

4 ASSESSMENT OF THE EFFECTS OF THE PROPOSED FLOOD RELIEF SCHEME ON EUROPEAN SITES AND ASSOCIATED MITIGATION

4.1 RIVER MOY SAC (002298)

The potential effects on each of the relevant Qualifying Interests of the River Moy SAC are described below.

4.1.1. Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (91EO)

This woodland habitat was recorded within the washlands and downstream of Crossmolina during the walkover survey of the study area. The woodlands within the study area were first assessed during the walkover survey, then any that had the potential to correspond with this Annex I habitat were subject to a detailed woodland assessment. The survey followed the methodology and assessment criteria outlined in Perrin (2008). The details of this survey are provided in Appendix V. A map showing the locations of the woodlands that correspond to this Annex I habitat are provided in Figure 3.3. The SAC boundary and the extent of the washlands are also shown in Figure 3.3.

The site-specific conservation objectives (SSCO) document for the River Moy SAC was consulted. Whilst only a single location for alluvial woodland is mapped within the SAC it is acknowledged that the full extent of the habitat is not defined in the SSCO document. The mapped example of the habitat is located on the western shores of Lough Conn close to Enniscoe House (approximately 2km to the south of the washlands). The habitat is also mentioned in the Site Synopsis as being well developed on the banks of the River Moy at Coryosla Bridge.

4.1.1.1. Direct Effects

There will be no works within or adjacent to this habitat. The only physical works within the SAC will be located on the banks of the River Deel at the intake point and at the location of the flow control structure. No alluvial woodland exists at these locations. There will be no loss in the area covered or changes to the distribution of this habitat within the SAC.

4.1.1.2. Indirect Effects

The potential for indirect effects on this habitat via a number of pathways was considered. Effects were considered in respect of the site-specific conservation objectives for the habitat. The potential for effects was considered both in relation to construction and operation of the proposed flood relief scheme.

Construction

The potential for the proposed construction works to result in effects on Alluvial Woodland as a result of the run off of pollutants was considered. There were two identified pathways assessed.

Firstly, there is potential for overland run off of pollutants to the washlands during construction either from extreme rainfall or if the channel became active prior to its completion. Both of these scenarios are extremely unlikely given the topography of the area, the nature of the works being undertaken and the lack of sensitivity of the receptor to a siltation event (most likely form of pollution is siltation). Nonetheless,

the proposed works have been specifically designed to avoid any such event. Measures as described in the Construction Environmental Method Statements that are provided as Appendix III include the following:

- Sediment control measures such as silt fencing and settlement ponds to prevent downstream run off
- Working from the downstream end towards the intake point to avoid the potential for the channel becoming active prior to its completion.
- Applying the final grass surfacing for each small section of channel as soon as it is completed to allow it to consolidate and prevent the potential for erosion

Secondly, there is the potential for run off of pollutants to Alluvial Woodlands downstream on the River Deel during construction of the intake structure and flow control structure. Again, the woodlands are not highly sensitive to pollution but robust design and construction measures are in place to avoid such an event and described in the construction and environmental method statements and the OCEMP that are appended to this document.

Measures include:

- Minimisation of Instream working area.
- Appropriate timing of works to avoid sensitive periods, flooding or high flows.
- Detailed construction drainage design to avoid potential run off
- Detailed monitoring regime that ensures all measures are effectively employed during construction.
- Employment of Environmental Clerk of Works.
- Use of Sondes upstream and downstream of the works area to continually monitor water quality during the construction period.
- Use of alarms that trigger when there is a 20% difference in turbidity between the upstream and downstream sondes.
- Emergency procedures in place to minimise the potential for or impact of any pollution event.

Operation

The operation of the flood relief channel has the potential to alter the normal functioning of the River Deel at high, low and flood flows. The potential for such effects was a primary consideration in the progression and design of the proposed development. The scheme has been specifically designed so there is negligible effect on the functioning of the River Deel in all but high flood events (return period of greater than one year). The channel will continue to convey the 'bank full' flow. All the Alluvial Woodlands that were recorded on the River Deel are located within the river corridor and 'bank full' channel. There will be no

change to the existing flooding regime within this channel. The extent of the benefitting lands has been mapped and demonstrates that the identified areas of Alluvial woodland which previously flooded in a five-year return period flood will continue to do so. This is shown in Appendix X. As such, no adverse effect on these areas of alluvial woodland will occur as a result of the proposed scheme as they will continue to flood as previously up to the approximate five year return period. The small areas that will no longer flood, were only subject to inundation from the River Deel in a greater than approximately 5 year return period and are not currently subject to regular inundation from the river. These areas are therefore not 'periodically inundated by the **annual** rise of the river level' as is described in the Interpretation manual of European Habitats (European Commission, 2013) as a defining feature of the Annex I alluvial woodland habitat (91E0) and will not be adversely affected by the lack of flooding from the River Deel since they are only very infrequently flooded at present (less than once approximately every five years).

The operation of the channel will result in additional flooding of the Alluvial Woodlands within the SAC in the washlands. This again was a primary consideration in the design of the development and has been extensively modelled. There were a number of outcomes that are critical to the assessment of the potential effects on the Alluvial Woodland. These are described below:

- In a 'do nothing' scenario, the washlands within the SAC are likely to be already flooded by the lake during the natural operation of the flood channel given the average wintertime levels of the lake. This is shown in Appendix X. The additional flooding during high water levels as a result of the diversion of water from the River Deel to the River Conn via the washlands (and the deliberate flooding of the washlands) is negligible in terms of area covered or depth of flooding.
- Should a flood occur during a period of low water within the lake (e.g. during the summer or in a dry period), the flooded area would be proportionally greater. However, it would be short lived (less than 36 hours in a 1:100 year event and considerably shorter in more frequent events as per the hydrological modelling undertaken) and would not adversely affect the hydrological functioning of any Alluvial Woodlands as the effect on the natural flooding regime would be negligible.

The velocities of the waters within the washlands were also modelled. As stated above, it is likely that the lands within the SAC will already be flooded during most occasions where the channel is in operation and thus there will be no significant flow or changes to the water level. In the event of the channel operating when the lake is at low level, it can be seen from Appendix X, the washlands cover a wide area where they occur within the SAC and this spread means that the velocities and depths are low with no potential for scour or erosion within the SAC.

The hydraulic assessment undertaken identifies areas of potentially high velocity within the flood channel itself. These areas will be fitted with scour protection during the construction of the channel to prevent erosion and sediment run off. Similarly, areas with potentially high velocities are predicted around the old mill at Mullenmore (Grid Ref:E1 14368 N316484).

Significant deposition of alluvial sediments are not predicted as a result of the diversion channel and it is noted that the washlands are already flooded for long periods with deposition naturally occurring throughout as a result of the lake.

4.1.2. Aquatic Species

The River Moy SAC is designated for the protection of four species that are entirely aquatic. These are:

- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]
- *Petromyzon marinus* (Sea Lamprey) [1095]
- *Lampetra planeri* (Brook Lamprey) [1096]
- *Salmo salar* (Salmon) [1106]

Whilst it is fully recognised that these four qualifying interests are different species and have different requirements, the pathways by which they have the potential to be affected are the same and thus they are discussed together to avoid repetition. The SSCO document was consulted and the individual conservation objectives for each species were considered in light of the specific targets and attributes. The SSCO document provided mapping of White Clawed Crayfish records. These showed records for the River Deel. There was no mapping for the other species within the SSCO document. Dedicated surveys for Crayfish in both the River Deel and the washlands were carried out in May 2017, March 2018, April 2019 and May 2020 and the species was found to be present in both. The full details of the surveys are provided above. A detailed desk study of fisheries habitat was undertaken as part of the EIAR study with the River Deel found to be a sensitive and important habitat but the Mullenmore Stream supporting low value fisheries habitat with the exception of a small section at the upper end (approx. 50m near the Mullenmore Springs and outside the SAC) that supported an eroding section of river.

4.1.2.1. Direct Effects

The proposed flow control structure is the only element of the proposed scheme that will have a direct effect on the River Deel during construction. It is the only element that is located within the river. The flow control structure is shown in detail in Appendix II and includes the structure itself, scour protection and a construction working area within the river channel. The river in this reach, provides suitable spawning and nursery habitat for salmon and lamprey species and provides a conduit for movement and migration up and down the catchment. It also provides high quality habitat for white clawed crayfish.

The construction of the proposed flood relief scheme has the potential to result in direct habitat loss, disturbance and displacement in relation to the identified aquatic QIs of the River Moy SAC.

In addition, the population of white clawed crayfish within the River Deel do not have the crayfish plague and there is the potential for the proposed works to introduce this disease to the catchment and to the population of crayfish within it. There are as yet, no records of alien crayfish species within the system (such as the signal crayfish). The proposed works also have the potential to introduce this species into the system

Whilst the footprint of the proposed development within the river channel is limited to 0.08ha of river habitat that is present throughout the Deel system. This loss is negligible in the context of the overall availability of habitat within the River Deel. However, mitigation is proposed within the design of the scheme to avoid any loss of habitat. The flow control structure has been designed so that the original bed of the river will be removed to facilitate construction but then will be immediately replaced to ensure that there is no loss of habitat for these QI species associated with the proposed scheme. Design drawings that show this are provided in Appendix II and the detailed construction method statements are provided in Appendix III.

With regard to potential disturbance and displacement effects on these species, the mitigation that will be employed to avoid such effects is summarised below.

- Instream work will only be undertaken, when the river is dry or outside the sensitive period for spawning lamprey and salmonid fish in the River Deel (July 1st to September 30th)
- Prior to any instream works a crayfish survey will be undertaken by a suitably qualified ecologist and any crayfish encountered will be translocated under licence to areas upstream of the proposed works.
- When dewatering the river (if necessary), no more than 50% of the river will be blocked at any one time, thus allowing continued passage for the aquatic KERs through the catchment.
- Where sandbag cofferdams are required to facilitate a dry working area, the area inside the cofferdam will be electro-fished under licence from the IFI prior to drawdown.
- Any removal of gravels will be undertaken when the river is dry. There will be no instream works and only the top of the accumulated gravel berm will be removed – leaving the low water channel undisturbed and unaffected.
- A tracked machine will be used to access the river channel from near the intake weir and will remove the gravels. Any gravels that are removed will be made available to the IFI for use in fisheries enhancement elsewhere in the catchment.
- All plant, machinery and equipment will be thoroughly cleaned and disinfected using Virkon 1% biocide prior to arrival and departure from the site to prevent the spread of invasive species such as Asian Clam, Zebra Mussel, Crayfish plague. Biosecurity measures are described in full in Appendix III.

4.1.2.2. Indirect Effects

Construction

The potential for the proposed development to result in indirect effects on the aquatic environment during construction exists in the form of run off of pollutants both to the River Deel and also to the Mullenmore Stream in the washlands. The measures that are in place to prevent and mitigate any such effects are described in full in Appendix III and summarised above in relation to Alluvial Woodlands.

An additional potential indirect effect on the aquatic habitat adjacent to the intake structure and flow control structure was considered in the form of vegetation removal leading to an increase in light levels within the river. Following site surveys however, this potential effect was discounted as the river bank in the area was not heavily shaded. The removal of these trees and bushes to construct the intake structure will not significantly alter light levels in the River and trees will be replanted following completion of the works.

Operation

The proposed flood relief scheme has the potential to result in changes to the natural functioning of the river, which could in turn result in adverse effects on the aquatic habitats and species that are identified as KERs above. The scheme has been designed specifically to avoid any effects on the river at any flow levels with the exception of those flows that exceed the bank full flow and result in flooding. These flows occur infrequently (less than once per year) for very short periods of time (max 36 hours in case of 1:100 year flood and decreasing with more frequent floods). The effect of the removal of the very high volumes of flood water from the overall flow will have a short term slight effect on the habitat within the river or in the Mullenmore Stream (in which spawning Brook Lamprey were recorded).

The scheme has been designed specifically to minimise the frequency with which it becomes operational whilst still providing flood protection to Crossmolina Town. To achieve this, a flow control structure is proposed in order to restrict high flows during flood conditions and to direct excess flow over the weir.

The extensive modelling and assessment of the proposed hydrological and hydromorphological impacts of the proposed scheme are provided in Chapter 7 (Appendix XI) and its associated appendices. This information has been reviewed in the completion of this assessment of the impacts of the operation of the proposed scheme on biodiversity.

The hydrological modelling undertaken concludes that there will be a drop in velocity between the intake weir and the flow control structure when the weir becomes operational. This will lead to the infrequent deposition of gravels and cobbles within the river channel at this location. These will need removing on a periodic basis. Any removal of gravels will be undertaken when the river is dry. There will be no instream works and only the top of the accumulated gravel berm will be removed – leaving the low water channel undisturbed and unaffected. A tracked machine will be used to access the river channel from near the intake weir and will remove the gravels. Any gravels that are removed will be made available to the IFI for use in fisheries enhancement elsewhere in the catchment.

The modelling and assessment that was undertaken concludes that any changes to the hydrological/hydrogeological regime in the River Deel upstream and downstream of the proposed works will be infrequent and minor and it is anticipated that any potential effects will be consistent with intra-reach variability in bed shear recorded by the 1D HEC-RAS model elsewhere within the existing channel. There will therefore, be **no significant effect on the natural hydrological/hydromorphological regime within the River Deel** either upstream or downstream of the proposed works. There will be no significant changes to the existing patterns of erosion, deposition or sediment transfer associated with the proposed works.

In addition to changes to the function of the River Deel during flood conditions, the potential for the construction of a channel to influence the low flow conditions in the river was also considered and extensively modelled. The River Deel loses water along its course through a number of swallow holes in its bed and it regularly runs entirely dry between Ballycarroon (Grid Ref: E112130, N316091) and Crossmolina Town. At the outset of the design of the scheme, concerns were raised regarding the excavation of a channel in such close proximity to a river in a region of karst bedrock and the potential for either blocking or exposing a flowpath, which could in turn affect the flows within the river. The potential for any such effects was fully assessed through a programme of long term monitoring of the losses within the river and testing of where they were discharging (Mullenmore Springs), along with detailed assessment of the route taken by any conduits. The results of this testing are provided in the hydrology chapter (Appendix XI). It concludes that the excavation and operation of the diversion channel as proposed is **highly unlikely to result in any measurable effect** on the existing function of the River Deel during low or normal (non-flood) conditions.

Changes to the hydrological and hydromorphological regime within the River Deel have the potential to result in significant changes to the habitat for these aquatic species. This could lead to loss of suitable habitat for each of the species mentioned above within the River Deel.

However, as discussed above, following detailed and extensive modelling of the potential effects of the impact of the proposed scheme on the hydrology and hydromorphology of the river, it has been concluded that there will be no significant changes to the existing habitats within the river. Any changes that may occur will be consistent with intra-reach variability in bed shear recorded by the 1D HEC-RAS model. Thus, there will be no significant alteration to the habitats of the aquatic KER species as a result of the proposed scheme.

The only appreciable predicted hydromorphological impact which will have a noticeable effect is the predicted deposition of gravels upstream of the flow control structure. These will require maintenance in the form of the periodic removal of the tops of any accumulated berms. This is discussed above and any maintenance will be undertaken when the river is dry so that there is no requirement for any instream works or potential for habitat loss or disturbance to aquatic species. Only the tops of the berms will be removed and there will be no affect on the low flow channel.

There will be no adverse effect on any aquatic KER in respect of changes to the hydrological or hydromorphological regime within the River Deel.

Barriers to movement through the catchment

The construction of the flow control structure within the river channel has the potential to result in an obstruction to the passage of fish and other aquatic species up and down the catchment. This would represent a significant impact on the distribution of these species throughout the catchment and could potentially prevent them from reaching potential spawning or other important habitats.

However, the flow control structure (which is the only instream structure) has been specifically designed to facilitate continued passage of all aquatic species through the catchment. The structure is shown in Drawing L_04 and Section Drawing S_04 (Appendix II). One of the culverts is set at a lower level than the others in order to maintain a low flow channel (or thalweg) at all times until the river dries out entirely. All culvert sections are buried into the substrate of the river and the existing gravels are replaced within the base of the culvert and in the surrounding scour protection. The flow control structure is narrow and will not significantly shade the channel.

There will be no restriction to movement of aquatic species throughout the catchment as a result of the proposed scheme.

Stranding of Fish

The potential for fish to become trapped in the bypass channel following its operation was also considered. The potential for fish to either be washed into the channel over the intake structure or swim up the channel from the Mullenmore Stream was assessed.

In relation to the potential for fish to swim up the channel, the washlands spread the water over a large area (see Appendix X) and the channel will run for a very short period of time (max. 36 hours). Fish are unlikely to swim up the channel during this short period and without an obvious flowpath. It is anticipated that the numbers of fish that will be washed over the weir will be negligible and comparable to those that may get stranded during a flood event in the absence of the proposed development (No records of large numbers of stranded fish outside the river banks following previous floods were found during the desk studies undertaken and consultation with the IFI).

Despite the low probability of fish becoming stranded in the channel, a small thalweg has been provided within the design. This provides a defined flowpath along the channel rather than having a flat base and connects with an existing drain that leads to one of the Mullenmore Springs and from there to the stream. This thalweg has a dual function. It will be used to facilitate fish passage as described above and also to let a small flow through the channel in advance of the main overflow of the weir to provide early warning. In addition, the local IFI will be informed following any operation of the channel (as they would following any flood event) to allow the rescue of any fish that may become stranded.

4.1.3. Otter (1355)

4.1.3.1. Direct Effects

The proposed scheme will result in the loss of approximately 50m (25m on each bank at flow control structure) of bankside habitat at the location of the flow control structure. There will also be some works adjacent to the river bank at the intake weir though this will be set back from the riverbank and will not result in significant habitat loss within 10m of the river bank.

The proposed in-stream works associated with the construction of the flow control structure have the potential to result in physical disturbance and displacement of otter. A holt was identified approximately 10m from the flow control structure and is shown in the faunal records map that is included as Confidential Appendix VIII.

In addition, the proposed works have the potential to restrict access to otter throughout the catchment by blocking the river during construction.

The loss of riparian habitat will be minimised by fencing off the minimum area necessary to complete the proposed works to avoid un-necessary habitat loss. In addition, following construction, the temporary bankside works area will be reinstated with the planting of native trees and shrubs.

To mitigate any potential for disturbance, prior to construction, a dedicated otter survey will be undertaken by a suitably qualified ecologist to determine whether the identified holt is occupied and active. The status of the holt will be assessed (breeding holt/occasional use etc.) and a derogation licence for potential disturbance will be sought if works are proposed within 30m of an active holt. If the holt is in active use as a breeding holt at the time of the proposed works – these works will be suspended until breeding activity has concluded. All works will be undertaken in accordance with the 'Guidelines for Treatment of Otters prior to the Construction of National Road Schemes' (NRA 2008) following the procedure set out in EP 20 of the OPW 'Drainage Maintenance and Construction Environmental Guidance' (OPW 2019)

In addition to the above, all works will be undertaken between the hours of 8am and 6pm thus avoiding the main periods of activity for this crepuscular species.

4.1.3.2. Indirect Effects

Measures are described above in relation to the protection of water quality and ensuring that the hydrological regime of the River Deel, the Mullenmore Stream and the washlands associated with Lough Conn is not subject to any effect during all except for flood flow conditions during either construction or

operation. Modelling, as summarised in the water chapter Appendix XI also demonstrates that the operation of the diversion channel will not result in any adverse effects on the River Deel or the Washlands. This applies equally to indirect effects on otter as it does to the other identified receptors.

4.2 LOUGH CONN & LOUGH CULLIN SPA (004228)

The potential for the proposed flood relief scheme to result in adverse effects on the Lough Conn & Lough Cullin SPA is assessed below. Whilst no physical works are located within 300m of the SPA, the proposed washlands extend into and the SPA is located downstream of the proposed works via the River Deel.

Dedicated bird surveys were undertaken on a monthly basis during 2016 with an additional three months during 2017 (January, February, March). The results of these vantage point surveys are provided in Appendix VII. The bird surveys were focussed primarily on the washlands and SPA.

The results of the bird surveys as they pertain specifically to the Special Conservation Interests (SCIs) of the SPA are provided below. An assessment is then made of the potential for the proposed flood relief scheme to result in adverse effects on the integrity of the SPA.

4.2.1 Bird Survey Results

4.2.1.1 Tufted Duck (*Aythya fuligula*) (A061)

Tufted duck were only recorded on one occasion during the surveys that were undertaken. A maximum flock size of 40 was recorded on flooded farmland associated with Lough Conn within the washlands on the 30th January 2016. None were recorded during any other of the surveys undertaken.

4.2.1.1 Common Scoter (*Melanitta nigra*)(A065)

This species was not recorded during any of the surveys that were undertaken. This species is known to be in decline on the lake (Hunt et.al., 2012) and breeds on wooded islands. The habitats in the washlands and in the surrounding area are unlikely to be used regularly by this species as they do not include the wooded islands that are favoured by the species.

4.2.1.2 Common Gull (*Larus canus*)(A182)

This species was recorded during nine out of the 15 survey days with a total flock size of 130 recorded on the 20th March 2017. This was the only large flock recorded with low numbers of birds (max.15) recorded on all other occasions. The birds were strongly associated with the lake and the shoreline. This species also breed on islands in the lake.

4.2.1.3 Greenland White Fronted Goose(*Anser albifrons flavirostris*)(A395)

This species was recorded on three occasions during the bird surveys The maximum flock size recorded was 24. The birds were recorded in flight and on the grasslands adjacent to the lake.

4.2.1.4 Wetlands & Waterbirds (A999)

The survey recorded a wide range of wetland and waterbird species associated with the lake and the surrounding grasslands at the lakeshore with a total of 52 bird species recorded, 24 of which are wildfowl and wetland species. The washlands within the SPA are used extensively by wildfowl species

4.2.2 Assessment of potential for adverse effects

4.2.2.1 Direct effects

No physical works will be undertaken within 300m of the SPA but the identified washlands do include areas within the SPA as shown on Figure 2.1. Potential direct effects include erosion due to increased flow of water and extended area, depth and duration of flooding. These potential effects have been fully discussed in relation to Alluvial Woodlands above. The potential effects on the washlands have been extensively modelled and it is concluded that there will be no adverse effects on the washlands for the following primary reasons:

- In the majority of flood events, the washlands will already be flooded by the lake and additional flooding will not be significant in terms of area or depth.
- If the bypass channel becomes operational during low lake levels, the effect of the flooding will cover more of the washlands but will be shortlived (max. 36hours in 1:100 year flood)
- The velocities of the waters in the washlands have been modelled. As the waters within the SPA are distributed over a very wide area and at very shallow depth (see Appendix X), they have low velocities and will not cause erosion within the SPA.

The above effects are highly unlikely to result in adverse effects on the habitats within the SPA or the utilization of those habitats by birds that are among the named SCI species or the wetlands and waterbirds for which the SPA is also designated.

4.2.2.2 Indirect effects

The potential for the proposed development to result in indirect effects on the aquatic environment during construction and operation exists in the form of run off of pollutants both to the River Deel and also to the Mullenmore Stream in the washlands. The measures that are in place to prevent and mitigate any such effects are described in full in the Construction Method Statements in Appendix III and the OCEMP (Which is provided as Appendix IV. These measures are also summarised above in relation to Alluvial Woodlands.