Carnroe Weir Rehabilitation and Fish Pass Construction
Project Description & Works Proposals

WATERWAYS IRELAND
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1.0 Introduction

1.1 Waterways Ireland

Waterways Ireland is the North/ South Implementation Body responsible for the inland navigable waterway systems in Ireland. The Body was formally established by means of an international treaty made on 8th March 1999 between the British & Irish Governments. This treaty was given domestic effect, North and South, by means of the North/ South Co-Operation (Implementation Bodies) (Northern Ireland) Order, 1999 and the British Irish Agreement Act, 1999 respectively.

The Department of Infrastructure in Northern Ireland and the Department of Regional Development, Rural Affairs, Arts and the Gaeltacht in the Republic of Ireland are the sponsoring Departments with responsibility for the Body.

Waterways Ireland operates under the policy direction of the North South Ministerial Council (NSMC) and the two Governments, and is accountable to the Northern Ireland Assembly and the Houses of the Oireachtas.

Waterways Ireland is responsible for maintaining navigable waterways across the island of Ireland. As part of this remit Waterways Ireland has a duty to maintain infrastructure associated with the waterways for example locks, weirs, moorings and sluice gates in a safe functional condition.

1.2 Scheme Background

1.2.1 Site Location and History

Waterways Ireland is responsible for navigation and associated infrastructure on the Lower River Bann which flows from Lough Neagh at Toome to the bar mouth on the north coast at Castlerock. Along this stretch of river are a number of navigation weirs and locks including at Carnroe located approximately 5 kilometres north of the town of Kilrea.

The weir at Carnroe was originally built in the 1850s and whilst there have been some significant repairs and alterations during the 20th Century such as the addition of a fish pass, the structure remains fundamentally in the same form as originally constructed. The weir is listed on the Industrial Heritage Register.

1.2.2 Existing Condition

A major component of the remit of Waterways Ireland is the periodic condition and structural survey of key structures on the navigable waterways. As part of its asset management procedure Waterways Ireland has carried out a number of non-intrusive surveys over the past decade to establish and monitor the existing structural condition of the weir and to assess what, if any, repair works are required.

A report, completed in 2016, identified defects including displaced masonry, mortar loss and undermining of the weir structure, voids in the

Figure 1- Undermining of the Weir Apron
weir apron, bulging and displaced masonry in the pier walls and failed embankments and retaining walls.

The 2016 report assessed the structure as having deteriorated since a previous structural report was carried out in 2013 which had at that time considered the structure to be in a critical condition displaying advanced deterioration causing the functionality of some elements of the structure to be significantly reduced with local failures possible.

As the maintenance of water levels facilitated by the weir at Carnroe is essential to the retention of navigation and the protection of the existing habitat and ecology of the river Waterways Ireland has determined that there is now an urgent need to undertake a project to rehabilitate the weir.

2.0 Proposed Scheme Overview

To ensure navigation and the safety of users is maintained, Waterways Ireland are proposing to undertake extensive rehabilitation works to the weir. The proposed works will be carried out in a manner so as to conserve the heritage value of the structure and to give a minimum operational life span of 75 years.

Additionally, Waterways Ireland, under direction from the Department of Agriculture, Environment and Rural Affairs (DAERA), are proposing to replace the existing fish pass with a new modern fish pass so as to reduce the barrier that the weir currently presents to the passage of aquatic species along the course of the river. The design of the fish pass has been undertaken to ensure current European legislation is met and will be subject to approval from DAERA.

Navigation through the lock chamber and thereby along the river will be maintained throughout the duration of the works as will the facility for canoe portage around the chamber.

3.0 Project Description

Waterways Ireland proposes to undertake the Project in phases. The first phase will comprise preliminary works to permanently upgrade two existing accesses to improve safe access and egress. These preliminary works are subject to separate planning applications and works are hoped to be undertaken in 2019 subject to planning approval. The main development which this notice refers to comprises onshore temporary works and in-river temporary and permanent works.

In order to facilitate the in-river works it will be necessary to construct temporary cofferdams to dewater sections of the river to carry out inspections and subsequent repairs to the weir and to construct the upgraded fish pass. It is proposed to carry out the in-river construction works in two phases each within a cofferdam blocking off up to 60% of the river width. The first phase of the works will require a cofferdam to be constructed from the west river bank to east of the river centre line with access to the works site predominantly from the western (County Londonderry) side across agricultural land. Phase two will necessitate a cofferdam from the lock chamber to west of the river centre line with access from the eastern (County Antrim) side. Phase two will include construction of the new fish pass.
A hydrological model has been developed using bathymetric data from a 2018 survey to model river flows and the impact of cofferdams. All proposals impacting on river flows and levels have been the subject of consultation with, and advice from, the Department of Infrastructure Rivers and the project will be the subject of a Schedule 6 Drainage Order Consent application to that Department.

The rate of progress of the works will be impacted significantly by the weather, water levels and flows that occur during the construction period. In order to minimise the risk of flooding either of the works themselves or of lands upstream of the weir and to give the appointed contractor the flexibility to programme the works to take best advantage of his preferred methods and prevailing weather conditions the in-river works may be carried out over two calendar years commencing in the Spring of Year 1 with completion due no later than in the Autumn of Year 2.

The actual sequencing and programming of the work phases will be for the appointed contractor to determine within the constraints described above, any statutory approvals and the requirements of the Environmental Impact Assessment.

The subsequent sections of this document describe the methods most likely to be adopted and the materials most likely to be used to deliver the project.

Detailed design can only be finalised following the findings of further inspections of the exposed structure that can only be completed following de-watering. As such the appointed contractor’s preferred methods of working will determine the final processes and materials to be adopted.

4.0 Access & In-river Temporary Works Proposals

4.1 Permanent Access changes

Accesses will be created to the weir from both the east and west side of the river. Phase 1 of the works will require access from both east and west. Phase 2 will require access from the east side only.

Access to the river from the public road network from both east and west will require improvements to existing laneways which are outside the boundary of this site and are hoped to be completed within 2019 subject to separate applications for planning approval to Causeways Coast & Glens Borough Council.

4.1.1 Eastern Access

Access to the works site from the eastern, County Antrim, side will utilise an existing bitmac surfaced laneway which leads from Vow Road to Carnroe weir and lock chamber.

From the end of the bitmac laneway to the location of the lock chamber is approximately 150 metres. This section of the access lane is currently a compacted unbound surface which will be retained and maintained for the duration of the works. On completion of the in-river construction works this length of access lane will be re-surfaced to match the access lane as will the area where the lane widens into a car-park.

Access into the Phase 2 cofferdam will be via temporary structures formed to allow vehicles to cross over the lock chamber and travel onto the de-watered river bed. A temporary steel bridge will be installed across the chamber to access the lock chamber pier. The design of the temporary bridge will allow navigation through the lock chamber to be maintained. From the pier a temporary unbound ramped access will then be created down to the river bed immediately downstream the weir.
Access for the launching of floating plant and equipment for the construction of the sheet piling for cofferdams for both phases of the works will be facilitated using the eastern access from Vow Road. A stable unbound surfaced platform is available alongside the lock chamber for the positioning of a mobile crane to lift equipment such as floating pontoons, a piling rig and piling materials onto the river upstream of the weir.

4.1.2 Western Access

Access to the works from the western, County Londonderry, side will utilise an existing concrete surfaced lane which leads from Agivey Road to a farmhouse and outbuildings.

A 3.5 metre wide unbound access track will be constructed from the farm buildings to the weir site. This will involve minor demolition of derelict farm buildings and the clearance of shrubs and fencing. Topsoil along the length of the access track will be stripped and stored in a designated area for re-use and compacted granular fill material will be laid on top of a geotextile membrane to create the access track. Fencing and field gates will be erected to isolate the access route from the surrounding agricultural land. The western access route will terminate in a site compound adjacent to the river bank. From the compound area temporary unbound access ramps will be constructed onto the river bed within the cofferdam both upstream and downstream of the weir.

Upon completion of the scheme this temporary access road will be reinstated to its original condition for agricultural use.

4.2 In-river Temporary Works

The temporary works required to facilitate access to the site include cofferdams, a temporary fish pass and site compounds.

4.2.1 Cofferdams

The in-river works to repair the weir and construct the fish pass will be carried out in a dry working area created by the construction of temporary cofferdams to de-water sections of the river. No underwater repair work or concreting will be carried out. The works will be carried out in two phases each within a cofferdam blocking off up to 60% of the river width.

The cofferdams will comprise a sheet pile wall upstream of the weir and a downstream bund which will be created using a combination of sheet piles, sand bags and imported impermeable material. Existing gravel shoals will also be utilised.

On completion of a watertight seal to the Phase 1 and Phase 2 cofferdams electrofishing and de-watering will be carried out. Electro-fishing will be undertaken in accordance with the requirements of the Department of Agriculture, Environment and Rural Affairs Inland Fisheries, and all pumping of water from within the cofferdams to the river will be via approved silt traps.

4.2.2 Temporary Fish Pass

During Phase 2 of the project, i.e. when the cofferdam to the eastern bank has been installed, the existing fish pass will be decommissioned and not be functional due to its location within the de-watered area. A temporary pre-fabricated fish pass will be installed for this phase of the works which will be integral with the cofferdam wall where it intersects with the weir. The design of the fish pass has been the subject of consultation with, and advice from the Department of Agriculture,
Environment and Rural Affairs Inland Fisheries and will be the subject of an approval application to the Department.

4.2.3 Site Compounds

There is sufficient space available on both the east and west river banks to facilitate the construction of site compounds. Both of the proposed site compounds will have full access and egress from the public road network.

Each compound will be secured with the erection of a boundary fence and gates to the entrance. The area within the boundary fence will be stripped of topsoil which will be set aside for later re-use. A geotextile will be laid and the entire compound area will be surfaced with compacted granular fill. Upon completion of the scheme the areas used for the site compounds will be restored to grassland.

5.0 Permanent Works Proposals

5.1 Weir Repairs

The exact type and extent of the repairs that are necessary to the weir structure cannot be fully defined until the weir has been de-watered and a close structural inspection carried out. Based on the most recent visual structural surveys a close approximation to the final nature and extent of the necessary repairs can be made and a design for their remediation has been developed.

The repair works will include some or all of the following construction activities which are described on the Drawings.

- Masonry repairs to the weir structure including replacement of missing or damaged stonework with stone sourced to match existing,
- Raking out and re-pointing of mortar joints to the weir structure,
- Grouting of the weir structure,
- Breaking out of the existing downstream weir apron and replacement,
- Anti-erosion measures downstream of the apron to prevent future undermining,
- Re-construction of revetment along the west river bank,
- Repairs to the stonework of the lock chamber pier wall.

The drawings identify and describe those aspects of the 'on-shore' works that will remain as permanent features on completion of the project.

5.2 Fish and Elver Passage

The existing fish pass will be demolished and replaced with a larger Larinier style pass which will diminish the barrier the weir currently presents to the passage of aquatic species upstream. The new fish pass will be constructed using in-situ reinforced concrete and all works in its construction will be undertaken entirely within the cofferdam. Construction of the new, wider, fish pass will require the demolition of the existing fish pass, a section of the weir and part of the lock chamber pier wall. The pier wall will be reconstructed and combined with the fish pass wall.
Two Elver passes currently exist one where the weir meets the west bank and one where the weir intersects with the lock chamber pier wall. The Elver pass on the western bank will be retained and upgraded by the installation of 'bristle mats' while the pass on the eastern bank will be demolished and a replacement provided which will be combined with the Larinier pass.

6.0 Future Management & Maintenance

On completion of the project, Carnroe weir will be left in a structurally sound condition and will be managed as part of Waterways Ireland Asset Management System. Significant future repairs to the concrete and masonry are not envisaged until beyond the 75 year design life of the proposed works. The Larinier fish pass will be regularly maintained to ensure its continued efficiency in promoting the passage of aquatic species.

Permanent improvements to the access lane from Vow Road will enhance user safety and amenity for visitors to the public recreation facilities at Carnroe. Maintenance of the lane will remain, as is currently the case, as the shared responsibility of its users including Waterways Ireland. The access from Agivey Road will remain in private ownership. The upgrading of the junction of this private access onto Agivey Road will improve future road safety at this location.