

| Habitat/ Species and geographic importance | KER Y/N | Rationale |
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| Eroding River (River Deel) and associated riparian fringes International Importance as habitat for aquatic species | Yes | The River Deel is designated for conservation as part of the River Moy SAC. Works are proposed within and immediately adjacent to this habitat. The river is a KER in the context of the habitat it provides for the range of aquatic species within it. |
| Lough Conn International Importance as habitat for aquatic species | Yes | Lough Conn is designated for conservation as part of the River Moy SAC. No work are proposed within or adjacent to Lough Conn but both the River Deel and the washlands discharge to this lake. The lake is a KER in the context of the habitat it provides for the range of aquatic species within it. |
| Depositing River (Mullenmore Stream) and Calcareous Spring (FP1) Local Importance (Higher Value) | Yes | The Mullenmore Stream provides high biodiversity value in the local context and provides connectivity with Lough Conn. |
| Wet Willow, Alder Ash woodland (WN6) where it has been identified as Annex I Alluvial Woodland (91E0) International inside SAC National Outside SAC | Yes | This habitat is located at two discreet locations within the River Moy SAC downstream of Jack Garrett Bridge and also within the same SAC within the washlands. It has been recorded outside the SAC around the Mullenmore Springs. There is potential for the proposed scheme to result in indirect effects on this habitat and it is included as a KER |
| Immature Wet Willow Alder Ash Woodland (WN6), Mixed Broadleaved Woodland (WD1), Scrub (WS1), Hedgerows (WL1), Treelines (WL2) Local Importance (Higher Value) | Yes | These are not Annex I habitats but do provide semi natural habitats with high biodiversity in a local context and are included as a KER on this basis. |
| Agricultural Grasslands, artificial drainage ditches and Built surfaces | No | These habitats are common and widespread in the local and wider area and are of comparatively low ecological value. |

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| Local importance (Lower Value) | | |
| Birds SCIs of the Lough Conn and Lough Cullin SPA International Importance | Yes | Whilst there is no potential for direct effects on the SPA, following the precautionary principle, there is potential for significant effects on water quality within the SPA, which could affect the habitat of these species. |
| Birds (non SCI) Local Importance (Higher Value) | Yes | Other species such as Kingfisher and songbirds that are not among the SCIs of the SPA have the potential to be significantly affected as a result of disturbance, habitat loss or degradation. |
| Bats Local Importance (Higher Value) | No | Whilst the River Deel provides high quality habitat for these species, there is no potential for the proposed scheme to result in significant loss or deterioration of roosting, foraging or commuting habitat. There is no potential for significant disturbance either. These species are not among the KERs |
| Badger Local Importance (Higher Value) | Yes | This species has been recorded within and surrounding the footprint of the proposed scheme. It has the potential to be significantly impacted through habitat loss and disturbance. |
| Otter International Importance | Yes | This species is among the QIs of the River Moy SAC. It has been recorded within and surrounding the footprint of the proposed scheme. It has the potential to be significantly impacted through habitat loss and disturbance. |
| Aquatic Species International Importance | Yes | Aquatic species including salmon, lamprey species and white clawed crayfish are among the QIs of the River Moy SAC. Other aquatic species such as freshwater pearl mussel, salmonid and coarse fish are not among the QIs of the SAC but are ecologically significant and are included as KERs |
| Other Faunal species recorded | No | The other faunal species recorded during the surveys undertaken in support of this EIA were common and widespread in the local and wider area and unlikely to be significantly affected by the proposed scheme. |

Table 5.12 Identification of KERs

5.5. ECOLOGICAL IMPACT ASSESSMENT

5.5.1. Do Nothing/Current Scenario

If the proposed works were not to go ahead, it is likely that the current regime of management and maintenance on the river will continue with the nature of the river being maintained essentially as it is at

present. It is likely that maintenance works would include the Ad Hoc removal of trees and branches from upstream of the town of Crossmolina as and when they threaten to get washed down or restrict flow within the river. The OPW would continue to maintain the River Deel downstream of the Jack Garrett Bridge to Lough Conn and the Mullenmore Stream as part of their ongoing maintenance of those channels.

5.5.2. Construction Phase Effects

5.5.2.1. Impacts on Habitats during construction

The proposed scheme has been specifically designed to avoid where possible or otherwise minimize the loss or disturbance of ecologically sensitive habitats identified in the area such as the River Deel and the associated riparian corridor or the wet woodlands associated with the washlands. The habitats that will be permanently or temporarily affected by the scheme are listed below, complete with the area (and lengths) affected, are provided in Tables 5.13-5.14 below.

| Habitat | Total Area Affected (Hectares) |
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| Buildings and Artificial Surfaces (BL3) | 0.68 |
| Spoil and Bare Ground (ED2) | 0.01 |
| Improved Agricultural Grassland (GA1) | 3.39 |
| Amenity Grassland (GA2) | 0.24 |
| Dry Meadows and Grassy Verges (GS2) | 0.03 |
| Wet Grassland (GS4) | 4.21 |
| (Mixed) Broadleaved Woodland (WD1) | 0.04 |
| Wet Willow-Alder-Ash Woodland (WN6) (non Annex I) | 0.32 |
| Scrub (WS1) | 0.10 |
| Upland Eroding River (FW1) | 0.08 |

Table 5.13 Areas of habitat lost

| Habitat | Total Length Affected (m) |
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| Drainage Ditches (FW4) | 352 |
| Hedgerows (WL1) | 1331 |
| Tree Lines (WL2) | 140 |

Table 5.14 Lengths of linear habitat lost

Impacts on Non-KER habitats during construction

The majority of the habitats upon which the proposed diversion channel is located are grasslands or built lands that have not been identified as KERs and are not of high ecological or biodiversity value. The impacts on these habitats of Local Importance (Lower Value) are not considered significant at any geographic scale as they are common and widespread in the local and wider area. In addition, the grasslands that are lost will be replaced within the grass lined channel, thus greatly reducing any residual loss. The grasslands within the diversion channel will be sown with native grass seed and pollinator friendly wildflower seed mixes. They will be maintained through mowing in late August or September on an annual basis. All cut material will be removed to prevent the build-up of nutrients within the grasslands.

Impacts on Aquatic KER Habitats during construction

The identified aquatic KER habitats include:

- Eroding River (FW1) Habitat in The River Deel (International Importance)
- Depositing River (FW2) Habitat in the Mullenmore Stream (Local Importance (Higher Value))
- Limestone Marl Lake (FL3) in Lough Conn and associated lakeshore habitats (International Importance)

Direct effects only apply to the River Deel, in which physical works are proposed in the form of the flow control structure. Indirect effects apply to all receptors, which are located downstream of the proposed works via either the River Deel or the washlands. The potential effects are described and characterised in detail in Table 5.15 below.

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| <p>Description of Effect</p> | <p>Direct effect – Habitat Loss</p> <p>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 Drawing L_04 and Section Drawing S_04. (Appendix 3A, Chapter 3) and includes the structure itself, scour protection and a construction working area within the river channel. The habitats within the river do not conform to any Annex I habitat.</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The construction of the proposed scheme has the potential to result in water pollution during the construction phase. This could result not only from the instream construction works associated with the flow control structure but also as a result of run off from the construction of the terrestrial elements of the scheme that are adjacent to the river. Potential pollutants could include silt, hydrocarbons, cementitious material and other chemicals used in construction.</p> |
| <p>Characterisation of unmitigated effect</p> | <p>Direct Effect – Habitat Loss</p> <p>The loss of 0.08ha. of non-Annex I freshwater habitat within the River Deel is characterized as a short term, reversible, negative impact of slight magnitude (Impacts on aquatic species within the River Deel are considered in Table 5-20 below) given that the area lost is a tiny fraction of the overall amount of Eroding River habitat within the River. It is noted that the area where the river flow control structure is proposed is not unique and supports a similar habitat to that found both up and downstream</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The potential for the construction of the proposed scheme to result in pollution in various forms to enter the River Deel/Mullenmore Stream/Lough Conn is characterized as a short Term, reversible negative effect of moderate magnitude.</p> |
| <p>Assessment of Significance Prior to Mitigation</p> | <p>Direct Effect – Habitat Loss</p> <p>This habitat is widespread throughout the river channel, is not listed on Annex I of the EU Habitats Directives or among the Qualifying Interests of the SAC The loss of 0.08ha is not significant in the context of the overall receptor of international importance.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has the potential to result in pollution of the River Deel/Mullenmore Stream/Lough Conn over a large area downstream of the works. Whilst the potential effect is short term and the magnitude considered to be moderate, this is a potentially significant effect on these receptors of international importance.</p> |
| <p>Mitigation</p> | <p><i>Direct Effect – Habitat Loss</i></p> <p><i>Whilst no significant effect was identified in terms of habitat loss, mitigation is proposed within the design of the scheme to avoid any long term loss of habitat. The flow control structure has been designed so that the original bed of the river will be removed to</i></p> |

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| | <p>facilitate construction but then will be replaced during the operational phase of the development.</p> <p>Design drawings that show this are provided in Layout Drawing L_04 and Section Drawing S_04. Section 3 (Appendix 3A)</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity are provided in Section 5.5.6 below and in the OCEMP that is provided in Appendix 3C. Measures include:</p> <ul style="list-style-type: none"> • Minimisation of Instream working area as outlined in construction drawings provided in Appendix 3A. • 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. |
| Residual Effect following Mitigation | <p>Direct Effect – Habitat Loss</p> <p>Following the implementation of the mitigation described above, the loss of eroding river associated with the proposed works will be negligible and is not considered significant at any geographic scale.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>Following the implementation of the mitigation described above, the potential for pollution of the River Deel/Mullenmore Stream/Lough Conn during construction is minimised to insignificance.</p> |
| Potential for Cumulative Effect | <p>As the construction will not result in any significant effects on the Eroding River habitat in the River Deel, the Depositing River habitat in the Mullenmore Stream or the lacustrine habitat of Lough Conn, it cannot contribute to any cumulative effect in this regard</p> |

Table 5.15 Potential Effects on Aquatic KER Habitats

Impacts on Terrestrial KER Habitats during construction

The identified terrestrial KER habitats include:

- Wet Willow Alder Ash Woodland (WN6) (Annex 1) (International Importance)
- Immature Wet Willow Alder Ash Woodland (WN6) (Non Annex 1) (Local Importance (Higher Value))
- Mixed Broadleaved Woodland (WD1) (Local Importance (Higher Value))

- Hedgerow (WL1) (Local Importance (Higher Value))
- Tree Line (WL2) (Local Importance (Higher Value))
- Scrub (WS1) (Local Importance (Higher Value))

Wet Willow Alder Ash Woodland was assigned international importance where it was identified within the River Moy SAC both downstream in the River Deel catchment and in the washlands and where it conformed to the Annex I habitat Annex I Alluvial Woodland (91E0). It was assigned, National Importance where it was identified outside the SAC. This Annex I habitat was entirely avoided in the design of the scheme.

The potential effects on the terrestrial habitat KERs are described and characterised in detail in Table 5.16 below.

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| Description of Effect | Direct effect – Habitat Loss The proposed scheme will result in the loss of approximately 1,471m of tree line and hedgerow habitat and 0.09 ha. of scrub and woodland habitats. There will be no loss of Annex I Alluvial Woodland habitat as a result of the proposed scheme. |
| | Indirect Effect – Habitat deterioration resulting from Water Pollution Following the precautionary principle, there is potential for the proposed scheme to result in indirect effects on woodland and tree line habitats within the riparian corridor downstream of the proposed works as a result of water pollution |
| Characterisation of unmitigated effect | Direct Effect – Habitat Loss The loss of 0.09 ha. of non-Annex I habitat within the construction footprint is characterized as a permanent, yet reversible, negative impact of slight magnitude given that the woodland areas to be lost are very small in size and the hedgerow and tree line habitats common and widespread locally and in the wider area. |
| | Indirect Effect – Habitat deterioration resulting from Water Pollution The potential for the construction of the proposed scheme to result in pollution in various forms to enter the River Deel/Mullenmore Stream/Lough Conn and affect habitats that are primarily terrestrial but within the riparian corridor is characterized as a short Term, reversible negative effect of negligible magnitude. |
| Assessment of Significance Prior to | Direct Effect – Habitat Loss The loss of these habitats, whilst of slight magnitude, represents a significant effect at |

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| Mitigation | <p>the local scale.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The proposed works do not have the potential to result in significant effects on these primarily terrestrial habitats.</p> |
| Mitigation | <p>Direct Effect – Habitat Loss</p> <p>The loss of 1,471m of hedgerow and tree line and 0.46ha. of woodland habitat will be mitigated through the planting of 2,445m of native hedgerows and treelines along with replanting of native trees around the intake structure and the flow control structure. There will be no net loss of these habitats following mitigation.</p> <p>Habitat loss will also be minimised by the fencing off the construction area at the outset of the works and preventing all vehicular access to these areas during construction. See Drawing numbers L_01 to L_04 in Appendix 3C for fence line. Trees to be retained outside the construction footprint will be protected through the use of fencing to maintain a root protection area as set out in BS 5837: Trees in relation to construction (2012). Habitat loss has taken into account the root protection area of the trees to be retained.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity are provided in Section 5.5.6 and in the OCEMP that is provided in Appendix 3C. Measures are summarised in Table 5.18 – to avoid repetition.</p> |
| Residual Effect following Mitigation | <p>Direct Effect – Habitat Loss</p> <p>Following the implementation of the mitigation described above, there will be no net loss of woodland, hedgerow and tree line habitat associated with the proposed works. There will be no significant impact in this regard.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>Following the implementation of the mitigation described above, the potential for pollution of the River Deel/Mullenmore Stream/Lough Conn during construction to result in deterioration of riparian woodlands and tree lines is minimised to insignificance.</p> |
| Potential for Cumulative Effect | <p>As the construction will not result in any significant effects on the terrestrial KERs, it cannot contribute to any cumulative effect in this regard</p> |

Table 5.16 Potential Effects on Terrestrial KER Habitats

5.5.2.2. Impacts on Fauna during construction

Impacts on Non KER Fauna

The site of the proposed scheme provides suitable habitat for a range of faunal species that were not identified as KERs. These include species such as fox (*Vulpes Vulpes*), field mouse (*Apodemus sylvatica*), stoat (*Mustela ermina*), rabbit (*Oryctolagus cuniculus*), pine marten (*Martes martes*) and a range of other species that are either common and widespread in the local and wider area or were not seen during the extensive surveys undertaken. No potential for significant effects on these or other species that have not been identified as KERs has been identified.

The River Deel and associated habitats provide high quality habitat for bat species. However, no significant roosting habitat was identified during the extensive surveys undertaken and there will be no significant loss or fragmentation of foraging or commuting habitat. There is no lighting associated with the proposed development and no potential for significant disturbance of the taxa. No potential for significant effects on this taxon was identified and they are not included as a KER.

Impact on Aquatic KERs – Species during construction

Aquatic species that were identified as KERs include:

- Salmon (International Importance)
- Lamprey Species (International Importance)
- White Clawed Crayfish (International Importance)
- Freshwater pearl mussel (International Importance)
- Other Salmonid and Coarse Fish (Local Importance (Higher Value))
- European eel (Local Importance (Higher Value))

The potential effects on these KERs are described and characterised in detail in Table 5.17 below.

Description of Effects**Direct effect – Habitat Loss**

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 Layout Drawing L_04 and Section Drawing S_04. (Appendix 3A) 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 these aquatic KERs and provides a conduit for movement and migration up and down the catchment. Prior to the repeated drying out of the river in recent years this reach of the river supported populations of adult freshwater pearl mussel, though none are currently present in the area (2020).

Indirect Effect – Habitat deterioration resulting from Water Pollution

The construction of the proposed scheme has the potential to result in water pollution during the construction phase. This could result not only from the instream construction works associated with the flow control structure but also as a result of run off from the construction of the terrestrial elements of the scheme that are adjacent to the river. Potential pollutants could include silt, hydrocarbons, cementitious material and other chemicals used in construction.

Direct Effect – Disturbance and Displacement

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 the identified aquatic KERs.

There is potential to displace crayfish that are resident in that section of the river and for mortality during in-stream excavations. In addition, whilst there are no freshwater pearl mussel present at this location at present, there is potential for the species to migrate back into this reach of the river prior to the commencement of the works and therefore potential for direct mortality.

Similarly, should works be undertaken during the spawning period for Salmonid and Lamprey species, there is the potential for displacement of spawning fish and direct mortality of eggs and young fish.

The proposed instream works also have the potential to temporarily prevent access for the aquatic KERs through the catchment by blocking the river during construction works.

Direct Effect – Spread of crayfish plague

The population of white clawed crayfish within the River Deel do not have the crayfish

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| | <p>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.</p> |
| <p>Characterisation of unmitigated effect</p> | <p>Direct Effect – Habitat Loss</p> <p>The loss of 0.08ha. of habitat for these aquatic species within the River Deel is characterized as a short term, reversible, negative impact of slight magnitude given that the area lost is a tiny fraction of the overall amount of suitable habitat within the River. It is noted that the area where the river flow control structure is proposed is not unique and supports a similar habitat to that found both up and downstream</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The potential for the construction of the proposed scheme to result in pollution in various forms to enter the River Deel/Mullenmore Stream/Lough Conn is characterized as a short Term, reversible negative effect of moderate magnitude.</p> <p>Direct Effect – Disturbance</p> <p>The direct disturbance and displacement of the aquatic KERs is characterized as a Short Term reversible Moderate Negative Effect that could cover a large area within the system. The impact of pollution could disturb and/or displace spawning fish downstream and blocking the river could result in effects on the entire catchment.</p> <p>Direct Effect – Spread of crayfish plague</p> <p>The spread of crayfish plague or the introduction of the alien, signal crayfish to this previously unaffected population of international significance would constitute a permanent, irreversible, significant, negative effect.</p> |
| <p>Assessment of Significance Prior to Mitigation</p> | <p>Direct Effect – Habitat Loss</p> <p>This habitat is widespread throughout the river channel, but due to the sensitivity of the receptors (Annex II of EU Habitats Directives or among the Qualifying Interests of the SAC), the temporary loss of 0.08ha. is considered potentially significant in the context of the conservation status of the overall receptors.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has the potential to result in pollution of the River Deel/Mullenmore Stream/Lough Conn over a large area downstream of the works. Whilst the potential effect is short term and the magnitude considered to be moderate, this is a potentially significant effect on these receptors of international importance.</p> <p>Direct Effect – Disturbance and Displacement</p> <p>Whilst the potential effect is short term and the magnitude considered to be moderate, this is a potentially significant effect on these receptors of international</p> |

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| | <p>importance.</p> <p>Direct Effect – Spread of crayfish plague</p> <p>This is a potential significant negative effect on this species of international importance.</p> |
| <p>Mitigation</p> | <p>Direct Effect – Habitat Loss</p> <p>Whilst no significant effect was identified in terms of habitat loss, mitigation is proposed within the design of the scheme to avoid any long term 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 replaced during the operational phase of the development to ensure that there is no loss of fisheries habitat associated with the proposed scheme. Design drawings that show this are provided in Appendix 3A Layout Drawing L_04 and Section Drawing S_04.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity are provided in Section 5.5.6 and in the OCEMP that is provided in Appendix 3C. Measures are summarised in Table 5.15 are applicable here also.</p> <p>Direct Effect – Disturbance and displacement</p> <p>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 October September 30th)</p> <p>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.</p> <p>Similarly, prior to any instream works being undertaken, a survey for freshwater pearl mussel will be undertaken by a suitably qualified ecologist. In the unlikely event that freshwater pearl mussel are present, a derogation licence will be sought from the NPWS to facilitate their translocation to a suitable location within the river (where it does not dry out for extended periods on an annual basis.</p> <p>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.</p> <p>Where 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.</p> <p>Direct Effect – Crayfish Plague</p> <p>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 Section 5.5.6 below.</p> |
| <p>Residual Effect following Mitigation</p> | <p>Direct Effect – Habitat Loss</p> <p>Following the implementation of the mitigation described above, the loss of eroding river associated with the proposed works will be negligible and is not considered significant at</p> |

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| | any geographic scale. |
| | <i>Indirect Effect – Habitat Degradation resulting from Water Pollution</i> Following the implementation of the mitigation described above, the potential for pollution of the River Deel/Mullenmore Stream/Lough Conn during construction is minimised to insignificance. |
| | <i>Direct Effect – Disturbance and Displacement</i> Following the implementation of mitigation as described above, there is no potential for the construction of the proposed scheme to result in significant effects in relation to disturbance and displacement. |
| | <i>Direct Effect – Crayfish Plague</i> Following the implementation of mitigation as described above, there is no potential for the construction of the proposed scheme to result in significant effects in relation to the spread of crayfish plague. |
| Potential for Cumulative Effect | As the construction of the proposed scheme will not result in any significant effects on the identified aquatic KERs, it cannot contribute to any cumulative effect in this regard |

Table 5.17 Potential Effects on Aquatic KERs

Impact on otter during construction

The potential effects on otter (International Importance) are described and characterised in detail in Table 5.18 below.

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| <p>Description of Effect</p> | <p>Direct effect – Habitat Loss</p> <p>The proposed scheme will result in the loss of approximately 50m (approximately 25m on each bank) 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.</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>There is potential for the proposed scheme to result in indirect effects on otter as a result of water pollution. The pollution of the water and consequent impact on fish and crayfish species has the potential to affect otter by reducing prey availability within the river.</p> <p>Direct Effect – Disturbance and Displacement</p> <p>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 disused holt was identified approximately 10m from the flow control structure and is shown in the faunal records map that is included as Figure 5.7 in confidential Appendix 5F.</p> <p>In addition, the proposed works have the potential to restrict access to otter throughout the catchment by blocking the river during construction.</p> |
| <p>Characterisation of unmitigated effect</p> | <p>Direct Effect – Habitat Loss</p> <p>The loss of 50m. of non-Annex I habitat within the construction footprint is characterized as a permanent, reversible, negative impact of slight magnitude given that the area to be lost is very small in size and is not unique to this reach of the river.</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The potential for the construction of the proposed scheme to allow pollution in various forms to enter the River Deel/Mullenmore Stream/Lough Conn and to result in negative effects on otter in terms of a reduction in prey availability is characterized as a short Term, reversible negative effect of slight magnitude.</p> <p>Indirect effect – Disturbance and Displacement</p> <p>Given the location of the holt in such close proximity to the proposed flow control structure, there is potential for disturbance of otter to result in a short term, reversible, negative impact of moderate magnitude</p> |
| <p>Assessment of Significance Prior to</p> | <p>Direct Effect – Habitat Loss</p> <p>The loss of otter habitat is temporary and of such small scale that it does not represent a significant effect on this species.</p> |

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| | <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The proposed works do have the potential to result in significant effects on the aquatic prey species of otter and therefore could potentially have a significant negative effect on this species</p> |
| Mitigation | <p>Indirect effect – Disturbance and Displacement</p> <p>The proposed works are located within 10m of an identified (if disused) holt and therefore have the potential to result in significant effects in terms of disturbance to this species.</p> <p>Direct Effect – Habitat Loss</p> <p>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.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity are provided in Section 5.5.6 below and in the OCEMP that is provided in Appendix 3C. Measures are summarised in Table 5.15.</p> <p>Indirect effect – Disturbance and Displacement</p> <p>Prior to construction, a dedicated otter survey will be undertaken by a suitably qualified ecologist to determine whether the identified holt has since become 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)</p> <p>In addition to the above, all works will be undertaken between the hours of 8am and 6 pm thus avoiding the main periods of activity for this crepuscular species.</p> |
| Residual Effect following Mitigation | <p>Direct Effect – Habitat Loss</p> <p>Following the implementation of the mitigation described above, there will be no significant habitat loss associated with the proposed works.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>Following the implementation of the mitigation described above, the potential for pollution of the River Deel/Mullenmore Stream/Lough Conn during construction to result in deterioration of prey species availability for otter is minimised to insignificance.</p> <p>Indirect effect – Disturbance and Displacement</p> <p>Following the implementation of appropriate mitigation, there is no potential for the proposed works to result in significant effects on otter in terms of disturbance or displacement.</p> |

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| Potential for Cumulative Effect | As the construction will not result in any significant effects on otter, it cannot contribute to any cumulative effect in this regard |
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Table 5.18 Potential Effects on otter

Impacts on Badger during construction

The potential effects on badger (Local Importance (Higher Value)) are described and characterised in detail in Table 5.19 below.

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| Description of Effect | <p>Direct effect – Habitat Loss</p> <p>The proposed scheme will result in a temporary loss of foraging habitat throughout the works area during construction. Following completion of the scheme, there will be no loss of foraging habitat.</p> <p>A sett that was identified within the diversion channel during surveys undertaken early in the assessment appears to have been abandoned in recent years and is no longer active. However, this disused sett will be lost to facilitate construction of the proposed diversion channel.</p> |
| | <p>Direct Effect – Disturbance and Displacement</p> <p>The construction of the proposed diversion channel has the potential to result in the disturbance and potentially direct mortality of badger -should the abandoned sett become re-occupied in advance of the proposed works.</p> |
| Characterisation of unmitigated effect | <p>Direct Effect – Habitat Loss</p> <p>The loss of foraging habitat during construction is characterised as a short term, reversible, negative not significant effect as this habitat is widely available in the surrounding area.</p> |
| | <p>Indirect effect – Disturbance and Displacement</p> <p>There is potential for disturbance of badger to result in a short term, reversible, negative impact of Slight magnitude</p> |
| Assessment of Significance Prior to | <p>Direct Effect – Habitat Loss</p> <p>The loss of badger habitat is temporary and of such small scale that it does not represent a significant effect on this species.</p> |

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| | <p>Indirect effect – Disturbance and Displacement</p> <p>Should the abandoned sett that was identified along the diversion channel become re-occupied, there is potential for significant effects on this species in terms of direct mortality or disturbance.</p> |
| Mitigation | <p>Direct Effect – Habitat Loss</p> <p>The loss of 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 works area will be reinstated with the planting of native grasslands, trees and shrubs.</p> <p>Indirect effect – Disturbance and Displacement</p> <p>Prior to construction, a dedicated Badger survey will be undertaken of the entire works area by a suitably qualified ecologist to determine the current status of badger activity throughout the site.</p> <p>Should any active setts be encountered, during the dedicated pre-construction badger survey (if badgers have migrated into the area since the recent dedicated surveys that have been undertaken), they will be similarly avoided where possible.</p> <p>Should setts be identified within the development footprint during the pre-construction surveys (i.e. if the abandoned sett is re-occupied or if additional new setts are identified), a licence will be sought to exclude the Badgers in advance of the undertaking of any construction or clearance works.</p> <p>All works will be carried out in accordance with the ‘Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes’ (NRA 2008) and OPW EP 23 – Badger Procedure (OPW 2019)</p> |
| Residual Effect following Mitigation | <p>Direct Effect – Habitat Loss</p> <p>Following the implementation of the mitigation described above, there will be no significant habitat loss associated with the proposed works.</p> <p>Indirect effect – Disturbance and Displacement</p> <p>Following the implementation of appropriate mitigation, there is no potential for the proposed works to result in significant effects on badger in terms of disturbance or displacement.</p> |
| Potential for Cumulative Effect | <p>As the construction will not result in any significant effects on badger, it cannot contribute to any cumulative effect in this regard</p> |

Table 5.19 Potential Effects on badger

Impacts on Birds During Construction

The potential effects on bird species that are among the SCIs of Lough Conn and Lough Cullen SPA (International Importance), other species such as Kingfisher that are associated with the River Deel and listed on Annex I of the EU Birds Directive and other common species that are associated with the farmland, hedges, tree lines and woodlands within the study area (Local Importance (Higher Value)) are described and characterised in detail in Table 5.20 below.

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| Description of Effects | <p>Direct effect – Habitat Loss</p> <p>The proposed scheme will not result in any loss of habitat within the Lough Conn and Lough Cullen SPA. It will not result in any loss of supporting habitat for the SCI species of this SPA.</p> <p>The proposed scheme will not result in any loss of habitat for nesting kingfisher.</p> <p>The proposed scheme will result in the loss of woody vegetation that provides suitable nesting, roosting and foraging habitat for a wide range of common bird species. This takes the form of 1,471m of hedgerows and tree lines and 0.46ha. of scrub and woodland habitats.</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The construction of the proposed scheme has the potential to result in water pollution during the construction phase. This could result not only from the instream construction works associated with the flow control structure but also as a result of run off from the construction of the terrestrial elements of the scheme that are adjacent to the river. Potential pollutants could include silt, hydrocarbons, cementitious material and other chemicals used in construction. This has the potential to result in deterioration of the aquatic habitat for birds within the Lough Conn and Lough Cullen SPA and within the River Deel.</p> <p>Direct Effect – Disturbance and Displacement</p> <p>No works are proposed within or adjacent to the Lough Conn and Lough Cullen SPA and there is no potential for disturbance or displacement of the SCI species of this SPA.</p> <p>No suitable nesting habitat for kingfisher was identified in the vicinity of the proposed works and there is no potential for disturbance or displacement of this species as a result of the proposed works.</p> <p>The proposed works have the potential to result in physical disturbance and displacement of the common bird species associated with the woodland, farmland and riparian areas within and adjacent to the construction footprint. There is potential for direct mortality of nesting bird species.</p> |
| Characterisation of unmitigated effect | <p>Direct Effect – Habitat Loss</p> <p>The loss of tree lines, hedgerows and woodland habitats that are common and widespread in the local area and not unique to the proposed construction footprint is characterised as a permanent, reversible, negative effect that is not significant on receptors of Local Importance (Higher Value)) as these habitats are common and widespread in the local area and the species recorded are not dependent on the</p> |

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| | <p>area.</p> <p>There will be no loss of nesting, roosting or foraging habitat for SCI species of the Lough Conn and Lough Cullen SAC (International Importance) as a result of the proposed scheme.</p> <p>Indirect Effect – Habitat deterioration resulting from Water Pollution</p> <p>The potential for the construction of the proposed scheme to allow pollution in various forms to enter the River Deel/Mullenmore Stream/Lough Conn is characterized as a short Term, reversible negative effect of slight magnitude in respect of bird species. Following the precautionary principle, this pollution does have the potential to result in in habitat deterioration within Lough Conn, which is designated as part of the Lough Conn and Lough Cullen SPA, and supports avian receptors of International Importance.</p> <p>Direct Effect – Disturbance</p> <p>The proposed works have the potential to result in a short term, reversible, effect that is not significant on receptors of (local Importance (Higher Value)).</p> <p>There is no potential for the proposed works to impact on SCI species of the Lough Conn and Lough Cullen SPA (International Importance) in this regard.</p> |
| <p>Assessment of Significance Prior to Mitigation</p> | <p>Direct Effect – Habitat Loss</p> <p>The predicted habitat loss associated with the construction of the proposed scheme is not considered significant in respect of bird species.</p> <p>Indirect Effect – Habitat Degradation resulting from Water Pollution</p> <p>The construction of the proposed scheme has the potential to result in pollution of the River Deel/Mullenmore Stream/Lough Conn over a large area downstream of the works. Whilst the potential effect is short term and the magnitude considered to be slight, this is a potentially significant effect on the SCI avian receptors of international importance.</p> <p>Direct Effect – Disturbance and Displacement</p> <p>The potential for significant effects on bird species as a result of disturbance and/or displacement was not identified.</p> |
| <p>Mitigation</p> | <p><i>Direct Effect – Habitat Loss</i></p> <p><i>Whilst no significant effect was identified in terms of habitat loss for nesting, roosting or foraging birds, mitigation is proposed within the design of the scheme to avoid any long term loss of habitat.</i></p> <p><i>The loss of 1,471 m of hedgerow and tree line and 0.46ha. of woodland habitat will be mitigated through the planting of 2,204 metres of native hedgerow and 221 metres of native tree line. Along with the replanting of trees surrounding the infrastructure at the intake and flow control structures.</i></p> |

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| | <p><i>Indirect Effect – Habitat Degradation resulting from Water Pollution</i> The construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity are provided in Section 5.5.6 and in the OCEMP that is provided in Appendix 3C. Measures are summarised in Table 5.15 are applicable here also.</p> <p><i>Direct Effect – Disturbance and displacement</i> Whilst no significant disturbance and displacement effects on bird species are predicted, all works will be carried out in strict accordance with Section 40 of the Wildlife Act (1976 – 2012)</p> |
| <i>Residual Effect following Mitigation</i> | <p><i>Direct Effect – Habitat Loss</i> Following the implementation of the mitigation described above, any loss of these habitats associated with the proposed works will be negligible and is not considered significant at any geographic scale.</p> <p><i>Indirect Effect – Habitat Degradation resulting from Water Pollution</i> Following the implementation of the mitigation described above, the potential for pollution of the River Deel/Mullenmore Stream/Lough Conn during construction is minimised to insignificance.</p> <p><i>Direct Effect – Disturbance and Displacement</i> Following the implementation of mitigation as described above, there is no potential for the construction of the proposed scheme to result in significant effects in relation to disturbance and displacement.</p> |
| <i>Potential for Cumulative Effect</i> | As the construction of the proposed scheme will not result in any significant effects on the identified avian KERs, it cannot contribute to any cumulative effect in this regard |

Table 5.20 Potential Effects on bird species

5.5.2.3. Spread of Invasive Species

Three stands of Japanese Knotweed were identified within the footprint of the proposed scheme during the walkover surveys and one was recorded in the washlands. To prevent the species from spreading, the OPW and Mayo County Council have been pre-treating the strands since 2018 with glyphosate herbicide applied in late summer or early autumn a management strategy has been put in place to remove and treat the identified stands. This plan is included within the Environmental Method Statements and mitigation that are described in section 5.5.6.

In addition, a pre-commencement walkover survey will be undertaken to ensure that any further stands have not become established within the timeframe between publication of the EIAR and commencement of the works. Any such stands will be subject to the same management as those already identified.

The works management plan provided in Section 5.5.6 also provides details of the biosecurity measures that will be employed to ensure that there is no potential for the activity associated with the proposed works to introduce invasive species onto the site. The main measures are:

- The thorough cleaning and disinfecting of machinery and materials prior to introduction on to the site.
- The inspection of any topsoil, stone or other imported material (should this be required) to ensure that it is not contaminated with invasive species before allowing it to be brought onto the site.

5.5.3. Operational Phase Effects

5.5.3.1. Changes to flows and hydrological/hydromorphological regime in the River Deel

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 significant 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 of this EIAR 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 of the EIA. 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.

5.5.3.2. Impacts on Habitats during Operation

Impacts on Non KER Habitats During Operation

The operation of the proposed development will result in impacts on the grasslands, hedgerows and tree lines within the footprint of the development. These habitats will be the subject of ongoing maintenance in the form of mowing and trimming. The effects on these habitats are not considered significant at any geographic scale and they are not considered to be KER habitats. Many of the habitats in the benefitting lands and in the washlands comprise urban or improved agricultural lands that are of relatively low biodiversity value and unlikely to be significantly affected by the scheme. These habitats are not considered to be KERs.

Impacts on habitats surrounding the River Deel during Operation

The proposed development has the potential to impact on the habitats that surround the River Deel downstream of the proposed development in the fact that they form part of the benefitting lands and will no longer flood. Following the habitat surveys that were undertaken in these benefitting lands, the riparian woodlands that conform to Annex I Alluvial Woodland (91E0) were identified as KERs of International importance (As shown on Figure 5.5). The other benefitting lands include the town of Crossmolina and improved farmland with hedges and treelines. These habitats will not be significantly altered by the lack of flooding and are not included as KERs.

The woodlands that are located between the proposed works and the Jack Garrett Bridge, that will be included in the ongoing Moy drainage maintenance programme are also included as a KER of Local Importance (Higher Value).

The potential effects on these KERs are described and characterised in detail below.

Alluvial Woodland

The habitats within the bank full area associated with the River Deel will continue to flood as before and will not be affected by the proposed scheme. The extent of the benefitting lands has been mapped and demonstrates that the identified areas of Alluvial woodland which previously flooded in an approximate five-year return period flood will continue to do so. This is shown on Appendix 5H As such, no significant effect on these areas of alluvial woodland is anticipated as a result of the proposed scheme as they will continue to flood as previously up to approximately the 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 an 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 significantly affected by the lack of flooding from the River Deel since they are only very infrequently flooded at present (less than once every five years).

Woodlands between the proposed works and the Jack Garrett Bridge

The River Deel will be formally included within the OPW drainage maintenance programme following the construction of the scheme. Maintenance will include trimming of woody vegetation within the channel upstream of the bridge, this will require periodic maintenance to prevent, riparian trees causing a narrowing of the channel, further deposition of silt and the danger of trees becoming dislodged and swept downstream and causing obstructions (particularly of the bridge) which could cause flooding. Management of riparian trees is a standard procedure, undertaken by the OPW at numerous ecologically sensitive locations throughout the country. The works will be undertaken in accordance with the '*Drainage Maintenance and Construction Environmental Guidance*' (OPW 2019). This section of the channel is currently

maintained on an Ad Hoc basis (not by the OPW) but following confirmation of the proposed development, will be carried out in line with OPW environmental protocols and will be the subject of Ecological Impact Assessment (EclA), AA Screening or Appropriate Assessment in advance of any such works. **As such, no significant effects are predicted.**

The methods by which this work will be completed are described below:

- During the vegetation clearance works associated with the scheme (as described above). The riparian trees within the channel will be assessed and any trees that are likely to fail under flood conditions will be removed to ground level (coppiced).
- In addition, any low branches that are shown to be gathering trash or compromising river flow during high water will be removed to reduce obstruction to conveyance of water and to prevent the further deposition of silt within the river channel.
- Following preliminary inspections undertaken, it is anticipated that the majority of the trees will be retained and the overall vegetation structure will remain similar to the existing situation. There will be no significant changes to the level of shading along the channel with continued dappled shading of the channel.
- There will be no significant changes to the level of shading along the channel with continued dappled shading of the channel.
- Works will be carried out on foot using chainsaws or from the roadside using tree shears. There will be no requirement for machinery to track in the riparian area. No in-stream works as part of this maintenance works (all works will be carried out at low water).
- Ongoing maintenance of the riparian vegetation will include rotational coppicing of (mainly) Grey Willow to prevent any trees becoming sufficiently large to become unstable in a flood situation and to prevent low branches from trapping silt or slowing the conveyance of water to a large extent. This will be undertaken without the tracking of machinery in the riparian area and without the requirement for in-stream works. All cut material will be removed from the site.
- Continuous cover of riparian vegetation will be retained through rotational management and root systems will be retained to prevent soil from becoming destabilised and allow for vigorous and fast re-growth.
- Continuous cover of riparian vegetation will be retained through rotational management and root systems will be retained to prevent soil from becoming destabilised and allow for vigorous and fast re-growth.

Impacts on the Washlands during Operation

The operation of the channel will result in additional flooding of the washlands. This was a primary consideration in the design of the development and has been extensively modelled. This modelling is provided in Chapter 7 of this EIAR and its associated appendices.

There were a number of outcomes that are critical to the assessment of the potential effects on the Alluvial Woodland, Mullenmore Stream and springs, Lough Conn and Lakeshore habitats. These are described below:

Changes to the hydrological regime

- The washlands within the SAC are likely to be already flooded by the lake during operation of the flood channel given the average wintertime levels of the lake (Chapter 7 - Water). The additional flooding during high water levels 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 more significant. However, it would be short lived (less than 36 hours in a 1:100 year event and considerably shorter in more frequent events) and would not be significant in terms of the hydrological functioning of the area.

The short term flood events will not result in significant effects on the hydrological functioning of the habitats in the washlands.

Increased velocities in the Washlands

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 Appendix 5H that 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 significant scour or erosion within the SAC.

Details of the hydraulic modelling as provided in Chapter 7 of this EIAR (and shown on in Appendix 5H) identifies areas of potentially high velocity within the flood channel itself. In order to minimise this impact, an energy dissipation structure has been included in the design of the scheme and is fully described in

Chapter 3 of this EIAR. There is also potential for high flows to occur on the Mullenmore Stream around the old mill at Mullenmore (Grid Ref: E114,367, N316,487). This area will be monitored and, in the event, that the banks of the existing stream become eroded during flood events, standard bank protection measures will be implemented.

Following the implementation of mitigation in the form of an energy dissipation structure within the diversion channel and if necessary standard bank protection measures in the Mullenmore Stream such as soft engineering in the form of willow planting or the installation of Christmas trees along the bank. The requirement for such measures will be determined as part of the ongoing maintenance of the channel by the OPW. There is no potential for significant erosion or any other impacts associated with the velocity of the floodwaters within the washland habitats.

Deposition of alluvial sediments

It is not anticipated that the operation of the proposed diversion channel will result in any significant deposition of alluvial sediments or impacts in this regard. It is noted that the washlands are already flooded for long periods with deposition naturally occurring throughout as a result of the flooding from the lake.

5.5.3.3. Impacts on Species During Operation

Impacts on Aquatic Species During Operation

The proposed operation of the diversion channel has the potential to affect the aquatic species that were identified as KERs. These species include:

- Salmon (International Importance)
- Lamprey Species (International Importance)
- White Clawed Crayfish (International Importance)
- Freshwater pearl mussel (International Importance)
- Other Salmonid and Coarse Fish (Local Importance (Higher Value))
- European eel (Local Importance (Higher Value))

Impacts on these species could result in a number of ways – each is discussed below.

Changes to the hydrological/hydromorphological Regime

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 in Section 5.5.2.2 in relation to construction phase impacts, there will be no significant loss of aquatic habitat as a result of the proposed scheme. In addition, as discussed in Section 5.5.3.1, 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 within the expected variations of the normal functioning of the river. 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 in Section 5.5.3.1 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 significant 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 3A, Chapter 3). 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 Chapter 7) and the channel will run for a very short period of time (max. 36 hours). Significant numbers of 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 overspill 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.

Impacts on otter and badger during operation

It is not anticipated that the proposed scheme will result in any significant effect on either species during operation. There will be no loss or disturbance of habitat of either species. There will be no pollution of the watercourses or changes to the hydrological regime that may affect otter. The maintenance of the proposed scheme will be minor and is unlikely to result in significant disturbance to either species. There will be no restriction to the movement of otter throughout the catchment or badger throughout the diversion channel or washlands. The works associated with the extension of the River Moy drainage maintenance scheme will be minor in nature and will be undertaken in full accordance with the OPW EP 20 otter procedure and EP 23 badger procedure where appropriate, with operational staff completing walkover surveys one week in advance of the works and no works undertaken within 30m of an occupied holt or Sett (or 50m from a badger sett during the breeding season. There is no potential for the operation of the proposed scheme to result in significant effects on otter or badger.

Impacts on Birds during Operation

It is not anticipated that there will be any significant effects on birds during operation. There will be no habitat loss and very low levels of activity that could lead to disturbance. The native hedges that surround the channel will be trimmed annually. The hedge trimming will be undertaken outside the bird nesting season and will involve the use of a tractor and flail. No significant effects on the identified birds are predicted.

5.5.3.4. Effects of Maintenance

Intake and flow control Structures

The maintenance of the intake and flow control structures includes an inspection regime to ensure that there is no deterioration in the structural integrity of either structure which may occur over time and that they are functioning correctly. It is expected that the structures will be relatively maintenance free otherwise. In the unlikely event that repair works are required, any such works will be the subject of individual ecological impact assessment and Screening for Appropriate Assessment (possibly full AA depending on the nature of required works). No significant effects on any ecological receptor is predicted.

Diversion Channel

In general, the management of the bypass channel will involve the mowing of the grass within it using a tractor and mower to prevent scrub encroachment. This will be undertaken on a relatively regular basis (approx. every year) so that scrub does not start to develop. The hedge trimming will be undertaken outside the bird nesting season and will involve the use of a tractor and flail. No significant effects on the any ecological receptors are predicted.

5.5.4. Decommissioning Phase Effects

The proposed development is designed to be permanent with an indefinite lifespan and no decommissioning is proposed. As such, do decommissioning stage impacts have been identified. Any decommissioning of the development would be subject to a separate assessment.

5.5.5. Biodiversity Gain

The following measures will be put in place to promote biodiversity through the construction and operation of the proposed scheme:

- The sections of the grasslands that are not in the base of the channel and subject to high levels of erosive stress will be sown with native wildflower seed mixes that are designed to encourage pollinators. The grasslands will be managed as a hay meadow with an annual cut undertaken in late summer or early autumn and all cut material removed.
- 20 Bird and bat boxes will be erected throughout the works area for the scheme to provide nesting and roosting opportunities.
- The planting of native hedgerows will include species such as hazel and hawthorn that provide a source of food for wildlife.
- The grasslands in the diversion channel will not be fertilised or treated with any herbicide or pesticide.
- A nesting bank for kingfisher will be constructed adjacent to the River Deel in the vicinity of the flow control structure.

5.5.6. Environmental Method Statements and description of Mitigation

The methods by which the works will be undertaken are described in general below. The details of the measures that will be used to minimise impacts on the identified Key Ecological Receptors are provided in this section. These measures have been discussed with the project engineers, hydrologists and the client and the provisions of the method statements and the mitigation measures set out in them have been agreed as possible and achievable. They follow tried and tested procedures, which are known to be effective. The works have been described in terms of the following operations:

- Site Preparation and Clearance of Vegetation
- Construction of Diversion Channel
- Construction of Road Bridges, Roads and Energy Dissipation Structure
- Construction of Intake Structure
- Construction of Flow Control Structure
- Construction Compound
- Monitoring

In addition to the above, general construction and site management measures to prevent any pollution and/or adverse effects on areas outside the site are also described in this section.

5.5.6.1. Construction Methods

Site Preparation & Clearance of Vegetation

Overall, the proposed development will require the removal of approximately 1,471m of tree line and hedgerow along with a small area (0.46 ha) of recently established woodland and scrub where the intake structure is to be located and Mixed Broadleaved Woodland at the location of the Flow Control Structure.

Clearance will be undertaken on a sectional basis as work proceeds in the various areas. All clearance will have due regard to seasonal restrictions. It is anticipated that works will start with the construction of the diverted Lake Road and with a section of the diversion channel from which materials to construct the road will be excavated. Following this, the bridges and the energy dissipation structure will be constructed in tandem with the diversion channel itself. The intake structure will be constructed when the channel is completed and stabilised. The final piece of the project to be completed will be the flow control structure (though preparation for this may be undertaken in advance of its construction if weather conditions are favourable and the river dries out or is reduced to very low flow). The removal of this vegetation will be undertaken outside the bird nesting season as defined in Section 40 of the Wildlife Act 1979 as amended which runs from March 1st to August 31st.

Three small stands of Japanese Knotweed were identified within the works area. These are the subject of a management plan that is included as section five of this document. These identified strands will be fenced off and avoided during the site preparation and vegetation clearance operations.

Prior to removal of vegetation in close proximity to the River Deel and within the SAC, a silt fence will be erected by hand on the river bank to form a solid barrier between the works area and the river. There will be no requirement to remove instream trees. The requirement for these works in close proximity to the River Deel has been minimised to a length of approximately 150m at the location of the intake structure and at the location of the flow control structure with these being the only interfaces with the SAC.

Prior to construction, a dedicated otter survey will be undertaken by a suitably qualified ecologist to determine whether there is any occupied and active holt in the vicinity of the works. The status of any holt encountered 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)

Prior to the undertaking of the site clearance works a pre-construction Badger survey will be undertaken of all areas to be cleared.

Should any setts be encountered during the dedicated pre-construction badger survey (if badgers have migrated into the area since the recent dedicated surveys that have been undertaken), they will be avoided where possible by a distance of greater than 30m.

Should new setts be identified within the development footprint during the pre-construction surveys (i.e. if the abandoned sett that is within the footprint of the diversion channel is re-occupied or if additional new setts are identified), a licence will be sought to exclude the Badgers in advance of the undertaking of any construction or clearance works or to work within 30m of any such sett.

All works will be carried out in accordance with the 'Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes' (NRA 2008) and OPW EP 23 – Badger Procedure (OPW 2019)

Vegetation will be cut and chipped or removed from the site. Where roots require removal and excavation is undertaken, any unconsolidated ground will be sown with grass seed following completion to prevent erosion.

Construction of the Diversion Channel

Following the site clearance described above and the appropriate treatment of protected fauna on the site, works areas will be fenced off to prevent additional land take and the potential for additional effects. The fenced area will include all the areas required to facilitate the works such as site compounds and areas necessary for temporary works. The intake structure and flow control structure will not be included within the worksite associated with the channel and works within these areas are described separately in this document.

Construction of the channel will begin at the downstream end and will involve the removal of the overburden to create the channel. This will be undertaken in small successive sections with each being reinstated prior to commencement on the next. Reinstatement will involve replacing topsoil, levelling and sowing with grass and wild-flower seed mix on the sides and base. A seed mix that is specifically designed for use in calcareous soils will be used. An example of a potentially suitable wild flower seed mix is the Esker Ridge/Burren Wildflower Seed Mixture EC08 available from Design by Nature (<http://www.wildflowers.ie>)

All materials to be removed from the site will be taken to an authorised waste or recovery facility via the public road network and in sealed vehicles.

Whilst no significant watercourses were identified along the route of the channel, there are a number of drainage channels within the fields (many of which are dry and none that regularly carry a significant flow). The ecological clerk of works will identify any areas where there is any potential for run off of pollutants to the washlands and any potential pathways will be blocked with silt fencing and/or check dams. As shown on Plate 5.16 below.

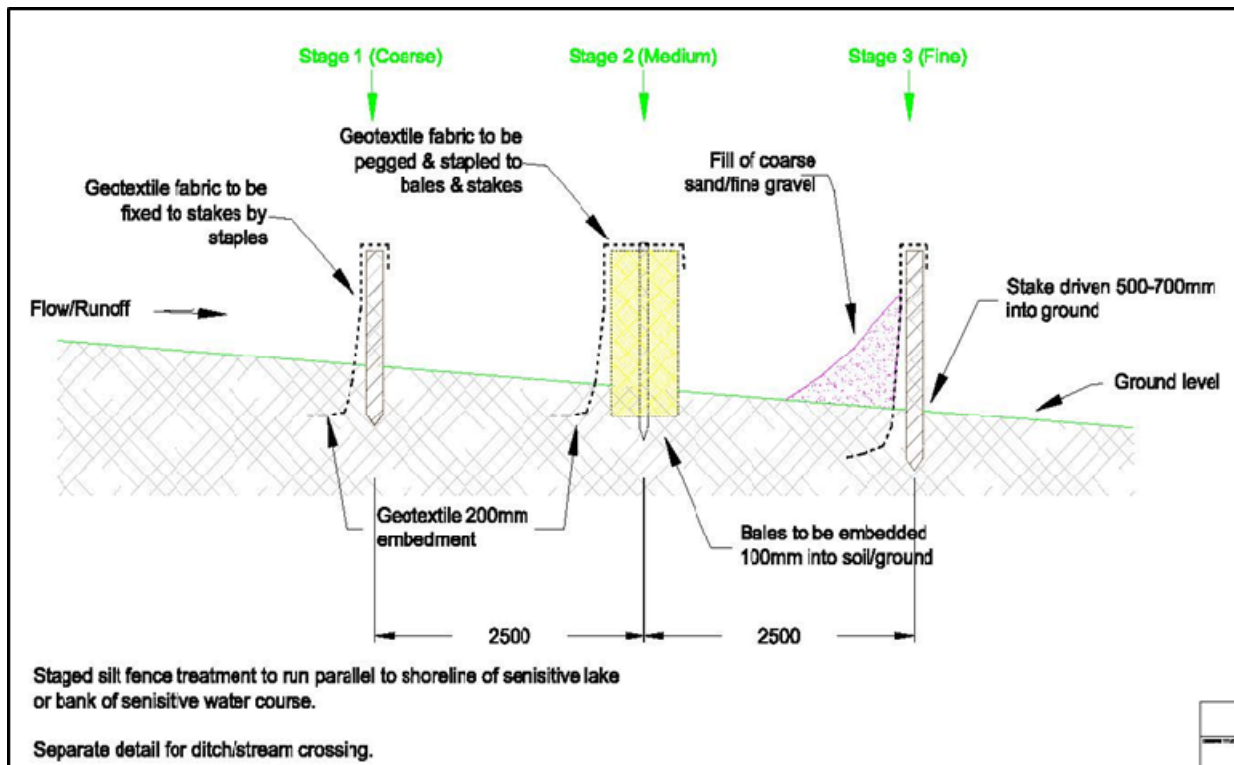


Plate 5.16. Silt Fence Detail

No significant accumulation of water within the excavations is anticipated following detailed site investigations. In addition, the OPW will manage the site to ensure that ingress of waters to the works area is minimised and that any clean waters are prevented from entering where possible and discharged to ground as described below. However, if there is the requirement to dewater any excavations, waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag and into a discharge point. The discharge point will consist of a circle of triple silt fences (diameter approx. 20m). In the centre of this will be a circle of straw bales wrapped in Terram. All waters will be discharged to this location through a silt sock (Silt bag). Waters will filter through the silt sock, straw bales and silt fences before diffusely discharging to ground. As shown on Plate 5.16.

This discharge points will be constructed prior to the commencement of construction works. The discharge points will move as required with the progression of the works. The discharge point will be monitored and checked on a daily basis (when in use) to ensure that it is in good working order and is effective in preventing the release of any potentially polluting material to any sensitive habitat or to result in any erosion on the site.

It will be necessary to store topsoil on the site in order to reinstate the channel. All storage will be undertaken within the identified works area including the site compounds. The amount stored at any one time will be minimised by completing the channel on a sectional basis with each section being completed before proceeding to the next. Topsoil storage areas will be defined and fenced off with silt fencing to prevent run off. It is likely that storage areas will move as the channel progresses towards the River Deel.

A sonde will be placed in the Mullenmore springs and stream and turbidity will be continually monitored to ensure that there is no effect of the proposed works on this watercourse.

Construction of the Road Bridges, Roads and the Energy Dissipation Structure

The proposed flood relief scheme will involve the construction of two road bridges, a section of realigned local access road at the eastern end of the scheme and an energy dissipation structure. All these works are located within the identified works area and are not proposed in close proximity to the River Deel, Mullenmore Springs, Lough Conn or any other sensitive ecological receptor. These works will be fenced off from the wider area and subject to the same silt and pollution control measures as discussed in relation to the construction of the channel. The Ecological Clerk of Works will be responsible for monitoring the site set up and pollution control measures. No works are proposed in close proximity to significant watercourses and no pathway for effects on the River Deel is identified. The Invasive species management plan (As described below) will be implemented in advance of commencement of works associated with these elements of the scheme. The works will involve use of concrete and other potentially polluting materials. The general construction measures as described below, will be implemented in full during these works.

Construction of the Intake Structure

This will involve the construction of a new reinforced concrete intake structure and spillway on the banks of the River Deel at the upstream end of the abovementioned grass lined channel.

The entire boundary between the working area and the River Deel will be fenced off with a triple silt fence as shown in Plate 5.16. In addition to this, a solid wall of double walled one tonne sand bags, filled with soil will be constructed inside the silt fences to create a solid barrier between the works area and the river (and SAC). The bags will be filled away from the river and transported to the site.

All works will be undertaken entirely within the confines of the works area as described above. Topsoil will be stripped as necessary to prepare the foundations. It will be either stockpiled for re-use within the confines of the works area or removed from the site and stored for re-use within the dedicated site compound at a location that is over 30metres from any watercourse and is adequately protected with silt fences. Where soil is to be stored over a calendar month, it will be sown with grass seed to prevent any windblow or water erosion and subsequent run-off. Where it is not required for re-use, it will be removed to an authorised waste facility.

Following detailed site investigations, the requirement for rock breaking to be undertaken is not anticipated.

The invasive species, Japanese knotweed has been identified from three locations within the works area (as shown below) and has been the subject of ongoing treatment for the last two years. These stands of knotweed will be managed as per the invasive species management plan below to avoid its spread.

Following soil removal, formworks and steel for the structure will be constructed ensuring that all works are located within the defined works area that is protected from run off by the solid barrier described above. Formwork will be of solid construction and will be sealed to prevent any leakage of concrete during pouring operations.

Whilst no significant excavations are proposed, should any ingress of water (ground or rain) require pumping out prior to the pouring of concrete, this will be pumped from the site of the intake structure and discharged to a discharge point within the diversion channel as described in the preceding sections.

The weather forecast will be checked prior to the pouring of the concrete and no such works will be undertaken when bad weather is forecast. Works will be planned/programmed to avoid water levels that may cause inundation of the works area and any works at any time when water levels that may cause inundation of the works area will be avoided. Concrete will not be poured at times when heavy rain is predicted as this may lead to run off and over spillage of the form work.

Form work will be constructed with an adequate capacity and additional freeboard to prevent any spillage.

Alarmed Sondes will be placed in the river and will measure turbidity upstream and downstream of the works area. If there is a 20% difference in levels of turbidity between the upstream and downstream sondes, all works will cease until the source is identified and the problem rectified (if it is found to be associated with the proposed works).

Concrete trucks and other construction vehicles will work entirely from hard standing areas to avoid the generation of mud within the works area. Temporary hard standing will be made of clean stone behind the proposed wall location (landward side) and all machinery will work from this area.

Concrete trucks will not be washed out at the site of the proposed works. If chutes require wash out, this will be undertaken at a designated wash out tank located in the site compound. This will recycle waters within the tank.

Stone gabions will be placed at the upstream and downstream ends of the intake structure and the soil will be placed on the top of these. Taller native vegetation such as Hazel and Hawthorn will be planted in these drier areas.

All bankside works will be undertaken at times of low water and good weather, when there is no potential for the works area to become inundated with flood water.

There will be no storage of materials, machinery or soil in areas that are susceptible to flooding.

Construction of the Flow Control Structure

The terrestrial works area will be set up in advance of any instream works. The minimum area necessary to complete the works will be fenced off and all interfaces with the River Deel and SAC will be fenced off with triple layered silt fencing whilst the terrestrial working areas are excavated as necessary and surfaced with clean stone.

All terrestrial works will be undertaken at times of low water and good weather, when there is no potential for the works area to become inundated with flood water or for significant amounts of surface water to accumulate on the site or to run off.

Following site preparation on the banks, the instream works will be undertaken outside the sensitive period for spawning fish in the River Deel (October to June inclusive) or preferably in a period when there is no flow in the river.

Whilst it is intended to set up the instream works areas during periods when there is no flow in the river, should this not be possible, they will be set up when there is low flow in the river.

Prior to commencement, the section of the river-bed within the works area will be the subject of surveys for the following protected species:

White clawed crayfish – which, if present, will be translocated to areas upstream under licence from the NPWS.

Freshwater pearl mussel – which are not currently present in this section of the channel – but could potentially be washed in between completion of this EIAR and commencement of construction.

Following these surveys, an instream works area will be created by lifting 1 tonne bags of sand into the river to create a horseshoe shaped cofferdam that encloses no more than half the river at any one time – allowing passage of fish etc to continue (if the river is not dry). The sand bags will be double bagged, with the inner bag being sealed.

Whilst it is proposed to carry out these works in a period when the river is dry, if it is undertaken at low water, the cofferdammed area will be electro-fished under licence from the IFI prior to dewatering.

If dewatering is required, a submersible pump will be used to pump waters to land at a distance of over 30m from the River Deel. At this point, it will be discharged to ground via a silt bag and to a constructed discharge point as described above (and shown on Plate 5.16).

The gravels, cobbles and boulders from the riverbed will be removed from the instream works area as required and stored within the terrestrial works area.

The base for the culverts will be constructed with all the same best practice requirements for the use of concrete as described above and adhered to.

The centre culverts will be installed at a level below the existing bed of the river and the gravels and cobbles replaced and reinstated.

The culverts installed in the initial phase of the works will be set at a lower invert than the subsequent phase (second half of the river). This will allow any flows that may be in the river at the time of the works to be directed through the recently constructed culvert, whilst the second half of the river is cofferdammed and the culverts installed in that section.

Wing walls will be constructed on the banks at either side of the culverts. These will either be constructed of reinforced concrete or sheet piles.

The terrestrial works area will then be reinstated by re-seeding with native grass seed and the planting of native tree species including grey willow and alder on the banksides and hazel on the areas that are higher up the bank.

In order to take advantage of periods when the river runs dry in advance of completion of the diversion channel, it may be beneficial to complete the base for the flow control structure. If this is the case, the procedure as outlined above will be followed, the in-channel excavations undertaken and the gravels and cobbles replaced. This will minimise the works that will be required during a later construction and has the potential to take full advantage of periods when the river runs dry.

During all works, the same pollution prevention measures and monitoring of turbidity within the river with sondes as described above in relation to the intake structure, will be undertaken.

Construction Compound

The proposed works will require a number of site compounds throughout the construction phases. Any compounds will be located within the identified works area but may move to accommodate different elements of the works. All compound locations will meet the following requirements:

The compound will be surfaced with a hard standing to prevent the un-necessary generation of mud.

A silt fence will be erected on all sides to prevent any run off from the perimeter.

The compound will be adequately buffered from the River Deel (and River Moy SAC) to prevent any run off of surface waters to any sensitive environment.

All materials stored within the compound will be appropriately covered and stored to avoid run-off or pollution. There will be no storage of materials outside the confines of the defined storage compound.

The site compound will be located in an area that is not susceptible to flooding.

Monitoring

The construction works will be monitored at several levels of seniority as described below to ensure that the environmental best practice prescribed in this document is fully adhered to and is effective. The following system will be put in place to ensure compliance.

The contractor will assign a member of the site staff as the environmental officer with the responsibility for ensuring the environmental measures prescribed in this document are adhered to.

All operatives working on the site will be made fully aware of the environmental responsibilities, conditions and requirements along with a full description of the methods to be employed. This information will be imparted at a dedicated site induction prior to commencing work on the site.

A checklist will be filled in on a weekly basis to show how the measures above have been complied with. Any environmental incidents or non-compliance issues will immediately be reported to the project team and that the project team will take corrective action if necessary.

The construction management team will be regularly monitoring the works and will be fully briefed and aware of the environmental constraints and protection measures to be employed.

Whilst the works to construct the channel will be ongoing over a long period and will involve only works a relatively small area at any one time, the site will be visited by a suitably qualified ecologist (ECoW) on a weekly basis. An audit of the works will be undertaken during these weekly visits and it will be ensured that the prescribed methods are employed. Any potential impacts additional to those predicted will be highlighted and if necessary, additional measures put in place to prevent them. Any deviance from the agreed methodology will be highlighted and if necessary rectified.

Sondes will be put in place in the River Deel upstream and downstream of the works area and also in the Mullenmore Stream. These will continuously measure turbidity from the time that the scheme is confirmed and will gather baseline data from the river prior to any works commencing. They will continuously measure turbidity throughout the construction period. If there is a 20% or greater difference between upstream and downstream turbidity, an alarm will sound and a message will be sent to the site foreman and the ECoW. Works will be ceased until the cause of the difference is identified and (if it is associated with the works) rectified

The works associated with the construction of the flow control structure and site set up for the intake structure will require full time, on-site supervision from the ECoW. The other elements of the works will be overseen by the ECoW but will involve regular inspections and audits throughout the construction phase.

The ECoW will be responsible for:

- Ensuring that the works are carried out in accordance with the approved method statements.
- Highlighting and discussing any deviance from the agreed plan. Deviances will be agreed with the relevant authorities and the project team in advance of adoption.
- Taking water samples and turbidity readings as appropriate. Discussing works and preparations with the site staff to ensure that works can be completed as per agreed method statements.
- Stop works if there are any significant effects on the River Deel as a result of pollution or changes to the flow or danger of inundation of the works area.

Auditing

Environmental audits will be carried out during the construction phase of the project. In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the OPW. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the OCEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

Environmental Compliance.

The following definitions shall apply in relation to the classification of Environmental Occurrences during construction:

- **Environmental Near Miss:** An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.
- **Environmental Incident:** Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.
- **Environmental Exceedance Event:** An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded. An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary. Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.
- **Environmental Non-Compliance:** Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Construction Manager, as advised by the Site ECoW. Corrective actions may be required as a result of the following:

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Construction Manager and the ECoW will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

Construction Phase Plan Review

The Outline CEMP will be updated and reviewed prior to commencement of construction, and also every six months thereafter during the construction phase of the project.

5.5.6.2. Emergency Response Plan

An Emergency Response Plan (ERP) is presented in this section. It provides details of procedures to be adopted in the event of an emergency in terms of environmental protection.

Emergency Response

The Emergency Response Plan (ERP) provides details of procedures to be adopted in the event of an environmental emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require a weekly review and may require updating and submissions from the contractor/PSCS and suppliers as the project progresses. If sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this document.

Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager will lead the emergency response which makes them responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Plate 5.17. In a situation where the Site Manager is unavailable, the responsibility will be transferred to the next person

in the chain of command outlined in Plate 5.17. This will be updated throughout the various stages of the project.

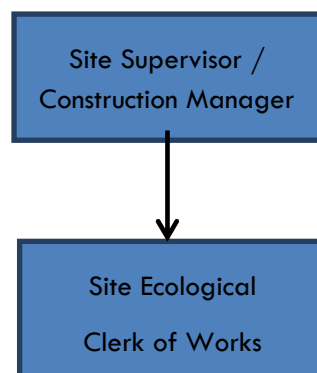


Plate 5.17 Emergency Response Procedure Chain of Command

Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the proposed project. Oil/Fuel spillages are one of the main environmental risks that will exist at the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident.

- Immediately notify the ECoW immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- Simultaneously, stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- The ECoW will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The ECoW will notify the appropriate regulatory body such as OPW, Mayo County Council.

- Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.
- The ECoW must be immediately notified.
- If necessary, the ECoW will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (SPA or SAC), the ECoW will liaise with the Project Ecologist.
- A record of all environmental incidents will be kept on file by the ECoW and the Main Contractor. These records will be made available to the relevant authorities such as the OPW or Mayo County Council.
- The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

Flood Response Measures

- The ECoW and site staff will monitor the weather forecasts on a daily basis.
- The works will be undertaken at a time of year when flooding is least likely to occur – based on available data.
- If a heavy rainfall event is forecasted by Met Eireann within the River Deel catchment area, that may result in a flow of higher than the Q50 at the site of the proposed development, the works shall be ceased.
- All machinery and materials will be removed from the site in advance of any flood event.
- No potentially polluting works will be undertaken in areas that are liable to flooding during periods of high rainfall or high water levels. The sand bag dam will also be removed from the river in advance of any potential flood and replaced following any flood event.

5.5.6.3. General Construction Site Environmental Management

The following measures will be employed during the construction process to prevent the occurrence of negative impacts on the environment occurring as a result of the proposed works

General Site Maintenance

- All construction activity and storage associated with the main phases of development will take place within the defined site areas and construction compound as described above.
- There will be no storage of materials or construction activity outside the confines of the defined storage compound.
- All substances and materials used in construction will be stored in a suitable storage compound within the construction site. Where necessary materials will be covered and banded.
- The construction site will be kept free from litter and debris. It will be cleared daily with any detritus removed to skips that separate all recyclable and waste materials.

- All trucks leaving the site will be checked to ensure that they have clean wheels and if the site becomes dirty with trucks fouling the access road, a wheel wash will be installed to prevent this.
- Dust prevention measures will be put in place as necessary throughout the site. These will include the use of dampening sprays, covering of dusty areas with stone and covering of stored loose material.
- No works will be undertaken between 6pm and 8am to minimise the potential for disturbance to fauna.

No artificial lighting will be required in the works areas close to the River Deel or any other areas of ecological sensitivity. It may be required within the construction compound but will not be focused onto any areas of ecological sensitivity.

Hydrocarbon Usage

The use of plant and machinery on the construction site creates the potential for hydrocarbon pollutants to issue from the site and contaminate the wider environment. The following measures will be put in place to avoid the occurrence of any adverse impacts resulting from the use of hydrocarbons on the site.

- All plant and machinery will be kept in good condition and checked regularly for oil/fuel leaks.
- It is unlikely that large volumes of fuel will be stored on the site but any storage bowzers will be adequately banded or double skinned and kept in secure areas within the site.
- Refuelling will take place in a defined refuelling location and a drip tray will be used on all occasions.
- Vehicles will never be left unattended during refuelling operations.
- All hoses, nozzles, valves will be locked into the off position when not in use
- A hydrocarbon spill kit will be on site at all times for use in the case of emergency. This will include absorbent pads, oil containment booms and other items for the clean-up and containment of spills.
- A plan will be in place for dealing with spillage events.

Waste Disposal

The works on the site will result in the production of construction waste material. This could lead to pollution of the environment if removed to a location that could impact on ecologically sensitive habitats.

- Any waste material arising will be removed to a permitted waste facility.
-

5.5.6.4. Operation and Maintenance

Intake and Flow Control Structure

Operational requirements of the intake structure and flow control structure include an inspection regime to ensure that there is no deterioration in their structural integrity or operational function, which may occur

over time and that the adjustable element is functioning correctly. It is expected that the structures will be relatively maintenance free otherwise. In the unlikely event that repair works are required, any such works will be the subject of individual ecological impact assessment and Screening for Appropriate Assessment (possibly full AA depending on the nature of required works).

There will be the requirement to remove deposited material from the river channel between the intake structure and the flow control structure on a periodic basis. This will be undertaken using an excavator to remove any accumulated gravels. All works will be undertaken during periods when there is no flow in the River Deel. Any gravel deposits will be topped so as not to result in any effect on low or normal flows within the river. A low flow channel will always be retained. Any gravels that require removal, will be made available to the IFI for fisheries enhancement works elsewhere within the River Deel and will be stored on the site for this purpose. Any works carried out by the IFI using these gravels will be the subject of their own separate ecological and environmental assessments. No works within the wetted channel of the River Deel will be necessary.

The bankside vegetation adjacent to the intake weir will be maintained at a low level. This will be undertaken using a strimmer on a periodic basis. No in-stream works will be required.

Bypass Channel

In general, the management of the bypass channel will involve the mowing of the grass within it using a tractor and mower to prevent scrub encroachment. The scheme requires that this will be undertaken on an annual basis so that scrub does not start to develop within the channel. The native hedges that surround the channel will also be trimmed. The hedge trimming will be undertaken outside the bird nesting season and will involve the use of a tractor and flail.

The diversion channel will be sown with a wild flower/pollinator friendly seed mix in all areas except the very base of the channel where, the erosive forces may require a tough, resistant sward. The grass will be cut in September of each year, and if necessary, in March. All cut material will be removed from the site (as hay). No fertiliser will be applied to the grasslands within the diversion channel. An example of a potentially suitable wild flower seed mix is the Esker Ridge/Burren Wildflower Seed Mixture EC08 available from Design by Nature (<http://www.wildflowers.ie>)

The following specific measures will be employed:

- Cutting will not take place before characteristic annual, biennial or short-lived perennial plant species which depend on seed production have set seed (for example yellow rattle (*Rhinanthus minor*). Sustained early hay cutting is known to reduce species richness in meadows (Smith 1994).

For this reason, cutting will be undertaken in August of each year. This will also maintain their nature conservation value while also maintaining reasonable crop yields.

- Ensure an occasional late hay cut (late August/September) (e.g. 1 year in 5), where practical. This will promote late-flowering species such as devil's bit scabious (*Succisa pratensis*) (Crofts, and Jefferson, (eds), 2009).
- Late cutting of grassland will also benefit ground nesting bird species such as meadow pipit or skylark.
- Discourage machinery access to grassland when ground conditions are wet, otherwise rutting will occur which will damage the sward and create areas which could be invaded by undesirable species.
- Ensure hay bales are removed from the field within three-four weeks to avoid sward damage. Smaller bales coupled with lighter machinery are also preferable to avoid soil compaction (Crofts, and Jefferson, (eds), 2009). The removal of vegetation off the grassland will also help to impoverish the soil/ reduce nutrients and thereby suppress competitive grass species and enhance floral diversity.
- Grass cut each year will always be removed and not left to decay on site. Where vegetation is left on site, changes in the botanical composition of the grassland may ensue. Excess vegetation left on site may also suppress low growing species and reduce species-richness.
- There will be no use of herbicides or artificial fertilisers during the management of the meadow.

Maintenance of River Deel

The River Deel is currently included within the River Moy Drainage Maintenance Scheme from Lough Conn to the Jack Garrett Bridge in Crossmolina. It is currently managed by the OPW over this reach. Following the construction of the proposed scheme, the reach of the River Deel from between the Jack Garrett Bridge and just upstream of the proposed intake structure will be included within the River Moy Maintenance region. The OPW will manage the vegetation along this section of the river, following the construction of the proposed scheme to ensure that the current condition of the channel is retained.

Maintenance will involve periodic trimming of woody vegetation at the edges of the channel upstream of the bridge. This is designed to prevent riparian trees causing a narrowing of the channel, further deposition of silt and the danger of trees becoming dislodged and swept downstream and causing obstructions (particularly of the Jack Garrett Bridge) which could cause flooding. Management of riparian trees is a standard procedure, undertaken by the OPW at numerous ecologically sensitive locations throughout the country. This section of the channel is currently maintained on an Ad Hoc basis (not by the OPW). However, following confirmation of the scheme, this will be carried out in line with OPW environmental protocols and will be the subject of AA Screening in advance of any such works.

The methods by which this work will be completed are described below:

- During the vegetation clearance works associated with the scheme (as described above). The riparian trees within the channel will be assessed and any trees that are likely to fail under flood conditions will be removed to ground level (coppiced).

In addition, any low branches that are shown to be gathering trash or compromising river flow during high water will be removed to reduce obstruction to conveyance of water and to prevent the further deposition of silt within the river channel. Following preliminary inspections undertaken, it is anticipated that the majority of the trees will be retained and the overall vegetation structure will remain similar to the existing situation.

- There will be no significant changes to the level of shading along the channel with continued dappled shading of the channel.
- Works will be carried out on foot using chainsaws or from the roadside using tree shears. There will be no requirement for machinery to track in the riparian area. No in-stream works as part of this maintenance works (all works will be carried out at low water).
- Ongoing maintenance of the riparian vegetation will include rotational coppicing of (mainly) Grey Willow to prevent any trees becoming sufficiently large to become unstable in a flood situation and to prevent low branches from trapping silt or slowing the conveyance of water to a large extent. This will be undertaken without the tracking of machinery in the riparian area and without the requirement for in-stream works. All cut material will be removed from the site.
- Continuous cover of riparian vegetation will be retained through rotational management and root systems will be retained to prevent soil from becoming destabilised and allow for vigorous and fast re-growth.

5.5.6.5. Invasive Species Management Plan

The invasive alien species, Japanese Knotweed (*Fallopia japonica*) was identified on the site of the proposed flood defence scheme. Three small strands were recorded within the footprint of the proposed works. Two are located close to the proposed bridge over the R315 (Grid Ref: E 114073, N 316814 and E 113984, N 316796). These measured approximately (13sqm. and 7sqm.). The third area is located in the vicinity of the intake structure (Grid Ref: E 114073, N 316814). All stands are shown on Figure 5.8. No other invasive species were recorded within the works area although a stand was recorded in the washlands at Grid Ref E 114338, N 316530, but will not be affected by the proposed works.

There follows a comprehensive plan for the treatment of this species within and surrounding the site of the proposed works in accordance with guidelines set out in the 'the Irish Water guidelines, (Irish Water Report, Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability) . These are hereafter referred to as 'the guidelines'

- A Pre-construction invasive species survey will be undertaken at the site of the proposed flood relief scheme.