OIFIG na nOIBREACHA POIBLÍ
OFFICE OF PUBLIC WORKS

River Deel (Crossmolina) Drainage Scheme

Exhibition Report

Table of Contents

1. Introduction

1.1. Context

The River Deel and Crossmolina Town have a long history of flooding. The four most recent flood events in 1989, 2006, and 2015 (twice) resulted in flooding of three main streets in Crossmolina Town.

At the request of Mayo County Council, the Office of Public Works (OPW) carried out a Feasibility Study in 2012, which established the potential viability of a Flood Relief Scheme for the River Deel. A wide range of flood relief options were considered under technical, environmental, economic and social criteria, including structural and non-structural measures.

1.2. Summary of Proposed Scheme

The design standard to be adopted for the Scheme is the 1% Annual Exceedance Probability (AEP) flood level with provision for adaptability to the Medium Range Future Scenario.

An options assessment was carried out for the River Deel (Crossmolina) Drainage Scheme in 2014 in which a wide range of flood relief options were considered including structural and non-structural measures.

The following four options were brought forward for further detailed analysis using the multi-criteria assessment:

- Option A – Flood Defences Only
- Option B – Flood Defences in Combination with Dredging
- Option C – Flood Defences in Combination with Bridge Replacement
- Option D – Diversion Channel

Option A was identified as the emerging preferred option based on the cost estimate, multi criteria analysis (MCA), benefit score, MCA benefit to cost ratio and the economic benefit to cost ratio.

During detailed assessment, a review of the structural integrity of the existing Jack Garrett Bridge to withstand an imposed loading from the projected 1% AEP flood levels indicated that the replacement of the Jack Garrett Bridge with a purpose designed bridge would be required in order to facilitate the progression of Option A.

This prompted a review of the flood risk management options for the River Deel (Crossmolina) Drainage Scheme and further additional detailed hydrological and hydrogeological investigations were undertaken. The following options were carried forward for review and Option 3 was identified as the preferred option:

- Option 1 – Flood defences incorporating bridge replacement
- Option 2 – Combination of flood defences incorporating bridge replacement and dredging
- Option 3 – Diversion Channel

Option 3, the diversion channel, was progressed to Public Exhibition and an Environmental Impact Assessment Report (EIAR) was produced. The EIAR was prepared by Ryan Hanley in association with MKO on behalf of the Office of Public Works (OPW).

In accordance with the Arterial Drainage Acts of 1945 and 1995, prior to the exhibition, interference notices were issued to parties who would be affected by the proposed scheme, including landowners, occupiers, reputed owners and beneficiaries of rights of way, wayleaves etc. These parties were then invited to comment on the scheme being proposed.

1.3. Structure of this Report

This report provides a brief overview of the public exhibition, summarises the observations received at and following the public exhibition in 2018, the responses issued by OPW and details possible actions or changes to the scheme following public exhibition.

2. Public Exhibition

2.1. Overview

The first public information day for the River Deel (Crossmolina) Drainage Scheme was held on 14 September 2012 to present the study area and invite feedback regarding the proposed scheme. Information compiled from the first public information day was included in the Constraints Study Report.

A second public information day was held in Crossmolina Town Hall on 13 June 2014, at which a draft version of the preferred option for the proposed scheme at that time (Option A) was displayed.

A third public information day was held on 08 April 2016 detailing the scheme progress to date and the requirement for the reassessment of options due to the bridge replacement associated with the initial preferred option (Option A) was not viable. Several comments were received at the public information day on 8th April 2016 indicating a preference for the diversion channel. The comments received at the public information day were considered in the scheme design.

Option 3 (the diversion channel) was identified as the preferred option and progressed to public exhibition. The public exhibition for the River Deel (Crossmolina) Drainage Scheme took place in Crossmolina Public Library and the offices of Mayo County Council from 21 May 2018 to 22 June 2018.

The exhibition was launched with an open day on 21 May 2018 in Crossmolina Town Hall and was open to the public from 14:00 until 21:00. Three additional events took place in Crossmolina Town Hall at the dates and times listed below.

- 29 May 2018 – 14:00 to 19:30
- 06 June 2018 – 14:00 to 19:30
- 15 June 2018 – 14:00 to 19:30

The four events were attended by representatives from OPW, Mayo County Council, Ryan Hanley and MKO to provide information on the proposed scheme and to answer any queries from the public.

Landowners affected by the proposed scheme were notified in advance and invited to attend the public exhibition. Relevant local representatives and stakeholders were also invited to attend the public exhibition. The exhibition was advertised in print media and on the radio.

The opening day was well attended, with over 100 attendees estimated. The attendance sheets are provided in Appendix A. It was noted that not all attendees signed in.

2.2. Discussion on Public Exhibition Days

Speeches were delivered by Richard Dooley (OPW), Maurice Buckley (OPW), Peter Hynes (Mayo County Council), Minister Kevin Moran and Minister Michael Ring. Jonathan Reid, Ryan Hanley delivered a presentation detailing the proposed scheme.

The exhibition was also attended by TD Dara Calleary, Senator Michelle Mulherin and Senator Rose Conway-Walsh, County Councillors, representatives from Crossmolina Flood Action Committee, Inland Fisheries Ireland (IFI) and National Parks and Wildlife Service (NPWS).

3. Observations

A period of six weeks following the public exhibition was provided for affected landowners and members of the public to submit observations regarding the proposed scheme. 10 observations were submitted and are listed in table 3.1 below. A copy of the observations are provided in Appendix B.

Table 3.1 Summary of Observations Received

Submission No.	Observation Submitted By	Dated	Property Lot No.
1	Health Service Executive	10 July 2018	-
2	Inland Fisheries Ireland	12 July 2018	-
3	John Garrett	-	100.11
4	Crossmolina Flood Action Group	-	-
5	Department of Heritage, Culture an the Gaeltacht	16 July 2018	-
6	Trena Gallagher	20 July 2018	300.13
7	Paddy Heffernan	30 July 2018	100.12
8	Bury Architects	02 August 2018	300.05
9	Bury Architects	02 August 2018	300.03
10	James Nallen	03 August 2018	-

Each of the observations are summarised in this section along with a summary of the response issued by the OPW. A copy of the full response to each submission is included in Appendix C.

3.1. Submission 1: Health Service Executive (HSE)

3.1.1. Summary of Submission 1

A submission was received from the HSE dated 10 July 2018. The HSE were generally positive and made the following observations:

1. The scheme 'is welcomed and will have a positive impact on the population, businesses and infrastructure of the town'.
2. Recommendation that a dedicated Communication Officer be put in place and continued consultation with 'residents and local businesses along the route of the scheme' take place, along with liaison with the HSE Environmental Health Department (EHD).
3. Details of how the public will be made aware of disruptions to water supply, utility services, and local access to be provided in the Construction Management Plan. HSE EHD also to be contacted.
4. The public to be made aware of potential risks to private water supplies.
5. Details regarding proposed noise mitigation and monitoring to be provided in the Construction Management Plan and clarification to be provided regarding monitoring at the location of any potential complaints.
6. The Dust Mitigation Plan to be submitted to HSE EHD in advance of the commencement of the project.
7. A Pest Control Management Plan to be included in the Construction Management Plan.
8. Suggestions regarding facilities for construction staff working on the scheme.
9. Opinion expressed that traffic impact is not sufficiently considered in EIAR.
10. Details regarding restricted access, including plans for wheelchair and less abled access to health facilities and public buildings, to be included in the Construction Management plan.
11. Details regarding security of site compound to be included in the Health & Safety Plan.

3.1.2. Summary of Response

In relation to the issues raised regarding public consultation during the construction phase of the project, OPW will ensure that there is a dedicated Projects Communications Manager (PCM) in place who shall keep the public informed of the scheme progress and will be responsible for liaison with the Environmental Health Department, local residents and the general public. The PCM will communicate with any landowners or members of the public who may be impacted throughout all phases of the project such as in the event of accidental severance of a service or increased rodent activity.

In relation to noise and vibration, the Construction Environmental Management Plan will define the critical periods, persons responsible for monitoring and the noise sensitive locations that will be monitored.

A Dust Minimisation Plan will be included in the Construction Environmental Management Plan which will be provided to the HSE. The Dust Minimisation Plan will be reviewed regularly during the construction phase of the Scheme.

OPW confirm that there is no record of surface water abstractions for human consumption from the River Deel. The karst hydrogeological assessment carried out as part of the environmental assessment included the GSI database of wells in the region and no additional wells were identified as part of the Public Consultation. The Construction Environmental Management Plan will be prepared in advance of any works in order to ensure all works are carried out in a manner designed to avoid and minimise any adverse impacts on the receiving environment.

In relation to mitigation for impacts to existing utilities, the contractor/ OPW will be supplied with the information obtained in the site investigations. The contractor/ OPW will carry out additional site investigation prior to excavation to determine the exact location of any underground services in order to reduce the risk of accidental severance of any existing utilities during the construction phase.

The OPW notes the suggestion from the HSE that facilities for the staff working on the construction of the Scheme be provided in the compound. The OPW will include detail relating to accommodation in a separate Construction Environmental Management Plan for direct labour works.

Chapter 10 of the EIAR considers at a high level the impact of construction activities in the area. The localised traffic disruptions as a result of other proposed works throughout the scheme will be mitigated through the use of industry standard traffic management measures. These traffic management measures will be designed in accordance with the 'Guidance for the Control and Management of Traffic at Roadworks – Second Edition'.

In relation to access to public buildings, the proposed works areas are outside of Crossmolina Town and it is not anticipated that it will negatively impact access to public buildings.

The contractor/OPW (for direct works) will be responsible for ensuring adequate measures are taken to prevent unauthorised access to the site compound by members of the public.

3.1.3. Possible Actions/ Changes to Scheme

A dedicated Project Communications Manager (PCM) to be put in place throughout all phases of the project to inform the public of project progress and any construction activities which may impact the local community as well as liaise with the Environmental Health Department, local residents and the public.

The Construction Environmental Management Plan will be prepared in advance of any works in order to ensure all works are carried out in a manner designed to avoid and minimise any adverse impacts on the receiving environment.

No proposed changes to the Scheme.

3.2. Submission 2: Inland Fisheries Ireland

3.2.1. Summary of Submission 1

A submission was received from Inland Fisheries Ireland (IFI) dated 12 July 2018. Inland Fisheries Ireland were generally positive and welcomed the opportunity to comment on the scheme proposals. Inland Fisheries Ireland made the following observations regarding possible fisheries mitigation measures:

1. Feedback is generally positive:
    a. Proposal to divert 'flows of a specified magnitude and retaining natural river regime' 'is considered as very positive'
    b. 'No objection provided all mitigation measures'…. are carried out'
    c. 'The proposal to have 'washlands' at the downstream end of the channel is positive in regard to scope for wetland/ wet woodland habitats conservation.'
2. Residual concerns regarding channel operation:
    a. 'Legitimate concerns' that fish species could become 'stranded in the by-pass channel in the wake of flood and overflow events'. 'A salvage plan should be discussed and agreed with OPW – IFI prior to scheme commencement'.
    b. Potential for fish to use washlands and bypass channel to migrate from Lough Conn to River.
    c. 'IFI would welcome discussions with OPW in regard to a control structure or a transition type structure to be installed at the downstream end of the bypass channel to reduce the potential for this upstream attraction to occur'. IFI cited Arterial Drainage Scheme at Cappamore scheme as an example.
3. IFI see a 'fisheries mitigation opportunity' at Ballycarroon, as the current arrangement of ford and culverts is 'problematic for fish mitigation in low-medium flows'. Options suggested include a single span bridge with soffit above flood levels or a box culvert.
4. Other comments:
    a. Emergency Response Plan to include IFI as notifiable body.
    b. Note that River Deel lies within a Special Area of Conservation (002298) and designated for species including Atlantic Salmon and Sea Lamprey which are migratory; migrating upstream as adults, spawn and migrate back downstream in juvenile life stages. The timing of works to take migration of SAC fish species into account.
    c. Detailed method statements for intake weir to be agreed with IFI Ballina in advance.

3.2.2. Summary of Response

A more detailed 2D hydraulic model of the proposed scheme has been undertaken which is based on hydrographic data acquired in 2019 and hydrometric data acquired since the Public Exhibition for the River Deel at the location of the proposed channel intake. Preliminary outputs from this model indicate that a River Flow Control Structure is required within the River Deel in order to manage flow to the diversion channel. The response to IFI set out that detailed design of the proposed scheme will commence once the model has been updated. The entire development envelope will be considered at detailed design stage and will include detailed locations of all mitigation measures and full details of downstream maintenance works that may be required along the River Deel.

The OPW will liaise with IFI during the design stage and attempt to reach a mutual agreement on the issues raised in IFI's submission. These issues include:

1. The inclusion of an emergency response plan
2. Preparation of detailed works method statements
3. Restriction on timing of instream works (if required)
4. The design of upstream and downstream control structures to minimise the risk of fish becoming stranded in the diversion channel along with a salvage plan for stranded fish

The EIAR and NIS will be updated as required prior to confirmation of the Scheme.

The OPW are not in a position to undertake works as part of the River Deel (Crossmolia) Drainage Scheme which are outside of the study area, such as at Ballycarroon, and fulfil no purpose in relation to the Scheme.

3.2.3. Possible Actions/ Changes to Scheme

OPW to liaise with IFI during the detailed design and construction phase and attempt to reach mutual agreement on the issues raised in IFI's submission.

The Exhibition Drawings made reference to an Energy Dissipation Structure, details of which were not provided on the drawings. Design has since commenced on this structure, which will include a level step, thereby discouraging fish passage from Lough Conn to the River Deel via the diversion channel. A small low flow channel will provide continuity through the new structure as the channel dries out towards the end of an overflow event.

A new River Flow Control Structure has also been incorporated into the scheme within the River Deel. The invert of the structure has been recessed into the river bed to allow it to be lined with natural river gravels.

3.3. Submission 3 & 4: Crossmolina Flood Action Committee & Mr. John Garrett

3.3.1. Summary of Submission 3 & 4

Submissions received from the Crossmolina Flood Action Committee and Mr. John Garrett on 13 July 2018 and 23 July 2018, respectively, included the following comments:

1. Opinion expressed 'the objective of the scheme will not be achieved as proposed' and 'that undue weight has been accorded to' maintaining hydrological regime in the river.
2. The weir level is seen as being too high.
3. Opinion expressed that the weir is set back too far 'from the river bank' and should be moved towards the river and reoriented on plan 'to take more advantage of the water velocity'.
4. Suggestion that the weir be moved towards the point where the river turns northwards towards Crossmolina and closer to the river to enhance flow over the weir.
5. The submission noted that "water in torrent will tend to continue in a straight line until its velocity is exhausted".

6. Opinion expressed that the proposed scheme attempts to "do the bare minimum to alleviate rather than solve a problem" and again notes that a lower weir will give a greater safety margin to prevent flooding in Crossmolina Town.

3.3.2. Summary of Response

The response noted the shared concern in relation to ensuring the correct balance is achieved in preventing flooding in Crossmolina Town and also maintaining the hydrological regime in the River Deel. The intake structure will be designed to ensure that the hydrological regime in the river will not be altered except in extreme flood flow conditions. There will be flexibility to alter the level of the weir as determined by ongoing monitoring in the river.

The proposed weir level was determined based on the available modelling data prior to public exhibition. In the response to both submissions, it was noted that a more detailed 2D hydraulic model was under construction using additional hydrometric data at the location of the proposed intake and in the channel. It was noted that the weir position was selected to prevent insofar as practicable the need for instream works, to avoid residential properties and to achieve channel alignment which would allow for an efficient diversion channel route. The response noted that the weir arrangement and flow control mechanism would likely undergo some modification as part of the detailed design and will be designed so as to minimise the frequency at which the diversion channel takes flow from the River Deel, but without compromising on the ability of the scheme to protect the town of Crossmolina against the 1% AEP flood.

3.3.3. Possible Actions/ Changes to Scheme

A 2D hydraulic model of the River Deel at the location of the intake structure was constructed taking into account additional hydrometric data at the location of the proposed intake and in the channel. The model identified a requirement for a River Flow Control Structure within the River Deel which has also been incorporated into the scheme.

It had been hoped to avoid a direct footprint within the River Deel, however the results of the 2D hydraulic model demonstrated that this was not possible. A mechanism for adjusting levels is incorporated into both structures. The inclusion of a River Flow Control Structure should alleviate the concerns expressed in these two submissions.

3.4. Submission 5: Department of Culture, Heritage and the Gaeltacht

3.4.1. Summary of Submission 5

The Department of Culture, Heritage and the Gaeltacht made the following observations in the submission dated 16 July 2018:

1. Archaeology:
   a. Mitigation measures recommended in EIAR to be carried out by a suitably qualified and experienced archaeologist
   b. An Underwater Archaeological Impact Assessment (UAIA) is required should in-river works be proposed. Archaeological monitoring shall be carried out by a suitably qualified and experienced underwater archaeologist.
2. Nature Conservation

a. The River Deel (Crossmolina) Drainage Scheme is located within the River Moy SAC (001198). The River Deel is habitat to a number of Annex II species of the River Moy SAC. The qualifying interests of River Moy SAC include inter alia 'the Annex I priority habitat, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*'. The extents of this habitat within the SAC are unknown. Areas in the vicinity of the scheme are wooded or tree lined; 'some of which corresponds to the Annex 1 woodland habitat'. Therefore, determining the extent of this woodland type is 'key to 'determining the significance of the likely effects.'
b. 'Construction, operation and maintenance of the scheme, and future associated maintenance of the Moy Arterial Drainage Scheme, have potential to alter, impact or disturb the Annex I habitat, the Annex II species, and the habitats of the Annex II species, including in terms of short- to long-term structure and function. Other protected species, e.g. Badger, and their breeding sites or resting places, may also be affected.'
c. 'Public authorities are obliged, when exercising their functions, to take appropriate steps to avoid, in European sites, the deterioration of natural habitats and the habitats of species, as well as disturbance of species for which a site has been designated insofar as this disturbance could be significant in relation to the objectives of the Habitats Directive.'
d. 'The Department acknowledges the significant amount of surveying and work undertaken in the preparation of the EIAR and NIS' however the Department notes that further consideration may be required in relation to the following elements:'
    i. Project/Scheme elements:
        1. The reasonable alternatives that were considered
        2. Complete project details including the full envelope of the development and works to be carried out during construction and operational stages
        3. Cross section drawings along the full extent of the scheme showing before and after details for the Scheme
        4. Full details of mitigation measures and how they will be implemented
        5. Full details of construction methods
    ii. Hydrology/hydrogeology/geomorphology
        1. 'establish the baseline hydrological, hydrogeological and physical conditions and characteristics of the receiving environment'
        2. consider the assessment of the long-term hydrological, hydrogeological' … 'and geomorphological' .. 'effects of the scheme on its own and cumulatively or in combination with other plans and projects, including arterial drainage maintenance currently being undertaken'
        3. 'include details of the hydrological model, on which impact predictions and calibration of the crest level of the weir are based'
        4. 'analyse residual effects, after the implementation of mitigation measures'
        5. 'provide details of any responses to monitoring where problems are identified or predicted'
        6. 'determine the size and location of the direct contribution area to the Mullenmore Springs'

7. It is unclear if the hydrological model includes climate change predictions.

iii. Biodiversity:
   1. a 'detailed assessment and analysis of the short to long-term effects on Freshwater Pearl Mussel and its habitat' is required
   2. an 'assessment of the likely effects on European sites' is required
   3. describe and characterise fully the environmental baseline in terms of woodlands and riparian vegetation present that will be impacted by the Scheme

iv. Natura Impact Statement:
   1. 'describe and characterise fully the woodlands and riparian vegetation of the SAC and include or exclude, on scientific grounds, the wider presence of the Annex I woodland type, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*'.
   2. 'describe and characterise fully the fen areas around Lough Conn, and present the scientific data and justifications for determining that these do not correspond to Annex I habitats';
   3. Provide further details in relation to the Otter surveys and surveys of White-clawed crayfish that have been carried out
   4. Provide details of the hydrological and hydrogeological assessments in relation to the likely effects on Annex I woodland habitat and the habitats of Annex II species;
   5. 'undertake robust analysis and reach clear and reasoned conclusions with respect to the implications for the conservation objectives and integrity of the SAC'.

3.4.2. Summary of Response

Archaeological Assessment
The OPW confirms that all archaeological mitigation will be carried out by a suitably qualified and experienced archaeologist, under licence to the Department of Culture, Heritage and the Gaeltacht.

The OPW confirms that, if required, a full and detailed Underwater Archaeological Impact Assessment (UAIA) shall be undertaken in advance by a suitably qualified and suitably experienced underwater archaeologist, under licence to the Department.

All archaeological monitoring shall be carried out by a suitably qualified and suitably experienced archaeologist. An underwater archaeologist with suitable experience will be employed, should instream works be required.

Nature Conservation

Project/Scheme Elements

A wide range of flood relief options was considered for the Scheme including increased conveyance, flood defence, storage, flow diversion and relocation of properties. Three options were brought forward for more detailed multi-criteria assessment:

Option 1 – Dredging in Combination with Flood Defences and Bridge Replacement
Option 2 – Bridge Replacement in combination with Flood Defences
Option 3 – Diversion Channel

The diversion channel was identified as the preferred option following detailed hydrological and hydrogeological investigations undertaken in 2016 and 2017. The full options report will be provided during the confirmation process.

The response noted that a more detailed 2D hydraulic model was being constructed based on recently acquired hydrographic and hydrometric data and that detailed design of the proposed Scheme would commence once the model had been updated. The entire development envelope will be considered at detailed design stage and will include cross section drawings, construction methodologies, detailed locations of all mitigation measures and full details of downstream maintenance works that may be required within the SAC. The EIAR and NIS will be updated where appropriate, with the additional information available following the detailed design process.

The response noted the it was not anticipated at the time that there will be any changes to the findings of the EIAR or NIS as a result of the detailed design undertaken.

The full details of all construction methods for all aspects of the proposed flood relief scheme will be finalised and fully documented following the detailed design process.

Hydrology/hydrogeology/geomorphology

The response noted that additional information relating to the baseline hydrological and hydrogeological environment will be included in the EIAR following detailed design.

The long-term hydrological and hydrogeological effects of the proposed development are fully considered in the EIAR. It was noted that the hydrological model was being upgraded to a 2D model based on updated hydrometric data in order to inform the detailed design of the scheme. The full details of the hydrological model will be included in an updated EIAR following detailed design and in advance of confirmation.

The EIAR will be updated to include full details of the hydrological/ecological monitoring that is proposed. This will include a clear and concise procedure for responding to any emergencies or ongoing issues that arise as a result of such monitoring.

In relation to the direct contribution area to the Mullenmore Springs, the hydrogeological assessment concluded that water flowing from the Mullenmore Springs originates from the River Deel and from a separate local sand and gravel aquifer. The Groundwater monitoring along the route of the diversion channel will assist in delineating the 4km^2 of sand and gravel terrain referred to above. This will however not affect the potential for unblocking of conduits near the springs, which can only be done through careful monitoring of excavation works.

The scheme will be designed to meet the '1 in 100 year' flood event, however it will be made adaptable for the mid-range future scenario. The hydraulic model includes for climate change scenarios.

Biodiversity

Freshwater Pearl Mussel
The EIAR bases its assessment on the fact that there will be no significant change to the hydrology, hydromorphology, sediment transfer, water supply etc. The hydraulic model and detailed design of the scheme will provide the additional information required by the Department to back up these findings and to demonstrate that the scheme has been designed with the specific aim of minimising effects on this and all other aquatic receptors to insignificance. The potential effects of any additional requirements following the detailed design process will be fully considered in the revised EIAR. In addition, a more detailed and specific assessment on the potential for effects on freshwater pearl mussel will be undertaken and the EIAR will be updated accordingly.

Assessment of European Sites
The EIAR will be updated to include more detail on the effects on European Sites.

Characterisation of the environmental baseline in terms of woodland and riparian vegetation.
The area downstream of the works will be included within the survey area and a characterisation of the baseline riparian and woodland conditions will be undertaken and included within the updated EIAR. A detailed assessment of the effects of the scheme on the downstream riparian and woodland conditions will be included within the EIAR.

Natura Impact Statement

Woodland Assessment and Characterisation
The woodlands and riparian vegetation both at and downstream of the proposed works will be the subject of further assessment and characterisation and further detail will be provided in the NIS.

Fen Characterisation
The fen surrounding Lough Conn was classified in the Irish Semi Natural Grassland Survey (Site 1723) (ISNG). No Annex I habitats were recorded from this site and the classification was verified during walkover surveys undertaken in the area undertaken by the project team. The NIS will be updated to include the necessary data supporting the classification both from the ISNG survey and from surveys undertaken by the project team.

Otter Surveys
The EIAR will be updated to include further details of the surveys undertaken and mapping of the findings. The results of any further surveys that may be undertaken prior to the submission of the EIAR for confirmation will also be included. Further assessment of inter-linkages with the proposed downstream maintenance will be presented in the NIS.

Crayfish

Crayfish surveys were carried out during the freshwater pearl mussel surveys of the River Deel and the Mullenmore Stream. The results are provided in Section 5.5.4 of the EIAR and also discussed in Appendix 5A, the freshwater pearl mussel survey report. The NIS will be updated with a more detailed description of the surveys and the results thereof.

Hydrological & Hydrogeological Assessments
Any additional hydrological/hydrogeological modelling that may be undertaken during the detailed design process will be presented in the NIS. The NIS will be updated to demonstrate how the surveys and modelling undertaken have been used to inform the analysis and to allow clear and reasoned conclusions to be reached.

Robust Analysis
It is considered that the NIS as presented provides full and robust analysis and reaches clear and reasoned conclusions with respect to the implications for the conservation objectives and integrity of the River Moy SAC. However, the ongoing modelling, surveys and detailed design of the scheme will provide additional information that is likely to further confirm the findings of the NIS and provide confidence in their accuracy.

3.4.3. Possible Actions/ Changes to Scheme

- An Underwater Archaeological Impact Assessment (UAIA) shall be undertaken should any in-river works be required
- Full details of mitigation measures and construction methods for all aspects of the proposed scheme will be provided following completion of detailed design. The EIAR and NIS to be updated, where appropriate, with additional information.
- The response noted that the EIAR will be updated to include the following:
    - Additional information regarding baseline hydrology and hydrogeology following detailed design, along with information from ongoing monitoring of river levels and the proposed intake structure and groundwater levels along the channel.
    - Full details of the 2D hydrological model following detailed design.
    - Full details of the proposed hydrological/ecological monitoring which will include a clear and concise procedure for responding to emergencies or ongoing issues that arise as a result of such monitoring.
    - A more detailed and specific assessment on the potential for effects on freshwater pearl mussel.
    - More detail on the effects on European Sites
    - A detailed assessment of the effects of the scheme on the downstream woodlands and riparian vegetation. The area downstream of the works will be included within the survey area and a characterisation of the baseline riparian and woodland conditions will be undertaken.
    - Further detail of otter surveys that have been undertaken and details of any additional surveys that may be taken prior to submission of the EIAR for confirmation.
- The response noted that the NIS will be updated as follows:
    - The woodlands and riparian vegetation both at and downstream of the proposed works will be the subject of further assessment and characterisation. The NIS will consider these woodlands in more detail.

- In relation to classification of the fen surrounding Lough Conn, the NIS will be updated to include the necessary data supporting the classification both from the ISNG survey and from surveys undertaken by the project team.
- In relation to otter surveys, further assessment of inter-linkages with the proposed downstream maintenance will be presented in the NIS.
- A more detailed description of recordings of White Clawed Crayfish which were carried out during the Freshwater pearl mussel surveys and the results thereof will be included.
- Any further hydrological/hydrogeological modelling that may be undertaken during the detailed design process will be presented in the NIS. The NIS will be updated to demonstrate how the surveys and modelling undertaken have been used to inform the analysis and to allow clear and reasoned conclusions to be reached.

3.5. Submission 6: Trena Blaine Gallagher

3.5.1. Summary of Submission 6

The letter dated 20 July 2018 was submitted on behalf of the landowner in relation to Lot no 300.13. The following observations were submitted:

1. The washlands cover a large area of the property.
2. The drawings do not indicate how the washlands will be fenced.
3. The washlands cover an existing farmyard and buildings.
4. The washlands cover an old family cottage which the family was intending to restore.
5. The washlands cover the old 16th century mill ruins.
6. Existing public services are along the route of the channel and washlands.
7. There is no explanation of what the "100 year return river flood" is.

3.5.2. Summary of Response

Alternative routes and termination points for the diversion channel were considered prior to Public Exhibition. The proposed route was chosen as it avails of the natural shallow valley associated with the Mullenmore Springs and the stream that drains to Lough Conn. A channel extending to the shoreline of Lough Conn would still lead to flooding around the Mullenmore Springs and would lower the normal water levels in the springs unless mitigation measures were implemented.

In relation to fencing of the washlands, a fence enclosing the washlands has not been shown on the drawings. The washlands extent is dictated by topographical features and not established field boundaries. The arrangements for enclosure of the washlands will be finalised in consultation with the affected landowners.

The washlands encompass the farmyard and buildings as the they are low lying relative to the surrounding topography. OPW will not propose locations for replacement of farmyard and buildings expect with the agreement of the landowner and further engagement on this issue is encouraged.

In relation to the old family cottage and mill, the flooding of these buildings is an inevitable consequence of the channel route chosen and the local topography. The author's suggestion that buildings to the North of the old mill be protected from flood

waters by an embankment was considered further at detailed design stage. The potential flow paths at this location presents difficulties in defining the level of protection that would be afforded by constructing the proposed embankment, due to the springs located in the Mullenmore area. The proposed embankment was deemed to be outside of the flood defence works and was therefore not recommended to be included in the scheme.

The local importance of the old mill has been acknowledged in the EIAR and the impact on this structure as a result of this scheme has been considered. The EIAR states that 'A detailed building survey of the mill ruins will be undertaken by a suitably-qualified and experienced archaeologist in order to compile a full record of the extant structures in written, drawn and photographic formats.'

The detailed design of this scheme will include measures designed to reduce the velocity of flood waters in the washlands in so far as is practicable without compromising on other requirements of the scheme. However, it is acknowledged that fast flowing flood waters in the vicinity of the mill will accelerate deterioration in the condition of the mill over time.

Details of utility diversions will be provided following the detailed design stage.

The 1% Annual Exceedance Probability (AEP) Flood is often referred to as the "1 in 100 year flood". This is the flowrate in the river that would not be exceeded on average any more often that once every one hundred years. The 1% AEP flow for the diversion channel is in 92.2 m^3/ second (92,200 litres per second).

3.5.3. Possible Actions/ Changes to Scheme

Consideration has been given to protecting buildings to the north of the old mill from flood waters with an embankment at detailed design stage, however this would add cost to the scheme, and would limit the cross sectional area of flow at this location, thereby increasing scour.

Arrangements for enclosure of the washlands to be finalised in consultation with the affected landowners.

3.6. Submission 7: Paddy Heffernan

3.6.1. Summary of Submission 7

The letter dated 30 July 2018 from received from Paddy Heffernan, Lot No. 100.12. The following observations were submitted:

Point A - Height of weir

The weir height should be 300mm lower in order to ensure that houses on Chapel Road will not be flooded

Point B - Location of weir

The weir should be located closer to Crossmolina approximately 30 metres from the proposed location. There is an option of removing fluvial deposits at this location which have narrowed the river to approximately 5.5 metres.

Point C - Cleaning of the river

In times of flood, fallen trees and debris on the riverbed increase the risk of flooding in Crossmolina. Remedial work to clear fallen trees and debris from the riverbed would improve the ability of the river to self-clean.

3.6.2. Summary of Response

In response to the submission it as noted that in relation to the proposed height of the weir, additional hydrometric data is currently being gathered at the location of the proposed intake to the diversion channel and in channel at the location of the proposed off take. A more detailed 2D hydraulic model was under construction at the time of the response. The weir arrangement and flow control mechanism are likely to undergo some modifications as part of the detailed design.

In relation to the location of the weir, the response noted that the location of the weir was originally chosen so as to prevent as far as practicable the need for instream works within the River Moy SAC, to avoid impact on residential properties and to achieve a channel alignment which allows for an efficient channel route downstream of the weir. It was noted in the response that the weir arrangement and flow control mechanism are likely to undergo some modifications as part of the detailed design based on the data from the updated 2D hydraulic model.

The operation and maintenance activities associated with the scheme include removal of accumulated deposits provided this does not required in streams works.

It is proposed to extend the maintenance activities from the point at which the River Moy Catchment Drainage Scheme terminates upstream as far as the intake structure.

3.6.3. Possible Actions/ Changes to Scheme

The weir arrangement and flow control mechanism have since undergone some modifications as part of the detailed design as more definitive.

3.7. Submission 8: Bury Architects

3.7.1. Summary of Submission 8

The submission was issued by Bury Architects on behalf of Mrs Breeda Mulkearns and Mrs Fidelis Walsh.

The following opinions were expressed in relation to the direct interference of Property Lot No. 300.05 by the River Deel (Crossmolina) Flood Relief Scheme:

1. Land loss and reduced value of asset.
2. Severance: flood structures may render a portion of the land inaccessible. The proposed crash barrier will render an area of the land inaccessible. This would equate to approximately 2.29Ha of land with residential potential being lost. Consideration should be given to grade levels to ensure adequate drainage of the new Lake Road to ensure the remaining land does not flood.

3. 'Injurious Affection': a stone wall should be built in lieu of the proposed timber post and rail fence line. The access point to the land should allow for safe egress to the realigned road and allay steepness of any embankment.
4. Disturbance: The drainage channel will cause a 'major disruption to the unsevered remaining lands'
5. Less Benefit: An estimate for the land loss due to the scheme was noted

3.7.2. Summary of Response

No significant issues were raised in the submission in relation to engineering design of the scheme. A submission for compensation may be issued following completion of the works.

The response noted that, in relation to the risk of flooding to the remainder of the site, the project team will ensure that the scheme is designed so as not to cause flooding of adjacent land insofar as is practicable.

In response to the query regarding the realignment of the Lake Road junction to avoid the creation of an inaccessible piece of land, the proposed design has taken into consideration horizontal and vertical alignment of existing and proposed roads, the proximity of the new bridge, including the minimum lengths of safety barrier required, and sight lines at the junction.

In relation to comments regarding fence types and hedgerows, the OPW noted in response that alternative fencing types may be used subject to agreement with individual landowners. Where considered appropriate and in consultation with the environmental consultants, new hedgerows are proposed in lieu of hedgerows removed as part of the scheme construction. Stone walls may be considered in discussion with landowners.

3.7.3. Possible Actions/ Changes to Scheme

Alternative fencing types may be used subject to agreement with individual landowners.

Otherwise, there are no proposed changes to the scheme.

3.8. Submission 9: Bury Architects

3.8.1. Summary of Submission 9

The letter was submitted by Bury Architects on behalf of Mr John Joseph and Rosemary Lynn and concerns Property Lot No. 300.03.

The following observations were made in relation to the River Deel (Crossmolina) Flood Relief Scheme:

1. Land loss and reduced value of asset
2. Severance: The total loss of residential land will equate to 0.54HA as the proposed crash barrier will render the site inaccessible. The submission also notes that the proposed bridge on the R315 seems to narrow.
3. 'Injurious Affection': Recommendations were made in relation to a new hedgerow and fencing. A stone wall should be built in lieu of the proposed timber post and rail fence line to hide the drainage channel from public view.

4. Disturbance: The drainage channel will 'represent a major change to the environs' and the view north will be bleak. The submission queries if the OPW maintain scrub growth.
5. Less Benefit: An estimate for the land loss due to the Scheme was noted.

3.8.2. Summary of Response

No significant issues were raised in the submission in relation to engineering design of the scheme. A submission for compensation may be issued following completion of the works.

In relation to the proposed crash barrier, the landowner will continue to have access to the lands from the side road which facilitates access to the R315 (known locally as Wilson's lane). In relation to the proposed bridge on the R315, the proposed design complies with TII Guidelines, however, the final bridge configuration will be determined at the detailed design stage

In relation to comments regarding fence types and hedgerows, the OPW noted in response alternative fencing types may be used subject to agreement with individual landowners. Where considered appropriate and in consultation with the environmental consultants, new hedgerows are proposed to replace hedgerows removed as part of the scheme construction. Stone walls may be considered in discussion with the landowners. It is proposed that the flood defence diversion channel will be maintained by OPW or agents acting on behalf of OPW through frequent grass cutting and vegetation maintenance.

3.8.3. Possible Actions/ Changes to Scheme

Alternative fencing types may be used subject to agreement with individual landowners.

Otherwise, there are no proposed changes to the scheme.

3.9. Submission 10: James Nallen

3.9.1. Summary of Submission

A copy of the hydrological report and flood risk assessment for a property were requested on behalf of Breege and John Nallen.

3.9.2. Summary of Response

The response noted the ongoing development of the scheme design and the proposal to publish the requested reports.

3.9.3. Possible Actions/ Changes to Scheme

No proposed changes to the scheme.

3.10. Other Verbal Comments at Exhibition

3.10.1. Summary of Other Verbal Comments at Exhibition

The comments and queries received during the public exhibition are detailed in Table 3.2.

Table 3.2 Summary of Observations/ Comments Received at Public Exhibition

Name / Organisation	Observation/ Comment	Response
Michael & Martina Gaughan	Wilsons Lane Maple Lodge Flooding; localised flooding from across fields approximately two times per year into garden. The flood waters entered the house on one occasion when fire brigade were not called in time	Contact has since been made.
John Valerio (Resident lake Road)	Proposal to engage a solicitor. Acknowledged benefit of a scheme despite reservations regarding local impacts at Mullenmore.	John was advised to engage a valuer first and informed that OPW would cover reasonable costs.
Noel Moffatt	General query regarding employment of a valuer.	Noel was advised that reasonable costs for a valuer would be covered. BMCD advised that the scheme presented at exhibition would likely be the scheme built.
Crossmolina Tidy Towns	Re: Mullenmore We have a planted area which we have spent a lot of time money and effort on. We would like it to be replanted.	
Phil Walsh and Bridie Mulkearns	General query regarding employment of a valuer.	Information was provided regarding engaging a valuer and OPW covering costs.
Heather Moore (Mullenmore, Crossmolina)	Query regarding structural impact of diversion channel on residential property.	A two-phase geotechnical investigation has been undertaken to date by OPW in order to obtain information on the ground conditions along the route of the proposed channel. OPW have also been monitoring groundwater levels along the route of the planned channel route. Excavation during the construction stage will be closely monitored. As is typical with projects of this nature

		a survey of structures in close proximity to the work areas will be undertaken before and after construction works.
Anna Marie Doyle	General discussion regarding scheme and request for drawings.	An electronic copy of maps were issued to Anna Marie Doyle.
Noel O' Boyle	General query regarding employment of a valuer.	Noel was advised to engage with a valuer. He agreed to email his comments to OPW but no email was received as of 22 June 2018. Contact has since been made on a number of occasions.
Sean Keane and others	Enquired about road straightening and hedge removal close to bridge on Rake St Road (Macken's Corner). Road safety concern - not caused by scheme but opportunity for improvement.	Concerns regarding road alignment and vegetation maintenance have since been referred to Mayo County Council.
John Valerio (Resident Lake Road)	Was concerned at the height of the new access road for neighbours.	John was assured by the engineer that the road levels would be reviewed at detailed design stage.

3.10.2. Possible Actions/ Changes to Scheme

No changes proposed.

4. Recommendation

Following a review of the observations and feedback received following the public exhibition for the River Deel (Crossmolina) Drainage Scheme, it is recommended that the preferred option of the drainage channel be progressed through detailed design to Confirmation Stage. The actions listed in Section 3 of this report will be taken into account during detailed design of the Scheme.

Appendix A – Attendance Sheets

Appendix B – Observations Received

Appendix C – OPW Response to Observations