

### 3.4 ECOLOGY

This ecological constraints assessment has been carried out to provide decision makers with clear and concise information on the international, national, regional and local ecological issues that must be taken into account when planning and designing the River Deel (Crossmolina) Flood Relief Scheme.

This section will provide the main ecological issues and constraints that could significantly affect the design of the scheme, delay progress or influence the costs.

The findings of this section will feed into further stages of the proposed scheme such as the Environmental Impact Assessment.

#### 3.4.1 Methodology

The methodology followed in completing this section of the report consisted of desktop research, field research and consultation with a number of governmental and non-governmental bodies. Consultation was held with the following bodies:

- National Parks and Wildlife Service (NPWS),
- Development Applications Unit of Department of Arts, Heritage and the Gaeltacht,
- Environment Protection Agency,
- Bat Conservation Ireland (Dr. Tina Aughey),
- An Taisce,
- Irish Peatland Conservation Council,
- Mayo County Council,
- BirdWatch Ireland;
- Irish Wildlife Trust,
- Lough Conn and Lough Cullin Anglers,
- Crossmolina Fishing Club,
- Crossmolina Tidy Towns,
- Bord na Móna,
- Coillte Teoranta
- Salmon Research Agency,
- Earthwatch (Friends of the Earth Ireland),
- Inland Fisheries Ireland,
- Waterways Ireland,

- Western River Basin District Office,
- Voice of Concern of the Irish Environment.

The following sources were also used in the compilation of this section of the constraints report:

- 1:50,000 scale Discovery series mapping;
- 1:10,560 OS Maps of the study area
- Aerial photography of the Study Area
- NPWS site synopses and database of information on designated sites and records of protected species.
- *New Atlas of the British & Irish Flora* (Preston *et al.*, 2002)
- *The Atlas of Breeding Birds in Britain and Ireland*' (Sharrock, 1976), *'The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991'* (Gibbons *et al.*, 1993) and *'The Atlas of Wintering Birds in Britain and Ireland'* (Lack, 1986)
- The EPA website <http://www.epa.ie/rivermap/data>
- The Water Framework Directive website [www.WFD.ie](http://www.WFD.ie)

The Study Area was also visited on the 24<sup>th</sup> October 2012 and a targeted walkover survey was undertaken to verify details on the ground.

During this visit, the general habitat types within the Study Area, in particular along the course of the River Deel, were observed and photographed. The purpose of this was to observe the habitats in the area first hand and to a certain extent to ground truth the findings of the desk study that is detailed in Section 3.4.2 below. No detailed floral or faunal surveys were carried out during this visit.

### 3.4.1. Desk study

#### 3.4.2.1 Designated Areas

With the introduction of the EU Habitats Directive (92/43/EEC) which was transposed into Irish law as the Natural Habitats Regulations, 1997, the European Union formally recognised the significance of protecting rare and endangered species of flora and fauna, and also, more importantly, their habitats. Member states were directed to provide lists of sites for designation.

#### Natural Heritage Areas

Natural Heritage Areas (NHAs) are heritage sites that were designated for the protection of flora, fauna, habitats and geological sites of **national** importance. Management of NHAs is guided by planning policy and the Wildlife (Amendment) Act 2000. It was from these NHAs that the most important sites were selected for international designation as SACs and SPAs.

### Special Areas of Conservation and Special Protection Areas

There are two types of EU site designation, the Special Area of Conservation (SAC) and the Special Protection Area (SPA). SACs are designated for the conservation of flora, fauna and habitats of European importance and SPAs for the conservation of bird species and habitats of European importance. These sites form part of “*Natura 2000*” a network of protected areas throughout the European Union.

Annex I of the Habitats Directive lists certain habitats that must be given protection. Certain habitats are deemed ‘priority’ and have greater protection. Irish habitats include raised bogs, active blanket bogs, turloughs, heaths, lakes and rivers. Annex II of the Directive lists species whose habitats must be protected and includes Lesser Horseshoe Bat, Otter, Salmon and White-clawed Crayfish.

#### 3.4.1.1 Designated Sites in the Vicinity of the Study Area

The National Parks and Wildlife Service publish synopses of the information regarding areas designated for conservation. Figure 3.4.1 in Appendix C shows all designated sites within 15 kilometres of the Study Area in addition to Conservation Objectives for nearest Natura 2000 sites.

#### Natura 2000 sites

The nearest Natura 2000 sites (SAC’s or SPA’s) are:

- River Moy cSAC (Site Code:002298)
- Lough Conn and Lough Cullin SPA/pNHA (Site Code: 004228)

The entirety of the Deel River within the Study Area is included within the River Moy cSAC, as is Lough Conn, into which the Deel River debouches. In addition, Lough Conn is also designated as part of the Lough Conn and Lough Cullin SPA/pNHA.

The River Moy cSAC comprises almost the entire freshwater element of the Moy and its tributaries including both Loughs Conn and Cullin. The site is a candidate SAC selected for alluvial wet woodlands and raised bog, both priority habitats on Annex I of the E.U. Habitats Directive. The site is also a candidate SAC selected for old oak woodlands, alkaline fens, degraded raised bog and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Atlantic Salmon, Otter, Sea and Brook Lamprey and White-clawed Crayfish. The site supports populations of several species listed on Annex II of the EU Habitats Directive, and habitats listed on Annex I of this directive, as well as

examples of other important habitats. The presence of a fine example of broad-leaved woodland in this part of the country increases the overall habitat diversity and adds to the ecological value of the site as does the presence of the range of nationally rare and Red Data Book plant and animal species.

The qualifying interests of the River Moy cSAC include the following Annex I habitats and Annex II species:

- [1092] White-clawed Crayfish (*Austropotamobius pallipes*)
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1096] Brook Lamprey (*Lampetra planeri*)
- [1106] Atlantic Salmon (*Salmo salar*) (only in fresh water)
- [1355] Otter (*Lutra lutra*)
- \* [7110] Active raised bogs
- [7120] Degraded raised bogs still capable of natural regeneration
- [7150] Depressions on peat substrates of the Rhynchosporion
- [7230] Alkaline fens
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- \*[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

The conservation objective of the River Moy cSAC is to maintain or restore the favourable conservation condition of the Annex I habitats and the Annex II species for which the SAC has been selected, as listed above.

Lough Conn and Lough Cullin are situated in north Co. Mayo and are connected by a narrow inlet near Pontoon. The main inflowing rivers to Lough Conn are the Deel, the Addergoole and the Castlehill while the main outflowing river from Lough Cullin is the River Moy. The lakes have a number of small islands. Fringing swamp vegetation occurs in some sheltered areas. Both Lough Conn and Lough Cullin are part of an important salmonid fishery. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greenland White-fronted Goose, Tufted Duck, Common Scoter and Common Gull. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. Lough Conn and Lough Cullin is one of only four areas in the country where Common

Scoter breed. The site also supports a good diversity of wintering waterfowl species, including Greenland White-fronted Goose and a nationally important population of Tufted Duck. The occurrence of Greenland White-fronted Goose, Whooper Swan and Golden Plover is of note as these species are listed on Annex I of the E.U. Birds Directive.

The conservation objective of the SPA is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- Tufted Duck (*Aythya fuligula*) [wintering]
- Common Scoter (*Melanitta nigra*) [breeding]
- Common Gull (*Larus canus*) [breeding]
- Greenland White-fronted Goose (*Anser albifrons flavirostris*) [wintering]
- Wetlands

Other Natura 2000 sites within or partially within a 15 kilometre radius of the Study Area boundary are listed below:

- Bellacorick Bog cSAC/pNHA (Site Code: 001922)
- Bellacorick Iron Flush cSAC/pNHA (Site Code: 000466)
- Lough Dahybaun SAC (Site Code: 002177)
- Killala Bay/Moy Estuary SAC/pNHA (Site Code: 000458)
- Killala Bay/Moy Estuary SPA (Site Code: 004036)
- Newport River SAC (Site Code: 002144)
- Owenduff/Nephin Complex SAC (Site Code: 000534)
- Lough Hoe Bog pNHA/SAC (Site Code: 000633)

These Natura 2000 sites are all either upstream of the Deel River or in a different catchment from the Deel River and therefore are unlikely to be directly affected by the project. However it should be noted that water levels within Natura 2000 sites such as the Bellacorick Bog Complex SAC, upstream of the Deel River and within the same catchment, could conceivably be affected by major drainage works downstream, and this should be considered as a constraint of the project.

Negative impacts on fish stocks could impact on the River Moy cSAC in a number of ways. Salmon (*Salmo Salar*) are a species protected under Annex II of the EU Habitats Directive

and secondly salmonid fish play a vital part in the lifecycle of Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species, which although not designated as a qualifying interest of the River Moy cSAC, is known to be present within the Deel River.

### Other Designated Sites

There are no pNHAs or NHAs within the Study Area apart from Lough Conn and Lough Cullin pNHA, which is discussed above as it is also designated as a SPA. However, a number of pNHAs and NHAs are also located within a 15 kilometre radius of the Study Area boundary, apart from those, which are also designated as Natura 2000 sites:

- Ummerantarry Bog NHA (Site Code: 001570)
- Forrew Bog NHA (Site Code: 002432)
- Cunnagher More Bog NHA (Site Code: 002420)
- Croaghmoyle Mountain NHA (Site Code: 002383)
- Lough Alick pNHA (Site Code: 001527)
- Moy Valley pNHA (Site Code: 002078)
- Altaconey Bog pNHA (Site Code: 000459)
- Drumleen Lough pNHA (Site Code: 001499)
- Killala Esker pNHA (Site Code: 001517)
- Cloonagh Lough (Mayo) pNHA (Site Code: 001485)

#### 3.4.1.2 New Flora Atlas

A search was made in the New Atlas of the British & Irish Flora (Preston et al., 2002) to find which rare or unusual plant species had been recorded in the 10km squares in which the study area is situated, (G01, G11 and G12) during the 1987-1999 atlas survey. One species protected under the Flora (Protection) Order (FPO) (S.I. No. 94/1999) was found in G11: Great Burnet (*Sanguisorba officinalis*). This species is found on lake shores in Mayo (Lough Conn and Lough Cullin) and on dry banks in Down (Donaghadee) and Antrim (Carnlough). No protected species were recorded in the other two 10km squares within the study area during the most recent survey period (1987-1999). Yellow Marsh Saxifrage (*Saxifraga hirculus*) was found in the 10km square, G01, during pre-1970 surveys but was not recorded in subsequent surveys. This species is very rare and is currently found in wet bog habitat at only seven documented sites, all situated in Mayo.

### 3.4.1.3 Bird Atlases

'The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991' (Gibbons et al., 1993) and 'The Atlas of Wintering Birds in Britain and Ireland' (Lack, 1986) were consulted for information regarding the distribution of birds in Ireland. However, it should be remembered that, for some species at least, more recent work has been carried out.

These atlases show data for breeding and wintering birds respectively in individual 10 km by 10 km squares. Table 3.4.1 shows those species found in the relevant 10 km squares, G01, G11 and G12, that are recorded in the Breeding Birds Atlases and are also protected under the EU Birds Directive or mentioned on the Birds of Conservation Concern in Ireland (BoCCI) red list. Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the BoCCI Red List meet one or more of the following criteria:

- Their breeding population or range has declined by more than 50% in the last 25 years
- Their breeding population has undergone significant decline since 1900
- They are of global conservation concern

Common Name	Scientific Name	Breeding Atlas 88-91			Annex I	BoCCI red list
		G01	G11	G12		
Common Scoter	<i>Melanitta nigra</i>	-	Conf	-	No	Yes
Peregrine*	<i>Falco peregrinus</i>	Conf	Conf	Conf	Yes	No
Corncrake	<i>Crex crex</i>	Pres	Conf	Pres	Yes	No
Lapwing	<i>Vanellus vanellus</i>	Conf	Conf	-	No	Yes
Curlew	<i>Numenius arquata</i>	-	Conf	Conf	No	Yes
Redshank	<i>Tringa totanus</i>	-	Conf	-	No	Yes
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	-	Conf	-	No	Yes
Common Tern	<i>Sterna hirundo</i>	-	Conf	-	Yes	No
Arctic Tern	<i>Sterna paradisaea</i>	-	Conf	-	Yes	No
Yellowhammer	<i>Emberiza citrinella</i>				No	Yes

**Table 3.4.1 Breeding Bird Atlas Data (G01, G11, G12)**

- Indicates the bird was not recorded

\* All records from the Republic of Ireland are centralised within 50 km squares

Conf Confirmed breeding

Pres Present, no breeding evidence

Four species listed in Annex I of the EU Birds Directive have been recorded as breeding within the relevant 10km squares, in the Atlas of Breeding Birds namely Peregrine, Corncrake, Common Tern and Arctic Tern. Peregrine require cliffs and rocky crags as

nesting sites and therefore are unlikely to be breed within the Study Area. Corncrake are now restricted to the Shannon Callows, north Donegal and western parts of Mayo and Connaught, where difficult terrain precludes the use of machinery and where traditional late haymaking still takes place. Therefore it is unlikely that this species would be encountered within the study area. Common Tern and Arctic Tern breed on islands in lakes and have used islands in Lough Conn in the past and therefore may be found within the Study Area.

Common Scoter, Lapwing, Curlew, Redshank, Black-headed Gull and Yellowhammer have also been recorded in the relevant squares of the Atlases of Breeding Birds and are included on the BoCCI red list. Common Scoter breed on islands on Lough Conn and Lough Cullin and therefore may be found within the Study Area. Lapwing prefer open farmland as breeding habitat and therefore may present in the general vicinity of the proposed works. Curlew nest on the ground in rough pastures, meadows and heather and may also be present in the area in the breeding season. Redshank are also ground nesters and use grassy tussocks, in wet, marshy areas and occasionally heather as sites for their nests. Black-headed Gulls breed both in coastal and inland locations, generally in colonies with nests on the ground in wetland areas, such as bogs and marshes and artificial waterbodies. Yellowhammer have a preference for agricultural land, with adjacent scrub and may also be found within the study area.

In terms of wintering birds, Table 3.4.2 below shows those species found in the 10 km squares, G01, G11 and G12, that are recorded in the Atlas of Wintering Birds in Britain and Ireland 1988-91 and are also protected under the EU Birds Directive or mentioned on the Birds of Conservation Concern in Ireland (BoCCI) red list.

Common Name	Scientific Name	Annex I	BOCCI red list	Numbers*		
				G01	G11	G12
Bewicks Swan	<i>Cygnus bewickii</i>	Yes	No	1-8	1-8	-
Whooper Swan	<i>Cygnus cygnus</i>	Yes	No	10-32	10-32	-
Greenland White-fronted Geese	<i>Anser albifrons flavirostris</i>	Yes	No	-	13-64	-
Hen Harrier	<i>Circus cyaneus</i>	Yes	No	1	1	-
Lapwing	<i>Vanellus vanellus</i>	No	Yes	1-435	436-1,500	1-435
Dunlin	<i>Calidris alpina</i>	Yes	No	-	1-90	-
Curlew	<i>Numenius arquata</i>	No	Yes	-	41-209	1-40
Redshank	<i>Tringa totanus</i>	No	Yes	-	1-14	-
Herring Gull	<i>Larus argentatus</i>	No	Yes	-	-	1-70



Common Name	Scientific Name	Annex I	BOCCI red list	Numbers*		
				G01	G11	G12
Blackheaded Gull	<i>Chroicocephalus ridibundus</i>	No	Yes	-	1-380	1-380
Yellowhammer	<i>Emberiza citrinella</i>	No	Yes	1-25	-	1-25

**Table 3.4.2 Wintering Bird Atlas Data (G01, G11, G12)**

\* The numbers given in the fifth column represent the number ranges into which the maximum number of birds recorded in a day (defined as 6 hours) during the three winters of the survey fall.

Five birds recorded as wintering in the relevant 10 km square are protected under Annex I of the EU Habitats Directive: Bewick's Swan, Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Dunlin. Overwintering Bewick's Swans are now declining in numbers in Ireland and are concentrated in Wexford and are therefore unlikely to be found within the Study Area. Whooper Swan winter on large waterbodies and the surrounding grasslands and may be found within the Study Area. Lough Conn is one of the sites utilised by a population of Greenland White-fronted Goose. The geese feed mainly on Annagh Island and at a shoreline site near Cloonaghmore Point, the latter of which is located within the Study Area. Hen Harrier use open country in winter and therefore use the Study Area during the winter season. Dunlin are generally found in coastal habitats in the winter season and are therefore unlikely to be found within the Study Area at this time.

A further six birds that are listed on the BoCCI Red list were recorded in the atlas as being wintering in the area. These included Lapwing, Curlew, Redshank, Yellowhammer, Black Headed Gull and Herring Gull. Lapwing winter on farmland and flat coastal areas. Curlew winter on mudflats and adjacent fields. Redshank tend to favour coastal and estuarine habitats but can also be found at large lakes such as Lough Conn in winter. Black Headed Gull winter on a variety of habitats and Herring Gull winters on lakes, estuaries and open fields. Yellowhammer winter on agricultural land, with adjacent scrub. All the above species are potentially found at the site of the proposed works.

#### 3.4.2.6 NPWS Records of Protected Species

The NPWS mapviewer was consulted for records of protected species within the relevant 10 km squares, G01, G11 and G12. No records were available for the 10km square, G12. One record within the 10km square G01 was found for the aquatic plant, Slender Naiad (*Najas flexilis*), which is listed on Annex II and IV of the E.U. Habitats Directive and on the Flora (Protection) Order (FPO). This record is from Lough Dahybaun, which is designated as a Special Area of Conservation for this species, and is located 8.9 kilometres from the Study Area. There are six records listed within the 10km square, G11. Five of these are for Great Burnet (*Sanguisorba officinalis*) and the details are listed below:

- Lough Conn, Cappanaglough (G185150), 30/07/1999
- Lough Conn, Rinmore (G195111), 25/07/1999
- Lough Conn, (G1010), 1900
- Lough Conn, Garrycloonagh (G175170), 02/08/1987
- Lough Conn, Rinmore (G198108), 02/08/1987

A record for the FPO-listed orchid, Drooping Lady's Tresses (*Spiranthes romanzoffiana*) was also found in the 10km square, G11. This record dated from the 30th July, 1999 and no location was provided.

#### 3.4.1.4 Fisheries Information

##### 3.4.1.4.1 Online Atlas of Freshwater Fish in Irish Lakes

The online Atlas of Freshwater Fish in Irish Lakes, which is a collaborative project between the National Biodiversity Data Centre and Inland Fisheries Ireland (IFI), was consulted. The following species were recorded in Lough Conn between 1990 and 1994 according to the atlas: Arctic Char (*Salvelinus alpinus*), Brown Trout (*Salmo trutta*), Perch (*Perca fluviatilis*), Pike (*Esox lucius*), Rudd (*Scardinius erythrophthalmus*) and Salmon (*Salmo salar*).

##### 3.4.1.4.2 Water Framework Directive Surveillance Monitoring Fish Stock Survey

A total of six species were recorded during the most recent Water Framework Directive surveillance monitoring fish stock survey carried out in the River Deel at Crossmolina on the 30<sup>th</sup> July 2012 by staff from Inland Fisheries Ireland IFI). These included: Roach (*Rutilus rutilus*), Perch (*Perca fluviatilis*), Eel (*Anguilla anguilla*), Salmon (*Salmo salar*), Pike (*Esox lucius*) and Lamprey (*Lampetra sp.*). The most abundant fish recorded was Perch (approximately 59% of the total catch). During the previous survey undertaken in 2008 close to Deel Castle, Brown Trout (*Salmo trutta*) was also found but Lamprey was not recorded. Roach was the most common species caught on this occasion.

##### 3.4.1.4.3 Inland Fisheries Information

Inland Fisheries Ireland's website, <http://www.fishinginireland.info>, provides information on angling throughout the country. The best known and most frequently fished locations for Salmon on Lough Conn are the northern end of the Lough particularly the area around the mouth of the Deel River, which is within the Study Area; and Victoria Bay, Cuilkillew (Cornakillew), Massbrook and Castlehill Bay in the south-western and western areas of the lake. The strait at Pontoon Bridge between Loughs Conn and Cullin was a favorite haunt for salmon anglers fishing from the shore. However in the interests of conservation this and other

parts of the lake are currently closed to salmon fishing. Trout fishing on Lough Conn is described on the website as potentially 'very good but sporadic at times'.

#### 3.4.1.4.4 Juvenile Lamprey Populations in the Moy Catchment

The NPWS commissioned a survey of juvenile lamprey populations in the Moy catchment, which was undertaken during July/August 2004. Five survey sites were located on the River Deel and one site was located at Pontoon - the connection between Lough Conn and Lough Cullin.

Lamprey species were found at three of the five sites sampled on the River Deel: at Deelcastle (*Lampetra sp.* only), N59 Bridge (*Petromyzon marinus* and *Lampetra sp.*) and the Ford east of Ballycarroon House (*Petromyzon marinus* and *Lampetra sp.*). No lamprey were found at the other two sites at Ballmulty Bridge or Cominch Bridge. It is considered that an impassable natural barrier prevents access by lamprey to the upper reaches of the Deel. High densities of Sea Lamprey were found in undrained sections of the river in the vicinity of Ballycarroon House. Relatively high densities of *Lampetra* species were found at two sites, one upstream and one downstream of Crossmolina. A strong presence of Young-of-the Year (YOY) Sea Lamprey larvae was recorded in the River Deel. Extensive lamprey habitat was noted in the Deel River during the survey both in the undrained reaches of the river upstream of Crossmolina and in some drained stretches downstream of Crossmolina. However, it was considered in the report that construction of deflectors to improve salmon angling in the river may have reduced the extent of lamprey nursery habitat in lower reaches of the river.

Bycatch caught at the sampling sites on the River Deel included other fish species including: Atlantic Salmon, Brown Trout, European Eel, Three-spined Stickleback, Perch, Roach and Minnow. Records of the Annex II species Freshwater Pearl Mussel and White-clawed Crayfish were also noted during the survey. The Freshwater Pearl Mussel records were from previously unrecorded sites for this species (Ballymulty Bridge and the Ford east of Ballycarroon House). Since 2004, this population of Freshwater Pearl Mussel in the River Deel has been surveyed extensively and further information is provided below.

#### 3.4.1.5 Freshwater Pearl Mussel in the River Deel

Freshwater Pearl Mussel (*Margaritifera margaritifera*) is listed on Annex II of the E.U. Habitats Directive and was first recorded from the Deel in 2004 and subsequently stretches of the river were surveyed in 2005 and 2008. The NPWS commissioned Evelyn Moorkens and Ian Killeen to conduct a survey with the objective of mapping the full distribution and to investigating the population profile of this species in the River Deel. Their report was prepared in October 2009.

The River Deel was separated into 69 sections and a further 15 sections of tributaries were also surveyed. Pearl Mussels were found in the River Deel over a distance of approximately 20 kilometres, with the downstream limit near Deelcastle (G175191). The upstream limit detected during the 2009 survey was just downstream of the confluence with the Shanvolahan River (G067154). Anecdotal evidence documented in the 2009 report indicates that there specimens were known in the area around and downstream of Deel Bridge within 10 year of the publication of the report. However despite potentially suitable habitat no live or dead shells were found in this area by the surveyors in 2009. No mussels were found in tributaries of the River Deel.

Abundance of mussels varied widely over the 20 kilometre section, in which they occurred, although they were found to be present almost continuously throughout this stretch of the river. Geomorphological variation was considered to constitute the main factor in this variation, with land drainage schemes (in particular downstream of Crossmolina) and fisheries activities also important factors. The report identifies the area between Crossmolina and Ballynulty Bridge as being location of the core of the mussel population within the River Deel. Several sections within this stretch of the river were found to have abundant mussels (>1500 mussels per 100 metres length of river). Upstream of Ballynulty Bridge, mussel distribution was patchy and only small areas held moderately high numbers. Towards the upstream limit, numbers were restricted to occasional individuals. Downstream of Crossmolina, abundance was categorised predominantly as frequent with occasional sections classified as common.

A total population of approximately 89,000 individuals was estimated based on the numbers of mussels estimated for each survey section. As this number was considered to be an under-estimate, the likely population of this species in the River Deel is probably over 100,000 individuals.

The report documents a relatively wide size profile with some evidence of recent juvenile recruitment. Juvenile mussels under 65mm in length corresponded to 7.8% of the total population. The ideal profile should have 20% of mussels under 65mm. Some parts of the river have a more favourable size profile such as downstream of Ballynulty Bridge, where 16.7% of the mussels were greater than 65mm in length.

Redox potential measurements demonstrated that the substrate in the Deel is relatively highly silted in certain locations. Even in areas with the highest numbers and most

favourable size profiles, the loss in redox at 5cm depth was over 25%. A level of 20% is considered necessary for effective juvenile recruitment.

The report describes the results of the survey as having found 'a large and important population of Margaritifera' still present in the River Deel 'with some recruitment of young mussels occurring, a rare situation in mussel populations in Ireland.' The very rare duck mussel *Anodonta anatina* was also found in the river during the survey. There are five status categories defined for populations of Freshwater Pearl Mussels in SACs and the River Deel population is considered to fit into Status 2, which is describes 'large widespread populations of adults, or smaller numbers in good but restricted habitat, some juveniles in more than one area.' 18.5% of populations in SACs in Ireland fall into this category. Based on these status categories the report concludes that the Deel population would rank as 7<sup>th</sup> out of 28 populations.

The report states that the Deel system is large and intensively managed in general and that recovery of the population to favourable status would be 'very challenging with strong management measures needed'. The majority of the mussels, and those with the most favourable size-age profile are found in areas of very fast flow within boulder dominated habitats, in conditions which mitigate against the effects of siltation and scouring respectively. The report further claims that the '*river would benefit from conservation management measures, both in its upper catchment to cease the input of fine sediment loading into the river from the peaty areas, and in the more intensively managed areas, where some buffering from intensive management is needed and drainage inputs need to be either blocked or trapped en route.*' The authors state that such a plan is important as many mussels in small number distributed throughout the river face extinction as they cannot currently recruit and groups of mussels in the fastest riffles are not likely to be sustainable without wider occupation. A sub-basin catchment management plan is recommended for the population of Freshwater Pearl Mussel in the River Deel.

#### 3.4.1.6 Biodiversity & Generic Recommendations for Crossmolina Community Council Ltd.

Crossmolina's Tidy Towns Committee commissioned a report containing recommendations on enhancing biodiversity in the area in 2011. A biodiversity survey was carried out for the purposes of the report and the following habitat features were recorded within the town: hedgerows, trees and woodland, the River Deel, Lough Conn and grassland. The report states that '*some of the hedgerows around the outskirts of the town are fairly well developed with a reasonable number of woody native species*'. Species recorded included Hawthorn (*Craetagus monogyna*), Blackthorn (*Prunus spinosa*), Holly

(*Ilex aquifolium*) and Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*) and Willow (*Salix sp.*).

The trees along the riparian zone of the River Deel are described in the report as being 'very important in enhancing the ecology of the river corridor' for their own intrinsic biodiversity value and their role in reducing disturbance of species using the river, provision of shade and sheltering of invertebrates. The report recommends enhancement of wooded areas on the river bank, concentrating on native species. Advice is also provided on the selection of species for maximisation biodiversity. An alien species survey was also conducted and a number of stands of Japanese Knotweed (*Fallopia japonica*) were identified in the area.

The report identifies and details several potential projects for increasing biodiversity in the town including the following:

- A bird nest box and bird feeder making and placement project with schools, youth clubs and local tenant groups,
- An annual biodiversity event,
- Provision of more signs and correct information at appropriate points in the town to highlight the important local biodiversity and issues facing it,
- Undertaking invasive species awareness in the town and Japanese Knotweed control,
- Planting of native hedge and trees in Crossmolina with the intention of linking up existing habitat features,
- Creating and enhancing specific biodiversity areas/gardens in communal areas,
- Creation of a wildlife walk through the village incorporating the river and the community garden,
- Information evening/talk on recording and submitting biodiversity data for national projects,
- Enhancement of the biodiversity of graveyards.

### 3.4.2 Field Study

#### 3.4.2.1 Terrestrial Ecology

The Study Area was visited on the 24th October 2012. During this visit, the general habitat types within the Study Area, in particular along the River Deel from the ford at Ballycarroon

to south of Deelcastle, were observed and photographed. The purpose of this was to observe the habitats in the area first hand and to a certain extent to ground truth the findings of the desk study. No detailed floral or faunal surveys were carried out.

#### 3.4.2.1.1 Flora

The River Deel at the south-western section of the study area at Ballycarroon flows through fields of pasture land with undulating topography and treelines with some small areas of woodland. The river itself was fringed over much of its course with a line of mature broad-leaved trees with Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Grey Willow (*Salix cinerea oleifolia*), Alder (*Alnus glutinosa*) and Hazel (*Corylus avellana*) found along the riparian corridor.

The river itself was quite slow-flowing above the ford at Ballycarroon but further downstream flow was relatively fast with much exposed bedrock with steep elevated banks for a short stretch (Plate 3.4.1). Flow slowed considerably as the river continued towards Crossmolina. The entire riparian corridor is designated for nature conservation under the River Moy SAC.

Moving in a northerly direction, the River flows through the urban area of Crossmolina Town. The steep banks generally evident between Ballycarroon ford and the outskirts of the town give way to a more level plain as the river approaches the town (Plate 3.4.2). Mature trees border the river until it reaches the town, whereupon the channel is bordered by amenity grassland on either bank. Below the bridge in the centre of the town, the river is slightly faster flowing with a substrate of cobble, boulder and bedrock (Plate 3.4.3). The river meanders through the rear of the town's main street. A dense infestation of Japanese Knotweed (*Fallopia japonica*) was noted in this area (Plate 3.4.4). Mature trees border the riparian zone. As the river flows northwards it passes through pastoral agricultural land delineated into field systems by treelines. Areas of woodland are also present in this area. The river doubles back on itself and turns to flow southwards in the townland of Knockglass. The banks become steeper again in the area surrounding the bridge over the N59 at Knockadanagan. The riparian corridor continues to be flanked by pasture-land and riparian woodland, increasingly dominated by Alder and Grey Willow (Plate 3.4.5).

Further downstream flow becomes slower and stands of Common Club-rush (*Schoenoplectus lacustris*) become increasingly prevalent both on the river banks and

within the channel itself (Plate 3.4.6). At the mouth of the river, as it enters Lough Conn (Plate 3.4.7), there is an area of wetland.

Tributaries of the Deel within the Study Area include the Tooreen River, the Rappa Stream and the Rathnamagh River. These rivers pass through similar grassland habitat but are much smaller in size than the River Deel and generally have a less developed riparian zone.

It should be noted that in various locations within the study area, the invasive species Japanese Knotweed (*Fallopia japonica*) was encountered along the riparian corridor. Rhododendron (*Rhododendron ponticum*) and Laurel (*Prunus lauroceratus*) were noted in stands of trees within the study area but were not widespread throughout the area and were not noted within the riparian corridor.



**Plate 3.4.1 View of the River Deel downstream of Ballycarroon Ford**





**Plate 3.4.2 View of River Deel riparian corridor just upstream of Crossmolina Town**



**Plate 3.4.3 View of the River Deel downstream of the bridge in Crossmolina Town**



**Plate 3.4.4 Japanese Knotweed along River Deel behind Crossmolina Town**



**Plate 3.4.5 View of River Deel looking upstream from N59 Bridge at Knockadanagan**



**Plate 3.4.6 View of River Deel with stands of Common Club-rush near Deelcastle**



**Plate 3.4.7 View of Lough Conn from Wherrew close to the mouth of the River Deel**

### 3.4.2.1.2 Fauna

In terms of faunal habitat, the river and its bankside vegetation within the study area offer a wide variety of habitats that potentially play host to a broad range of faunal species. Potential ecologically significant fauna in this area include the following:

- The entire length of the river offers good habitat for Otter (*Lutra lutra*) with ample vegetation for cover along the river banks and likely good food supplies within the river. This species is known from the River Deel within the study area and plentiful Otter spraints, often containing primarily White-clawed Crayfish (*Autropotamobius pallipes*) remains, were noted during the site visit on the 24<sup>th</sup> October. White-clawed Crayfish are known to be prevalent within the Deel catchment.
- The River Deel hosts an important population of Freshwater Pearl Mussel (*Margaritifera margaritifera*) and some areas known to host this species were visited. However no-instream surveys were carried out on the occasion of the site visit.
- Some of the banks may be suitable for Kingfisher, which require muddy banks close to water with suitable fishing perches as breeding habitat.
- The habitats within the study area offer good potential habitat for bat species with woodland, buildings and old trees along with the river and its associated feeding habitat.
- The study area offers potential for waterbirds in general, in particular the lower stretches of the river and the northern part of Lough Conn, which is included within the study area.

### 3.4.2.2 Aquatic Ecology

#### 3.4.2.2.1 Water quality

Water quality is discussed in more detail in Section 3.5 of this report. The EPA website <http://www.epa.ie/rivermap/data>, contains information regarding water quality in selected Irish rivers based on surveys carried out by the EPA. Information was gained from EPA monitoring stations on the Deel River within and upstream and downstream of the study area. No EPA monitoring data was available for the Tooreen and Rathnamagh Rivers. Biological information is provided in the form of Q values. Q Values are used to express biological water quality and are based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. Q1 indicates a seriously polluted water body and Q5 indicates unpolluted water of high quality. A value of Q3 indicates moderately

polluted water. Water results on the Deel River dating from between 1971 and 2010 indicated predominantly unpolluted water in satisfactory condition.

### 3.4.3 Summary of Key Constraints and Implication for the Proposed Scheme

#### 3.4.3.1 Main Findings

- The Deel River is of considerable ecological significance along the entire length of its course and is designated as part of the River Moy SAC. It flows into Lough Conn, which is also part of the River Moy SAC and is also designated as part of the Lough Conn and Lough Cullin SPA. The Deel River provides habitat for a range of species that are listed on Annex II of the EU Habitats Directive including many qualifying interests of the River Moy SAC such as White-clawed Crayfish, Sea Lamprey, other Lamprey species, Salmon, Otter and other Annex II species such as Freshwater Pearl Mussel, which are not listed as qualifying interests of the SAC.
- In addition, the river has potential to support Kingfisher, a species listed on Annex I of the Birds Directive and the Lough Conn and Lough Cullin SPA is selected for the Annex I bird species, Greenland White-fronted Goose, as well as Tufted Duck, Common Scoter and Common Gull.
- The River Moy cSAC is also designated for Annex I habitats such as Old Oak Woodlands, Alluvial Forests, Alkaline Fens, Active and Degraded Raised Bogs and Depressions of the Rhyncosporion.
- Great Burnet and Irish Ladies' Tresses, both plant species listed on the Flora (Protection) Order (1999) are known from the shores of Lough Conn and may therefore be found within the Study Area.
- The River Deel hosts salmonid spawning, nursery and angling habitat and Lough Conn is also an important salmon angling location. Fish stock surveys in the River Deel undertaken for the purposes of the Water Framework Directive (WFD) included Salmon, Lamprey and Eel in their catch. Lough Conn also has a population of Arctic Char, whose status is described as 'vulnerable' in the Irish Red Databook (Vertebrates).
- The combination of all the riparian, woodland, peatland and grassland habitats in the Study Area creates an area of relatively high biodiversity with cover and feeding grounds for a wide range of flora and fauna.
- The invasive species, Japanese Knotweed (*Fallopia japonica*) was recorded extensively throughout the study area.

### 3.4.3.2 Key Constraints

- Given the sensitivity of the river habitat, factors that materially affect the function of the river under normal flow conditions such as water depth, velocity and changes to the shape of the bed should be given consideration, so that the existing function of the river can be maintained. Impacts to areas up and downstream of the Study Area should also be considered as part of the assessment.
- In design of the proposed scheme, consultation with both IFI and NPWS will be necessary, together with an appropriate amount of survey work to establish baseline conditions in the river. Constraints may be placed on the times of year that in-stream works may be carried out depending on the results of the various surveys and the results of consultation with IFI and NPWS. Constraints may also be placed on the time of year/weather conditions that the surveys may be undertaken.
- In salmonid spawning areas, in-stream works are generally not permitted during the period October – March (inclusive), as this is the sensitive time for spawning. Given that the river is also an important angling and nursery area, it is likely that further constraints will need to be considered.
- Freshwater Pearl Mussel Surveys and Otter surveys can be undertaken at any time of year but are dependant on water levels. Pearl Mussel surveys require that there is good visibility in the water column and can only be undertaken in sunny, bright weather when water levels are not high and sediment loading on the river is low. Where such surveys are required, weather conditions will constrain the timing of these.
- The optimal survey season for White-clawed Crayfish is from July to September. Surveys and removal operations should be avoided in the period when females are releasing young (late May-July). It is also recommended to avoid surveys in the period from December to the end of March as efficiency of searches is very low.
- Kingfisher surveys should be carried out during the summer nesting period (April – September).
- Any surveys for Greenland White-fronted Geese in the Study Area must be carried out in the winter bird season (October-March).
- The River Deel is designated as part of the River Moy SAC and flows into Lough Conn, which is designated both as part of the River Moy SAC and the Lough Conn and Lough Cullin SPA. Negative impacts on qualifying interests of the sites and other habitats or species of conservation importance have the potential to

negatively affect the status of these designated sites. Screening for Appropriate Assessment should inform the requirement for the preparation of a Natura Impact Statement and progression to Stage 2 Appropriate Assessment.

- Consideration should be given to areas of higher biodiversity and ecological sensitivity, such as woodlands, wetlands and riparian vegetation along the river corridor. If works are required in these areas, care should be taken to mitigate significant effects.
- Appropriate measures should be taken to ensure that the spread of any invasive species is not accelerated by any proposed works.
- Regard should be had to the *Biodiversity & Generic Recommendations for Crossmolina Community Council Ltd* commissioned by Crossmolina's Tidy Towns Committee 2011.