the railway on a viaduct consisting of two retaining walls and earth fill, as was done on the Dublin and Kingstown Railway in the previous decade and would be done with the Dublin Wicklow and Wexford Railway from Harcourt Street in the following decade.

The sheer scale of the vaulted area provides an opportunity to utilise the space more imaginatively and to greater utility. Even with the proposal to bring many of these vaults into use for the present proposal a substantial number of vaults would still remain unused, particularly further to the north toward Seville Place.

38.5 Predicted impacts

Predicted direct construction impacts:

In order to provide for the increase in usage of the station following electrification it is proposed to bring part of the vaults beneath the station into use as an access to the station. This will require the provision of stairs, lifts and escalators with consequent piercing of some of the vaults. It will also involve the provision of new flooring, new surfaces to some of the walls and fitting out sections of the vaults for the purpose of retail units, storage, bathrooms and other ancillary uses. Two access points are to be provided from Preston Street, the main one through the existing arched opening at the end of the street and a second one into the next vault to the south to provide for access to cycle parking. Some works will also be undertaken on the upper level to instal the lifts, escalators and staircases.

Predicted indirect construction impacts:

There will be an indirect impact on the setting of the vaults and of the station structures on the upper level during construction.

Predicted operational impacts:

The appearance of the affected areas of the vaults will be modified as a result of the works and there will also be some changes to the appearance at the upper level, with consequent effects on the setting of the protected structure.

38.6 Mitigation

The impacts on the fabric of the protected structure and on the settings of the various components of the protected structure are being mitigated by design.

39. SIGNAL BOX AT EAST WALL

Built heritage reference in EIAR: BH-9

ITM grid reference: 717327, 734979

39.1 Historical summary

In 1877 the London North Western Railway Company (LNWR) laid down railway tracks running off the GSWR and GNR branches to North Wall. The LNWR lines ran beneath Sheriff Street to the company's passenger steamer station at North Wall. These spur lines facilitated railway connections to the cross-channel steamers for both passenger traffic and live cattle exports. As part of the construction of the LNWR extension to North Wall the company erected a signal box in the space between the track leading to the company's station and the GSWR track leading to that company's goods station at North Wall, adjacent to East Wall.

The signal box is now disused since the closure of the branch to the LNWR station at North Wall and the subsequent lifting of the track.

39.2 Conservation status

The signal box at East Wall is not a protected structure and is not listed in the NIAH.

The signal box is included in the Dublin City Industrial Heritage Record.

39.3 Survey

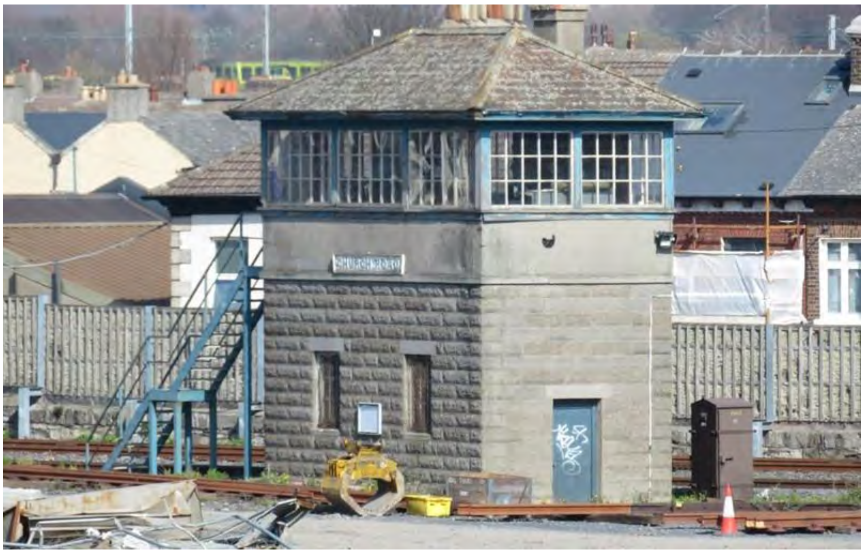

Figure 527 Signal box at East Wall

The signal box is a two-storey structure, with a facing of rock-faced limestone ashlar on the ground floor, above which is a string course separating the lower level from a rendered section above. A door opening and window openings on the lower floor have flat heads. The top of the signal box is glazed with small-paned lights between mullions. The roof is hipped and slated. A single-pot chimney stack rises from the north-eastern side and a steel staircase on the north-western side provides access to the upper floor.

39.4 Analysis

The signal box at East Wall is reasonably intact and while it was not entered for the purpose of this survey it is said to retain its original levers for changing the points on the track. Many signal boxes have been removed over the years and while the NIAH has recorded about sixty of them nationwide, this represents many different types and designs and the numbers of signal boxes of any one type or design is now limited.

39.5 Predicted impacts

Predicted direct construction impacts:

The signal box is to be demolished to facilitate the provision of new track to service the proposed Spencer Dock railway station.

Predicted indirect construction impacts:

None.

Predicted operational impacts:

None.

39.6 Mitigation

No mitigation is possible other than to record the signal box by means of photographs, measured drawings and written descriptions.

40. ROYAL CANAL AT ASHTOWN

Built heritage reference in EIAR: BH-146

ITM grid reference: 716912, 735937

40.1 Historical summary

As noted in the historical background section above, the construction of the Royal Canal commenced in Dublin City in 1790 and over the next few years the works progressed westward. The plaques on Longford Bridge at Ashtown show that construction had reached that area by 1792. At Ashtown the construction of the canal involved the provision of a canal lock to cater for the slope in the land as the canal approached the city and this is a double chambered lock, involving three sets of lock gates, allowing for a two-stage descent with a drop of a little over five metres. As the landscape did not fall as suddenly as this the canal was raised up on an embankment to the west of the lock. A road that ran north-south was diverted a little to the east to allow for a crossing at the lower level of the canal, obviating the need for extensive ramping of the road over the higher section of the canal, such that Longford Bridge was erected close to the lock and to the east.

In 1831 the Royal Canal Company permitted the use of a supply of canal water to run a watermill, as described below in the section on Ashtown Oil Mill. This necessitated the provision of a spillway from the canal to feed the headrace leading to the mill and a culvert to the east of the lock to allow for the return of the water to the canal at the lower level.

With the construction of the Midland Great Western Railway in the 1840s an embankment was constructed for the railway on the southern side of the canal, returning to the same level as the canal towpath westward from the lock. This higher level of the railway allowed for a level crossing that was close to the same level as the top of the road across Longford Bridge, minimising the need for a ramp leading up to the crossing.

40.2 Conservation status

The stretch of the Royal Canal that lies with the administrative area of Fingal County Council is a protected structure, reference 944a in the record of protected structures for Fingal. The stretch of the canal that lies within Dublin City is not included in the record of protected structures.

The sections of the Royal Canal within Fingal and Dublin City are not listed in the NIAH.

The Royal Canal is included in the Dublin City Industrial Heritage Record.

40.3 Survey

Figure 528 Royal Canal within Dublin city, looking to east

The Royal Canal at Ashtown is partly within the administrative area of Dublin City Council and partly within that of Fingal County Council, the boundary running down the centre line of Longford Bridge. To the east of the bridge the canal turns slightly toward the north before proceeding eastward in a straight line. The towpath is on the northern side, where there is a stone retaining wall at the margin of the canal, while on the southern side the canal margin is largely marked by a tree-covered bank.

Figure 529 Longford Bridge, on boundary between Fingal and Dublin city

As noted above, the boundary between the administrative areas of Dublin City and Fingal runs along the centre of the road across Longford Bridge. The bridge is a protected structure in the records of protected structures for both planning authority areas.

Figure 530 Royal Canal within Fingal, looking to west

On the Fingal side of the boundary is the 10th lock, which is a double canal lock, and which has a fall of approximately five metres.

Figure 531 Northern bank of Royal Canal within Dublin city

At the eastern side of Longford Bridge the abutments of the bridge splay to facilitate a wider section of the canal. To the east of the splayed wing walls the canal bank rises up to the level of the railway station with a covering of trees. A little downstream from the bridge is a double culvert with parabolic arches. This may be the exit from the tailrace of Ashtown Oil Mill, as discussed below.

Figure 532 Twin-arched feature on southern side of Royal Canal

40.4 Analysis

The section on Ashtown Oil Mill below notes that the power for the mill came from the flow of water from the Royal Canal. The five-metre fall at the double lock allowed for a significant potential power, which the mill utilised to run its machinery. The spent water returned to the canal downstream from the lock and the double culvert may be the location for this tailrace. It is noted below that the tailrace is said to have been 360 metres long, in which case it would be significantly further to the east of this arched outlet. Whether or not that is correct, indicating that this double-arched feature is not the tailrace, it is clear that this feature is of note and is clearly part of early works connected with the canal in the 1790s, the mill in the 1830s or the railway in the 1840s.

It is noted that Ashtown Oil Mill is a protected structure as set down in the record of protected structures for Fingal County Council. However, the easternmost section of the tailrace and the double arch of the culvert lie within Dublin City Council's administrative area.

40.5 Predicted impacts

Predicted direct construction impacts:

The proposed footbridge/cycle bridge at Ashtown Station is to be erected partly on the canal bank and it will be necessary to work from within the canal during the construction of the bridge. This will have the potential to damage the water seal beneath the canal and the canal bank and could also lead to damage to the masonry of the double arch and to the vaulting of the culvert that lies behind the arches.

Predicted indirect construction impacts:

The construction of the bridge will lead to impacts on the setting of the canal and of Longford Bridge.

Predicted operational impacts:

The pedestrian/cycle bridge will have some impact on the setting of the canal and Longford Bridge.

40.6 Mitigation

Mitigation measures need to ensure that the integrity of the seal within the canal is not compromised, that the canal and its embankment are reinstated following construction. Mitigation should also ensure that the double arch and the culvert that feeds it ae protected from damage throughout the construction works.

The effects on the setting of the canal during construction cannot be mitigated, while the effects on the setting at operational phase have been mitigated as far as is possible through design.

41. ASHTOWN OIL MILL

Built heritage reference in EIAR: BH-148

ITM grid reference: 710843, 737372

41.1 Historical summary

When the Royal Canal was constructed in the 1790s it required the construction of a number of locks to allow for canal traffic to descend as the canal progressed from its summit toward sea level. In reasonably flat country the canal could proceed without locks, any difference in ground level being allowed for through the use of embankments or cuttings. Unlike rivers, canals needed to descend in stages and these stages were facilitated by and defined by the locks.

The industrialists of the day generally used water power to run their machinery and the most common source of this power was the descent of the waters of a river or stream. The presence of a canal lock, however, presented an opportunity for a ready-made head of water without the need for expensive weirs and long runs of headraces with sluices, connecting a weir with the mill. It was not always possible to utilise a canal in this way as there would be a certain amount of loss of water and the canal had to have spare capacity in its water supply to allow for this wastage. Provided this surplus was available the canal company could lease out the use of water to bring an additional income.

The McGarry family owned some fifty-two hectares of land at Ashtown and in 1831 Robert McGarry entered into an agreement with the Royal Canal Company and erected a mill at Ashtown for the purpose of crushing rape seed and flax seed, probably grown locally on his own farm. From this seed, the mill produced rape oil, linseed oil, rape cake and linseed cake, the latter two for use as animal feed. In the 1860s the mill was sold by the McGarry family to Messrs McMaster and Hodgson, druggists and general merchants based in Jervis Street and Capel Street, Dublin. Samuel McMaster had been a successful druggist and his firm had recently passed to George McMaster, who entered into partnership with Edward Hodgson.

The mill had a millpond close to the canal, to the west of the mill and the water supply running via this millpond drove a water wheel 8.5 metres in diameter and 3 metres in width. The tailrace is said to have been 360 metres long, though this seems unlikely as the only reasons for a long tail race would normally be ensuring that flood waters did not back up the tailrace to the mill and to ensure that the maximum fall of water was achieved for the millwheel. Neither of these conditions would apply to a canal supply and the only requirement was that the tailrace should return the water to the canal downstream from the lock.

McMaster and Hodgson continued to operate the Ashtown Oil Mills until the mid-1950s and the firm is still in existence, though now dormant.

41.2 Conservation status

Ashtown Oil Mill is a protected structure, reference 691 in the record of protected structures for Fingal.

The mill is listed in the NIAH, reference 11362067, where it is assigned a Regional rating for its architectural, artistic and technical interest.

41.3 Survey

Figure 533 Eastern façade of Ashtown Oil Mill

Ashtown Oil Mill is a five-storey, four-bay mill building constructed with rubble stone with some brick. The window openings are flanked by brick; some have lintels of timber, others of concrete and the openings are spanned by brick relieving arches. The roof is hipped and has a covering of fibre-cement tiles. A four-storey, three-bay wing projects eastward from the mill, toward the northern end of the façade.

Figure 534 View of Ashtown Oil Mill from the south-west

Figure 535 Outbuilding at eastern side of mill site

There are several outbuildings within the mill complex, many of which are overgrown with ivy and other vegetation and some of which are derelict. These include buildings along the Mill Lane frontage, at the eastern boundary of the site, very heavily overgrown as seen in the figure above. The figure below shows a building at the western end of the southern boundary, partly reconstructed with concrete and with a corrugated steel roof covering.

Figure 536 Outbuillding on southern side of mill site

Figure 537 Outbuilding on western side of mill site

A building on the western side of the mill site is seen in the figure above and is heavily overgrown. It has a corrugated steel roof.

Figure 538 Site of millpond at Ashtown Oil Mill

The millpond lay to the west of the mill building and has been backfilled and covered over to provide for parking. The site of the millpond lies in the middle distance in the figure above, extending toward the hedge in the distance.

41.4 Analysis

It is not the purpose of this text to comment on the present state or condition of the buildings on the site of Ashtown Oil Mill except to note that the main building is extant and that a number of outbuildings also survive, though generally in an altered state. The outbuildings on the perimeter are at least partly constructed of rubble stone, though with some concrete visible and with corrugated roofs.

The parts of the mill complex that are outside the mill site are also at least partly extant. The millpond has been backfilled and covered over with asphalt to provide a parking area. It is more than likely that remnants of this millpond and its associated water channels survive below ground. Downstream from the mill, to the east, there is no reason to suppose that any works have occurred to disturb or damage the below-ground culvert for the tailrace. The construction of the railway embankment crossed the tail race, but would not have destroyed it, as the mill continued in use for another century after the railway was built.

41.5 Predicted impacts

Predicted direct construction impacts:

There will be no direct impact on the mill or its outbuildings arising from the proposed works. There will be a direct impact on the site of the millpond and the headrace due to the excavations for the cutting through which the road is to be diverted. There will be a potential impact on the tailrace through the construction of the pedestrian and cycle bridge at Ashtown Station and the location of the construction compound in the area between the railway line and the mill site.

Predicted indirect construction impacts:

There will be an indirect impact on the mill during construction through the effects on the setting of the mill arising from the proximity of the construction works to the west of the mill and the construction compound to the north.

Predicted operational impacts:

There will be an indirect impact on the setting of the mill through the location of the road cutting to the west of the mill.

41.6 Mitigation

The impacts on the millpond and headrace are to be mitigated through recording the details, as discussed in the chapter on archaeology.

The potential impacts on the tailrace are to be mitigated by ensuring that the works do not damage the below-ground culvert of the tailrace or the masonry of the arches on the canal bank.

No mitigation of the effects on the setting of the mill during construction or operation would be possible.

42. ASHTON HOUSE

Built heritage reference in EIAR: BH-149

ITM grid reference: 710600, 737503

42.1 Historical summary

The present Ashton House owes its appearance to nineteenth-century remodelling and, probably, enlargement. However, there was a house on this site at least as early as 1760, when it was depicted on John Rocque's *Actual Survey of the County of Dublin*, published in that year. The house is also shown clearly on John Taylor's map of *The Environs of Dublin*, 1816 and William Duncan's *Map of County Dublin* of 1821. Rocque's map shows a driveway leading from Mill Lane and another running to the north on River Road, while it also shows a walled garden to the north-west, though this later became part of the adjacent property at Ashbrook.

42.2 Conservation status

Ashton House is a protected structure, reference 690 in the record of protected structures for Fingal County Council.

The house is listed in the NIAH, reference 11362065, where it is assigned a Regional rating for its architectural and artistic interest.

The demesne of the property is included in the NIAH garden survey under reference 2292.

42.3 Survey

Figure 539 Ashton House (from NIAH, 2005)

Ashton House is a three-storey, three-bay house with two-storey, single-bay wings and with a full height breakfront with triple windows and a projecting porch. The house is Italianate in style, with a painted, rendered façade topped with a balustrade.

Figure 540 Gateway to Ashton House

The gateway to Ashton House on Mill Lane is comprised of a central vehicular gateway flanked by pedestrian gates on either side. Each of the three gates is flanked by dressed limestone piers with rounded corners and with a frieze decorated with alternating discs and vertical lines. The capstone is missing from the northern pier of the vehicular gateway, while the other three capstones are concealed beneath ivy. The capstones are single-piece, with projecting cornice and with concave pyramidal upper section topped with urns. The gates are of wrought iron. The entire assemblage is set back slightly with curved wing walls rendered with Roman cement and ruled and lined.

Figure 541 Vehicular gateway

Figure 542 Northern part of gateway showing gates and wing wall

The driveway within the gates is surfaced with asphalt. The demesne has a dense belt of trees around its boundaries, while the rest of the area within the walls is mostly parkland, with trees around the house and in a group on the driveway. The utilitarian buildings associated with the house are located to the south-west of the main house

Figure 543 Gate lodge to Ashton House

The gate lodge of Ashton House is three-bay and single-storey, with a projecting porch. The façade is rendered with stucco architraves to the window and door openings and with rendered quoins. The roof is hipped and slated with a central valley and chimneystack. There are single-storey additions on the northern and western sides of the gate lodge.

42.4 Analysis

Ashton House is a substantial property in large grounds, secluded behind its demesne wall and the dense belt of trees along the boundaries. The house itself is set back some 190 metres from the gateway at Mill Lane. While the house and its lodge have the appearance of nineteenth-century buildings, the presence of a house and gate lodge on this site in the mid-eighteenth century suggests that the main house is a remodelled house based on an eighteenth-century building. The way in which the property is depicted on the small-scale map produced by John Rocque in 1760 indicates that the demesne was already in existence by that time, though the gate piers appear to be of a later date.

42.5 Predicted impacts

Predicted direct construction impacts:

The gateway is to be removed into storage prior to the works to construct the realigned Mill Lane and reinstated on completion of the works, though in a new location further back into the property. A section of the demesne wall will also be taken down and rebuilt.

It is proposed to locate a construction compound within the parkland of the demesne.

Predicted indirect construction impacts:

There will be an indirect impact on the setting of Ashton House and the gate lodge during construction and the setting of the demesne will also be affected.

Predicted operational impacts:

Following completion of the works the setting of the gateway and the gate lodge will be affected in the longer term, with some impact on the character of the demesne.

42.6 Mitigation

Prior to the commencement of the works the gateway and its adjacent demesne wall are to be cleared of vegetation in accordance with a method statement to the prepared by the project conservation architect (PCA), following which they are to be recorded by means of photographs, drawings and written descriptions. The settings of the demesne and the gate lodge are to be recorded by photographs and written description.

The gateway and part of the demesne wall are to be taken down in accordance with a method statement to be prepared by the PCA and removed to safe storage. On completion of the works the gateway and new section of demesne wall are to be reinstated in accordance with a method statement prepared by the PCA.

43. REFERENCES

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GLOSSARY

The glossary set out below define some of the more technical terms used in the text of this report.

Abutment: The masonry or other material at the end of a bridge that holds back the horizontal thrust of an arch.

Arch: A curved structure that spans a space and supports the weight above it.

Arch ring: The curved line of stones at the arch on the face of the bridge, comprised of voussoirs including the keystone.

Archivolt: A decorated curved band running around the face of an arch, similar to an architrave, but curved.

Arris: The sharp edge or corner of a stone, brick or wall

Ashlar: Stone that has been shaped to have flat surfaces and straight arrises. Ashlar is also a form of walling made up in courses with finely finished squared stones and slender joints.

Barrel: The soffit, or curved underside of the interior of the bridge, formed by vaulting.

Calp: A form of limestone with a significant mud content. It forms the bedrock beneath Dublin city and parts of the surrounding area.

Capping: The stones or slabs that finish the upper surface of a parapet. Also known as coping.

Causeway An embankment on which a road is carried above the level of the surrounding ground.

Centring: Scaffolding erected with a curved upper surface on which the masonry of an arch is laid, and which supports the masonry until the arch is completed and capable of bearing its own weight.

Chamber: The section of a canal lock between the gates and within which the water level may be raised or lowered to allow boats to be transferred between sections of a canal that are at different levels.

Chert: A silica-based stone similar to flint, but dark grey or black and found as bands or beds in some limestones.

Coping: The stones or slabs that finish the upper surface of a parapet. Also known as capping.

Course: A layer of masonry between horizontal lines. This will often be a single layer of brick or rectangular stone. Rubble stone walling does not necessarily incorporate continuous horizontal lines, but where it is built in stages that finish at horizontal lines it is said to have been brought to courses.

Crown: The highest point of an arch, equivalent to the bottom surface of the keystone.

Extrados: The upper face of an arch, usually the upper surface of the voussoirs where they join the masonry of the spandrel.

Flood arch: An arch of a bridge, or in a causeway near the bridge, that is normally dry, and which is capable of carrying water in times of flood.

Hammered: (or hammer-dressed) – stone that has been roughly finished in the quarry to produce a flat face, often with hammer marks visible.

Harling: A render comprised of lime-based mortar with fine gravel or coarse sand as aggregate and applied by dashing.

Intrados: The lower face of an arch, usually meaning the face of the voussoirs on the inner face of the bridge.

Keystone: The stone at the top and centre of the arch, i.e. the central voussoir, often larger and/or more ornate than the other voussoirs.

Lock: A section of a canal that can be closed off with lock gates to provide a means for boats to be raised or lowered between sections of a canal that are at different levels.

Overbridge: A bridge that carries a road over a railway line.

Parapet: The wall of a bridge above the level of the road.

Pattress plate: A plate of steel, cast iron, wrought iron or other material on the face of a bridge and securing the end of a tie bar.

Pier: The vertical section of a bridge above which an arch or vault rises.

Plinth: A wider section at the bottom of a pier, projecting out into the river beneath an arch or to the front of the cutwater or pier.

Punched: Stone that has been finished in the quarry with a face that is rough, but shows the diagonal lines of the punching tool.

Putlog: A horizontal scaffolding pole that extends into the wall that is being constructed, sometimes leaving a hole in the wall when the pole is withdrawn, or with the cut end left in the wall and concealed under plaster, usually rotting away to leave a hole.

Quoin: A stone, often squared or dressed to a rectangular shape, forming the corner of a structure.

Rifle vaulting: Vaulting in a skew bridge where the courses of masonry twist as they run through the bridge. The courses are helical.

Ring stones: Stones in the arch ring. This includes voussoirs but can also include stones that are not true voussoirs as they don't align with the radius of curvature of the arch.

Rise: The difference in height between the spring of an arch and its crown, usually measured as the vertical distance between the top of the plinth and the bottom of the keystone.

Rock-faced: Stone that has been shaped in the quarry but left with a rough face, similar to broken stone.

Segmental arch: An arch, the curve of which is an arc of a circle. Pointed segmental is when the arch is made up of two curves joining at an angle.

Skew bridge: A bridge that crosses at an angle such that the arches or vaults are not perpendicular to the sides of the bridge.

Skewback: A stone at the lower end of an arch from which the arch springs. It will have a horizontal lower face and a sloped upper face where it adjoins the first voussoir.

Span: The distance crossed by an arch or vault.

Spandrel: The face of the bridge between the arch and the surface of the road and extending through the full width of the bridge.

Spring: The point from which an arch or a vault rises.

String course: A projecting horizontal course in a masonry wall, frequently of dressed stone, though also of brick or plaster.

Tie bar: A bar of steel or wrought iron inserted through the thickness of a bridge and secured at each end with a pattress plate, with the aim of preventing the spandrels of the bridge from spreading outwards. Tie bars are usually not part of the original bridge but are inserted as part of repair work.

Tooling: A series of parallel chisel marks in a stone to give a regular, fluted surface. Often found at the margins of stones that are otherwise rock-faced or hammer dressed.

Towpath: A pathway alongside a canal along which horses would walk as they towed canal boats.

Underbridge: A bridge where a road, river, canal or footpath runs under a railway.

Vault: An elongated arch, where the length is greater than the span.

Vermiculated: Having a decorative surface resembling a tightly packed set of worm tracks.

Voussoir: An individual stone that forms part of the face of the arch. Often cut to shape, but can be natural stone, either squared or flat. True voussoirs have joints that are on the radius of the curvature of the arch, while in some arches the stones are set at a shallower angle than the radius.

Weep hole: A hole in the masonry of a bridge to assist the removal of water. Weep holes are frequently found at the base of a parapet to carry water off the road surface but may also occur in the spandrels and vaults to drain water from the interior of the bridge.

Wing wall: The wall beyond the spandrel of a bridge, often splayed forwards of the spandrel and retaining an embankment.