Carnroe Weir Rehabilitation
EIA Report - Non Technical Summary
Waterways Ireland

May 2019
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Introduction

This Non-Technical Summary presents the main findings from an Environmental Impact Assessment (EIA) of proposals by Waterways Ireland to refurbish and rehabilitate Carnroe Weir, Lower River Bann. The full technical appraisal and findings of the EIA are detailed within an Environmental Impact Report (EIA Report) which explains the proposals, their likely environmental effects and the measures which will be taken to minimise any adverse effects.

It is important to note that previously, the site at Carnroe was identified as being suitable for the development of a hydro-electric power generation scheme and studies showed that this could be achieved without significant environmental impact. However, it has been decided that the hydro-electric power generation scheme will not be progressed and as such, this EIA was solely concerned with the rehabilitation of the weir.

As such, it is considered that when construction is completed there will be no operational impacts from the refurbished weir, other than an anticipated improvement in fish passage. Therefore, this EIA Report is largely concerned with the construction phase only and consideration of operational phase impacts will only be considered in specific sections were a potential ongoing impact is anticipated.

Atkins environmental specialists were responsible for the production and co-ordination of this EIA and were responsible for the majority of the technical assessments contained within this EIA Report. However, a number of Atkins’ sub consultants have also been utilised:

- Fred Hammond – Cultural Heritage Report;
- Ross Macklin – Ecological surveys; and
- Paul Johnston – Specialist Fishery Advice.

It is intended that this Non-Technical Summary will inform people who have a general interest in the proposal, but who are not concerned with its detailed technical assessment.
The proposed rehabilitation works

Waterways Ireland are responsible for maintaining navigable waterways throughout the island of Ireland. As part of this remit, Waterways Ireland have a duty to maintain in a safe condition infrastructure associated with the waterways – for example locks, moorings, weirs, sluice gates etc.

One river for which Waterways Ireland are responsible for navigation and associated infrastructure on is the Lower River Bann, the course of which runs from the sluice gates at Toome on Lough Neagh to the bar mouth on the north coast at Castlerock. Along this stretch of river are a number of weirs and locks, one of which is located at Carnroe.

Structural Engineering surveys have shown that the weir at Carnroe is in poor condition with, in particular, significant undermining of the structure. Therefore, Waterways Ireland identified an urgent need to undertake significant Rehabilitation works of this weir. In order to allow the requisite work activities for successful Rehabilitation the following main elements are anticipated (note precise sequencing of work will be determined following the appointment of a contractor):

<table>
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<th>Main work elements</th>
<th>When anticipated</th>
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<tr>
<td>Improvement to access to the weir from both the Agivey Road (West Bank) and Vow Road (East Bank)</td>
<td>Anticipated in Spring – Summer Year 1</td>
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<tr>
<td>Establishment of a temporary construction compound to accommodate contractor facilities (site offices, material / bunded fuel store etc.)</td>
<td>Anticipated in Spring – Summer Year 1</td>
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<td>Construction of a temporary bunded area in the river to allow work on the bed of the river and weir face to take place in dry conditions i.e. isolated from the river</td>
<td>Phase 1 (West Bank): Anticipated in Spring – Summer Year 2</td>
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<td>Phase 2 (East Bank): Anticipated in Spring – Summer Year 3</td>
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<tr>
<td>Rehabilitation of weir, to include repair to existing weir apron and establishment of scour protection</td>
<td>Note that Phase 1 work activities will include the installation of a temporary fish pass (Alaskan ‘A’ type) to allow this to be operational when the existing fish pass is removed and replaced during Phase 2.</td>
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<tr>
<td>Removal of existing 1930’s concrete fish pass and installation of new Larinier type fish pass and refurbish / improve elver passes</td>
<td></td>
</tr>
<tr>
<td>Removal of bunded area</td>
<td></td>
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<tr>
<td>Removal of all plant and materials and reinstatement of adjacent areas</td>
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The construction hours employed are dependent upon which season the work takes place in with hours in the summer months anticipated to be from 0700 to 1900 hours on weekdays, 0700 to 1300 on Saturdays with no work on Sundays, while in winter the hours would be expected to be 0800 to 1630 hours on weekdays, 0800 to 1300 on Saturdays and no work on Sundays. Working hours outside of this regime will only occur in exceptional circumstances and would be discussed in advance with the Local Authority EHO unless it is an emergency situation.

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 construction contractor’s preferred methods of working will determine the final processes and materials to be adopted. Finalised design, materials and methods will be constrained by the requirements and conditions of planning approval.
Temporary Works – Cofferdam

The in-river works to repair the weir and construct the fish pass will be carried out in two separate phases in dry working areas created by construction of temporary cofferdams to dewater sections of the river. It is anticipated that this method will significantly reduce the threat of pollution e.g. from placing of cement or from runoff of sediment. No underwater repair work or concreting will be carried out.

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.

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 settlement area/tanks. Ongoing water monitoring will be undertaken at the discharge point.

During Phase 2 (East Bank) of the project, the existing fish pass will be decommissioned and will not be functional due to its position within the dewatered area. A temporary pre-fabricated steel fish pass will be installed during Phase 1 and therefore be operational for this phase of the works.

Access to the Weir

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 predominantly require access from the east side.

Both the eastern and western accesses require improvements to be carried out at their junctions with the public road network. With respect to navigation through the weir and public moorings during construction, access will be maintained to the public at all times. It should be noted that short delays through the lock chamber may be seen when loading and unloading is occurring however this will be kept to a minimum where possible. Portage by canoes through the works will be accommodated through the lock chamber.

The most likely option for loading and unloading both equipment and material into the water is at Carnroe itself. There is an existing slipway and an area for loading / unloading will be provided adjacent to the lock chamber as part of the temporary works. It is noted that this area was successfully used during site investigation works.

Rehabilitation Activities

It is anticipated that the following activities will be undertaken within the dry bunded area:

- Masonry repairs to the weir structure including replacement of missing or damaged stonework with stone sourced to match existing (or replacement if original cut stone is located immediately downstream),
- Power washing of the stone
- 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 in reinforced concrete,
- Anti-erosion measures immediately 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.

Fish and Elver Passage

The existing fish pass will be demolished and replaced with a larger Larinier style fish 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 weir. 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.

**Equipment**

At this stage it is not known what plant and machinery would be used for the work activities in the Rehabilitation of the weir as the choice of plant and machinery will be made by the appointed contractor, but is likely to include at least the following:

- 20 ton excavator with piling hammer;
- 10 ton track excavator;
- 5 ton track excavator;
- Lorry with Hi-ab;
- 6 ton dumper;
- 1No. bitumen paver;
- 1No. excavator with jack hammer;
- 1No. concrete crusher;
- 1No. sheep’s foot roller;
- 1No. vibrating drum roller;
- 2No. 6" water pumps;
- 1No. 4" submersible pump;
- Work boat with 50hp outboard engine;
- Floating pontoon;
- Portable settlement tanks;
- Appropriate number of stop logs.

In addition to the larger plant, the following tools could be expected to be used on site:

- Stilth saw and angle grinder;
- Petrol operated drill;
- Various small hand and electric 110 volt operated tools;
- Various slings, chains and shackles (certified loading).
Consultation

As noted, an EIA was undertaken previously in order to assess the potential impacts of a proposed hydro-electric power generation scheme. As part of this previous EIA, Rehabilitation of the weir was considered and consultation with a range of both statutory and non-statutory bodies was undertaken, along with the development of a Scoping Report. This set the parameters and direction of the EIA for the combined scheme of weir Rehabilitation and hydro-electric power generation.

For this EIA, a further round of consultation was undertaken in July 2017 in order to inform the previously consulted statutory and non-statutory bodies that the hydro-electric power generation scheme is no longer being progressed and also to request any comments they may have on the scheme, as well as any new information they may hold for the Carnroe area which may not have been considered previously. This consultation was used to confirm that the parameters as originally set out in the Scoping Report relating to the Rehabilitation of the weir were still valid.

Overview of EIA findings

Legislation, Plans and Policies

It is essential that the proposed development complies with all relevant Planning and legal requirements applicable to Northern Ireland.

The EIA Report provides an overview of the wide range of plans, policies and legislation which are in force within Northern Ireland and which may have relevance to the proposed development. For example, note is made of the range of Planning policy and guidance such as the Regional Development Strategy, relevant Area Plans, Planning Policy Statements, Development Control Advice Notes and so on.

None of the legislation, plans or policies precludes the proposed development from being completed and any constraints can be addressed through careful design and implementation.

There are though, a number of areas of which it is vital that due note is made, in particular during the construction phase. For example, there is a need to ensure that species are protected as required under the Wildlife (Northern Ireland) Order 1985 and the Wildlife and Natural Environment Act (Northern Ireland) 2011. Similarly, the requirements of the Water Framework Directive, which is implemented in Northern Ireland by The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 are considered in detail.

Paramount to this Rehabilitation project is protection of the natural environment and it is considered that an appropriate level of protection could be achieved, for example, through the implementation of a comprehensive Construction Environmental Management Plan (CEMP) that would address all relevant issues raised in Pollution Prevention Guidelines and other similar guidance documents. This CEMP would be implemented by the contractor appointed to undertake the work and would apply to all his staff and any subcontractors. Note that the initial CEMP for this project has been developed and will be updated as the project design develops, contractor is appointed and so on.

An interrogation of the Planning Online database was made to ascertain if there are any significant developments in the vicinity of the site which have received extant planning approval but have not yet been constructed. The results of this search revealed there are a number of planning applications within 1km of the proposed development site, however it was concluded that there were no implications for the proposed Rehabilitation works.

Geology, Soils and Agriculture

The assessment has shown that while there will be permanent disturbance to the underlying rock strata from construction activities, this will be of a slight negative impact – i.e. the impact will be observable but is unlikely to be of significance in the locality.

Similarly, the construction activities will impact on soil. Mitigation such as proper topsoil handling and storage mean that this impact will be temporary (being limited to the construction phase), though it will be slight negative during this period.

It is anticipated that the impact on agriculture will be neutral, as livestock can be protected from construction activities and appropriate liaison will take place with the landowner. Most land to be subject to direct land take is in the ownership of Waterways Ireland and the proposed mitigation measures mean that the viability
of any landholding will not be compromised or subjected to severance. There is a small increase in flood risk upstream of the temporary works (particularly during Phase 1). Note that matters relating to compensation payments etc are outside the remit of this Environmental Assessment.

Contaminated Land
The application site primarily consists of agricultural land with sparse residential properties in the vicinity along with road infrastructure.

The majority of the areas of concern with regard to possible ground contamination which have been identified at the site or on adjacent land represent relatively minor possible pollutant sources, and as such do not require further investigation. However, the areas of concern and potential for contamination should be incorporated into the environmental management planning for the Rehabilitation / construction works.

Potential areas of concern include the following:
- Agricultural Land;
- Heating oil tanks;
- Foul drainage; and
- Fuel leaks from vehicles.

No immediate action is required to mitigate any identified or potential environmental risk or possible hazard. No other intrusive investigations are recommended as the other potential risks are classified as tolerable (at worse). However, the areas of concern and potential for contamination should be incorporated into the environmental management planning for the development construction works.

Should evidence of potential ground contamination be encountered during the site clearance and Rehabilitation works further professional advice will be sought and the appropriate form of action taken e.g. sampling and analysis of the ground, waste characterisation and disposal, or other localised remedial action.

Ecology
This chapter represents the terrestrial ecology assessment and should be considered in conjunction with the fisheries assessment and accompanying Habitats Regulations Assessment.

Carnroe Weir, situated on the Lower River Bann is not subject to statutory designations for nature conservation however, a number of sites which have been designated for nature conservation and natural heritage are present in the wider surrounding landscape. A Habitats Regulation Assessment has shown that it is considered that the proposed development at Carnroe Weir will not negatively impact on the qualifying interests of any sites designated for nature conservation; therefore there is no likelihood of significant effects on Bann Estuary SAC or Lough Neagh & Lough Beg SPA as a result of the proposed works either alone or in-combination with other plans and projects.

Proposed weir repair works are anticipated to result in largely negligible impacts on terrestrial flora and fauna; apart from areas where hedges need to be removed to facilitate access road widening and improved visibility splays. Hedgerows in Northern Ireland are priority habitats and those removed should be replaced with hedgerows of equal dimensions, species richness and with species of local provenance. In doing so, this is anticipated to result in neutral effects in the long term.

Close adherence by the contractor to measures outlined in the Construction Environmental Management Plan will ensure that impacts on ecological receptors are minimised throughout the construction phase. Once reinstated the weir will not impact on terrestrial habitats, flora or fauna.

The Water Environment
As with any construction site there is a potential for water pollution to occur. In this instance, matters are complicated by the need for construction activities to take place in the watercourse (Lower River Bann). This will be achieved by the establishment of a dry area behind a bund (created by the use of a sheet pile wall and careful placing of 1 ton sand bags containing a suitably graded clean stone mix). Prior to discharge via suitable settlement tanks, the water in this bunded area will be allowed to settle within the bunded area. Construction activities will therefore be undertaken within a dry bunded area and this will help ensure the potential for water pollution to occur to be minimised. A watching brief and, where flow and depth of water permit, installation of sediment curtains will be maintained to ensure sediment is not an issue during the
establishment of this bunded area. Should rain water or seepage occur into the bunded area, any water to be pumped out of these areas will be directed to settlement tanks of appropriate design and capacity prior to discharge.

In short, no water containing silt or mud will be permitted to discharge directly to any waterway. In addition, all materials, including oils and lubricants will be used in a proper and controlled manner. All stores of potentially hazardous material will be constructed to ensure that any spills are unable to travel to a watercourse. All equipment will be maintained in a suitable manner to ensure that there are no leaks from them and they will be kept secure from vandalism.

A Construction Environmental Management Plan (CEMP) will be developed that will include all measures to minimise the risk of pollution and will take note of the guidance contained within the series of Pollution Prevention Guidelines published by NIEA and other appropriate guidance. This CEMP will be enacted on site by the appointed contractor and will apply to all staff and sub-contractors working on the site. Note that the initial CEMP is contained within Appendix Q.

It is considered therefore that with the implementation of a CEMP and close adherence to the proposed mitigation (including the construction activities to be isolated from the watercourse by the bunded area), the environmental impact on water quality from construction activities will be Slight Negative – i.e. where the scale of the impact is unlikely to be of material significance in the locality.

Implementation of the proposed mitigation measures mean that it is not anticipated that the proposed development will impact on the status of the water bodies (surface or groundwater) on or downstream of the development site – i.e. the proposed scheme will not cause a reduction in the status of these water bodies and it will not hinder the objective to improve the status of these waterbodies (surface or groundwater).

It is also the case that the proposed Rehabilitation works will help to complement many of the improvements required under the Water Framework Directive, for example relating to fish passage and these issues are explored further in relevant chapters of his EIA Report and WFD Assessment.

**Fisheries, Aquatic Ecology and Physical Habitat**

The Fisheries chapter focuses on potential effects on fish stocks, in particular fish migrations and it is recognised that the proposed Rehabilitation works will cause a degree of disruption to fish and the aquatic environment in the immediate area of the weir. However, it is considered that effects can be minimised through the application of appropriate mitigation measures.

Key potential effects during construction include the physical obstruction of the fish pass for upstream migrating salmon and eels, noise and vibration effects, temporary loss of river bed habitat and sensitive species and impacts on aquatic ecology. As such integration of a number of mitigation measures in relation to the scheduling of works, fish rescue, provision of a temporary fish pass, reinstatement of bed and avoidance of key migration periods during the construction period will ensure potential for adverse effects are minimised.

Potential effects during the operational phase may arise as a result of the new larinier fish pass which is anticipated to result in beneficial effects with respect to the migration of salmon, trout, coarse fish and sea and river lamprey. The reinstatement and upgrading of eel passes on each side of the river channel will also ensure that they should remain fully functional and fit-for-purpose for the foreseeable future.

No long-term negative effects on angling in the Carnroe fishing beat are anticipated. The new fish pass will discharge into the existing stream at the upstream end of the beat and hydrological features of the river in this area should remain largely unaltered.

Of note, salmon smolts tend to pass directly over the weir during their downstream migration, following the angle of the weir towards the western bank. There is some concern that the larger volumes of water passing down the new fish pass will leave lower flows over the weir with the result that smolts could become isolated towards the western bank. Although assessment finds that the potential for isolation is low, a period of monitoring will be undertaken during the operation phase with respect to the migration of salmon smolts. This will ensure that any impedance of migration is identified and remedial action can be taken.

In terms of physical habitat of the river bed and disruption to the aquatic environment, it is recognised that the proposed Rehabilitation works will cause a degree of disruption in the immediate area of the weir. Effects could be caused by sediment release and entrainment, release of other pollutants, noise and vibration and loss of river bed habitat. However, it is considered that the mitigation proposed in relation to water quality, fisheries and hydrogeomorphology will ensure that impacts will be of slight adverse magnitude and not significant.
Hydrology and Hydrogeomorphology

It has been shown that the proposed Rehabilitation works will lead to an increased risk of flooding along the stretch of the Lower River Bann between Movanagher weir and Carnroe weir. This is particularly the case for the period when the river channel is blocked up to 60%.

The land most affected by the predicted increase in flood extent is predominantly woodland and agricultural lands, however two receptors were found to be at increased flood risk during a 1% AEP flood event due to the temporary works, namely Movanagher Fish Farm and local farm buildings.

Flood levels at the farm buildings were found to increase by approximately 0.08m and 0.15m for the 50% and 60% blockage scenarios respectively. Flood levels at Movanagher Fish Farm were found to increase by approximately 0.41m and 0.59m for the 50% and 60% blockage scenarios respectively.

However, a range of mitigation measures have been identified which could reduce the flood risk. It is also to be noted that should the channel be blocked for up to a maximum 60% in Phase 1, then this will leave a requirement for just over 40% in Phase 2 (allowing for an overlap between the working areas) and as such, risk would be lower in this second phase than the scenarios examined.

It is to be noted that the predicted floodplain for the Permanent Works was found to be identical to the Baseline floodplain.

Blocking of the river channel by up to 60% will also lead to an increase in stream power that could lead to scour of the river bed in the areas to which the flow is directed. This blockage could also lead to deposition of some material behind the coffer dam. Blocking of the river by 60% in Phase 1 (i.e. the western side) would provide protection to the islands immediately downstream of the weir (though there may be some erosion of these in both Phases) and direct the greatest stream power to the right (eastern) bank. This area has already been scoured due to the flow patterns at the weir at present and therefore effects on the bed material are likely to be reduced. It is also the case, that as with the consideration of flood risk, this would leave approximately 40% of the river channel to be blocked in Phase 2, with a consequent reduction in the risk of scour from that modelled.

Following completion of the Rehabilitation works, it is anticipated that the river channel is likely to recover with sediment deposition and flow patterns returning to baseline conditions within 2 to 5-years depending on the flow conditions.

Noise

As a weir Rehabilitation scheme, noise impacts will be limited to the construction phase and as such operational noise is not given any further consideration as part of this assessment of noise.

The assessment found that temporary adverse impacts through noise generated during the construction phase are predicted, particularly where construction activities associated with the site access road works are taking place in close proximity to individual noise sensitive receptors. It is however noted that due to the transient nature of these works that the duration of any exceedances of threshold criterion will be for a limited time only.

Due to the increased distances from sensitive receptors noise generated as a result of the weir Rehabilitation works is likely to be significantly lower and not anticipated to cause a significant effect.

In summary noise generated during construction will be minimised by good practice mitigation measures and conditions agreed with the local council and will be short term in duration.

Air Quality

Potential adverse impacts during the construction phase may be caused by factors such as dust arising from the working area and from the site access roads. These potential impacts could be due to the transport, vehicle and machinery emissions and the use and storage of construction materials which can lead to dust generation in the vicinity of the working areas. Stockpiled materials may also be subject to disturbance by high winds, especially if the surfaces are not stabilised.

Nonetheless, air quality impacts during the Rehabilitation works can be mitigated by adopting best practice construction techniques which are well established and successfully used on a wide range of construction sites.

The IAQM Construction Dust Assessment Guidance utilised for this proposal determined that with the appropriate mitigation measures in place, any potential adverse effects resulting from Rehabilitation works
would be minimised such that there would not be any significant residual effect on the existing residential receptors.
The operation of the weir will have a passive (neutral) impact on air quality in the area therefore operational impacts have not been assessed as part of this EIA.

Cultural Heritage
For the purposes of the assessment, the term cultural heritage has been taken to include known and unknown archaeology, buildings of historic and archaeological interest, Conservation Areas and industrial archaeology.

It was established that it is likely that the general area of the proposed scheme has been inhabited and utilised, both permanently and transiently, at all periods of human activity in Ireland. While there is evidence of this in a range of artefacts and monuments found in or located across the local area, it is also the case that there may be unknown artefacts still to be identified. The appointed contractor will be made aware of their responsibilities to notify the proper authorities (NIEA) in the case of an archaeological find.

Of main heritage value in the area is the weir itself and it is to be recognised that this heritage feature is in an increasing state of disrepair. With appropriate mitigation, the proposed repairs and minor modifications to Carnroe Weir will have a high net beneficial impact upon the physical sustainability of those features of the weir complex which are of heritage value.

Landscape and Visual Impact
The weir at Carnroe falls within the Lower Bann Floodplain Landscape Character Area, but it is not subjected to any formal landscape protection.

The site is situated on the Lower River Bann, in a stretch of the river bounded by agricultural fields of mainly improved pasture. These fields are bounded by hedgerows of mixed species and which contain a mix of tree types and maturity. Clearly the river is the dominant landscape feature in the general area. There are a number of scattered properties in the wider area. These properties often have a mix of building types – with residential and other buildings associated with agricultural premises (sheds / barns etc) typical. The buildings are also of different age and architectural type – with modern building styles (non-vernacular) being dominant.

Also of note are a small development (6 No.) of modern residential dwellings directly adjacent to the weir on the east bank. This development has been partially constructed but is now abandoned and heavily vandalised and it is unclear if the development will be progressed.

During the Rehabilitation works, negative visual impacts will be experienced due to the presence of site compounds and associated storage of materials (including waste) as well as construction plant and machinery. There is also likely to be some loss of hedgerows and trees (of mixed species and maturity). While some of these impacts can be mitigated, it is considered that as these are for the most part limited to the Rehabilitation works, it is more efficient e.g. in terms of how long it takes to carry out the work, to allow the contractor to work unhindered in terms of having to screen construction activities. One important mitigation though will be to replant any lost areas of hedgerow / trees as soon as suitable conditions allow. Their loss will be temporary, but it will be a number of years before replacement planting becomes fully established and mature.

There will also be visual impact caused by the Rehabilitation activities to the weir itself. Due to the nature and location of these works, it will not be possible to mitigate these impacts. However, as with the rest of the Rehabilitation activities, these are temporary in nature and will be confined to the works phase.

The original 1930’s concrete fish pass, situated adjacent to the lock gates, is an abrupt and relatively unsympathetic feature, relative to the weir profile and its wider setting. The fish pass will be removed and replaced as part of the Rehabilitation works. While the new fish pass will be wider, it will however be designed and faced to be more sympathetic with the existing weir.

Population and Community Issues
At present, it is anticipated that the fishery will remain open and navigation will be maintained through the lock during the Rehabilitation works. However, construction sites and the activities associated with them are by their nature inherently risky. Therefore, during construction, it is anticipated that visitors (including anglers
and canoeists) will need to be excluded from some areas of the weir and adjacent banks due to health and safety reasons for the duration of the works, though there may be opportunity for angling outside the immediate working site boundary.

Appropriate communication between the appointed Contractor and The Honourable The Irish Society regarding practical concerns (such as car parking / pedestrianised access to the river) and site hazards throughout the works will however be essential to prevent the potential for site accidents and conflicts of interest. It is vital that adequate communication / consultation takes place with anglers and river users in order to prevent site accidents and Waterways Ireland will not take responsibility for decisions on angling rights.

Specific Health and Safety details for the construction phase are outside the scope of this Environmental Impact Assessment as these will only be developed once precise design and construction methodologies have been developed. At this stage, it is sufficient to say that throughout the construction phase, adherence to high standards of Health and Safety for all construction workers, site visitors and members of the public will be of paramount importance. All construction activities will take place in the context of the relevant Northern Ireland Health and Safety legislation.

Although not quantified at present encouragement should be given within the construction contract for staff (when skills allow) and materials (if available) to be sourced from the local area to Carnroe.

In relation to potential loss of earnings from angling or agriculture, it is considered that these aspects are outside the remit of this Environmental Assessment.

The provision of the newly designed fish pass with safety provisions for canoeists has been found to be a slight positive impact in that it will improve safety at the weir – both to canoeists passing over the weir and to anglers and casual visitors to the weir.

Poaching will always likely be a problem on high value angling rivers. Therefore, it is vital that poachers are not provided with any opportunity for easier poaching during the construction works. As such, the design of any works are, therefore to consider measures to help prevent poaching and this is to be made clear in any contract documents issued for the appointment of a Contractor.

In addition, the appointed Contractor is to liaise closely with the Bailiffs of all statutory bodies (as well as The Honourable The Irish Society), local angling clubs and the PSNI.

If poaching becomes an issue at the construction site, then Security is to be provided. This could be a manned presence if required – measures are to be agreed with the relevant authorities.

Climate

In line with the new requirements for climate, outlined in EU Directive 2014/52/EU and transposed into law through the Planning (Environmental Impact Assessment) Regulations (NI) 2017, this assessment considers:

- The potential effects of the proposed scheme on climate, in particular the magnitude of greenhouse gas (GHG) emissions emitted during both construction and operation; and
- The vulnerability of the proposed scheme to climate change, in particular the possible impacts on the proposed scheme of extreme weather (driven by climate change) during operation and adaptation to improve resilience to these impacts.

With respect to vulnerability, the assessment identifies flood risk as the key climate risk and reasons that current design standards and best practice operational and maintenance regimes are expected to provide a degree of resilience to climate risks. Adaptation measures are however identified and required with respect to design, construction and operation in order to provide appropriate resilience over the life of the proposed scheme. Rehabilitation of the weir is anticipated to increase resilience to climate change and an increased frequency of extreme events through installation of adequate scour protection, rock armour and other specific repair works. These will ensure that the integrity of the weir is improved and operational life span extended.

In terms of effects on climate change, it is recognised that while in comparison to background UK total and NI total emissions, the proposed scheme is considered very small, it is nevertheless the multiple, very small individual UK impacts that cause the overall negative effect on climate.

In short, any scheme, no matter if it is big or small, will contribute negatively towards UK Carbon Reduction Targets. It is however important to note that the proposed scheme is only going ahead as inspection surveys (August 2009 and August 2013) on the condition of Carnroe Weir concluded that its condition had deteriorated to a level that was not acceptable in terms of safety and its ability to perform its role (such as
allowing adequate navigation and fish passage) to a satisfactory standard and deterioration was ongoing. The weir was classified as being in critical condition and in need of immediate remediation works. The construction of the proposed scheme will nevertheless cause an initial slight negative impact against the UK Carbon Reduction Targets, typical of any minor construction works project.

It is anticipated that following implementation of the mitigation measures, construction of the proposed scheme will cause small quantities of emissions, and as such have a negative impact at the UK Target scales. This is to be expected due to the fact that the proposed scheme involves construction of a new fish pass and Rehabilitation work with a ‘sunk’ carbon investment.

It is however noted that, excluding the construction emissions, there will be a neutral impact on climate as there is not expected to be any operational energy emissions, with the exception of minor maintenance requirements as per the current situation.

Fundamentally, the weir is required to facilitate navigation along the Lower River Bann. By opting to refurbish the existing structure and extend its lifespan, this removes the requirement for installation of a new weir structure in the near future. It is reasoned that the development of any new weir structure would attribute considerably higher levels of emissions due to a longer construction period and higher levels of embedded carbon through, for example, a requirement for large quantities of concrete and that Rehabilitation of the existing weir therefore represents a much more sustainable option.

Vulnerability to a major accident or disaster

In line with the new requirements for major accidents and disasters outlined in Article 3(1) of the EIA Directive, this EIA Report considered:

- Vulnerability of the proposed scheme to risks of major accidents and/or disasters; and
- Any consequential changes in the predicted effects of the proposed scheme on environmental topics.

The assessment noted areas of vulnerability to the weir related to storms, floods and transport accidents. Floods and storms are addressed via the relevant chapters in this EIA Report, with appropriate mitigation measures detailed.

Transport accidents were considered in specific respect of river navigation by boat users, canoeists and other recreational users which frequent the site. The lock gates provide an essential, safe means of navigation around the weir for boat users.

In December 2009, there was an accident at the weir which tragically led to the drowning of a canoeist. In this instance the canoeist was navigating directly over the weir and experienced ‘tow back’ at the base of the weir. This graphically illustrates the danger of navigation directly over the weir – particularly during periods of high water when the ‘tow back’ at the base of the weir can be substantial. Navigation over the weir by canoe is not recommended at any stage and signs to this effect will be placed at and above the weir. It is also the case that the design of the new fish pass is such that should anyone, canoeist, angler or ad-hoc visitor enter the pass, deliberately or accidentally, there are measures in place such as hand grabs and a ladder to ease escape from the pass.

There are not expected to be any significant adverse effects after mitigation, resulting from major accidents and disasters, as a result of the proposed scheme. It is to be noted that the purpose of the Rehabilitation scheme is to ensure that the weir is maintained in a safe and satisfactory manner and to avoid failure of this critical piece of infrastructure.

Materials and Waste

Material resources are required for construction of the new access roads, foundations, fish pass structures, weir Rehabilitation etc.

It is important that waste is considered holistically over the lifetime of the project as materials and techniques used in construction may have knock on effects regarding the operation of the scheme. The detailed design and Site Waste Management Plan (to be developed by the appointed contractor) will be required to deliver efficiencies including reducing excess waste, increasing the recycling potential of materials, and minimising the requirement for raw materials.

Where site won materials are found to be unsuitable, resources could potentially be sought from the local area to avoid increased haulage distances. However, there is a possibility of quantities of “waste” excess materials requiring movement off site.
Potential effects from the proposed scheme from materials requirement and excess materials / waste should be considered in more detail during the detailed design stage. Potential effects may relate directly to material demand, the sourcing of materials, the generation of non-useable materials from the site clearance and demolition, the re-use of soils and materials on site, the pre-treatment of materials prior to re-use on site, the recycling of materials and wastes, and the re-use and/or disposal of materials off site.

Material Assets
Material Assets is a very broad term that encompasses a wide range of features and which could cover almost all physical or non-physical sector of the environment that could be said to have material value. It is expected that the proposed scheme will have some permanent positive impacts on identified material assets. Chief among these will be the extension to the lifespan of the weir itself and improved fish pass which will also include safety features for canoeists.

On the other hand, there will be a requirement to temporarily restrict access to the weir for purposes of recreation (canoeing, navigation, angling etc.) during the construction stage. These restrictions are all for Health & Safety purposes and it is to be noted that it is the anticipation that the fishery and navigation through the lock will remain open during the Rehabilitation works.

Note that while there may be temporary disruption to some agricultural or recreational (including angling) activities due to construction, issues such as compensation are outside the scope of this Environmental Assessment.

Human Health
The proposed Rehabilitation of the weir at Carnroe has the potential to have health and wellbeing implications for a range of people who live or work in the area of Carnroe, or who are visitors undertaking leisure-based activities at or immediately adjacent to the weir. Some of the identified different groups of people could be considered ‘vulnerable’ in terms of potential health and wellbeing implications.

As would be expected for a scheme of this nature, the greatest potential for impacts on health and wellbeing occurs during the Rehabilitation phase, as large scale civil engineering works are undertaken. However, it has been shown that there are a range of mitigation measures that will be enacted, for example through the Construction Environmental Management Plan, which are anticipated to reduce or nullify these impacts to a slight adverse impact in a worst-case scenario in terms of health and wellbeing.

Throughout the development of the proposed scheme consideration has been given to constructability issues in relation to the safety and health of the operatives undertaking the work and those living, working or visiting the area. Every effort has been made to eliminate foreseeable hazards and reduce risks where possible. However, where it has not been possible to eliminate a hazard, measures to reduce the residual risk as low as reasonably practicable have been implemented. At this stage there are likely to be a number of unforeseeable hazards and risks that may only materialise as a detailed design is developed and following appointment of a contractor. Such hazards and risks would be assessed as and when they are identified. A hazard register will be prepared, and measures taken either in design or in procedural operations to mitigate against the hazard.

When the Rehabilitation works themselves are complete, for many aspects of health and wellbeing, the weir will have no impact (as is the case at present). However, opportunities will have been taken through the design and subsequent construction process to improve the safety at the weir. This is particularly relevant to those who use the weir directly for sport such as canoeists, but which will also benefit anglers and casual visitors to the weir. As such, the Rehabilitation works will have beneficial impacts in terms of health and wellbeing in the longer term through making the weir safer and more attractive to users. The weir will therefore continue to provide a recreational focus for a range of visitors and this will continue to engender a sense of wellbeing.

Transportation
The proposed weir Rehabilitation works are anticipated to result in typically no more than 20 HGV deliveries (40 HGV movements) and approximately 20 – 30 car / light goods vehicle movements per day. Existing and anticipated daily flows along the Agivey and Vow Roads respectively suggest this increase can be considered to have minor adverse effects.
The proposed site can be accessed from both the Vow Road (along an existing access lane) or from the A54 Agivey Road (along an existing laneway to a farm holding and then a required new access lane to the river bank). Safe access and egress to and from the site will be facilitated by a number of junction, track widening and visibility improvements and through traffic management measures, for example the use of stop and go boards on the Vow Road during HGV movements and by the introduction of temporary statutory speed restrictions. It is important to recognise that these improvements to the access junctions (such as increased sight lines) will be a permanent feature and represent an improvement in safety for residents of the access lanes and visitors to the residential properties along these lanes as well as visitors to the weir at Carnroe. Access to the east and west banks will require traffic movements across private laneways which currently afford access to residential properties, farmland and key angling locations, just downstream of the weir. The appointed Contractor will therefore be required to liaise closely with such stakeholders in order to ensure continued cooperation and minimise disturbance.

A Construction Traffic Management Plan (CTMP) will be further developed and enacted by the appointed contractor in order to manage all site related traffic in a safe and effective manner with as little impact on the surrounding road network as possible. Monitoring by the contractor of road conditions during Rehabilitation works is a key component of the CTMP. It is therefore expected that impacts on traffic will be Minor adverse (slight deterioration compared to the current scenario) and restricted to the Rehabilitation works period. Due to the very low number of vehicles anticipated to be required to visit the site during operation (with a worst case anticipated to be one maintenance vehicle per day), along with no anticipated changes in the frequency of visits by anglers or other ad-hoc visitors, no specific mitigation is proposed, and it is considered that this impact would be permanently Neutral.

**Summary and Conclusions**

**Summary**

This Environmental Report has been prepared by Atkins Limited to assess the anticipated environmental impact of the Rehabilitation of an existing weir at Carnroe, Lower River Bann.

The Rehabilitation of the weir is required as it was shown that this asset has deteriorated to a level that is not acceptable in terms of safety and its ability to perform its role such as allowing adequate fish passage to a satisfactory standard and deterioration is ongoing. It is also the case that this weir plays a key role in navigation on the river and therefore there is no alternative to maintaining this feature in a safe condition. In short there is no ‘Do Nothing’ Option.

It is recognised that the work activities required for the Rehabilitation of the weir are likely to result in some negative environmental impacts. However, it is considered that these impacts can be mitigated and would be temporary to the Rehabilitation phase.

In summary, the main construction impacts will be / potentially be in the following areas:

- Visual intrusion from machinery / stored materials and earthworks
- Loss of some habitat, including hedgerows and trees
- Potential detrimental impact on water quality from Rehabilitation activity
- Any pollution incidents which may occur could impact on aquatic ecology
- Possible damage to unknown archaeological artefacts
- Increase in noise levels in the area due to HGV movements and construction machinery, particularly during access improvement works
- Potential impacts on air quality from emissions / dust during construction
- Increase in the risk of flooding between Carnroe and Movaghner during the ‘in-river’ works phases
- Potential temporary scour to bed of river immediately downstream of the weir

The mitigation measures set out within the EIA Report are considered to be sufficient to ensure that all the potential negative impacts associated with the construction phase can be reduced to an acceptable level. A key component of implementation of the proposed mitigation measures and subsequent environmental protection is the application of an effective Construction Environmental Management Plan. This CEMP will be a ‘live document’ that will be continuously updated as the project develops through further design, the appointment of a contractor and so on. The first iteration of this CEMP has been developed and reflects understanding of the issues identified in the Environmental Impact Assessment. Allied to the continued development of the CEMP by the appointed contractor will be the further development of an effective
Construction Traffic Management Plan, the first iteration of which has also been developed. In addition, the appointed contractor will develop a Site Waste Management Plan that will be used to address issues relating to materials and waste on site.

While undertaking the required work activities in a safe and efficient manner is paramount, it is anticipated that angling in the area and navigation through the lock chamber can be maintained.

Rehabilitation of the weir will result in this noted industrial heritage feature having a prolonged lifespan and will allow continued navigation along the River Bann by recreational boats.

In addition to the Rehabilitation of the weir, it is proposed that the opportunity is taken to improve fish passage for a greater range of species than is possible at present. This will be enabled by the replacement of the existing 1930’s concrete fish pass with a new ‘Larinier’ type fish pass. Provision of this new fish pass is anticipated to improve fish passage significantly, with very positive effects and is an important component of helping to meet the Objectives for this river catchment under the terms of the Water Framework Directive. Fish passage during the Rehabilitation works will be provided by the temporary installation of an ‘Alaskan A’ type fish pass.

It is recognised that the weir at Carnroe is located along a canoe trail and is a popular location for canoeing, though the dangers of the weir mean that it is recommended that canoeists do not cross the weir itself. Recognition of the dangers to canoeists means that the design of the new fish pass incorporates safety features such as rails that could be utilised should anyone find themselves caught within the fish pass. This improvement in safety would be of benefit not just to canoeists but also to anglers and any casual visitor to the weir.

No other committed developments, or other activities have been identified with which it is considered that the proposed Rehabilitation of the weir will interact to produce any cumulative effects.

Conclusion

The proposed Rehabilitation of the weir will have some negative environmental effects due to the work activities required to be undertaken, though it is anticipated that it is possible to mitigate these effects. It is also the case that for the most part, negative impacts are temporary, being confined to the construction phase. In addition, it is important to note that following completion of Rehabilitation, it is anticipated that the river in the vicinity of the weir will for the most part return to similar environmental conditions as those existing at present, though with a marked improvement in fish passage.

Rehabilitation of the weir will also prolong considerably the lifespan of this noted industrial heritage feature and ensure it continues to facilitate navigation along the Lower River Bann, as well as continue to provide a focal point for tourism and recreational opportunities. Rehabilitation of this existing asset also represents a much more sustainable option in terms of material usage, emissions of carbon and general disruption through a shortened working period compared to the development of a new weir, which would otherwise be required to continue facilitating navigation.

It is concluded therefore that there are no strong environmental reasons to preclude the Rehabilitation of the weir.