

# Constraints Study Report

## River Deel (Crossmolina) Flood Relief Scheme October 2012



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## RIVER DEEL (CROSSMOLINA) FLOOD RELIEF SCHEME

### CONSTRAINTS STUDY REPORT

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## EXECUTIVE SUMMARY

This report sets out the key environmental issues relating to the Study Area for the River Deel (Crossmolina) Flood Relief Scheme which may be impacted upon by potential flood risk management measures and/ or which may impose constraints on the viability and/ or design of these measures. Information has been gathered on engineering, socio-economic, environmental, archaeological and geotechnical constraints.

Environmental constraints have been investigated under the following headings:

- Human Beings
- Ecology
- Water
- Soils & Geology
- Archaeology & Cultural Heritage
- Landscape
- Air & Climate
- Material Assets

Under each heading, the assessment methodology is first outlined followed by a description of the defined Study Area or 'receiving environment'. Finally, a summary of the key constraints and implications for the proposed scheme is noted.

In addition to the assessments carried out, a public consultation was held to present the Study Area to the public and invite feedback regarding the proposed scheme. Information gathered during this public consultation has been included in this report.

This report is the first stage in the environmental assessment process, which will be ongoing throughout the planning and design of the project. Information gathered or alternatives suggested arising from public information days, meetings with stakeholders and written representations will be considered on the grounds of engineering feasibility, environmental viability, existing constraints and economics.

## SUMMARY OF KEY CONSTRAINTS

The following is a summary of the key constraints identified as part of this study.

HUMAN BEINGS
In designing the proposed scheme, the value (both cultural and economic) of any buildings (Residential, Retail, etc) close to river edge or likely to be adversely affected by the scheme should be taken into account. In addition, adverse impacts on buildings or structures of conservation interest should be minimised or avoided where possible.
Any design proposals should ensure that Bridge links between eastern and western sides of the town are maintained so that temporary or permanent disruption on local transport links in the town and route along the N59 between Ballina and West Mayo are minimised.
The design of the scheme should consider the public amenity value of the Study Area. Impacts on public amenity areas adjacent to the river should be considered, with replacement mitigation proposed if necessary. Access by anglers and visibility of the river as a tourist attraction should be given consideration as part of any proposed scheme.
Impacts on especially sensitive receptors e.g. schools, church, day care centre, should be considered in the flood risk assessment.
ECOLOGY
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 designing 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 <i>Biodiversity &amp; Generic Recommendations for Crossmolina Community Council Ltd</i> commissioned by Crossmolina's Tidy Towns Committee 2011.
<b>WATER</b>
The design of the proposed scheme should take into account the impacts on water (both Quality and Quantity) that any proposed flood relief scheme will have on the yields of existing groundwater abstractions, taking into account productive gravel

aquifers in the area.
The design of the proposed scheme should take into account the main objectives of the Water Framework Directive River Basin District Management Plan (RBDMP) by ensuring that any works proposed do not result in the deterioration of water quality.
The design should also take into account the presence of protected and sensitive areas identified in the RBDMP.
<b>SOILS &amp; GEOLOGY</b>
It is recommended that a geotechnical investigation be carried out once the potential flood alleviation measures are developed in order to identify local geology and ground conditions.
<b>ARCHAEOLOGY &amp; ARCHITECTURAL HERITAGE</b>
Given the provisions of the National Monuments Acts, no disturbance to, or interference with, any known archaeological sites can take place without first consulting the National Monuments Service of the Department of Arts, Heritage, and the Gaeltacht (DAHG).
It is recommended that all impacts on identified archaeological and heritage sites, and their immediate vicinities, be avoided in the design of the proposed flood relief scheme.
Should this not be possible then archaeological investigations are recommended for archaeological and heritage sites in the vicinity of, or those that would be directly impacted by the proposed scheme. It is recommended that this programme take place well in advance of construction works in order to allocate adequate time to evaluate and record any archaeological features that may be revealed.
It is recommended that any ground disturbance works associated with the proposed scheme be assessed for archaeological monitoring. Appropriate mitigation should be determined during the design phase in consultation with the National Monuments Service (DAHG).
It is recommended that the Underwater Archaeological Unit (DAHG) be consulted during the design of the proposed flood relief scheme in order to agree appropriate underwater archaeological assessment and mitigation strategies. Depending on the flood alleviation measures chosen, the riverine assessments required by the DAHG may consist of river bank and underwater archaeological survey pre-works, possible testing around the bridges and other sites along the river course, and full monitoring of all works.
All Record of Protected Structures sites have statutory protection and avoidance of these features is recommended.
The National Monuments Service of the Department of Arts, Heritage and the Gaeltacht should be consulted at all stages of the scheme development.



## LANDSCAPE

The Study Area includes areas and features designated as vulnerable and sensitive in the Landscape Appraisal for County Mayo, which is included as an Appendix to the Mayo County Development Plan (2008-2014). Many of these features are associated with Lough Conn. Although there are no scenic routes or highly scenic vistas within the Study Area, there are a number of scenic routes and one highly scenic vista within 10 kilometres of the Study Area. Appropriate design, siting and mitigation measures are therefore required to integrate the proposed scheme within the landscape. Particular regard should also be had to the potential visual impact on views available from the three stretches of designated Scenic Route and the areas of Scenic Landscape, which are located within the Study Area.

## AIR QUALITY

Prior to the selection of a preferred flood relief scheme as part of the Engineering Study, it is recommended that the short listed flood alleviation measure be assessed in relation to the impact of noise and vibration during the construction phase of the project.

It is recommended that mitigation measures be put in place to reduce the impacts on air quality and the noise environment during the construction phase of any proposed flood relief scheme.

It is recommended that the effects of vibration during the construction phase be considered in the selection process for a potential flood alleviation measures.

Meteorological and climatological data should be consulted in the engineering design process.

The potential impacts of climate change should be assessed with regard to the prediction of flood risk and should be taken into account in the design of a proposed flood relief scheme.

## MATERIAL ASSETS

It is recommended that the existing and proposed location of watermains and underground services in the vicinity of any proposed flood relief scheme be ascertained as part of the Engineering Study. It is recommended that Mayo County Council and other utility providers with services in the area be consulted regarding the location and priority of existing and proposed services. It is further recommended that the services be protected as part of any proposed flood relief scheme.

It is recommended that the Crossmolina Waste Water Treatment Plant remains operational at all times.

It is recommended that any proposed change in the hydrological regime of the River Deel and its tributaries be assessed in relation to the assimilative capacity of the river at the locations of the two discharges from Wastewater Infrastructure within the Study Area.



It is recommended that Mayo County Council and the National Roads Authority be consulted in relation to any effects on the existing and proposed roads infrastructure in the Study Area from a proposed flood relief scheme.

## 1 INTRODUCTION

### 1.1 OVERVIEW OF SCHEME

The purpose of the River Deel (Crossmolina) Flood Relief Scheme is to identify the most viable flood relief scheme to alleviate flooding in Crossmolina Town.

### 1.2 STUDY AREA

The Study Area extends along the channel, flood plains and surrounding lands of the River Deel from Ballycarroon to Lough Conn and includes three tributaries, their flood plains and surrounding lands as shown on Figure 1.1 overleaf. The Study Area is centred around Crossmolina town.

Several tributary streams join the River Deel within the Study Area along with larger tributaries including the Torreen River and the Rathnamagh River.

### 1.3 STAGE OF PROCESS

The Constraints Study is the first stage in the Environmental Impact Assessment for the River Deel (Crossmolina) Flood Relief Scheme and is being advanced in parallel with the Engineering Study for the River Deel (Crossmolina) Flood Relief Scheme. The project will be delivered in the following stages:

Environmental Impact Assessment		Engineering Study
Stage I	Part 1 <b>Constraints Study</b> ( <i>this stage</i> ) Part 2 Screening for Appropriate Assessment	Hydrology Study & Hydraulic Modelling Site Investigations Flood Risk Assessments
Stage II	Part 1 Environmental Assessment of Viable Options Part 2 Appropriate Assessment (if required)	Flood Risk Management Options Cost Benefit Analysis Selection of Preferred Option
Stage III	Environmental Impact Statement	Flood Risk Management Plan
Stage IV	Public Exhibition	Interference Notices Public Exhibition

**Table 1.1 Stages in the Planning of the River Deel (Crossmolina) Flood Relief Scheme**

### 1.4 SCOPE OF ASSESSMENT

Information has been gathered under the relevant headings prescribed in the Environmental Protection Agency (EPA) guidelines “Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003”

### 1.5 CONSULTATION

Consultation has taken place with statutory and non-statutory consultees as part of the initial scoping process. Comments and information were sought from the following list of consultees:

STATUTORY EIA CONSULTEES	
1	An Bord Pleanála
2	An Comhairle Ealaíon (The Arts Council)
3	An Taisce - The National Trust for Ireland
4	Commission for Electricity Regulation
5	Department of Agriculture, Food and the Marine
6	Department of Arts, Heritage and the Gaeltacht
7	Dept. of Communications, Energy & Natural Resources
8	Department of Environment, Community and Local Government
9	Department of Justice and Equality
10	Department of the Jobs, Enterprise and Innovation
11	Environmental Protection Agency
12	Faite Ireland
13	Health and Safety Authority
14	HSE Western Regional Health Forum
15	Inland Fisheries Ireland
16	Irish Aviation Authority
17	Mayo County Council
18	National Roads Authority
19	Office of Public Works
20	Railway Procurement Agency
21	The Heritage Council
22	West Regional Authority

**Table 1.2      Statutory EIA Consultees**

OTHER CONSULTEES	
1	An Óige
2	Birdwatch Ireland
3	Bord Gais
4	Bord na Móna
5	Botanical Society of the British Isles – local recorder
6	Coillte Teoranta
7	Councillor Gerry Ginty
8	Councillor Jarlath Eugene Munnelly
9	Councillor John O'Hara
10	Councillor Annie May Reape
11	Councillor Eddie Staunton
12	Crossmolina Agricultural and Industrial Show
13	Crossmolina Business Association
14	Crossmolina Community Alert
15	Crossmolina Community Development Ltd
16	Crossmolina Community Festival Committee
17	Crossmolina Chronicle
18	Crossmolina Fishing Club
19	Crossmolina GAA – Deel Rovers
20	Crossmolina Ladies GAA
21	Crossmolina Tidy Towns
22	Development Applications Unit
23	Earthwatch (Friends of the Earth Ireland)
24	Eircom
25	ENFO
26	Environment Section – Mayo County Council
27	ESB
28	Environmental Sciences Association of Ireland
29	Geographical Society of Ireland
30	Geological Survey of Ireland
31	Irish Creamery Milk Suppliers Association
32	HSE Western Regional Health Forum
33	Institute of Geologists of Ireland
34	Irish Farmers Association (Galway Mayo Branch)
35	Irish Heritage Trust

OTHER CONSULTEES	
36	Irish Peatland Conservation Council
37	Irish Planning Institute
38	Irish Wildlife Trust
39	Landscape Alliance Ireland
40	Lough Conn and Cullin Anglers
41	Mayo County Development Board
42	National Association of Regional Game Councils
43	National Building Agency
44	National Federation of Group Water Schemes
45	National Monuments Service
46	National Museum of Ireland
47	National Parks and Wildlife Service
48	Planning Section – Mayo County Council
49	Riverwalk Residents Association
50	Royal Town Planning Institute
51	Salmon Growers Association
52	Salmon Research Agency of Ireland
53	The Meteorological Service
54	The Mining Heritage Trust of Ireland
55	Tidy Towns Committee
56	Teagasc
57	Tourism Ireland
58	Voice of Irish Concern for the Environment
59	Water Services Section – Mayo County Council
60	Waterways Ireland
61	Western River Basin District Office

**Table 1.3 Other Consultees**

A copy of the letter and attachments issued to Consultees is included in Appendix A. Copies of any written correspondence received are also provided in Appendix A.





## **2 SCHEME CONTEXT AND BACKGROUND**

### **2.1 HISTORY OF FLOODING**

There is a long history of flooding in the floodplains of the River Deel and in Crossmolina town. Between 1963 and 1966, the Moy Catchment Drainage Scheme (CDS) was carried out on the River Deel from Lough Conn to approximately 200m upstream of Jack Garret Bridge. Since the CDS scheme, three significant floods have impacted the town and while a number of lesser events have also occurred, anecdotal information suggests that they had minor impact. The largest event occurred in October 1989 and initial analyses carried out by OPW have estimated that this event had a 35 year return period.

### **2.2 FUTURE CHANGES**

The risk of flooding may increase with time. Future changes, which have the potential to affect the risk of flooding include:

- Climate Change potentially resulting in higher rainfall and higher tide levels;
- Geomorphological processes, such as (i) sedimentation transport, which affects the area of conveyance of the river channel and (ii) erosion;
- Development within the catchment of the River Deel, which depending on the type of development may have the potential adversely affect the response of the catchment to rainfall;
- Changes in land use, including forestation and land drainage.

### **2.3 POTENTIAL FLOOD RISK MANAGEMENT MEASURES**

An Engineering Study is being advanced in parallel with the Environmental Assessment of the proposed flood relief scheme. The Constraints identified in this report will inform the selection of flood risk management measures as part of the Engineering Study.

The range of engineering measures typically considered for flood relief schemes include, but are not limited to the following:

- a) Do Nothing (i.e., implement no new flood alleviation measures)
- b) Non-Structural Measures (e.g. flood warning system or individual property protection)
- c) Relocation of Properties and/or infrastructure
- d) Reconstruction of Properties and/or infrastructure to a higher level
- e) Flow Diversion (e.g. river diversion or flood flow bypass channel)
- f) Flow Reduction (e.g. upstream catchment management or flood storage)
- g) Flood Containment through Construction of Flood Defences
- h) Increase Conveyance of Channel (upstream and/or through and/or downstream of the town)
- i) Sediment Deposition and Possible Sediment Traps
- j) Pump storm waters from behind flood defences



#### k) Measures Specific to the Study Location

It is not possible, at this stage, to define the number of scheme options that will require study, although a typical Engineering Study of this nature will identify between three and five viable options.

### 2.4 TOPOGRAPHY AND MAPPING

The Study Area extends along the river channel from Ballycarroon to Lough Conn, including a number of small tributaries along with the larger Tooreen and Rathnamagh Rivers, flood plains and surrounding lands as shown on Figure 1.1 previously. The Study Area centres on Crossmolina town.

The following mapping was used in order to prepare this Constraints Study;

- Ordnance Survey Discovery Series Mapping at 1:50,000 scale
- Old Raster 6" Mapping
- Old Raster 25" Mapping

Ordnance Survey 1:50,000 scale Discovery Series mapping is the main background mapping used in the preparation of the drawings provided with this report.



### **3 ENVIRONMENTAL CONSTRAINTS**

#### **3.1 INTRODUCTION**

The purpose of this section of the report is to describe the key environmental issues relating to the Study Area which may be impacted upon by potentially viable flood risk management measures and/ or which may impose constraints on the viability and/ or design of these measures.

#### **3.2 METHODOLOGY AND GUIDELINES**

This Constraints Study is the first stage in the Environmental Impact Assessment for the River Deel (Crossmolina) Flood Relief Scheme and is being carried out in accordance with the Environmental Protection Agency (EPA) guidelines "Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003".

Information has been gathered under relevant headings prescribed in the EPA Guidelines.

Ryan Hanley in association with McCarthy Keville O'Sullivan has employed archaeological specialists to carry out studies under the following heading:

<b>Study</b>	<b>Specialist</b>
Archaeology, Architectural & Cultural Heritage	John Cronin & Associates

**Table 3.1 Environmental Specialists**

The following sections outline the findings of the Constraints Study and identify potential environmental constraints associated with the scheme.



### 3.3 HUMAN BEINGS

This section sets out the socio-economic features of the Study Area that may impact on the selection of flood alleviation measures for the proposed scheme.

#### 3.3.1 Settlements and Planning Policy

The following sources of information were utilised in the preparation of this section:

- Mayo County Development Plan, 2008 - 2014
- Regional Planning Guidelines for the West Region, 2010 - 2022
- Census of Ireland 2006 and 2011 ([www.cso.ie](http://www.cso.ie))
- Mayo County Council Website
- Local Community Websites [www.crossmolina.ie](http://www.crossmolina.ie) and [www.crossmolina.net](http://www.crossmolina.net)

The major settlement within the Study Area is Crossmolina, which is located on the River Deel and close to the northern shore of Lough Conn in north Co. Mayo. The town is considered a 'smaller town or village' in the Mayo County Development Plan and is located seven miles west of Ballina (which is considered a national 'linked development hub' town in the National Spatial Strategy), on the N59 National Secondary Route.

There is no specific Local Area Plan for the town, but planning and development policies and objectives for the area are included within the Mayo County Development Plan. The most relevant of the overall strategies in the Mayo County Development Plan is to the Study Area is the proposed development of:

*'the Linked Hub of Castlebar/Ballina and Westport as its natural extension, as the spine around which the sustainable development of County Mayo will be structured, and to promote this extended Hub in the future development of spatial policy, both regionally and nationally'*

and *'to promote sustainability and vibrancy in rural communities, including small towns and villages'.*

Specific Strategic Policies in relation to Crossmolina (as one of the listed towns and villages in County Development Plan) are:

#### **P/CSS – 3.1**

*To promote their sustainable development and growth so that they are sustained and consolidated as local rural service centres, to enable them to provide an appropriate range of services and facilities, including social infrastructure, retail development, commercial and enterprise development and act as attractive, viable options for inward movement and investment.*

**P/CSS – 3.2**

*To retain their special character and identity and ensure the orderly development of newly developing areas by resisting urban sprawl, haphazard and piecemeal development and ribbon development.*

**P/CSS – 3.3**

*To support and promote the quality of the built environment through sensitive redevelopment, enhancement and renewal of the physical fabric and ensuring that new development respects the character, patterns and tradition or existing places and the built form.*

**3.3.2 Population and Housing**

The Census of Ireland ([www.cso.ie](http://www.cso.ie)) provides population information for Electoral Divisions (EDs), 'Small Areas', in addition to data specific to Crossmolina as a 'town'. Data for the EDs of Crossmolina North and Crossmolina South was reviewed, in addition to information for other EDs within the Study Area (Ardagh, Fortland, Deel and Carrowmore). Figure 3.3.1 shows the boundaries of the Electoral Divisions within the vicinity of the Study Area which were considered as part of the preparation of this Constraints Study.

The 2011 census population figure for the combined EDs is 4,257 persons, which is an increase of 8% since 1996. This increase mainly arose in the period between the 2006 and 2011 census, as previous data showed fluctuations in population within the area. Within the Crossmolina EDs this trend is similar, although overall, Crossmolina North experienced only a 0.6% increase in the 1996 – 2011 period, as opposed to a 9% increase in the Crossmolina South ED. Similar to the surrounding area, Crossmolina North experienced a 7.6% drop in population between 1996 and 2006 with the recovery only happening in the last census period.

The Mayo County Development Plan (based on 2006 preliminary CSO figures) anticipates an increase of 0.5% in smaller towns and villages in the coming years with an increase of ca. 3% in population of larger hub towns (including nearby Ballina) which is likely to have an influence on adjacent areas such as Crossmolina.

Overall there were 1,935 houses recorded in the total 6 ED areas in the 2011 census; with 21% identified as unoccupied. Rates of unoccupied houses were highest in the two Crossmolina EDs at 22% and 29% respectively for Crossmolina North and South. Household sizes averaged at 2.8 persons per household, with averages slightly lower in the more urban Crossmolina EDs (2.5 and 2.7 persons per household respectively for Crossmolina North and South). Sixty three percent of houses within the 6 EDs were serviced by septic tanks, again, with lower percentages in Crossmolina North (26%) and Crossmolina South (46%) as the town is serviced by a mains sewerage system. In rural EDs, an average of 88% of houses were recorded as serviced by septic tanks.



### 3.3.3 Industry and Business

Crossmolina is located seven miles west of Ballina, which is considered a national 'linked development hub' town with Castlebar in the National Spatial Strategy. This proximity to an employment centre therefore influences the employment opportunities available to inhabitants of Crossmolina and other rural areas surrounding Ballina. The primary type of employment provided in the town of Crossmolina is service based employment, in addition to employment generated by agricultural and tourist industries.

The 2011 census also provided information about the journey time to work, school or college where applicable. Within the 6 ED Study Area, 71% of respondents have a journey time of less than 30 minutes to their work or education, which indicates that the majority of employment and educational facilities are located relatively close by.

The 2011 Census data for the EDs in the Study Area shows that the industries which employ the greatest percentage of persons are Professional Services (21.4%), Commerce and Trade (19.6%) and Agriculture, Forestry and Fishing (13.6%). A greater percentage of females are employed in the professional services and 'other' industries; with a larger proportion of males employed in the Agriculture, Forestry and Fishing and Building and Construction Industries.

### 3.3.4 Tourism

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. During 2011 (the latest period for which Fáilte Ireland figures are available), total overseas visitors to Ireland were 9.9 million, a decrease from the previous years. According to Fáilte Ireland, the fall in tourist numbers and associated revenue in recent years is due to the global downturn and unfavourable exchange rates with the euro. Expenditure by overseas visitors to Ireland in 2011 was estimated to be worth €3.1 billion, down from €3.9 billion in 2009. (Source: *Fáilte Ireland*)

Ireland is divided into seven tourism regions. The West Region, in which the Study Area is located, comprises Counties Clare, Galway and Mayo. During 2011, Mayo benefited from 2.7% of the total overseas visitors to the country and a similar percentage revenue (€83M or 2.6%) of the total tourism income generated in Ireland for that year.

Table 3.3.1 provides Fáilte Ireland figures showing the type of activities that overseas tourists engaged in and a breakdown of the percentages that undertook each activity. From these figures it can be seen that Historical/cultural visits form the majority of all activities enjoyed in Ireland but with other activities including visiting gardens, hiking/walking, golf, fishing, cycling and equestrian pursuits and also significant activities in terms of tourism.

Fáilte Ireland data relating to the times of year that overseas tourists visit Ireland indicates that the peak season is July and August with less activity in the months of May, June and



September and relatively low visitor activity during the winter autumn, winter and early spring months October – April.

Holiday - Activities Engaged in (%)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Fishing	4	4	3	1	2	2	2	3	3	3	3
Equestrian Pursuits	2	2	1	1	1	1	1	1	1	1	1
Golf	6	7	4	2	3	3	3	5	4	3	3
Cycling	3	3	2	3	3	2	1	2	3	2	2
Hiking/ Walking	9	7	5	5	4	6	7	9	17	11	20
Historical/ Cultural visits	43	53	52	42	44	54	56	67	74	67	73
Visits to gardens	11	17	12	9	9	12	12	18	21	23	33

**Table 3.3.2 Activities undertaken by overseas visitors whilst visiting Ireland**

#### 3.3.4.1 Tourism Angling

The most recent survey undertaken by Fáilte Ireland (2005) found that while numbers of anglers have increased gradually from an all-time low of 56,000 visitors in 2002, the potential for growth remains. Excellent local angling is available on the River Deel and on nearby Lough Conn, in addition to the River Moy in Ballina.

#### 3.3.4.2 Local Tourist Attractions

Crossmolina.ie and crossmolina.net websites list a number of local attractions as outlined below:

##### *Crossmolina Looped Walks*

A series of Looped Walks were developed, consisting of Local Town Walks, Woodland (Heritage) Walks and Mountain Walks. The distances vary in length from 3km to 12 km.

##### *Kayaking on Lough Conn*

Kayaking on Lough Conn is available based from Gortnor Abbey Harbour, allowing participants to access the lake and River Deel within a short distance.

##### *Golf, Hiking and Boating*

Boating on Lough Conn and hiking in the general area are also available to locals and visitors to the area. Crossmolina is centrally located for golf enthusiasts with a number of gold courses within a short driving distance, including Ballina, Enniscrone, Castlebar and Belmullet.

##### *History and Archaeology*

Crossmolina and surrounding areas are dotted with a wealth of historical and archaeological sites. The ruin of Abbeytown Abbey is 1.5km north of Crossmolina and the ruins of Errew Abbey can be seen 10.5km south-east of Crossmolina, while the ruins of the 16<sup>th</sup> century Deel Castle are to be found at the northern end of Lough Conn.



There are a number of visitor centres within 30 minutes' drive of Crossmolina, including:

North Mayo Heritage Centre at Enniscrone  
Céide Fields Visitor and Interpretative Centre  
Foxford Woollen Mills  
National Museum of Country Life, Turlough

The annual Crossmolina Community Festival takes place at the end of July each year.

### **3.3.5 Community Facilities**

#### **3.3.5.1 Education**

Educational facilities in Crossmolina include the local play school and mixed Crossmolina National School, which has 158 pupils on the roll for 2011/2012 and is located in a relatively recently constructed purpose-built building (opened 2000). Glenmore National School is also located within 7km of Crossmolina. Second level students are catered for by St. Tiernan's College, administered by the VEC and located in Crossmolina with approx. 250 students. In addition, Jesus and Mary Secondary School at Gortnor Abbey, which recently celebrated its centenary, is also located within the Study Area and caters for students from the vicinity.

#### **3.3.5.2 Sports and Recreation**

There are a number of sports clubs in Bandon; the local GAA club, Deel Rovers have playing pitches and changing facilities on the N59 to the west of the town centre. The club has a number of underage teams and the area is also home to a Ladies GAA club. Badminton, boxing and basketball are also facilitated by local clubs, in addition to soccer at Kilmurray. Youth of all ages in the area can participate in Ladybirds and Brownies clubs in addition to the local Foróige club.

#### **3.3.5.3 Local Amenities**

The Crossmolina Town Trail was developed by the local Tidy Towns Committee, in addition to a LEADER funded Biodiversity Plan which was drawn up in 2011 on behalf of the Crossmolina Community Council. As part of the trail, a brochure is available online, in addition to plaques on the various features around the town, which incorporates historical, archaeological and other local interest information. A riverwalk was also developed in 1990, which includes some signage and ecological interpretative information about rare species using the River Deel.

### **3.3.6 Key Constraints**

- In designing the proposed scheme, the value (both cultural and economic) of any buildings (Residential, Retail, etc) close to river edge or likely to be adversely



affected by the scheme should be taken into account. In addition, adverse impacts on buildings or structures of conservation interest should be minimised or avoided where possible.

- Any design proposals should ensure that Bridge links between eastern and western sides of the town are maintained so that temporary or permanent disruption on local transport links in the town and route along the N59 between Ballina and West Mayo are minimised.
- The design of the scheme should consider the public amenity value of the Study Area. Impacts on public amenity areas adjacent to the river should be considered, with replacement mitigation proposed if necessary. Access by anglers and visibility of the river as a tourist attraction should be given consideration as part of any proposed scheme.
- Impacts on especially sensitive receptors e.g. schools, church, day care centre, should be considered in the flood risk assessment.



### **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:

- Ummerantary 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, Cuilkilllew (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 (*Autopotamobius 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 Rhynchosporion.
- 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.



### **3.5 WATER**

This section of the Constraints Study describes the existing hydrological environment of the Study Area and the immediate surrounding area, in addition to the potential impacts arising as a result of the River Deel (Crossmolina) Flood Relief Scheme.

#### **3.5.1 Methodology**

The establishment of potential hydrological constraints within the Study Area involved a review of desktop information, including:

- EPA water quality database and maps
- Well card data compiled by the Geological Survey of Ireland (GSI)
- National Water Study, County Mayo (2000)
- OPW Database of Hydrometric Stations
- Western River Basin District Management Plan (2009 – 2015)

The desktop study was supplemented by a site visit to the Study Area on 24<sup>th</sup> October 2012, in order to further establish the overall hydrological regime within the Study Area.

#### **3.5.2 Receiving Environment**

##### **3.5.2.1 Water Supply**

###### **3.5.2.1.1 Existing River Abstractions**

There is no record of surface water abstraction from the River Deel for human consumption. There is a public water supply scheme in operation in Crossmolina town, along with a number of Group Water Schemes in operation in and in the vicinity of the Study Area. The public supply to Crossmolina town is fed by a combination of the Ballina Regional Water Supply Scheme and a local groundwater source described in the section below. The Ballina Regional Water Supply Scheme is supplied by Lough Conn from an intake works at Wherrew, located downstream of Crossmolina on the north eastern shore of the lake.

Part of the public water supply scheme and the Group Water Schemes are fed by groundwater sources as described below.

###### **3.5.2.1.2 Existing Groundwater Abstractions**

Well card data produced by the Geological Survey of Ireland (GSI) indicates that there are four wells in the vicinity of the Study Area which are used for potable water supply and agricultural purposes.

There are three groundwater abstractions for potable use within the study area, including an abstraction for the Tobermore Group Water Scheme, the Carrowkeel Group Water



Scheme and the Crossmolina Public Water Supply Scheme. The locations of these wells are shown in Appendix D.

A groundwater abstraction for the Crossmolina Public Water Supply is located in the townland of Tobermore and provides 910m<sup>3</sup>/day from a small pump house at the well. It is noted that Crossmolina town was connected to the Ballina Regional Water Supply Scheme in 2007 as described above, however this groundwater source remains the predominant supply for the town at the time of this report.

There is an additional groundwater abstraction point within the Study Area located in the townland of Knockbaun which is used for agricultural and domestic purposes.

#### 3.5.2.1.3 Hydrometric Stations

There is a gauging station located on the River Deel located at Ballycarroon upstream of Crossmolina town. OPW is responsible for the management of this automatic recorder. Information from this gauging station was also utilised by the OPW in the study of the recurring flooding in Crossmolina.

#### 3.5.2.1.4 Surface Water Features

The main hydrological feature within the Study Area is the River Deel, which flows into the Study Area from the south-west. The river flows south-westwards through the town of Crossmolina before veering to the north and then arcing southwards to where it enters Lough Conn in the townland of Wherrew (Grid reference: E117,010 N317,060).

In addition, there are three main tributaries that flow into the Deel River within the Study Area; the Tooreen and Rathnamagh Rivers and the Rappa Stream.

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. One monitoring station is located on the Rappa Stream and monitoring data from this station is included in this Section. 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. These Q value ratings are shown in Table 3.5.1.

Quality Ratings	Quality Class	Pollution Status	Condition (re beneficial uses)
<b>Q5, Q4-5, Q4</b>	Class A	Unpolluted	Satisfactory
<b>Q3-4</b>	Class B	Slightly Polluted	Unsatisfactory
<b>Q3, Q2-3</b>	Class C	Moderately Polluted	Unsatisfactory
<b>Q2, Q1-2, Q1</b>	Class D	Seriously Polluted	Unsatisfactory

**Table 3.5.1 Q value classification**

In addition, various chemical parameters were also tested and are available for some of the monitoring points. Biological and chemical data for a number of the monitoring points within the study area are shown in Tables 3.5.2 and 3.5.3 below.

Information was gained on the River Deel as a whole, including seven monitoring points that are within the Study Area (highlighted in blue in Tables 3.5.3 and 3.5.4 overleaf) and three that were located upstream (Bridge at Keenagh, Deel Bridge and the Ford S.W. of Knockbrack).

Biological Quality Ratings (Q Values)														
	Station Nos.	1971	1973	1977	1980	1984	1989	1993	1995	1998	2001	2005	2007	2010
Bridge at Keenagh	0006	-	-	-	-	-	5	4-5	4-5	4	4	4	4	4
Deel Bridge	0010	-	-	-	5	5	4-5	4-5	4	4	4	4	4	4
Ford S.W. of Knockbrack	0025	-	-	-	4-5	4-5	4-5	4	4	3-4	4	4	4	4
Ford at Ballymulty	0050	-	-	-	-	5	-	-	-	-	-	-	-	-
Ford E. of Ballycarroon House	0100	5	-	-	5	5	4-5	4-5	4	4-5	5	4-5	4-5	4-5
Crossmolina Bridge	0120	-	-	-	-	-	-	-	-	-	-	4	4-5	4
S.E. of Crossmolina	0150	-	-	-	4	-	4	4	-	-	-	-	-	-
800m d/s Crossmolina Bridge	0200	-	-	-	-	-	4-5	4-5	-	4	-	4-5	-	-
1.3km d/s Crossmolina Bridge	0250	-	-	-	-	-	-	-	3	-	4	4	-	-
Knockadangan Bridge	0300	5	5	4-5	3-4	3-4	4	5	3-4	4	4-5	4	4	4
Bridge at Deelcastle	0400	-	-	-		4	4-5	4-5	4	4-5	4-5	4-5	-	4-5

**Table 3.5.2 Biological water quality in the Deel River Study Area based on EPA data**

Chemical Data				
Parameter	Unit	Station No. 0010 Deel Br		
		Minimum	Mean	Maximum
Alkalinity-total	mg/l CaCO <sub>3</sub>	4.0	27.4	101.0
Chloride	mg/l Cl	11.0	20.3	28.0
Conductivity @25°C	µS/cm	51.0	132.7	291.0
pH		6.0	7.2	8.0
Temperature	°C	4.3	9.5	14.9
Total Hardness	mg/l CaCO <sub>3</sub>	15.0	44.5	119.0
True Colour	Hazen	56.0	117.1	245.0
Nitrite	mg/l N	0.003	0.003	0.003
ortho-Phosphate	mg/l P	0.006	0.018	0.034
Total Oxidised Nitrogen	mg/l N	0.200	0.200	0.200
Ammonia-Total	mg/l N	0.015	0.022	0.050
BOD - 5 days (Total)	mg/l O <sub>2</sub>	0.5	0.8	1.6
Dissolved Oxygen	% Saturation	87.0	96.0	105.0
Parameter	Unit	Station No. 0100 – Ford E. of Ballycarroon House		
		Minimum	Mean	Maximum
Alkalinity-total	mg/l CaCO <sub>3</sub>	11.0	56.4	131.0
Chloride	mg/l Cl	14.0	21.6	30.0
Conductivity @25°C	µS/cm	95.0	190.4	340.0
pH		6.7	7.5	8.2
Temperature	°C	4.4	9.7	14.8
Total Hardness	mg/l CaCO <sub>3</sub>	15.0	73.9	158.0
True Colour	Hazen	57.0	119.1	278.0
Nitrite	mg/l N	0.003	0.003	0.003
ortho-Phosphate	mg/l P	0.006	0.018	0.026
Total Oxidised Nitrogen	mg/l N	0.200	0.213	0.400
Ammonia-Total	mg/l N	0.015	0.017	0.040
BOD - 5 days (Total)	mg/l O <sub>2</sub>	0.5	0.7	1.8
Dissolved Oxygen	% Saturation	94.0	98.5	106.0
Parameter	Unit	Station No. 0300 – Knockadangan Bridge		
		Minimum	Mean	Maximum
Alkalinity-total	mg/l CaCO <sub>3</sub>	20.0	137.4	292.0
Chloride	mg/l Cl	13.0	24.2	34.0
Conductivity @25°C	µS/cm	133.0	351.3	656.0
pH		6.7	7.7	8.2
Temperature	°C	3.0	11.1	17.7
Total Hardness	mg/l CaCO <sub>3</sub>	43.0	159.9	340.0
True Colour	Hazen	27.0	114.6	281.0



Nitrite	mg/l N	0.003	0.003	0.008
ortho-Phosphate	mg/l P	0.005	0.023	0.052
Total Oxidised Nitrogen	mg/l N	0.050	0.487	1.400
Total Phosphorus	mg/l P	0.010	0.033	0.095
Ammonia-Total	mg/l N	0.003	0.018	0.076
BOD - 5 days (Total)	mg/l O <sub>2</sub>	0.5	0.9	2.8
Dissolved Oxygen	% Saturation	63.0	95.1	120.0
Suspended Solids	mg/l	1.0	5.8	20.0

**Table 3.5.3 Chemical water quality in the Deel River Study Area based on EPA data**

Table 3.5.4 below shows the surface water quality standards applied across a range of relevant legislation.

Parameter	Units	European Communities (Quality Of Surface Water Intended For The Abstraction Of Drinking Water) Regulations, 1989 (S.I. No. 294/1989)*	European Communities Environmental Objectives (Surface Water) Regulations (S.I. No. 272 of 2009)	European Communities Drinking Water Regulations S.I. 106 of 2007	Salmonid Water Regulations (Mandatory Level) (S.I. No. 293 of 1988)
BOD	mg/l	5 – A1 & A2 7 – A3	High status ≤1.3 (mean) or ≤2.2 (95%ile)  Good status ≤1.5 (mean) or ≤2.6 (95%ile)	N/A	≤ 5
Suspended Solids	mg/l	50	N/A	N/A	≤ 25
pH	-	5.5-8.5 – A1 5.5-9.0 – A2 & A3	4.5-9.5 (Soft Water) 6.0-9.0 (Hard Water)	≥ 6.5 & ≤ 9.5	≥ 6 & ≤ 9
Conductivity	μS/cm	1,000	N/A	2,500	N/A
Phosphates	mg/l P <sub>2</sub> O <sub>5</sub>	0.5 – A1 & A2 0.7 A3	N/A	N/A	N/A
Molybdate Reactive Phosphorus (MRP)	mg/l P	N/A	High status ≤0.025 (mean) or ≤0.045 (95%ile)  Good status ≤0.035 (mean) or ≤0.075 (95%ile)	N/A	N/A
Chloride	mg/l Cl	250	N/A	250	N/A
Ammonium	mg/l NH <sub>4</sub>	0.2 – A1 1.5 – A2 4 – A3	N/A	N/A	≤ 1.0
Total Ammonia	mg/l N	N/A	High status ≤0.040 (mean) or ≤0.090 (95%ile)  Good status ≤0.065 (mean) or ≤0.140 (95%ile)	N/A	N/A
Nitrate	mg/l NO <sub>3</sub>	50	N/A	50	N/A
Nitrite	mg/l NO <sub>2</sub>	N/A	N/A	0.5	≤ 0.05
Dissolved	-	>60% - A1	Lower limit: 95%ile>80%	N/A	50% ≥ 9 mg/l

Parameter	Units	European Communities (Quality Of Surface Water Intended For The Abstraction Of Drinking Water) Regulations, 1989 (S.I. No. 294/1989)*	European Communities Environmental Objectives (Surface Water) Regulations (S.I. No. 272 of 2009)	European Communities Drinking Water Regulations S.I. 106 of 2007	Salmonid Water Regulations (Mandatory Level) (S.I. No. 293 of 1988)
Oxygen		>50% - A2 >30% - A3	saturation Upper limit: 95%ile<120 %saturation		
Total Hardness	mg/l CaCO <sub>3</sub>	N/A	N/A	N/A	N/A
Copper	mg/l Cu	0.05 –A1 0.1– A2 1.0 – A3	5 - water hardness ≤100mg/l CaCO <sub>3</sub> 30 - water hardness >100mg/l CaCO <sub>3</sub>	2.0	≤ 0.005 [1, 6] ≤ 0.022 [2, 6] ≤ 0.04 [3, 6] ≤ 0.112 [4, 6]
Zinc	mg/l Zn	3–A1 5- A2 & A3	0.008 - water hardness ≤10mg/l CaCO <sub>3</sub> 0.05 - water hardness>10 ≤100mg/l CaCO <sub>3</sub> 0.1- water hardness >100mg/l CaCO <sub>3</sub>	N/A	≤ 0.03 [1, 6] ≤ 0.2 [2, 6] ≤ 0.3 [3, 6] ≤ 0.5 [5, 6]
Total coliforms	no/100ml	5,000 – A1 25,000 – A2 100,000 – A3	N/A	N/A	N/A
Faecal coliforms	no/100ml	1,000 – A1 5,000 – A2 40,000 – A3	N/A	0	N/A

**Table 3.5.4 Mandatory levels for physiochemical parameters for specific legislation**

[1] At water hardness 10 mg/l CaCO<sub>3</sub>; [2] At water hardness 50 mg/l CaCO<sub>3</sub>; [3] At water hardness 100 mg/l CaCO<sub>3</sub>; [4] At water hardness 300 mg/l CaCO<sub>3</sub>; [5] At water hardness 500 mg/l CaCO<sub>3</sub>; [6] To be conformed with by 95% of samples over a period of 12 months where sampling is carried out at least once a month; where sampling is less frequent, to be conformed with by all samples.

\*S.I. No. 294/1989 is superseded by S.I. No. 272 of 2009. If a particular parameter is not found in SI 272 of 2009 then the 1989 value applies.

### Water Framework Directive

The Study Area is located within the Water Framework Directive (WFD) Western River Basin District and the management plan for this area was consulted. The main objectives of this management plan were to prevent deterioration, restore good status, reduce chemical pollution in surface waters and to achieve water-related protected areas objectives. The programme of measures designed to achieve these objectives are outlined in this document and include the following:

- Control of urban waste water discharges
- Control of unsewered waste water discharges
- Control of agricultural sources of pollution
- Water pricing policy



- Sub-basin management plans and programmes of measures for the purpose of achieving environmental water quality objectives for Natura 2000 sites designated for the protection of Freshwater Pearl Mussel populations
- Pollution reduction programmes for the purpose of achieving water quality standards for designated shellfish waters
- Control of environmental impacts from forestry

Information on status, objectives and measures in the Western RBD has been compiled for smaller, more manageable geographical areas than river basin districts, termed water management unit action plans. There are 16 water management units (WMUs) in the Western RBD. These units represent smaller river and lake basins where management of the pressures, investigations and measures will be focussed and refined during implementation of this plan. In addition, action plans focusing on groundwater and a transitional and coastal water management have been prepared for the Western RBD. WMU action plans are key background documents to the plan.

The Study Area is within the Conn Water Management Unit (WMU). There are 104 river water bodies in this WMU –24% High, 58% Good, 13% Moderate and 5% Poor Status. In addition, there are 13 lake water bodies within this WMU – 46% High, 8% Good and 46% Moderate Status. The status of the various water bodies in this area is calculated using the EPA data described above.

The status of the Deel is described in the Conn WMU as follows:

*‘The upper reaches of the Deel river network are at Good status, with some tributaries such as the Glasheens river and the Shanvolahan river at Moderate status. The middle part of the Deel is at High status, with the inflowing Owenbeg river at Good status also. Entering and exiting the village of Crossmolina, the Deel river is at Moderate status, with tributaries such as the Tooreen and Rathnamagh river entering downstream of the village at Good status. One of the tributaries, the Rappa stream has Poor status. The section of the Deel entering Lough Conn is classed as Moderate status’.*

The identified pressures/risks in this WMU include the following:

- Nutrient Sources: Over 80% of Total Phosphorus load within the WMU is from diffuse sources, with agriculture accounting for over 70% of TP and forestry accounting for 10% of TP.
- Point Pressures: There are 10 Waste-water Treatment Plants (WwTPs), 12 Section 4 licenced facilities, 2 Section 16 licenced facilities 4 IPCC licenced facilities and



two Water Treatment Plants (WTPs) within the WMU, as well as numerous Group Water Scheme (GWS) abstractions.

- Wastewater Treatment Plants and Industrial Discharges: Crossmolina WWTP is within the Study Area. Risks connected to this WWTP relate to insufficient BOD and nutrient assimilative capacity and historical deterioration in downstream Q value within 3km of outfall.
- Quarries: There are 8 quarries within the WMU.
- Agriculture: 21 water bodies have been determined to be at risk from agriculture within the WMU.
- On-site Water Treatment Systems: There are 9,363 OSWTS within the WMU Boundary, 8,685 OSWTS lie within 104 river water bodies. Within the river water bodies 1,147 OSWTS constitute a potential risk to waters because of where they are sited and constitute a risk to 7 water bodies
- Forestry: There are 9 water bodies within the WMU that have been determined to be at risk from forestry
- Morphology: There are 22 water bodies that have been determined to be at risk from morphology within the WMU
- Abstractions: One water body has been determined to be at risk from abstractions within the WMU : IE\_WE\_34\_2843 (Derryhick Lough)

In a scoping response dated the 3<sup>rd</sup> October 2012, the Western River Basin District (WRBD) office provided the following information and comments concerning the status of the waterbodies within the Study Area:

- The ecological status of Lough Conn has improved from moderate (interim status) to good (updated status) in the last five years. This status must be maintained.
- As the lake is designated as an SPA and is part of the River Moy cSAC, an Appropriate Assessment screening report will be necessary to determine if significant adverse impacts may occur. If a disturbance is likely both mitigation measures and possible alternatives must be proposed.
- The River Deel is designated as part of the River Moy SAC and therefore the protection of the annexed species and habitats for which it is selected must be prioritised.



- Issues such as siltation of salmonid spawning grounds and pearl mussel beds, as well as disturbance during peak salmonid migration and spawning periods must be taken into account.
- It is essential that any flood relief scheme takes into account the current ecological water body status and the overall conservation restore date for the waterbody.
- High and good status waterbodies need to be protected and their status retained
- The status of the poor and moderate water bodies cannot decrease and any flood relief scheme needs to include proposals to maintain or improve their ecological status.
- It is recommended that each waterbody in the Study Area should be independently assessed to confirm its current ecological status.

The full text of this scoping response is included in Appendix A to this report.

#### 3.5.2.2 Hydrogeology

The Geological Survey of Ireland (GSI) online database shows the Study Area as being underlain by Regionally Important bedrock aquifers along with a locally important sand/gravel aquifer which occupies the majority of the South Eastern portion of the Study Area. An extract from the GSI Online Database is included in Appendix D showing the location of aquifers in the Study Area.

The GSI online database has a record of one karst feature within the Study Area, namely a spring located in the vicinity of the Tooreen River to the west of Crossmolina. No other karst features are recorded on the database within the Study Area, however, local anecdotal information suggests that there are several more karst features within the Study Area including swallow holes and caves in the vicinity of the River Deel at Ballycarron. These were not evident during a site visit on the 24 October 2012, however they may be evident at lower water levels.

The direction of groundwater flow is likely to be influenced by the topography of the surrounding area. Groundwater within the Study Area is likely to be hydraulically connected to the River Deel and its tributaries.

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

- The design of the proposed River Deel (Crossmolina) Flood Relief Scheme should take into account the impacts (both Quality and Quantity) that any proposed flood relief scheme might have on the yields of existing groundwater abstractions, taking into account the presence of productive gravel aquifer's within the Study Area.

- The design of the proposed flood relief scheme should take into account the main objectives of the Water Framework Directive River Basin District Management Plan (RBDMP) by ensuring that any works proposed do not result in the deterioration of water quality and where possible contribute to the achievement of “good” status within the Study Area.



### **3.6 SOILS AND GEOLOGY**

This section describes the soils and geology underlying the Study Area for the River Deel (Crossmolina) Flood Relief Scheme.

#### **3.6.1 Methodology**

The section describes the bedrock geology, superficial deposits, economic geology and geological heritage of the Constraints Study Area identified from desktop information sources only. An inventory of the geological constraints identified by this desktop study is detailed below.

Soils and Geology constraints have been assessed with reference to the following:

- The Geological Survey of Ireland (GSI) online database
- Mayo County Council Planning Department (Application for Registration of Quarries under Section 261, Planning and Development Act 2000),
- Mayo County Development Plan (2008 - 2014)
- Concrete Products Directory (Irish Concrete Federation)
- Aerial Photographs
- ENVision Mines Site, the EPA's online Historic Mines Inventory

#### **3.6.2 Receiving Environment**

##### **3.6.2.1 Bedrock Geology**

The River Deel rises in the Nephin Beg mountain range at the foot of Birreencorragh Mountain. It flows northward through the valley between the Bullaunmore and Birreencorragh mountains and continues in this direction until turning eastward where it intersects the R312. The river continues eastwards until it enters the Study Area at Ballycarroon and gradually turns northward to flow through Crossmolina town. Downstream of Crossmolina, the River Deel loops around to the East and South to discharge into Lough Conn just north of Wherrew. Its total length is approximately 36km.

The Geological Survey of Ireland (GSI) Online Database indicates that the Study Area is underlain by Limestone with calcareous shale and contains Marine Shelf facies which indicate oceanic influence during the bedrock formation.

The GSI Online Database shows variable subsoil within the Study Area. A significant deposit of Glaciofluvial Sands and Gravels with small pockets of Peat and Till derived chiefly from Limestone extends in a South Westerly direction from Crossmolina town. The portion of the Study Area to the North East of Crossmolina town is dominated by Till derived from Limestone, with large pockets of Peat and Alluvium in the vicinity of the Deel and Tooreen Rivers. A very small amount of Alluvium is also present in the immediate vicinity of the River Deel near Ballycarroon. Pockets of Lake Deposits are recorded in the vicinity of Lough Conn while the subsoils underlying Crossmolina town are described as



Made Ground. Appendix E contains extracts from the GSI Online Database showing the geology in the Study Area.

### 3.6.2.2 Economic Geology

The term 'economic geology' refers to commercial activities involving soil and bedrock. The activities involved principally comprise aggregate extraction (sand and gravel pits and quarries) and mining. A number of sources were examined for information on such commercial activities within the Study Area, including the:

- Mayo County Development Plan (2008 - 2014)
- Concrete Products Directory (Irish Concrete Federation)
- Aerial Photographs
- ENVision Mines Site, the EPA's online Historic Mines Inventory

A review of the abovementioned sources has revealed that there is no mining activity in or in the vicinity of the Study Area.

### 3.6.2.3 Geological Heritage

To date, sites of geological interest have not been comprehensively covered by existing nature conservation designations. This is currently being addressed by the Department of Environment, Communications & Local Government and the Geological Survey of Ireland who are drawing up a list of sites of geological interest which will be proposed as Natural Heritage Areas in the future.

The Mayo County Development Plan (2008 - 2014) states '*In addition to sites designated under European and national legislation, there are also other areas in the County, which are of recognised conservation value, including a number of geological and geomorphological sites. Such area are recognised as stepping stones and components of wider ecological corridors and networks, the maintenance of which are necessary to halt or reverse the negative effects of progressive or cumulative habitat fragmentation.*'

The Development Plan identifies 121 sites of geological and geomorphological interest in the county which could potentially become proposed Natural Heritage Areas (pNHAs). None of the 121 sites are located within the Study Area.

There is one pNHA within the Study Area, however it is considered separately in Section 3.4 of this Constraints Study Report.

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

- It is recommended that a preliminary geotechnical investigation be carried out once the potentially viable flood risk management measures are developed in order to identify local geology and ground conditions.





### **3.7 ARCHAEOLOGY AND ARCHITECTURAL HERITAGE**

This section describes the archaeological and heritage constraints within the Study Area of the River Deel (Crossmolina) Flood Relief Scheme.

#### **3.7.1 Methodology**

An Archaeological and Architectural Heritage Constraints Study was commissioned in order to identify all recorded archaeological monuments and protected structures within the Study Area including the legal status, if any, of these features.

This study is based on a detailed desk study of the archaeological, architectural and cultural heritage resource within the Study Area (published & non-published datasets). This information has provided an insight into the development of the Study Area over time and an evaluation of both recorded and potential cultural heritage sites.

The principal sources reviewed for the archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). The Record of Protected Structures (RPS), as published by Mayo County Council and was reviewed in order to assess the architectural heritage. The following sources were also consulted:

- Various editions of Ordnance Survey maps;
- Excavations Database ([www.excavations.ie](http://www.excavations.ie));
- County Mayo Heritage Plan 2011-2016
- Mayo County Development Plan 2008-2014;
- National Inventory of Architectural Heritage;
- Aerial imagery; and
- Various published sources.

A full copy of the full Archaeological Constraints Report is included in Appendix F.

#### **3.7.2 Receiving Environment**

The tables presented in Appendix F provide lists of the various protected archaeological and architectural heritage sites within the Study Area. The key constraints that are protected by legislation comprise the recorded archaeological monuments (RMP Table 1.1; Appendix F) and protected structures (RPS Table 1.2; Appendix F). There may be some overlap between these two categories as built structures can be listed in both the RMP and RPS. In addition, a number of areas of cultural heritage potential identified through consultation of cartographical sources have also been included (Table 1.3; Appendix F). These are not protected structures or recorded archaeological monuments but may indicate the presence of potential unrecorded cultural heritage features.



It is recommended that, where possible, the scheme be designed to avoid any impacts on the 70 archaeological sites listed in Table 1.1 (Appendix F). Given the provisions of the National Monuments Acts, no disturbance or interference to any archaeological sites listed in the RMP can take place without first consulting the National Monuments Service. In the event that flood risk management measures, or increased potential for flooding, are required in the vicinity of any of recorded archaeological sites it is recommended that appropriate mitigation measures be designed in consultation with the National Monuments Service.

There is also the potential for the presence of unrecorded archaeological sites and artefacts within the Study Area. This is demonstrated by the recovery of a bronze axehead on the shores of the River Deel during 1960s arterial drainage works and the discovery of a number of previous archaeological sites during previous site investigation works in the Study Area. Any lands that may be impacted by ground disturbance works required by the proposed scheme (e.g. access tracks, compounds, site clearance works, trial-pits) may require archaeological investigations, such as test trenching or monitoring of works. The appropriate mitigation measures will be determined during the design phase in consultation with the National Monuments Service.

In the event that dredging, channel widening or embankment works along the river will be required as part of flood relief scheme, then there will be the potential for impacts on both recorded and unrecorded heritage features within the river channel, such as bridges, weirs, fords, wrecks, landing features, etc. If such works are to be considered as part of the design it is recommended that the Underwater Archaeological Unit, National Monuments Service be consulted in order to agree the appropriate underwater archaeological assessment and mitigation strategies. The riverine assessments required may consist of river bank and underwater archaeological surveys, test trenching around the bridges and other potential heritage sites along the river course and full monitoring of all sediment extraction works.

All Record of Protected Structures sites have statutory protection and avoidance of these features is recommended. In the event that works are required that may have a negative impact on protected structures then prior consultation with Mayo County Council will be required.

Should works be required in the vicinity of recorded archaeological monuments and protected structures then the formulation of site specific mitigation strategies is recommended. This will be carried out in consultation with the National Monuments Service and Mayo County Council. It is advised that this takes place well in advance of main construction works in order to allocate adequate time and resources to implement the agreed mitigation measures. Depending on the nature and extent of the works the mitigation measures may take the form of pre-works assessment (including test trenching) and/or monitoring of construction works carried out during the scheme.



It is also recommended that consideration should be given to the avoidance of visual impacts on protected archaeological and architectural heritage sites as part of the design of the proposed scheme.

### **3.7.3 Summary of Key Constraints and Implication for the Proposed Scheme**

- Given the provisions of the National Monuments Acts, no disturbance to, or interference with, any known archaeological sites can take place without first consulting the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht (DAHG).
- It is recommended that all impacts on identified archaeological and heritage sites, and their immediate vicinities, be avoided in the design of the proposed flood relief scheme.
- Should this not be possible then archaeological investigations are recommended for archaeological and heritage sites in the vicinity of, or those that would be directly impacted by the proposed scheme. It is recommended that this programme take place well in advance of construction works in order to allocate adequate time to evaluate and record any archaeological features that may be revealed.
- It is recommended that any ground disturbance works associated with the proposed scheme be assessed for archaeological monitoring. Appropriate mitigation should be determined during the design phase in consultation with the National Monuments Service (DAHG).
- It is recommended that the Underwater Archaeological Unit (DAHG) be consulted during the design of the proposed flood relief scheme in order to agree appropriate underwater archaeological assessment and mitigation strategies. Depending on the flood alleviation measures chosen, the riverine assessments required by the DAHG may consist of river bank and underwater archaeological survey pre-works, possible testing around the bridges and other sites along the river course, and full monitoring of all works.
- All Record of Protected Structures sites have statutory protection and avoidance of these features is recommended.
- The National Monuments Service of the Department of Arts, Heritage and the Gaeltacht should be consulted at all stages of the scheme development.



### 3.8 LANDSCAPE

This section of the Constraints Study Report addresses the landscape and visual constraints that have been identified within the Study Area. The Study Area is described with reference to Landscape Character and Landscape Type, and the ratings that have been assigned to it in terms of Sensitivity. The relevant recommendations that have been set out for this area by Mayo County Council in terms of landscape and visual characteristics are also addressed.

#### 3.8.1 Methodology

This section of the Constraints Study is based on a desk study of the previous landscape character assessments and reviews that have been carried out within the Study Area. It incorporates a description of the policies and objectives of Mayo County Council with regards to Landscape Character Assessment, Scenic Amenity, Views and Prospects, and Scenic Routes, with specific reference to the Study Area location. The primary sources of information consulted during the course of the desk study include:

- Mayo County Development Plan 2008-2014
- Landscape Appraisal of County Mayo, 2008
- Environmental Protection Agency CORINE Land Cover Map

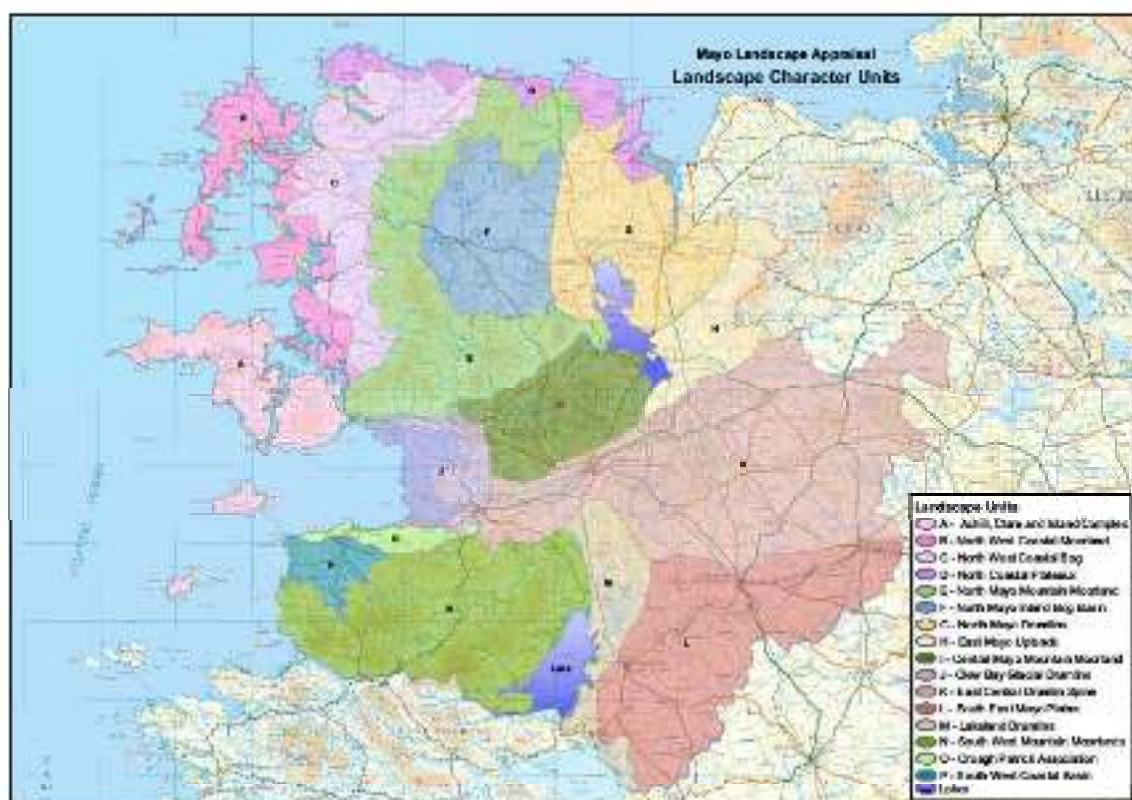
#### 3.8.2 Receiving Environment

##### 3.8.2.1 Landscape Character Units

It is mandatory objective of the current Mayo County Development Plan to preserve the character of the county's landscape. One of the County Development Plans Environment Development aims is to '*ensure that the resource that is Mayo's diversity and variety of landscapes is utilised prudently and sustainably and that new development is integrated sympathetically into the landscape in a manner that will ensure that the landscape can be handed on to future generations without being degraded*'.

The Landscape Appraisal of County Mayo, which forms part of the Mayo County Development Plan, identifies and describes the landscape character of the entire County.

The Landscape Appraisal of County Mayo, which was included as an Appendix to the County Development Plan 2008 – 2014 subdivides the county into 16 landscape character units, each of which contains an area of land that has similar elements such as slope, vegetation and land-use. The Study Area for this assessment is located entirely within Landscape Character Unit G: North Mayo Drumlins. Figure 3.8.1 shows a map of the landscape character units in Co. Mayo.



**Figure 3.8.1 Landscape Character Units in Co. Mayo**

The Landscape Appraisal Report describes this area as follows:

*'This area of drumlin topography contains mild low lying lakeland drumlins at the southern end merging into similar coastal topography in the north east surrounding Killala Bay. More severe, steeper drumlins occur around the foothills of the mountains to the north-west and the Ox Mountains to the east. The flood plain of the River Moy is also incorporated within this area. The land cover is dominated by pasture with sporadic areas of moorland and patches of exposed rock in the rugged drumlins to the east. Hedgerows and small patches of scrub and woodland create a patchwork of farmer landscapes in this area.'*

The boundary of this Landscape Character Unit is defined to the west by a combination of land cover, geology, soil type, and a progression to flat bog topography. The boundary to the north west, south west and east is marked by the change in slope and topography, while to the north the inland limits of directly draining coastal water sheds form the boundary.

Critical landscape factors, which define Landscape Character Unit G, are listed below:

- Mildly undulating topography represented by glacial drumlins,



- Shelter vegetation,
- Primary ridge lines (visible only against the sky from any prospect) and secondary ridgelines (visible at least from some prospects below a distant primary ridge line) located to the east as part of the Ox Mountains,
- Localised lake vistas of Lough Conn. Due to the low-lying nature of lakeland environments such as this, low prospect vistas are available from the roads of the Lough and its shores.

### 3.8.2.2 Land Uses

The Landscape Appraisal of County Mayo states that the main agricultural activity in this area (Landscape Character Unit G: North Mayo Drumlins) is livestock production and that the region is dominated by extensive areas of pasture with some pockets of bog. The significant urban settlement of Ballina is included as part of this Landscape Character Unit.

### 3.8.2.3 Policy Areas

As part of the Landscape Appraisal of the county, character units with similar visual landscape elements were also grouped into the following four Policy Areas:

- Policy Area 1: Montaine Coastal
- Policy Area 2: Lowland Coastal
- Policy Area 3: Uplands, moors, heath or bogs
- Policy Area 4: Drumlins and lowlands

Lakeland Sub-areas are also designated. According to the maps accompanying the Landscape Appraisal, the Study Area for this assessment is located within Policy Area 4A: a Lakeland Sub-area of Policy Area 4 (Drumlins and Inland Lowland), which is described in the Appraisal Report as:

*‘This distinctive area of the County comprises the landscapes of policy areas 3 and 4, which bound Lough Mask. It bounds often steep slopes and prominent ridge lines with limited shelter vegetation to the west and undulating areas of pasture, woodland and forest with underlying glacial drumlins to the east.’*

However the text describes Lakeland Sub-area 3A in relation to Lough Conn:

*‘This distinctive area of the County comprises the landscapes of policy areas 3 and 4, which bound Lough Conn. The environs of this Lough are often slopes and secondary ridgelines with limited shelter vegetation to the south and undulating areas of pasture, woodland and forest with underlying glacial drumlins to the north.’*





It would appear that the Crossmolina area fits best within Lakeland Sub-area 3A.

A set of indicative policies relating to the landscape attributes, robustness, and sensitivities of each Policy Area are provided in the Landscape Appraisal Report. These policies were intended to provide the framework and basis for such final landscape policies as required at the time of the development plan review.

The indicative policies for Policy Area 3A are as follows:

- **Policy 18** Encourage only development that will not detract from scenic lake land vistas, as identified in the development plan, and visible from the public realm. Such development must not have a diminishing visual impact due to inappropriate location or scale.
- **Policy 19** Promote only development that will not penetrate distinct linear sections of shorelines when viewed from areas of the public realm.
- **Policy 20** Recognise the value of scenic lake land vistas, as identified in the development plan. Protect areas that have not been subject to recent or prior development by ensuring any new development can be absorbed by the surrounding landscape.

#### 3.8.2.4 Study Area Land Cover

The CORINE land cover data for the Study Area was obtained from the Environmental Protection Agency (EPA). CORINE land cover is a map of the environmental landscape based on the interpretation of satellite images. It provides comparable digital maps of land cover for each country for much of Europe.

The CORINE data for the Study Area shows that pasture is the primary land cover within the Study Area. Pastoral land within and in the vicinity of the Study Area is interspersed with smaller areas of non-irrigated arable land, transitional woodland/scrub, bog and land principally occupied by agriculture with areas of natural vegetation. Continuous urban fabric occurs at the settlement of Crossmolina and Lough Conn is identified as a waterbody. Some broad-leaved forest and inland marsh is found close to the mouth of the Deel River as it debouches into Lough Conn. Areas of complex cultivation patterns are found to the north and south of the study area but are not identified within or adjacent to the Study Area. Figure 3.8.2 shows the CORINE data for the Study Area.



### 3.8.2.5 Landscape Sensitivity

The Landscape Appraisal of County Mayo designates areas according to the categories used in the CORINE Land Cover Project. Areas may be designated as vulnerable, sensitive, normal, robust or degraded.

According to the Landscape Appraisal of County Mayo areas or features designated as vulnerable *'represent the principal features which create and sustain the character and distinctiveness of the surrounding landscape'*. Certain areas of coastline, shoreline of lakes and rivers, skylines and ridges and promontories and headlands are designated as 'vulnerable' in Landscape Appraisal. Areas or features designated as 'Vulnerable' within or close to the Study Area include the shoreline of Lough Conn and the skyline of Nephin, which is visible from the study area. Policy with regard to vulnerable areas is stated as such in the Appraisal:

*'To be considered for permission, development in the environs of these vulnerable areas must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings. Particular attention should be given to the preservation of the character and distinctiveness of these areas as viewed from scenic routes and the environs of archaeological and historic sites.'*

The areas or features designated as sensitive within or close to the Study Area in the Landscape Appraisal include transitional woodland and scrub west of Lough Conn, Broad-leaved Forest west of Lough Conn to the south of the Study Area in the townlands of Prospect, grange, east of Tonabrock and east of the R315 road at Massbrook Lower, inland marshes on the shore of Lough Conn, the waterbody of Lough Conn itself, agricultural land with significant areas of natural vegetation on the western and north-western shores of Lough Conn. Sensitive areas or features are described in the Landscape Appraisal as having a *'distinctive, homogenous character dominated by natural processes.'* Policy relating to such areas is described in the Landscape Appraisal as follows:

*'Development in these areas has the potential to create impacts on the appearance and character of an extensive part of the landscape. Applications for development in these areas must demonstrate an awareness of these inherent limitations by having a very high standard of site selection, siting layout, selection of materials and finishes. Applications in these areas may also be required to*





*consider ecological, archaeological, water quality and noise factors insofar as it affects the preservation of the amenities of the area.'*

Considerations with respect to sensitive areas are also listed in the report as follows:

*'Where an area has been classified by the CORINE landcover classification system into groupings that are deemed to be indicative of a low potential to absorb significant development without significant change of character, then the area has the potential to be sensitive. These areas are indicative and prone to localised change over time where vegetative cover or agriculture management practices are the principal determinants. Landscape Appraisal for County Mayo CAAS Ltd. Page 49 Report The sensitivity to change may arise from very different sources e.g. woodlands may be sensitive to development that requires tree felling while peat bogs may be sensitive to development that requires tree planting. The principle role in Development Control of landscape sensitivity mapping should be to heighten awareness (and scrutiny) of the potential for additional or disproportionate visual prominence. Project by project evaluation, for development control purposes will be required to ascertain the presence and significance of a sensitivity and its relevance to the specifics of the proposed development (if any).'*

#### 3.8.2.6 Scenic Routes and Landscapes

Areas may also designated as scenic routes and highly scenic vistas. The Landscape Appraisal of County Mayo lists the roads designated as Scenic Routes within the county. The policy of the Planning Authority with regard to Scenic Routes, as set out in the Appraisal Report, is as follows:

*"Scenic routes indicate public roads from which views and prospects of areas of natural beauty and interest can be enjoyed. Sightseeing visitors are more likely to be concentrated along these routes. The onus should be on the applicant when applying for permission to develop in the environs of a scenic route, to demonstrate that there will be no obstruction or degradation of the views towards visually vulnerable features nor significant alterations to the appearance or character of sensitive areas."*

There are no Scenic Routes located within the Study Area. However there are a number of scenic routes, which are partially within a ten-kilometre radius of the Study Area:

- R297 from Castleconor to Crockets Town



- Local Road from Killala to Moyne Abbey
- R315 Lahardaun to Pontoon, west of Lough Conn
- L134 from Knockmore to north of Ross West (between Lough Conn and Lough Cullin)
- Local road from Beltra to the R315 junction at Lough Conn
- Local road east of Lough Conn from Garrycloonagh to Brackwanshagh

The locations of these routes are shown on the Scenic Routes and Protected Views map in Section 3 of the Landscape Appraisal for County Mayo.

Areas designated as scenic views are also identified in the Landscape Appraisal of County Mayo. None of these designated 'highly scenic vistas' are located within the Study Area. However one of the designated views is situated within a 10 kilometre radius of the Study Area: the view on the R315 from Cuilkillow to Pontoon (looking towards Lough Conn). This view is to the south-east and is therefore not directed towards the Study Area and therefore is unlikely to be affected by the proposed works.

### **3.8.3 Summary of Key Constraints and Implications for the Proposed Scheme**

- The Study Area includes areas and features designated as vulnerable and sensitive in the Landscape Appraisal for County Mayo, which is included as an Appendix to the Mayo County Development Plan (2008-2014). Many of these features are associated with Lough Conn. Although there are no scenic routes or highly scenic vistas within the Study Area, there are a number of scenic routes and one highly scenic vista within 10 kilometres of the Study Area. Appropriate design, siting and mitigation measures are therefore required to integrate the proposed scheme within the landscape. Particular regard should also be had to the potential visual impact on views available from the three stretches of designated Scenic Route and the areas of Scenic Landscape, which are located within the Study Area.



### **3.9 AIR AND CLIMATE**

#### **3.9.1 Air Quality**

##### **3.9.1.1 Methodology**

This section of the Constraints Study describes the existing air quality and noise environment within the Study Area, and identifies possible issues which have the potential to constrain the design of any flood relief scheme.

The Study Area is located in a rural area including the town of Crossmolina, Co. Mayo. Due to the non-industrial nature of the proposed scheme and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for the purposes of this Constraints Study. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the immediate vicinity of the site. Land-use in the vicinity of the site is dominated by pastoral agriculture.

The following items were the principal focus of the study:

- Identification of possible issues regarding air quality
- Identification of locations where there may be existing noise/ vibration-sensitive receptors
- Identification of any existing noise or vibration sources in the area
- A qualitative description of the existing noise climate

The following were referenced as part of the Constraints Study;

- Mayo County Development Plan (2008-2014)
- EPA website ([www.epa.ie](http://www.epa.ie))

##### **3.9.1.2 Air Quality Standards**

In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999. The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) deals with sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).



- A third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive, published in 2007, deals with polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air.

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for PM<sub>2.5</sub> (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM<sub>10</sub>) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 3.9.1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ) and parts per billion (ppb). The notation PM<sub>10</sub> is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. PM<sub>2.5</sub> represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

Pollutant	Limit Value Objective	Averaging Period	Limit Value ( $\mu\text{g}/\text{m}^3$ )	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide ( $\text{SO}_2$ )	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1 <sup>st</sup> Jan 2005
Sulphur dioxide ( $\text{SO}_2$ )	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1 <sup>st</sup> Jan 2005
Sulphur dioxide ( $\text{SO}_2$ )	Protection of vegetation	Calendar year	20	7.5	Annual mean	19 <sup>th</sup> Jul 2001
Sulphur dioxide ( $\text{SO}_2$ )	Protection of vegetation	1 <sup>st</sup> Oct to 31 <sup>st</sup> Mar	20	7.5	Winter mean	19 <sup>th</sup> Jul 2001
Nitrogen dioxide ( $\text{NO}_2$ )	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 <sup>st</sup> Jan 2010
Nitrogen dioxide ( $\text{NO}_2$ )	Protection of human health	Calendar year	40	21	Annual mean	1 <sup>st</sup> Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide ( $\text{NO}_2$ )	Protection of ecosystems	Calendar year	30	16	Annual mean	19 <sup>th</sup> Jul 2001
Particulate matter 10 ( $\text{PM}_{10}$ )	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1 <sup>st</sup> Jan 2005
Particulate matter 2.5 ( $\text{PM}_{2.5}$ )	Protection of human health	Calendar year	40	-	Annual mean	1 <sup>st</sup> Jan 2005
Particulate matter 2.5 ( $\text{PM}_{2.5}$ ) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1 <sup>st</sup> Jan 2015
Particulate matter 2.5 ( $\text{PM}_{2.5}$ ) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1 <sup>st</sup> Jan 2020
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean	1 <sup>st</sup> Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value ( $\mu\text{g}/\text{m}^3$ )	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8,620	-	1 <sup>st</sup> Jan 2005
Benzene ( $\text{C}_6\text{H}_6$ )	Protection of human health	Calendar Year	5	1.5	-	1 <sup>st</sup> Jan 2010

**Table 3.9.1 Limit values of Directive 2008/50/EC, 1999/30/EC and 2000/69/EC (Source: EPA)**

The Ozone Daughter Directive 2002/3/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 3.9.2 presents the limit and target values for ozone.

Objective	Parameter	Target Value for 2010	Target Value for 2020
Protection of human health	Maximum daily 8 hour mean	120 $\text{mg}/\text{m}^3$ not to be exceeded more than 25 days per calendar year averaged over 3 years	120 $\text{mg}/\text{m}^3$
Protection of vegetation	AOT <sub>40</sub> calculated from 1 hour values from May to July	18,000 $\text{mg}/\text{m}^3 \cdot \text{h}$ averaged over 5 years	6,000 $\text{mg}/\text{m}^3 \cdot \text{h}$
Information Threshold	1 hour average	180 $\text{mg}/\text{m}^3$	-
Alert Threshold	1 hour average	240 $\text{mg}/\text{m}^3$	-

AOT<sub>40</sub> is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80  $\mu\text{g}/\text{m}^3$  and is expressed as  $\mu\text{g}/\text{m}^3$  hours.

**Table 3.9.2 Target values for Ozone Defined in Directive 2008/50/EC**

### 3.9.1.3 Air Quality Zones

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas with population greater than 15,000
- Zone D: Remainder of the country.



These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the proposed development lies within Zone D, which represents rural areas located away from large population centres.

The ambient air quality monitoring carried out closest to the proposed development site is at the EPA offices on the outskirts of Castlebar, Co. Mayo. This monitoring location lies within Zone D.

#### 3.9.1.4 Receiving Environment

The Mayo County Development Plan (2008-2014) lists the following policies with regard to Air Quality:

- **P/EH-AN 1** It is the policy of the Council to maintain and improve the air quality of the County through the monitoring of air emissions from industry, road traffic and agriculture.
- **P/ EH-AN 2** It is the policy of the Council to support the *Climate Change Strategy* on an ongoing basis through implementation of supporting policies in the Plan, particularly those supporting use of alternative and renewable energy sources, sustainable transport and promotion of the retention of, and planting of trees, hedgerows and afforestation.
- **P/EH- AN 3** It is the policy of the Council to ensure that noise levels from new and existing developments do not exceed normally accepted standards, as set down in the *DoEHLG Noise Regulations 2006*, and that the requirements of *S.I No 140 of 2006 (Environmental Noise Regulations 2006)* are complied with, with regard to existing and future development in proximity to National roads.

An air quality monitoring station is already in place in Castlebar, so there are no immediate plans to monitor air quality in the vicinity of the Study Area.

It is not envisaged that a flood relief scheme recommended by the Engineering Study will increase the volume of traffic within the Study Area in the long term. Given the size of the Study Area, it is not envisaged that a flood relief scheme will have a long term detrimental affect on air quality.

Air quality may be temporarily impacted during the construction phase of the scheme, due in particular to the generation of dust.





The air quality in the vicinity of the proposed development site is typical of that of rural areas in the west of Ireland, i.e. Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland.

PM<sub>10</sub>, ozone and nitrogen oxides are measured at the monitoring site in Castlebar. There have been no exceedances of any of the parameters measured at this site so far in 2012. The PM<sub>10</sub> limit of 50 ug m<sup>-3</sup> is deemed breached if more than 35 exceedances have occurred. The Nitrogen dioxide hourly limit of 200 ug m<sup>-3</sup> is deemed breached if more than 18 exceedances have occurred and The Ozone information threshold is 180 ug m<sup>-3</sup>.

Regarding the Castlebar suburban background data, lower measurement values would be expected for the Study Area as it lies in a rural location, within Zone D.

### **3.9.2 Climate and Weather in the Existing Environment**

County Mayo has a temperate oceanic climate, resulting in mild winters and cool summers. The prevailing southwesterly winds bring moist air and frequent rain.

The Met Éireann weather and climate monitoring stations at Claremorris and Belmullet, both located in County Mayo, are both equidistant from the Study Area, located approximately 42 kilometres from the site. As the Study Area is located inland, data from the Claremorris station would be more reflective of conditions at the Study Area, rather than data from Belmullet, which is located on the coast.

Meteorological data recorded at Claremorris over the 30-year period from 1971-2000 is shown in Table 3.9.3 overleaf. Averages are not available for this station for the most recent period 1981-2010.

Mean annual temperature at the Claremorris station from 1971-2000 was 9.3° Celsius with the warmest month on average being July with a mean temperature of 15.0° Celsius for the 1971-2000 period. January was on average the coldest month with a mean temperature for this period of 4.6° Celsius. Average annual rainfall was 1173.6mm with the wettest month being December with a mean rainfall of 129.6mm. The driest month on average for the 1971-2000 period was April with an mean rainfall of 63.7mm. February was the windiest month during this 30 year period with a mean monthly speed of 10.3 knots or 1.85 kilometres per hour.

	Monthly and Annual Mean and Extreme Values												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<b>TEMPERATURE (degrees Celsius)</b>													
Mean daily max.	7.5	8.1	9.8	12.1	14.9	17.0	18.9	18.7	16.4	13.1	9.9	8.1	12.9
Mean daily min.	1.7	1.8	2.9	3.9	6.1	8.8	11.0	10.6	8.6	6.4	3.5	2.5	5.7
Mean	4.6	4.9	6.3	8.0	10.5	12.9	15.0	14.7	12.5	9.8	6.7	5.3	9.3
Absolute max.	13.3	13.6	16.2	22.3	25.4	29.8	30.5	28.0	25.1	19.9	15.9	14.3	30.5
Absolute min.	-2.9	0.1	0.0	5.0	6.1	11.2	11.7	12.2	10.5	6.8	1.3	-1.5	-2.9
Mean no. of days with air frost	8.7	7.3	5.2	3.3	0.8	0.0	0.0	0.0	0.1	1.2	5.3	7.6	39.5
Mean no. of days with ground frost	15	14	12	10	5	0	0	0	2	5	12	14	89
<b>RELATIVE HUMIDITY (%)</b>													
Mean at 0900UTC	90.7	90.3	88.7	82.5	79.3	80.4	83.6	86.2	88.1	91.6	91.2	91.0	87.0
Mean at 1500UTC	85.6	79.8	75.7	67.9	68.0	71.1	73.2	73.4	74.7	80.2	84.4	88.1	76.8
<b>SUNSHINE (hours)</b>													
Mean daily duration	1.3	1.9	2.6	4.3	5.0	4.4	3.7	3.8	3.2	2.4	1.7	0.9	2.9
Greatest daily duration	7.9	9.3	10.8	13.4	15.1	15.8	14.8	13.7	11.4	9.3	8.6	6.7	15.8
Mean no. of days with no sun	9.5	7.3	5.7	2.8	2.0	2.2	2.2	2.1	3.4	5.0	8.1	10.8	61.1
<b>RAINFALL (mm)</b>													



	<b>Monthly and Annual Mean and Extreme Values</b>												
	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Year</b>
Mean monthly total	127.9	102.1	101.6	63.7	68.1	64.5	70.1	95.7	94.3	128.2	127.7	129.6	1173.6
Greatest daily total	31.5	107.0	26.8	34.0	51.3	38.0	42.2	49.7	41.0	46.7	54.9	41.2	107.0
Mean no. of days with $\geq 0.2\text{mm}$	21	18	21	16	16	15	17	18	18	21	21	22	224
Mean no. of days with $\geq 1.0\text{mm}$	18	15	17	12	12	11	12	13	14	17	18	17	176
Mean no. of days with $\geq 5.0\text{mm}$	9	7	7	4	4	4	4	6	5	8	8	9	75
<b>WIND (knots)</b>													
Mean monthly speed	10.2	10.3	10.2	8.7	8.1	7.7	7.2	6.8	7.7	8.7	8.9	9.7	8.7
Max. gust	96	85	74	74	62	51	66	78	58	70	67	81	96
Max. mean 10-minute speed	59	48	45	41	41	34	39	32	37	46	40	52	59
Mean no. of days with gales	1.4	0.9	0.7	0.1	0.1	0.0	0.0	0.0	0.1	0.3	0.4	0.8	4.8
<b>WEATHER (mean no. of days with:)</b>													
Snow or sleet	5.7	4.4	3.8	1.6	0.2	0.0	0.0	0.0	0.0	0.1	1.2	3.1	20.0
Snow lying at 0900 UTC	2.3	0.7	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	4.6
Hail	4.4	3.2	5.4	3.2	1.6	0.4	0.1	0.0	0.7	0.8	2.6	2.7	25.2
Thunder	0.3	0.1	0.2	0.2	0.4	0.7	0.7	0.2	0.2	0.2	0.3	0.5	4.0
Fog	3.4	2.3	1.6	1.8	1.2	1.4	2.0	3.2	3.3	3.2	2.6	3.4	29.5

Table 3.9.3 Data from Met Éireann Weather Station, Claremorris, County Mayo 1971 to 2000

### 3.9.2.1 Climate Change

It is widely predicted that the climate in Ireland will change in the future, leading to increases in sea level, storm event magnitude and frequency, and rainfall depths, intensities and patterns. These impacts, along with others due to land use changes such as urbanisation and deforestation, are likely to have significant detrimental implications for the degree of flood hazard, and hence flood risk, in Ireland. The degree of these impacts over time are, however, subject to significant uncertainty.

To provide an adequate understanding of the potential implications of the predicted impacts of climate change and other future changes, with due consideration of the significant uncertainty associated with such predictions, a minimum of two potential future scenarios should be assessed as part of the flood risk prediction. These two scenarios are referred to as the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS), as described below:

- The former (the MRFS) is intended to represent a ‘likely’ future scenario, based on the wide range of predictions available and with the allowances for increased flow, sea level rise, etc. within the bounds of widely accepted projections.
- The latter (the HEFS) is intended to represent a more extreme potential future scenario, but one that is nonetheless not significantly outside the range of accepted predictions available, and with the allowances for increased flow, sea level rise, etc. at the upper the bounds of widely accepted projections.

The allowances, in terms of numerical values for future changes to 2100 in relevant phenomena or characteristics, which should typically be used for each of these scenarios, are set out in Table 3.9.4 below.

	MRFS	HEFS
<b>Extreme Rainfall Depths</b>	+ 20%	+ 30%
<b>Flood Flows</b>	+ 20%	+ 30%
<b>Mean Sea Level Rise</b>	+ 500 mm	+ 1000 mm
<b>Land Movement</b>	- 0.5 mm / year <sup>1</sup>	- 0.5 mm / year <sup>1</sup>
<b>Urbanisation</b>	<i>No General Allowance – Review on Case-by-Case Basis</i>	<i>No General Allowance – Review on Case-by-Case Basis</i>
<b>Forestation</b>	- 1/6 Tp <sup>2</sup>	- 1/3 Tp <sup>2</sup> + 10% SPR <sup>3</sup>

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduce the time to peak (Tp) by a third: This allows for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for increased runoff rates that may arise following felling of forestry.

**Table 3.9.4 Allowances for Future Scenarios (Time Horizon – 100 years)**

The following should however be noted:



- The allowances are based on current knowledge and science, and will be frequently reviewed and may be updated, as further research is undertaken
- The allowances are national, and some regionalisation or provision for the nature of the relevant catchment may be suitable where adequate knowledge or analysis would support this (although this would need to be robustly justified where the allowances are less than the assumed national allowances)

#### 3.9.2.2 Noise & Vibration

It is not envisaged that the preferred flood relief scheme emerging from the Engineering Study will have a long term detrimental affect on the noise environment within the Study Area; however noise during the construction phase of the project may have a temporary adverse impact on the environment.

#### 3.9.2.3 Noise/ Vibration-Sensitive Receptors within the Area

The majority of the noise/ vibration-sensitive receptors in the Study Area are concentrated in the town of Crossmolina, with sparse residential development also present throughout the remainder of the Study Area.

Vibration during construction has the potential to cause damage to structures, such as buildings, bridges and walls in the vicinity of the works.

Other noise/ vibration sensitive receptors in the Study Area include designated areas in particular the River Moy SAC and the Lough Conn and Lough Cullin SPA, which are dealt with more comprehensively in Section 3.4 of this report.

#### 3.9.2.4 Prevailing Noise Climate

The dominant noise source in the Study Area is road traffic noise from the N59 National Secondary Road, other regional and local roads and background urban noise within Crossmolina town.

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

- Prior to the selection of a preferred flood relief scheme as part of the Engineering Study, it is recommended that the short listed flood alleviation measure be assessed in relation to the impact of noise and vibration during the construction phase of the project.
- It is recommended that mitigation measures be put in place to reduce the impacts on air quality and the noise environment during the construction phase of any proposed flood relief scheme.
- It is recommended that the affects of vibration during the construction phase be considered in the selection process for a potential flood alleviation measures.
- Meteorological and climatological data should be consulted in the engineering design process.

- The potential impacts of climate change should be assessed with regard to the prediction of flood risk and should be taken into account in the design of a proposed flood relief scheme.



### 3.10 MATERIAL ASSETS

The Material Assets within the Study Area which are considered within this section of the Constraints Study include:

- Wastewater Infrastructure
- Waste Management Facilities
- Roads & Transportation Infrastructure
- Utilities

#### 3.10.1 Methodology

The following sources were consulted in the assessment of material assets within the Study Area:

- EPA Waste Water Discharge Licence Applications database
- Mayo County Development Plan (2008 - 2014)
- Replacement Waste Management Plan for the Connacht Region (as implemented through the Mayo County Development Plan)

#### 3.10.2 Receiving Environment

##### 3.10.2.1 Wastewater Infrastructure

Crossmolina Town is served by a partially combined sewerage network, which includes six sewage pumping stations and a WWTP.

The Crossmolina Wastewater Treatment Plant is located in the townland of Knockglass to the North east of Crossmolina Town and discharges treated effluent to the River Deel downstream of the town. The average volume of treated effluent discharged is estimated at 787m<sup>3</sup>/day, as per the Waste Water Discharge Licence Application for the Crossmolina agglomeration.

The WWTP currently provides primary, secondary and sludge treatment for a Population Equivalent (PE) of 3,150. This Waste Water Treatment Plant was constructed in 2003 and was designed to treat to the following standard;

BOD <sub>5</sub>	=	25mg/litre
Suspended Solids	=	35mg/litre
Phosphates	=	2mg/litre

In addition to the Waste Water Treatment Plant treated effluent outfall pipe, there is an additional wastewater outfall to the River Deel from the main pumping station located in Abbeytown, approximately 250m downstream of the Jack Garret Bridge. This is an emergency overflow pipe from the pumping station only comes into operation during extreme rainfall events or the prolonged loss of pumping ability.



There are 5 additional pumping stations within the wastewater agglomeration; however, the Waste Water Discharge Licence Application does not refer to emergency overflows in connection with these pumping stations.

### 3.10.2.2 Waste Management

The Connacht Waste Management Plan was consulted in relation to Waste Management Facilities in the vicinity of the Study Area. There is one redundant landfill site within the Study Area in the townland of Gortnalyer. This closed landfill has been identified in the Connacht Waste Management Plan in accordance with Section 22 (7)(h) of the Waste Management Act 1996 – 2005. It is not intended to re-commission this landfill as part of the Waste Management Plan.

### 3.10.2.3 Roads & Transportation Infrastructure

The primary road access to the Study Area and to Crossmolina town is via the N59 National Secondary Route. It provides access to Ballina to the East, and travels West through County Mayo as far as Bangor before turning south to pass through Westport and Clifden, County Galway before terminating in Galway City. The N59 passes through Crossmolina in an East West direction and directly serves a large portion of the town centre along with the surrounding houses.

The Mayo County Development Plan refers to plans for a bypass of Crossmolina town to be incorporated into planned improvements to the N59 between Ballina and Crossmolina. Details of this proposed bypass were obtained through an information brochure entitled “*N59 Crossmolina – Ballina Emerging Preferred Route – Public Consultation July 2008*”. This brochure presents the emerging preferred route for a proposed upgrade of the N59 Crossmolina-Ballina route which includes a bypass of Crossmolina town. The emerging preferred route commences in the townland of Cloonawillan on the footprint of the existing N59 approximately 750m west of Crossmolina. From here it diverges in a north-easterly direction as it passes through the townlands of Lecarrow and Crossmolina, running parallel with and south of the Fotish River before it crosses the R315 Ballycastle Road. From here it passes through the townland of Abbeytown, crosses the River Deel and enters the townland of Glebe. It continues in an easterly direction as it passes through the townland of Gortskeddia, crosses the Gortskedia Road, and enters the townland of Knockglass before it merges with the existing N59. The emerging preferred route is 12.2km long. It consists of a 3.9km northern bypass of Crossmolina town, a 3.6km upgrade of the existing N59 and a 4.7km off-line new road on its approach to its intersection with the N59 Ballina Relief Road. The emerging preferred route crosses the River Deel twice where the existing Knockadangan Bridge will be used and a new bridge will be required.

The National Roads Authority (NRA) website describes this project as “suspended”. Depending on the potentially viable flood risk management measures identified, consultation may be required with Mayo County Council Roads Department and the NRA to determine the status, extent and the interaction between the two projects.

Crossmolina is also served by the R315, travelling in a North South direction. It terminates in to the west Ballycastle, to the north of the Study Area, and travels along the Western and Southern coast of Lough Conn to terminate in Foxford.

All roads in the Study Area are maintained by Mayo County Council; however any proposed modifications to the N59 National Secondary Road will require consultation with the NRA.

#### 3.10.2.4 Utilities

Utilities in the Study Area include water supply networks, telecommunications, electricity supply and gas pipelines. It is highly likely that these services also cross the Rivers within the Study Area at various locations. These locations will need to be identified once the potentially viable flood risk management measures are identified.

### 3.10.3 Summary of Key Constraints and Implications for the Proposed Scheme

- It is recommended that the existing and proposed location of watermains and underground services in the vicinity of any proposed flood relief scheme be ascertained as part of the Engineering Study. It is recommended that Mayo County Council and other utility providers with services in the area be consulted regarding the location and priority of existing and proposed services. It is further recommended that the services be protected as part of any proposed flood relief scheme.
- It is recommended that the Crossmolina Waste Water Treatment Plant remains operational at all times.
- It is recommended that any proposed change in the hydrological regime of the River Deel and its tributaries be assessed in relation to the assimilative capacity of the river at the locations of the two discharges from Wastewater Infrastructure within the Study Area.
- It is recommended that Mayo County Council and the National Roads Authority be consulted in relation to any effects on the existing and proposed roads infrastructure in the Study Area from a proposed flood relief scheme.



## **4 PUBLIC CONSULTATION**

The details and analysis of the first Public Consultation event are contained within this section of the report.

### **4.1 PUBLIC CONSULTATION ARRANGEMENTS**

An initial Public Information Event was held in Crossmolina Town Hall on Friday the 14<sup>th</sup> of September 2012 from 4pm to 8pm. Members of staff from the Office of Public Works, Environmental Team (Ryan Hanley and McCarthy Keville O'Sullivan) and Design Team (Ryan Hanley and JBA Consulting) were available to answer questions from the members of the public in attendance.

#### **4.1.1 Advertising of Public Consultation**

Advertising of the Public Consultation Event was undertaken by the Environmental Team, in the local press in the week preceding the event. This included an advert in the local publication; The Western People. In addition, notices were placed on the local radio in the week and weekend preceding the event and notices were placed in local parish newsletters on the Sunday preceding the event. A press release was also issued to local news websites [www.crossmolina.ie](http://www.crossmolina.ie) and [www.mayonews.ie](http://www.mayonews.ie) who included features on their websites during the week leading up to the event.

#### **4.1.2 Literature Available for the Consultation**

Brochures and Questionnaires were available at the exhibition on the 14<sup>th</sup> of September. Stamped addressed envelopes were provided to those who wished to return questionnaire by post with a return date for the questionnaires of the 21<sup>st</sup> of September. Information in addition to the questionnaires was also accepted on the evening of the event or subsequently by post.

## **4.2 PUBLIC CONSULTATION MATERIALS**

### **4.2.1 Public Consultation Brochure**

A Constraints Study Public Consultation brochure was produced for the scheme, which showed the Study Area under consideration and provided a brief explanation as to the process involved and the options being considered. Brochures were freely available to the members of the public and interested parties, both during and after the exhibition. A copy of the brochure is attached in Appendix H.

### **4.2.2 Public Consultation Questionnaire**

A questionnaire with pre-printed questions was provided to each attendee, in association with the brochure. This provided an opportunity for members of the public to express their views on the Study Area shown and to provide information regarding flooding in their area, in addition to other comments they may have had relating to the design or the Environmental Constraints



Study. A prepaid envelope was also provided for the return of the questionnaire. A copy of the blank questionnaire is attached in Appendix H.

#### **4.2.3 Public Consultation Exhibition Posters**

The format of the Constraints Study Consultation exhibition was based on a number of scheme posters. The posters included:

- Scheme Objectives and Overview
- Constraints Study
- Study Area Map – Archaeological & Ecological Sites
- Statutory Process
- Public Involvement

A copy of the panels is included in Appendix H.

### **4.3 PUBLIC CONSULTATION EXHIBITION**

#### **4.3.1 Staffing of Exhibition**

At the venue, staff from the Office of Public Works, Environmental Team (Ryan Hanley and McCarthy Keville O'Sullivan) and Design Team (Ryan Hanley and JBA Consulting) were available to answer questions from the members of the public in attendance.

#### **4.3.2 Numbers of Public Attendees**

Members of the public visiting the exhibition were invited to sign a visitor's book to enable a record of the number of attendees to be maintained. A total of 16 attendees signed the attendance book at the event in Crossmolina Town Hall.

### **4.4 PUBLIC CONSULTATION RESPONSE**

#### **4.4.1 Verbal Comments at Exhibition**

Visitors to the exhibitions are considered to have in the main understood the proposals as presented at the exhibition. Comments received generally related to the level of flooding in the past. Some members of the public brought photographs or maps of their property or demonstrated to project team staff the location of their property and their general concerns regarding the level of flooding and damage which arose from the events. In addition to provision of information about flooding, members of the public also provided information regarding previous maintenance of the river and their suggestions relating to potential flood alleviation measures.



#### **4.4.2 Questionnaires Returned**

Approximately 20 questionnaires were distributed on the night, or taken by members of the public to distribute locally. By the 26<sup>th</sup> of September 2012, a total of six questionnaires had been returned to the Environmental Team. Questionnaires received after this date were not included within the analysis.

#### **4.4.3 Other Submissions**

Submissions were made by a number of members of the public both at the public consultation event and by post following the event. The information generally provided related to flood levels, photographs of previous flooding events and articles regarding flooding history or information about the River Deel. This information was provided to the design team to assist in the production of the flood model when ascertaining the levels of flooding in previous events.

### **4.5 Analysis of Public Consultation Response**

#### **4.5.1 Analysis of Questionnaires**

In total, there were six respondents to the questionnaire, all of whom lived within the Study Area and most of whom had been directly affected by the most recent and historical flooding events in the area. Full details of the response to the questionnaire are provided in Appendix H. Outlined below is a summary of the information obtained from the questionnaire.

##### **4.5.1.1 Flooding Information**

When asked about previous flood events, most respondents listed other flood events, with dates including the most recent event in December 2006, October and September 1989. Events in 2003 and 1987 and 1985 were also listed. At the public information day, the general consensus was that the flood event in 1989 was the worst event. The depth to which flooding was reported varied from 6 inches (in houses on Chapel St.) to 6 feet of water in gardens and open spaces.

Of those who responded, most had residential property affected (3 respondents), with one responding that their retail property would have flooded except flood defences were erected with haste as flood waters approached. One respondent listed retail property which had been flooded.

The majority of those who responded expressed that flooding occurred directly from the River/Stream, while 2 respondents listed overground flow (surface water) as a source and one respondent considered listed drains as a source.

Question 11 asked if respondents had put in place any measures to reduce the impact of flooding. All of those who had been flooded in previous events responded that they had now put in place measures. Seals for doors and entrances, sandbags and timber barriers and marine ply were listed as measures, in addition to replacement of wooden floors with concrete as a result of the flooding in 2006.

#### 4.5.1.2 Flood Alleviation Information

When asked in Question 12 if they had a preference for the type of flood alleviation method (from a selection of six measures) most respondents expressed dredging and cleaning/deepening of the River Deel as their first preference. Channel widening and construction of walls/embankments also ranked as the next highest preferences for most respondents. Overall numbers of individuals who rated answers to this question are provided in Table 4.5.1 below.

Preference Rating	1	2	3	4	5	6
No Works				1		1
Early Flood Warning System	1			1	1	
Walls & Embankments	1	1				
River Dredging	3	2				
River Widening			3			
Relocation				1	1	1

**Table 4.5.1 Answers to Question 12 – Indicate in order of preference, your preferred flood defence works**

Most respondents also made their own suggestions as to flood alleviation measures. Many of the respondents mentioned the ‘infilling of swallow holes’ which happened previously, and believe that removal of the infill would allow the passage of water and reduce the risk of flooding. Cleaning the river of debris and widening the river at locations where development has narrowed the channel, in addition to the creation of flood plains on agricultural land were other suggestions the respondents made.

#### 4.5.1.3 Environmental Constraints

In the final question on the questionnaire (Q14) respondents were given seven environmental topics and asked to rank their opinion of the importance of each constraint, from very important to unimportant.

Water Quality was considered the most important of the environmental constraints, with half of the respondents indicating it as ‘very important’. Angling Recreation and Tourism was considered generally as ‘Important’ by half of the respondents while there was no particular consensus in relation to the other environmental constraints, with Flora and Fauna, Local

Fisheries, Habitats, Architectural/Cultural and Landscape/Visual all receiving a spread of answers. Overall answers to this question are summarised in Table 4.5.2 below:

	Very Important	Important	Moderately Important	Low Importance	Unimportant
<b>Flora &amp; Fauna</b>	1	1	1	1	2
<b>Local Fisheries</b>	0	2	1	2	1
<b>Habitats</b>	1	1	1	2	1
<b>Water Quality</b>	3	2	0	0	1
<b>Architectural/Cultural</b>	0	2	1	2	1
<b>Landscape/Visual</b>	0	2	1	2	1
<b>Angling/Tourism/Rec.</b>	0	3	2	0	1

**Table 4.5.2 Answers to Question 14 – In your opinion, how important are the following environmental constraints to the proposed Flood Relief Scheme.**

In addition to ranking the importance of the various environmental constraints, respondents were also given the opportunity to provide comments specific to each of the environmental topics. A summary is provided below.

**Flora and Fauna:** Flood prevention is of much greater importance than Flora and Fauna. As far as we are aware, only 'pearl mussel' is affected by any works on the River. These have already survived the original Moy Drainage work and have colonised the river bed below Crossmolina Bridge. See Crossmolina Biodiversity Plan.

**Local Fisheries:** Local fisheries are due consideration but in proportion to the damage potential of flooding. Only in the last few years have tourist anglers appeared on the Deel above Crossmolina. Reinstating the river to its pre 1982 state is unlikely to have any major deleterious effect.

**Habitats:** Flood prevention is of much greater importance than habitats. Habitats are unlikely to be affected. So far in the seven major flooding events, water quality has not been affected. We see no reason why this should change. Otter and Kingfisher habitat along river banks.

**Water Quality:** Water Quality is important because of fisheries on the lake. If river was cleaned up it would draw tourism to the region and town. Water quality is important for all life forms. Clean water is essential for freshwater pearl mussels and crayfish as well as the local otter population and the kingfishers that nest along the river.





**Architectural/Cultural Heritage:** Due consideration of Architecture and Cultural Heritage should not outweigh Flood prevention. The flood relief works are likely to have a protective effect on the older buildings in Crossmolina.

**Landscape and Visual Amenity:** Embankments and walls may not be aesthetically pleasing so they may have a limited role. Assuming the river is cleaned and deepened, there will be no adverse effect on landscape and visual amenity. The River Deel is a key focal point for Crossmolina Town and is important to the town's appearance and to the local beauty spots along the river's length.

**Angling Tourism and Recreation:** Angling, tourism and recreation are of concern but the potential damage which another flood could cause means they should be considered but they should not limit the scheme. No effect on Angling, Tourism and Recreation. Prior to 1982 local people enjoyed the River without the risk of flooding. We expect a return to river condition at that time will have no adverse effect.

The Tidy Towns Plan includes a recommendation to develop a river walk from the Town Centre. This would improve access for local people to the river and encourage people to walk along its banks. The river is used regularly by visiting anglers and local fishermen. There is a strong fishing community in Crossmolina which spans all age groups.

#### 4.5 CONCLUSION

The Public Consultation was held to inform the general public of the Constraints Study and preliminary aspects of the Bandon Flood Relief Scheme and to obtain information about flooding or other relevant environmental information about the Study Area presented. Interested persons were able to scrutinise the consultation materials, have relevant questions answered and take away a brochure setting out the project for future reference.

The Public Consultation event was very successful in terms of attendance and replies to the questionnaire. A significant amount of valuable information was obtained both on the evening and circulated to the project team.

Overall feedback from members of the public was that they were happy to have been involved in the Public Consultation; they felt like their views were being heard, but wanted to see action arise out of the information as soon as possible.



## 5 SOURCES OF INFORMATION

### General

Environmental Protection Agency (EPA) guidelines “Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003”

Ordnance Survey Discovery Series Mapping at 1:50,000 scale

Old Raster 6” Mapping

Old Raster 25” Mapping

EPA ENVision Online Database

### Human Beings

Mayo County Development Plan, 2008 - 2014

Regional Planning Guidelines for the West Region 2010

Census of Ireland 2006 and 2011 ([www.cso.ie](http://www.cso.ie))

Mayo County Council Website

Local Websites [www.crossmolina.ie](http://www.crossmolina.ie) and [www.crossmolina.net](http://www.crossmolina.net)

Environmental Protection Agency Website – [www.epa.ie](http://www.epa.ie)

### Ecology

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>

<http://www.fishinginireland.info>

Mapping of the Distribution of *Margaritifera margaritifera* in the River Deel (Moy Catchment), Co. Mayo (Moorkens and Killeen, 2009)

The Water Framework Directive website [www.WFD.ie](http://www.WFD.ie)

A Survey of Juvenile Lamprey Populations in the Moy Catchment (O'Connor, 2004; Accessed at <http://www.npws.ie/publications/irishwildlifemanuals/IWM15.pdf>)

Biodiversity and Generic Recommendations for Crossmolina Community Council Ltd. (Woodrow, 2011)

### Water

The EPA website <http://www.epa.ie/rivermap/data>

The Water Framework Directive website [www.WFD.ie](http://www.WFD.ie)

EPA water quality database and maps.

Well card data compiled by the Geological Survey of Ireland (GSI)

OPW Database of Hydrometric Stations



Western River Basin District Management Plan  
Conn Water Management Unit Action Plan

### **Soils and Geology**

The GSI online database

Mayo County Council Planning Department (Application for Registration of Quarries under Section 261, Planning and Development Act 2000),

Mayo County Development Plan

Concrete Products Directory (Irish Concrete Federation)

ENVision Mines Site, the EPA's online Historic Mines Inventory

<http://maps.epa.ie/EnvisionMinesViewer/mapviewer.aspx>

### **Archaeology**

See references in report included in Appendix F for information sources

### **Landscape**

Mayo County Development Plan, 2008 - 2014

Landscape Appraisal of County Mayo, 2008

Environmental Protection Agency CORINE Land Cover Map

### **Air Quality**

Mayo County Development Plan, 2008 – 2014

EPA website ([www.epa.ie](http://www.epa.ie))

### **Material Assets**

EPA Waste Water Discharge Licence Applications for Waste Water Agglomerations within the Study Area <http://www.epa.ie/terminalfour/wwda>

Mayo County Development Plan, 2008 - 2014

N59 Crossmolina – Ballina Road Project July 2008 Public Consultation Brochure



## **Appendix A**

### **Letter issued to consultees and copies of Consultee Responses**

<b>A1</b>	<b>Consultation Letter</b>
<b>A2</b>	<b>Mapping Accompanying Consultation Letter</b>
<b>A3</b>	<b>List of Engineering Measures Accompanying Consultation Letter</b>
<b>A4</b>	<b>Responses from Consultees</b>

4 September 2012

**Our Ref:**

2268-120211

**Re: River Deel (Crossmolina) Flood Relief Scheme – Environmental Constraints Consultation**

A chara,

Ryan Hanley, in association with McCarthy Keville O'Sullivan, have been appointed by the Office of Public Works to carry out an Environmental Impact Assessment of the proposed River Deel (Crossmolina) Flood Relief Scheme.

The first stage of this work is to prepare a Constraints Study in order to identify the key environmental issues in the study area which may be impacted upon by possible flood alleviation measures and/or which may impose constraints on the viability and/or design of these measures.

In advance of the preparation of a full Engineering Study, it is not possible at this point to say exactly what flood alleviation measures will be proposed as part of the Flood Relief Scheme, however the range of flood measures typically considered are included on the enclosed sheet for your information.

The Study Area for the scheme is shown in red on the enclosed map.


We welcome your comments in relation to the Study Area and particularly in relation to any relevant environmental issues that may be impacted upon by a potential Flood Relief Scheme.

A Public Consultation will be held at Crossmolina Town Hall on 14 September 2012 from 4pm to 8pm at which you are invited to give us your comments. Alternatively, please submit your comments in writing to the postal or email addresses provided below.

A second public consultation will take place early next year during the preparation of the Environmental Impact Statement for the scheme, at which stage further details of the engineering measures proposed will be available. You will be given a further opportunity to comment at this stage.

We would appreciate that you would forward this documentation to the most appropriate person within your organisation, if it has been issued to you in error.

Yours sincerely,



Corina Colleran,  
McCarthy Keville O'Sullivan Ltd.



## Map Legend

 Study Area



**RYAN HANLEY**  
Consulting Engineers

MAP TITLE: **Location of Study Area**

MAP NO.: **Figure 1.1**

SCALE: **1:50,000**

PROJECT TITLE: **120211 - Deel Flood Relief Constraints**

ISSUE NO.: **120211 - 2012.10.16 -V1**

DRAWING BY: **Dervla O'Dowd**

CHECKED BY: **Corina Collieran**

DATE: **16-10-2012**

McCarthy Keville O'Sullivan Ltd., Block 1, G.F.S.C. Moneenageisha Road, Galway, Ireland. Email: info@mcCarthykos.ie Tel: +353 (0)91 735611 Fax: +353 (0)91 771279

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## **River Deel (Crossmolina) Flood Relief Scheme**

### **Possible Engineering Measures being considered for Flood Relief Scheme**

- a) Do Nothing (i.e., implement no new flood alleviation measures)
- b) Non-Structural Measures
  - i. Installation of a flood warning system
  - ii. Individual property protection
- c) Relocation of Properties and/or infrastructure
- d) Reconstruction of Properties and/or infrastructure to a higher level
- e) Flow Diversion
  - i. Diversion of entire river
  - ii. Flood flow bypass channel
- f) Flow Reduction
  - i. Upstream catchment management (i.e. reduce runoff)
  - ii. Upstream flood storage (single site or multiple sites)
- g) Flood Containment through Construction of Flood Defences
  - i. Walls or embankments
  - ii. Demountable defences
- h) Increase Conveyance (upstream and / or through and / or downstream of the town)
  - i. Change the channel section and / or grade
  - ii. Change the floodplain section and / or grade
  - iii. Remove or reduce local key constraints, e.g. bridges, bends, throttles, infill material on a floodplain, etc.
  - iv. Reduce the roughness of the channel / floodplain (removal of vegetation, lining, etc.)
  - v. Specify ongoing channel / floodplain maintenance
- i) Sediment Deposition and Possible Sediment Traps
- j) Tidal Barrage
- k) Pump storm waters from behind flood defences
- l) Measures Specific to the Study Location



**Ms. Corina Colleran**  
**McCarthy Keville O'Sullivan Ltd.**  
**Planning & Environmental Consultants**  
**Block 1, G.F.S.C.**  
**Moneenaisha Road**  
**Galway**

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Date / Date  
7 September 2012

Ar cTag / Our Ref  
NRA12 86013

Bhur dTag / Your Ref  
2268-120211

**Re: River Deel (Crossmolina) Flood Relief Scheme – Environmental Constraints Consultation**

**Dear Ms. Colleran**

I wish to acknowledge receipt of your correspondence of 4 September 2012 regarding the above.

The matter is receiving attention and a further letter will issue in due course.

**Yours sincerely**

  
**Olivia Morgan**  
**Programme & Regulatory Unit**





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**Patron**  
Michael D. Higgins  
President of Ireland

**Éarlámh**  
Micheál D Ó hUigínn  
Uachtarán Na hÉireann

From: [casework@birdwatch.ie](mailto:casework@birdwatch.ie)

To: [ccolleran@mccarthykos.ie](mailto:ccolleran@mccarthykos.ie)

18<sup>th</sup> October, 2012

### Re: River Deel (Crossmolina) Flood Relief Scheme – Environmental Constraints Consultation

Dear Ms Collieran

Thank you for submitting this project to us for comments.

For this project we have the following comments that should be considered:

- The site is adjacent to Lough Conn and Lough Cullin Special Protection Area (site code 004228) 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 site integrity of the site and wintering waterbirds should be considered in the assessment process.
- Survey work is also needed along River Deel for potential nesting Kingfishers, which is an Annex I species under the Birds Directive. Survey work is needed both for the **presence of any birds** and also for the **presence of suitable kingfisher habitats**. The latter is of particular importance as the kingfisher is an elusive bird and therefore easily missed.

We would welcome the opportunity to discuss the proposal and our comments further with you. Please notify us with any updates on this project.

Yours sincerely,

Vivi Bolin

Policy & Advocacy



Directors: K. O'Byrne (Chairman) J Cromie, B Lavery, J O'Halloran, JB Peart, SP Roche, J. Wilson

Registered charity no. 5703. BirdWatch Ireland is the trading name of the Irish Wildbird Conservancy, Cárde Éanlaith Éireann, a company limited by guarantee.

Registered in Ireland, no. 116468. Registered office: Unit 20, Block D, Bullford Business Campus, Kilcoole, Co. Wicklow, Ireland.

## Corina Colleran

---

**From:** Michael OKane <Michael.OKane@teagasc.ie>  
**Sent:** 23 October 2012 14:24  
**To:** Corina Colleran  
**Cc:** Sheila Gibbons; michael.diskin@teagasc.ie  
**Subject:** River Deel (Crossmolina) Flood Relief Scheme-Environmental Constraints Consultation.

Corina, further to the above and your letter to Teagasc of 4<sup>th</sup> September 2012, I would confirm that Teagasc will not be making any submission on this project and that we waive our right to be consulted on any derivative project associated with this scheme.

*Michael O'Kane C. Eng*  
*Teagasc*  
*Moorepark*  
*Fermoy*  
*PH 025 42307*  
*E [michael.okane@teagasc.ie](mailto:michael.okane@teagasc.ie)*

**Attention:**

This e-mail is privileged and confidential. If you are not the intended recipient please delete the message and notify the sender. Any views or opinions presented are solely those of the author. This email was scanned by Teagasc and has been certified virus free with the pattern file currently in use. This however cannot guarantee that it does not contain malicious content.

**Tabhair aire:**

Ta an r-phost seo faoi phribhleid agus faoi run. Mura tusa an duine a bhi beartaithe leis an teachtaireacht seo a fhail, scríos e le do thoil agus cuir an seoltóir ar an eolas. Is leis an udar amhain aon dearcaí no tuairimí a leirítear. Scanadh an r-phost seo le Teagasc agus deimhníodh go raibh se saor o vioras leis an bpatrunchomhad ata in úsáid faoi lathair. Ní feidir a rathu leis seo afach nach bhfuil abhar mallíseach ann.

Áras an Chontae,  
Chionna Páirce, Gaillimh  
Áras an Chontae,  
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Fón/Fone: (091) 509 000  
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Leictiún/Weib: [www.galway.ie](http://www.galway.ie)  
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Leabharlann  
Library  
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Mearthy Keville O'Sullivan,  
Galway County Council  
Planning and Environmental Consultants,  
Block 1, G.F.S.C.  
Moneenagcisha Road,  
Galway.

Date: 03/10/2012

**RE: River Deel (Crossmolina) Flood Relief Scheme -  
Environmental Constraints Consultation**

Dear Corina,

In response to your letter dated 4<sup>th</sup> September 2012 the WRBD Office has prepared the following comments.

The ecological status of Lough Conn has improved from moderate (intern status) to good (updated status) in the last 5 years and this status must be retained. The lake is a Special Protected Area and forms part of the River Moy Special Area of Conservation and its conservation must be prioritised. A screening report is necessary to determine if the implementation of a flood relief scheme would have a significant adverse impact on Lough Conn due to its SPA status. If a disturbance is likely, both mitigation measures and possible alternatives must be proposed.

The River Moy SAC includes the main extent of the River Deel and therefore the protection of the Annexed species and habitats described in the SAC Site Synopsis and Natura statement should be prioritized. The Moy-Deel catchment has been identified as having an extant population of freshwater pearl mussel *Margaritifera margaritifera*; however it is not an SAC for the species. The Moy catchment including the river Deel is one of the most important *Salmo salar* fisheries in Europe as well as holding stocks of the sea lamprey *Petromyzon marinus* and brook lamprey *Lampetra planeri*. It is necessary to determine the possible significant adverse effects a flood relief scheme may have on the latter species. Issues such as siltation of salmonid spawning grounds and pearl mussel beds, as well as disturbance during peak salmonid migration and spawning periods must be taken into account.



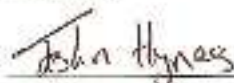


The Deel river system occurs in the Conn water management unit within the Western River Basin District. The proposed study area for the Flood relief scheme includes segments from 7 individual waterbodies (Table 1).

The waterbodies have been assigned an ecological status by the EPA based on the Q value assessments. It is essential that any relief scheme takes into account the current ecological water body status and the overall conservation restore date for the water body (Table 1). The status of the waterbodies within the proposed study area ranges from poor to high (Figure 1). The high and good status waterbodies need to be protected and their status retained. The status of the poor and moderate waterbodies cannot decrease and any Flood Relief Scheme needs to include proposals to maintain or improve their ecological status. Water body IE\_WE\_34\_1272 is currently at poor status and has been identified as being at risk from changes in river morphology and agricultural pollution.

Not all the waterbodies in the target area have been independently assessed. The status of 3 waterbodies has been estimated and extrapolated from a similar donor water body (IE\_WE\_3728 is a donor water body for IE\_WE\_34\_400 and IE\_WE\_34\_1817). We would recommend that each water body should be assessed independently to confirm its current ecological status.

Regards,



**John Hynes,**

**RBD Intern,**

**WRBD Office,**

**Galway County Council.**

Euro_Code	WBTYPE	NAME	RBMP_ EXTRAP	RBMP_ DONOR	ECOL_ LATEST	OBJECTIVE
IE_WE_34_3728	RIVERS	WE_Moy_Tooreen			Good	Protect
IE_WE_34_400	RIVERS	WE_Moy_RappaTRIB_Bunaneragh	YES	WE_34_3728	Good	Protect
IE_WE_34_1272	RIVERS	WE_Moy_Rappa_Cloonkee			Poor	Restore 2021
IE_WE_34_1817	RIVERS	WE_Moy_DeelTRIB	YES	WE_34_3728	Good	Protect
IE_WE_34_3896_2	RIVERS	WE_Moy_Deel_DooleegBeg_2			High	Protect
IE_WE_34_3896_3	RIVERS	WE_Moy_Deel_DooleegBeg_3			Moderate	Restore 2021
IE_WE_34_3741	RIVERS	WE_Moy_Conn	YES	WE_34_3728	Good	Protect

Table 1: Water bodies within the proposed Flood Relief Study Area. (Extract from EPA status update 2011)

# River Deel Study Area and Associated Water Management Units

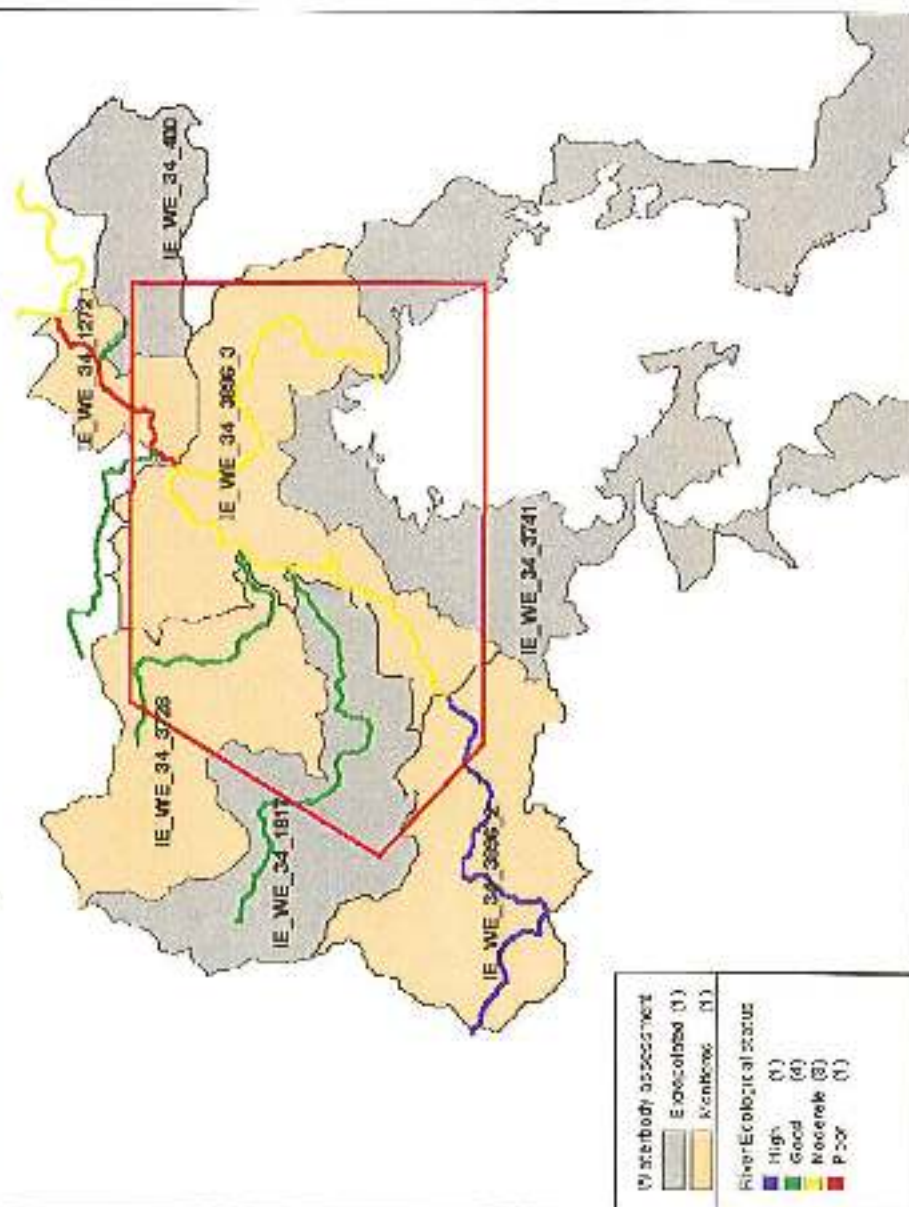


Figure 1: Waterbodies within the proposed Study area including ecological and extrapolated status



## Corina Colleran

---

**From:** Mellett David <dmellett@MayoCoCo.ie>  
**Sent:** 17 September 2012 15:04  
**To:** Corina Colleran  
**Attachments:** 2\_a\_1 N59.mht

Corina,

Link to the N59 Road Project through Crossmolina. As far as I know the Project is currently on hold.

Regards

David Mellett EE  
Water Services - Capital Works  
Tel: 094 9047431

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## N59 Crossmolina - Ballina Road Project

Length of Project: **12km**

Carriageway Type: **Reduced Single Carriageway** ([Diagram](#))

Current Status of Project: **Phase 3 - Route Selection**

This Project is funded by the Irish Government under the National Development Plan 2007 - 2013 and part financed by the European Union

### Introduction:

In July 1998 the NRA published the NRA National Road Needs Study. The N59 Crossmolina-Ballina Road Project was identified as needing improvement as a backlog project and that the road should be a reduced 2-lane cross section. The current Mayo County Development Plan 2003-2009 has stated in its transportation policy its objective to complete the improvements to the national routes and to continue to improve these routes as finance permits. The improvements proposed within the N59 Crossmolina-Ballina Road Project are consistent with this policy. The Ireland National Development Plan 2007-2013 is a Government policy to provide a high quality of service on the national road network and the improvements proposed within the N59 Crossmolina-Ballina Road Project are consistent with this policy. The National Spatial Strategy 2002-2020 recognizes the need to provide good quality road and public transport connections between Dublin, Galway, Mayo and Sligo and identifies 2 strategic radial corridors and 1 strategic linking corridor within County Mayo. These corridors will assist in promoting development within the West Region between the Gateways of Galway, Sligo and Athlone and the linked Hub of Castlebar and Ballina. The proposed N59 Crossmolina-Ballina Road Project is a fundamental element of this strategy. Transport 21 is a government sponsored policy which seeks to provide an integrated solution to Ireland's current and evolving transport needs that will underpin the country's competitiveness, promote balanced regional growth and enhance the quality of life for generations to come. It has identified a number of national routes for development and includes the N59 Crossmolina-Ballina Road Project.

The N59 between Crossmolina and Ballina is approximately 8.4km long when measured between both towns' speed limit restrictions. Its horizontal alignment is quite satisfactory with approximately 70% of its length being a combination of two straights (2.5km and 3.5km ) connected by a sharp bend of 100m curvature. The remaining 2.5km section approaching Ballina has a fairly satisfactory horizontal alignment and again is a combination of two straights. In general, the vertical alignment is fairly satisfactory but there are several locations where the gradient of the road compromises visibility and this is especially apparent on the 2.5km section approaching Ballina. There are approximately 20 at-grade junctions of varying importance gaining access onto the N59 and combined with the existence of approximately 80 individual house accesses also gaining direct access there are limited overtaking opportunities along the road and this is characterised by the presence of continuous white lining over much of its length. The road has no hardshoulder along the majority of its alignment and it has no right-turning provisions while its average width is approximately 7m. By amalgamating the above road particulars it is evident that the existing road is experiencing problems in catering safely and efficiently for the existing traffic needs of the region and platooning of vehicles is a common occurrence. Undoubtedly, current traffic trends which will realize an increase in traffic along the route will further aggravate this problem and diminish the effectiveness and safety of the road.

The objective of the N59 Crossmolina-Ballina Road Project is to provide a new route that is a justifiable solution to the existing and future needs of road users from a local, regional and national perspective having regard for the future road planning aspirations of both towns.

### Progress to Date:

#### *Project Planning (Phase 1 to Phase 3)*

In accordance with the requirements of the NRA National Roads Project Management Guidelines, Phase 1-Initial Project Planning the need for the project was agreed between Mayo County Council and the National Roads Authority.

Having established the need for the project, Phase 2-Constraints Study commenced in July 2005 when a Study Area was identified and information was gathered in relation to the various constraints that exist within this area which could affect the design and location of the project. A Constraints Study brochure with questionnaire was made available for public perusal and a closing date for the return of the questionnaire was September 2005.

Having identified the various constraints located within the Study Area, Phase 3-Route Corridor Selection of the process commenced when viable route option corridors were selected. A public presentation of the various route option corridors was held in June 2006 and the public were invited to attend, provided with a Route Option Corridor brochure and questionnaire and invited to assist in selecting the emerging preferred route by completing the accompanying questionnaire. The public were also encouraged to submit written submissions to supplement their views expressed in the questionnaire, if they wished to do so. Each of the Route Options were assessed from an Engineering, Economic, Human and Environmental perspective and the Emerging Preferred Route was presented to the public in July 2008 as part of a public consultation process. The public reaction to the project was assessed while the project undertook a further project appraisal and National Roads Authority review process. Consequently, the Preferred Route has been selected and it is anticipated that the route will be brought before the Council at the February or March 2010 Meeting.

However, if the Preferred Route is adopted, any planning applications located on any of the other route options, that were previously deferred, will be released to progress through the planning process.

The proposed route can be viewed at Crossmolina Library, Ballina Civic Offices or the Mayo National Roads Design Office, Castlebar. A map of the proposed route can be viewed on this webpage. Please scroll down for this link.

### Contact Information:

[Paul Hyland](#), Project Engineer,  
Mayo National Roads Design Office,  
Mayo County Council,  
Glenparke House,  
The Mall, Castlebar, County Mayo.

Phone: (094) 9047623; Fax: 094 9034525. Hours are from 9 a.m. to 1 p.m. and from 2 p.m. to 5 p.m., Monday to Friday.

### Publications:

**Information Brochures:**

Information leaflets/brochures and questionnaires are issued periodically to inform the public on the progress of the project and to assist us in assessing the public reaction to the project. Click on any of the following to view the file!

[Map of Preferred Route](#) pdf format or in [jpeg format](#)

**Map1:** Fotish, Lecarrow, Crossmolina, Abbeytown, Glebe.

**Map2:** Abbeytown, Glebe, Gortskeddia, Knockglass, Garraunard, Knockadangan, Knockagarravaun.

**Map 3:** Knockagarravaun, Deelcastle.

**Map 4:** Deelcastle, Ballymanagh, Knockanillaun, Slievenagark, Cloonclasney.

**Map 5:** Slievenagark, Cloonclasney, Tullyegan, Gortatogher, Farrandeelion.

**Map 6:** Tullyegan, Gortatogher, Farrandeelion.

[Proposed Changes at Abbeytown](#)

[Proposed Changes at Slievenagark](#)

Emerging Preferred Route [Brochure - pdf](#)

Constraints Study Brochure

Route Options Brochure

**Reports:**

Reports are prepared at various stages of the project in accordance with the requirements of the NRA National Roads Project Management Guidelines. The text of the reports may be downloaded here. Please note that the following Pdf files may not include all of the appendices, maps and diagrams contained in the published version in order to reduce the file size for downloading.

Constraints Study Report

**Other Relevant Information:**

If you have an interest in other aspects of road planning or construction click here to view some of the publications contained within this website. Alternatively, you can visit the National Roads Authority Website at [www.nra.ie](http://www.nra.ie) to view their comprehensive library of publications.

**Archaeology:**

During the planning and preliminary design stage (Phase 1 to Phase 4) of the project, no on-site intrusive archaeological investigations take place. This occurs during the construction stage of the project (Phase 5 to Phase 7) and generally occurs in advance of the main construction contract. However, a combination of desk-top and non-destructive field assessments of known archaeological sites occur during Phase 1 to Phase 4. If you wish to view this information, please refer to the Constraints Study Report, the Route Selection Report and the Environmental Impact Statement, where appropriate.



## Corina Colleran

---

**From:** Douglas Iain <idouglas@MayoCoCo.ie>  
**Sent:** 25 September 2012 10:26  
**To:** Corina Colleran  
**Attachments:** River Deel Flood Relief Scheme.doc

Corina,

Attached is a short submission, it doesn't go into detail on the potential schemes proposed but feel that submissions made on EIS and HDA early next year will be more beneficial and will be more specific. The submission points out a few existing problems within the Deel catchment and gives some references for reading material. If more detail is necessary at this time, please let me know.

The Council's viewpoint, this is a catchment which ranks as very important and any works here should be closely monitored.

Regards,

Iain Douglas  
Senior Planner

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## **River Deel Flood Relief Scheme – Environmental Constraints Consultation**

The River Deel catchment is one of the most studied river catchments in Ireland, and internationally. Extensive research has been undertaken on the River Deel catchment, specifically on the phosphorus loading from the river which discharges to Lough Conn. As the main tributary of Lough Conn, a designated SAC and SPA, the quality of the Deel is also of significance to the quality of this important Western lake, which supplies approximately 9000 m<sup>3</sup> drinking water per day to much of north Mayo.

While the Deel catchment was studied in detail by McGarrigle et al. (1993; 2000), McGarrigle and Champ (1999), Hallissey et al. (2001) and Donnelly (2001), a number of internationally peer-reviewed and conference papers also concluded with the same hypothesis tested within the Deel catchment – that phosphorus losses to surface waters increase with soil phosphorus levels and the majority of phosphorus loadings were from agricultural sources; lands and farmyards. Much research has led to water-protection recommendations with some national and local policies pertaining to agriculture, forestry, sewage treatment and worked peat bogs. The current possible engineering measures being considered for Flood Relief Scheme should focus on all water protection measures and appropriate excavation / earthworks to take into account the existing quality of the Deel and the underlying problems which have been so clearly and thoroughly studied, and invested in for decades. General water-protection measures (including silt traps and riparian buffer zones) should be established once the flood relief scheme has been selected, but specific measures to include soil P testing should also be considered for any engineering works which involve structural / construction works.

Incidentally, it is also worthy to note that the Deel River is one of two water bodies in the Western River Basin District where there was a failure in surface water chemical status, due to the presence of a priority hazardous substance (in this case a polycyclic aromatic hydrocarbon known as benzo[ghi]perylene+Indeno[1,2,3-c,d]pyrene).

From the current list of possible engineering works for flood relief, a number are considered unfeasible, including c) and d) relocation of properties and / or infrastructure and reconstruction of properties and / or infrastructure to a higher level, while others are quite radical and complex; diversion of entire river.

The flood relief scheme will undoubtedly undergo an Environmental Impact Assessment and a Habitats Directive Assessment should be undertaken to assess the significant effects on Natura 2000 sites in the vicinity. This should include potential impacts on the Lough Conn and Lough Cullin SPA and the River Moy Complex SAC, and an array of mitigation measures to negate / alleviate negative significant effects. Potential impacts of a flood relief scheme, in particular during construction, may include habitat / species disturbance and fragmentation, water pollution and aquatic habitat changes, to name a few.

When the EIS is being prepared and also during the HDA process, further comments will be made but until more details are provided on the scheme chosen as the most suitable, only general comments on current and past trends in water quality of the Deel can be given.

#### References

- Donnelly, K., 2001. The Response of Lough Conn and Lough Mask, two Irish Western Lakes, to Total Phosphorus Loadings, 1995 to 1999. Unpublished PhD thesis, University College Dublin.
- Hallissey, R., McGarrigle, M.L. and Donnelly, K., 2001. The relationship between in-stream total phosphorus and the characteristics of the surrounding catchment, Rappa catchment, Co. Mayo, Ireland. *Verh. Internat. Verein. Limnol* 27: 3556-3560.
- McGarrigle, M.L. and Champ, W.S.T., 1999. Keeping pristine lakes clean: Loughs Conn and Mask, Western Ireland. *Hydrobiologia* 395/396: 455-469.
- McGarrigle, M.L., Champ, W.S.T., Norton, R., Larkin, P. and Moore, M., 1993. The Trophic Status of Lough Conn. Mayo County Council, Castlebar, Co. Mayo 84 pp.
- McGarrigle, M.L., Hallissey, R., Donnelly, K. and Kilmartin, L., 2000. Trends in Phosphorus Loading to Lough Conn, Co. Mayo, Ireland. *Verh. Internat. Verein. Limnol* 27: 2642-2647.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Dr. K. Donnelly, BSc PhD



An tÚdarás um Bóithre Náisiúnta  
National Roads Authority

**McCarthy Keville O'Sullivan Ltd.**  
**Planning & Environmental Consultants**  
**Block 1, G.F.S.C.**  
**Moneenageisha Road**  
**Galway**

Teach Naomh Máirtín / Bóthar Waterloo / Baile Átha Cliath 4  
St. Martin's House / Waterloo Road / Dublin 4  
Teil: / Tel: + 353 1 680 2511 Facs: / Fax: + 353 1 688 0009

Dáta | Date 13 September 2012 Ár dTag. | Our Ref. NRA12 86013 Bhur dTag. | Your Ref.

**Re: River Deel (Crossmolina) Flood Relief Scheme – Environmental Constraints Consultation**

**Dear Sir/Madam**

Thank you for your correspondence of 4 September, 2012. The Authority endeavours to consider and respond to planning applications and other requests referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by the Authority in making such submissions or comments will seek to uphold official policy and guidelines as outlined in the Department of the Environments, Community & Local Government's Spatial Planning and National Roads Guidelines for Planning Authorities (2012). Regard should also be had to NRA guidance and other relevant circulars, which are available at [www.nra.ie](http://www.nra.ie).

The issuing of this correspondence is provided as best practice guidance only and does not prejudice the NRA's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

With respect to the River Deel Flood Relief Scheme, the recommendations indicated below provide only general guidance in relation to matters which may affect the National Roads Network and may form part of your early scoping of the proposed study.

The developer should have regard, *inter alia*, to the following:

- Consultations should be had with the relevant Local Authority/Regional Design Office with regard to locations of existing and future national road schemes in the area; N59 Relief Road and Crossmolina to Ballina Scheme,
- The Authority would be specifically concerned as to potential significant impacts the development would have on any national roads in the vicinity of proposed works; existing N59,
- The developer should assess visual impacts from existing national roads,
- The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts,



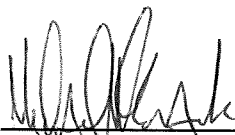
- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA Design Manual for Roads & Bridges (DMRB) and the NRA Manual of Contract Documents for Road Works,
- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA's Environmental Assessment and Construction Guidelines, including the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority, 2006),
- The EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1<sup>st</sup> Rev., National Roads Authority, 2004)),
- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines and best practice, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The Authority's Traffic and Transport Assessment Guidelines (2007) should be referred to in this regard. Please also have regard to Section 2.2 of the Guidelines which address circumstances where sub-threshold TTA may be required.
- The designers are asked to consult the National Roads Authority's DMRB *Road Safety Audit* (NRA HD 19/09) to determine whether a Road Safety Audit is required,
- In the interests of maintaining the safety and standard of the national road network, the EIS should identify the methods/techniques proposed for any works traversing/in proximity to the national road network.

(Developers may wish to consult the local planning authority, road authority/County Council or National Road Regional Design Office for the area for assistance on the foregoing matters).

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practise.

I hope that the above comments are of use in your scoping process.

**Yours sincerely**



**Michael McCormack**  
Policy Adviser (Planning)

## Bernadette Rabbitt

---

**From:** Corina Colleran  
**Sent:** 12 September 2012 12:20  
**To:** Bernadette Rabbitt  
**Subject:** Fwd: River Deel (Crossmolina) Flood relief scheme

Begin forwarded message:

**From:** "Parkes, Matthew" <[mparkes@museum.ie](mailto:mparkes@museum.ie)>  
**Date:** 12 September 2012 12:02:42 GMT+01:00  
**To:** "[ccolleran@mccarthykos.ie](mailto:ccolleran@mccarthykos.ie)" <[ccolleran@mccarthykos.ie](mailto:ccolleran@mccarthykos.ie)>  
**Subject:** River Deel (Crossmolina) Flood relief scheme

GE/2012/130

Dear Corina,

Regarding your environmental constraints consultation to the Mining Heritage Trust of Ireland (MHTI) on the above scheme, we are unaware of any mining heritage sites or features in the study area that need consideration. Obviously, if any historic mine sites or adits/shafts etc were encountered during any eventual engineering works we would be keen that we were consulted to make a record and assess, but it seems unlikely from the known records and geology of the area.

Whilst I and other Directors of MHTI might have personal views on the issues of trying to use engineering solutions to control geological processes, and as a response to bad planning control, we won't be adding them here.

Yours sincerely,

Matthew Parkes  
Director, Mining Heritage Trust of Ireland

Dr Matthew A Parkes  
National Museum of Ireland - Natural History  
Merrion Street, Dublin 2, Ireland  
Email: [mparkes@museum.ie](mailto:mparkes@museum.ie)  
Telephone: +353 (0)87 122 1967 or 01-6307006

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Earth Science Ireland Committee - <http://www.habitas.org.uk/es2k/>  
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Tá an t-eolas sa ríomhphost seo agus in aon chomhad a ghabhann leis ríonda agus d'fhadfadh sa bheith faoi phribhlíid dlítheil freisin. Sianann Ard Mhósaem na hÉireann ach go h-iríthe (ach níl tré theorann) chuile fhreagracht, agus níl ghlacann le haon dlíteanas i leith aon ríomhphost níl iat in a ghabhann leo, atá clomhillteach, taircisiñil, ciníoch níl a shéaraíonn cearta an duine in aon tsle eile, sáirí ríondachta, príobháideachais níl cearta eile san Éireamh. Mót an ríomhphost seo faighte agat trídhearmad, cuir ar an eolas muid lóithreach ag [ithelpdesk@museum.ie](mailto:ithelpdesk@museum.ie) agus scríos amach é fíin agus

chuile ch<sup>?</sup>ip de as do ch<sup>?</sup>ras. Deimhn<sup>?</sup>onn an fon<sup>?</sup>ta seo chomh maith gur seice<sup>?</sup>ileadh an teachtaireacht  
r<sup>?</sup>omhphoist seo ar fhait<sup>?</sup>os v<sup>?</sup>r<sup>?</sup>s.

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Ms Corina Culleran  
McCarthy Keville O'Sullivan  
Block 1, G.F.S.C.  
Moncenageisha Road  
Ballincollig  
Galway

12<sup>th</sup> September, 2012

Your ref: 2268-120211

Re River Deel Flood Relief Scheme

Dear Ms Culleran,

Thank you for your letter of 4<sup>th</sup> September, 2012, regarding the River Deel Flood Relief Scheme. We wish to inform you that the Institute of Geologists of Ireland does not make comments on individual environmental consultations.

Yours sincerely,

Susan Pyne  
Administrative Secretary

Company number 214400. Directors: D. Lewis, G. Stanley, S. Bolding, J. Doherty

*A member of the European Federation of Geologists*

UCD SCHOOL OF GEOLOGICAL SCIENCES, BELFIELD, DUBLIN 4

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12 September 2012

Ms Corina Colleran  
McCarthy Keville O'Sullivan Ltd  
Planning & Environmental Consultants  
Block 1, G.F.S.C.  
Monecnagcisha Road  
Galway

PLEASE QUOTE REF NUMBER ON ALL CORRESPONDENCE.  
Our Ref: 2012/44679N /JC HO

Dear Ms Colleran

I wish to acknowledge receipt of your recent correspondence addressed to the Minister for Agriculture, Food and the Marine, Simon Coveney, TD concerning the River Deel (Crossmolina) Flood Relief Scheme - Environmental Constraints Consultation.

I will bring your letter to the Minister's attention.

Yours sincerely,

  
Kevin Galligan  
Private Secretary



## Bernadette Rabbitt

---

**From:** Corina Colleran  
**Sent:** 12 September 2012 10:17  
**To:** brabbitt@mccarthykos.ie  
**Subject:** FW: Fáilte Ireland EIS and Tourism Guidelines 2011  
**Attachments:** EIS and Tourism Guidelines 2011.doc; ATT355644.txt; ATT355645.htm

---

**From:** Jill Stewart [<mailto:Jill.Stewart@failteireland.ie>]  
**Sent:** 11 September 2012 14:04  
**To:** Corina Colleran  
**Subject:** Fáilte Ireland EIS and Tourism Guidelines 2011

Dear Ms Colleran,,

I wish to acknowledge receipt of your recent letter to Fáilte Ireland in relation to Environmental Impact Statement of the proposed River Deel (Crossmolina) Flood Relief Scheme.

I attach a copy of Fáilte Ireland Guidelines for the treatment of tourism in an EIS, which we recommend should be taken into account in preparing the EIS.

Yours sincerely,

Jill Stewart.

Jill Stewart  
Destinations Development  
Fáilte Ireland  
88-95 Amiens Street  
Dublin 1  
Tel: 01 8847202  
[Jill.Stewart@failteireland.ie](mailto:Jill.Stewart@failteireland.ie)  
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<http://www.youtube.com/failteirelandtv>  
[www.thegatheringireland.com](http://www.thegatheringireland.com)

# Guidelines on the treatment of tourism in an Environmental Impact Statement

## **1. Introduction**

Tourism is a significant component of the Irish Economy – estimated to employ approximately 190,000 people – and contributing over €5.3 billion in spending to the economy in 2009. The environment is one of the main resources upon which this activity depends – so it is important that the EIS evaluates whether and how the interacting impacts of a project are likely to affect tourism resources.

The purpose of this short note is to provide guidance on how these impacts can be assessed through the existing EIA process. Undertaking an EIA is governed by the EIA Advice Notes published by the EPA. These Advice Notes contain detailed guidance on how to describe and evaluate the effects arising from a range of projects, including tourism projects.

These guidelines were written with the assistance of Conor Skehan, Head of Department of Environment and Planning, Dublin Institute of Technology.



## 2. Tourism and the Environment

There are two interactions between tourism and the environment.

1. Impacts caused by Tourism Projects
2. Impacts affecting Tourism (e.g. the quality of a destination or a tourism activity)

### Impacts caused by Tourism Projects

Tourism projects can give rise to effects on the environment. These are specifically dealt with under a number of Project Types in the Advice Notes, specifically:

#### 12 TOURISM AND LEISURE

- a. Ski-runs, ski-lifts and cable-cars where the length would exceed 500 metres and associated developments. Project Type 20
- b. Sea water marinas where the number of berths would exceed 300 and fresh water marinas where the number of berths would exceed 100. Project Type 10
- c. Holiday villages which would consist of more than 100 holiday homes outside built-up areas; hotel complexes outside built-up areas which would have an area of 20 hectares or more or an accommodation capacity exceeding 300 bedrooms. Project Type 28
- d. Permanent camp sites and caravan sites where the number of pitches would be greater than 100. Project Type 28
- e. Theme parks occupying an area greater than 5 hectares. Project Type 29

**Figure 1 The Advice Notes contain detailed descriptions on how to describe and evaluate the effects arising from a range of tourism projects.**

### Impacts affecting Tourism

Environmental effects of other projects on tourism are not specifically addressed in the Advice Notes. Taking account of the significance of tourism to the Irish economy a specialist topic of 'Tourism' has been prepared to facilitate a systematic evaluation of effects on this sector within the format laid down for other parts of the Environmental Impact Statement.

It is not intended that the assessment of effects on tourism should become a separate section of the Impact Statement, instead it is intended to become a specialist sub-section of the topic 'Human Beings' which is currently described in Section 2 of the Advice Notes

### 3. Tourism in the Existing Environment

#### Introduction

Visitor attitude surveys reveal that the following factors – in order of priority – are the reasons that tourists visit and enjoy Ireland:

- Beautiful scenery
- Friendly & hospitable people
- Safe & Secure
- Easy, relaxed pace of life
- Unspoilt environment
- Nature, wildlife, flora
- Interesting history & culture
- Plenty of things to see and do
- Good range of natural attractions

It is noteworthy that over half of the factors listed are environmental and that all others are related to the way of life of the people. The following describes how these factors are considered within an EIS, set out under EIA topic headings, and how they interact with tourism.

#### *Beautiful scenery*

This is covered in the '*Landscape*' Section. Particular attention needs to be paid to effects on views from existing purpose-built tourism facilities, especially hotels, as well as views from touring routes and walking trails. It is important to note that there appears to be evidence that the visitor's expectations of 'beautiful' scenery does not exclude an admiration of new modern developments – such as windfarms – which appear to be seen as indicative of a modern, informed and responsible attitude to the environment.

#### *Friendly & hospitable people*

This is not an environmental factor though it is indirectly covered under the '*Human Beings*' section of the EIS. The principal factor is the ratio of visitors to residents. This is of less significance in areas with long-established patterns of tourism.

#### *Safe & Secure*

This is not an environmental issue – though some of the factors that are sometimes covered under the heading of '*Human Beings*' – such as social inclusion or poverty – can point to likely effects and interactions.

#### *Easy, relaxed pace of life*

This is not an environmental issue though it is partially covered under '*Human Beings*' – see comments above.

#### *Unspoilt environment*

This is covered under the sections dealing with '*Landscape*', '*Flora*' and '*Fauna*' and to a lesser extent under emissions to '*Water*' and '*Air*'. In some instances traffic congestion, especially in rural areas, can be an issue, this is usually covered within '*Material Assets*'.

#### *Nature, wildlife, flora*

This is principally covered under the headings of '*Flora*' and '*Fauna*' and to a lesser extent by '*Landscape*', '*Water*' and '*Air*'. The principal issues being to avoid any effects that might reduce the health or extent of the habitats. This can occur either directly, by impinging on the site, or indirectly, through emission, that can affect the natural resources, like clean water, which the habitat depends on. It also considers effect on physical access to and visibility of these sites. Occasionally there are concerns about the disturbance or wear and tear of visitor numbers to such sites.

#### *Interesting history & culture*

This is principally covered under '*Cultural Heritage*' and, to a lesser extent, under '*Human Beings*'. The principal issues being to avoid damage to sites and structures of cultural, historical, archaeological or architectural significance – and to their contexts or settings. It also considers effect on physical access to and visibility of these sites. Occasionally there are concerns about the wear and tear of visitor numbers to such sites.

#### *Plenty of things to see and do.*

This is not an environmental issue though it is partially covered by the '*Human Beings*' section, where the tourism resources of an area are described and assessed.

#### *Good range of natural attractions*

This is covered by the '*Landscape*', '*Flora*', '*Fauna*', and '*Cultural Heritage*' sections of the EIS.

## 4. Project factors affecting Tourism

### Introduction

Tourism can be affected both by the structures or emissions of new developments as well as by interactions between new activities and tourism activities – for example the effects of high volumes of heavy goods vehicles passing through hitherto quiet, scenic, rural areas. Tourism can be affected by a number of the characteristics of the new project such as:

- New Developments
  - Social Considerations
  - Land-uses and Activities
- *New Developments* - will the development stimulate or suppress demand for additional tourism development in the area? If so, what type, how much and where? Marinas, golf courses, other major sporting facilities as well as theme parks and larger conference facilities can all stimulate the emergence of new accommodation, catering and leisure facilities often within an extensive area around a new primary visitor facility. Extensive urbanisation and large scale infrastructure as well as certain processing and extractive industries all have the potential to suppress demand for additional tourism – but usually only in the immediate locality of the new development. It should be noted however, that some types of new or improved large scale infrastructure – such as roads – can improve the visitor experience – by increasing safety and comfort or can convey a sense of environmental responsibility – such as wind turbines.
- *Social Consideration* - will the development change patterns and types of activity and land use? Will it affect the demographics, economy or social dynamics of the locality?
- *Land-use* - will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the tourism resources in the surrounding area?

### Existing Tourism

In the area likely to be affected by the proposed development, the following attributes of tourism, or the resources that sustain tourism, should be described under the following headings.

Note that the detailed description and analysis will usually be covered in the section dealing with the relevant environmental topic – such as '*Landscape*'. Only the relevant finding as to the likely significance to, or effect on, tourism needs to be summarised in this section.

### Context

Indicate the location of sensitive neighbouring tourism resources that are likely to be directly affected, and other premises which although located elsewhere, may be the subject of secondary impacts such as alteration of traffic flows or increased urban development. The following should be noted in particular:

- Hotels, conference centres, holiday accommodation – including holiday villages, holiday homes, and caravan parks.
- Visitor centres, Interpretive centres and theme parks
- Golf courses, adventure sport centres and other visitor sporting facilities
- Marinas and boating facilities
- Angling facilities
- Equestrian facilities
- Tourism-related specialist retailers and visitor facilities
- Historic and Cultural Sites
- Pedestrian, cycling, equestrian, vehicular and coach touring routes

Indicate the numbers of premises and visitors likely to be directly affected directly and indirectly.

Identify and quantify, where possible, their potential receptors of impacts, noting in particular transient populations, such as drivers, walkers, seasonal and other non-resident groups.

Describe any significant trends evident in the overall growth or decline of these numbers, or of any changes in the proportion of one type of activity relative to any other.

Indicate any commercial tourism activity which likely to be directly affected, with resultant environmental impacts.

### **Character**

Indicate the occupations, activities or interests of principal types of tourism in the area. – Where relevant, describe the specific environmental resources or attributes in the existing environment which each group uses or values; where relevant, indicate the time, duration or seasonality of any of those activities. For example describe the number of guides, boats and anglers who use a salmon fishery and the duration of the salmon season as well as the quantity and type of local accommodation that is believed to be used by the anglers.

### **Significance**

Indicate the significance of the principal tourism assets or activities likely to be affected. Refer to any existing formal or published designation or recognition of such significance. Where possible provide an estimate of the contribution of such tourism activities to the local economy. For instance refer to the number of annual visitors to a tourism attraction or to the grading of a hotel.

### **Sensitivity**

Describe any significant concerns, fears or opposition to the development known to exist among tourism interests. Identify, where possible, the particular aspect of the development which is of concern, together with the part of the existing tourism resource which may be threatened. For instance describe the extent of a potential visual intrusion onto a site of historic significance which is the main local tourist attraction.

## **5. Impacts on Tourism**

### **"Do Nothing" Impact;**

Describe how trends evident in the existing environment will continue and how these trends will affect tourism.

### **Predicted impact;**

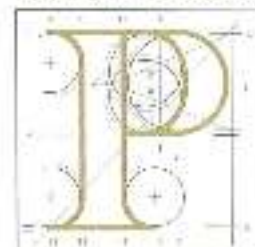
- Describe the location, type, significance, magnitude/extent of the tourism activities or assets that are likely to be affected.
- Describe how the new development will affect the balance between long-established and new dwellers in an area and its affect on the cultural or linguistic distinctiveness of an area. For example describe the effect of a new multi-national population required for an international call-centre located in a Gaeltacht area.
- Describe how changes in patterns of employment, land use and economic activity arising from the proposed development will affect tourism, for example, illustrating how a new industrial development will diversify local employment opportunities thereby reducing the area's unsustainable over-reliance on seasonal tourism.
- Describe the consequences of change, referring to indirect, secondary and cumulative impacts on tourism; Examples can include describing how the new development may lead to a reduced assimilative capacity for traffic or water during the peak of the tourism season or how new urbanism combined with existing patterns of tourism may lead to unsustainable levels of pedestrian traffic through a sensitive habitat.
- Describe the potential for interaction between changes induced in tourism and other uses that may affect the environment – for instance increasing new tourism-related housing affecting water resources or structures
- Describe the worst case for tourism if all mitigation measures fail.

## 6. Mitigating adverse impact on Tourism

Describe the mitigation measures proposed to:

- *avoid* sensitive tourism resources – such as views, access, and amenity areas including habitats as well as historical or cultural sites and structures.
- *reduce* the exposure of sensitive resources to excessive environmental burdens arising from the development's emissions or volumes of traffic [pedestrian and vehicular], and/or losses of amenity arising from visually conspicuous elements of the development – for example by prioritizing visual screening of views from a hotel towards a quarry.
- *reduce* the adverse effects to tourism land uses and patterns of activities – especially through interactions arising from significant changes in the intensity of use or contrasts of character or appearance – for example by separating traffic routes for industrial and tourism traffic.
- *remedy* any unavoidable significant residual adverse effects on tourism resources or activities, for example by providing alternative access to tourism amenities – such as waterways or monuments.





Corina Collieran  
McCarthy Keville O'Sullivan Ltd  
Block 1, G.F.S.C.  
Moncenageisha Road  
Galway

10<sup>th</sup> September 2012

Dear Madam,

I have been asked by An Bord Pleanála to refer to your letter dated 4<sup>th</sup> September 2012 in relation to the River Deel (Crossmolina) Flood Relief Scheme.

Please be advised that the Board will not be making any submission/observation in relation to the scheme.

If you have any queries in relation to the matter, please contact the undersigned officer of the Board.

Yours faithfully,

  
Sinéad McInerney  
Executive Officer





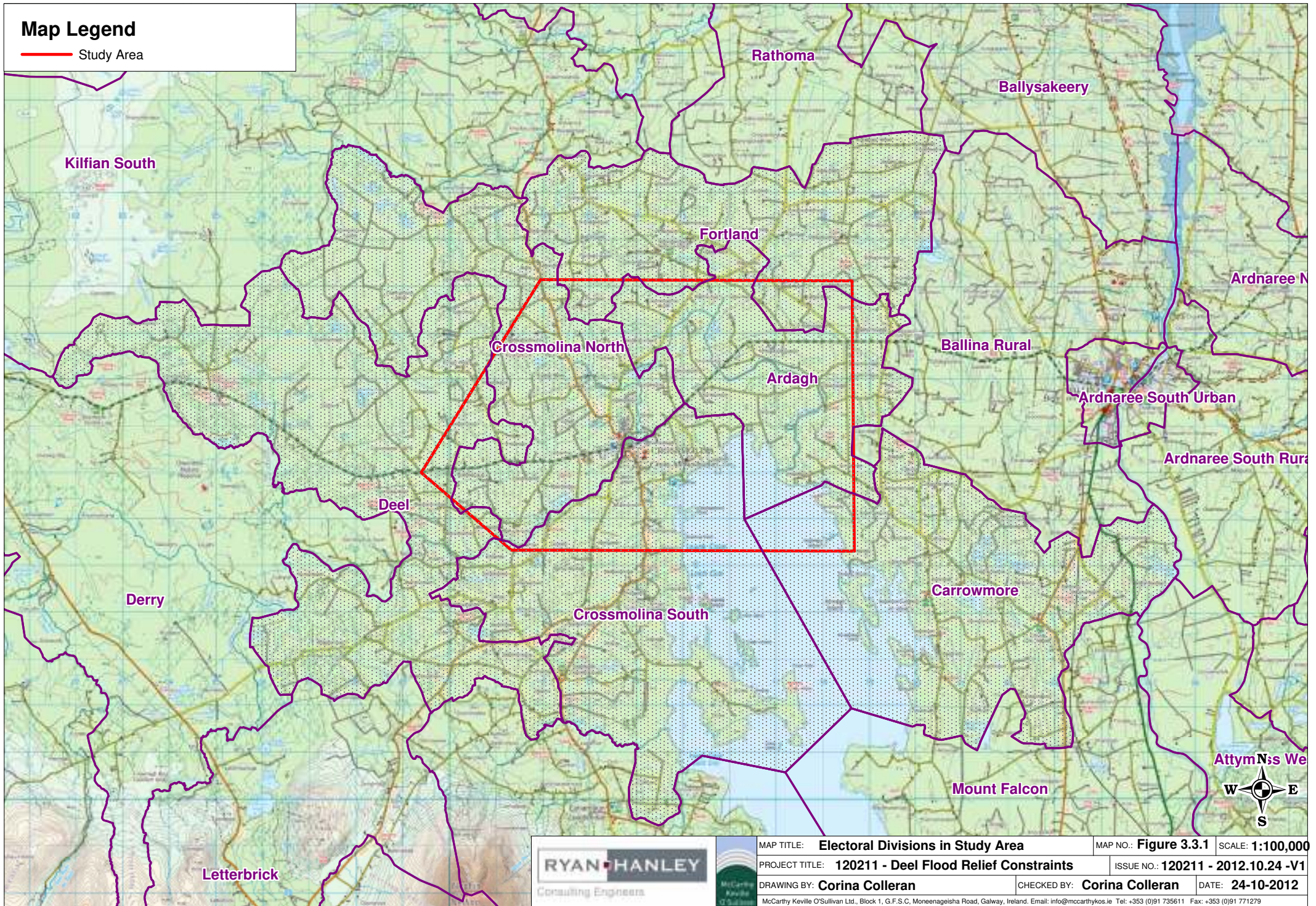
## Appendix B

### Map of Electoral Divisions in vicinity of the Study Area



## Map Legend

— Study Area



**RYAN HANLEY**  
Consulting Engineers



MAP TITLE: **Electoral Divisions in Study Area**

MAP NO.: **Figure 3.3.1**

SCALE: **1:100,000**

PROJECT TITLE: **120211 - Deel Flood Relief Constraints**

ISSUE NO.: **120211 - 2012.10.24 -V1**

DRAWING BY: **Corina Colleran**

CHECKED BY: **Corina Colleran**

DATE: **24-10-2012**

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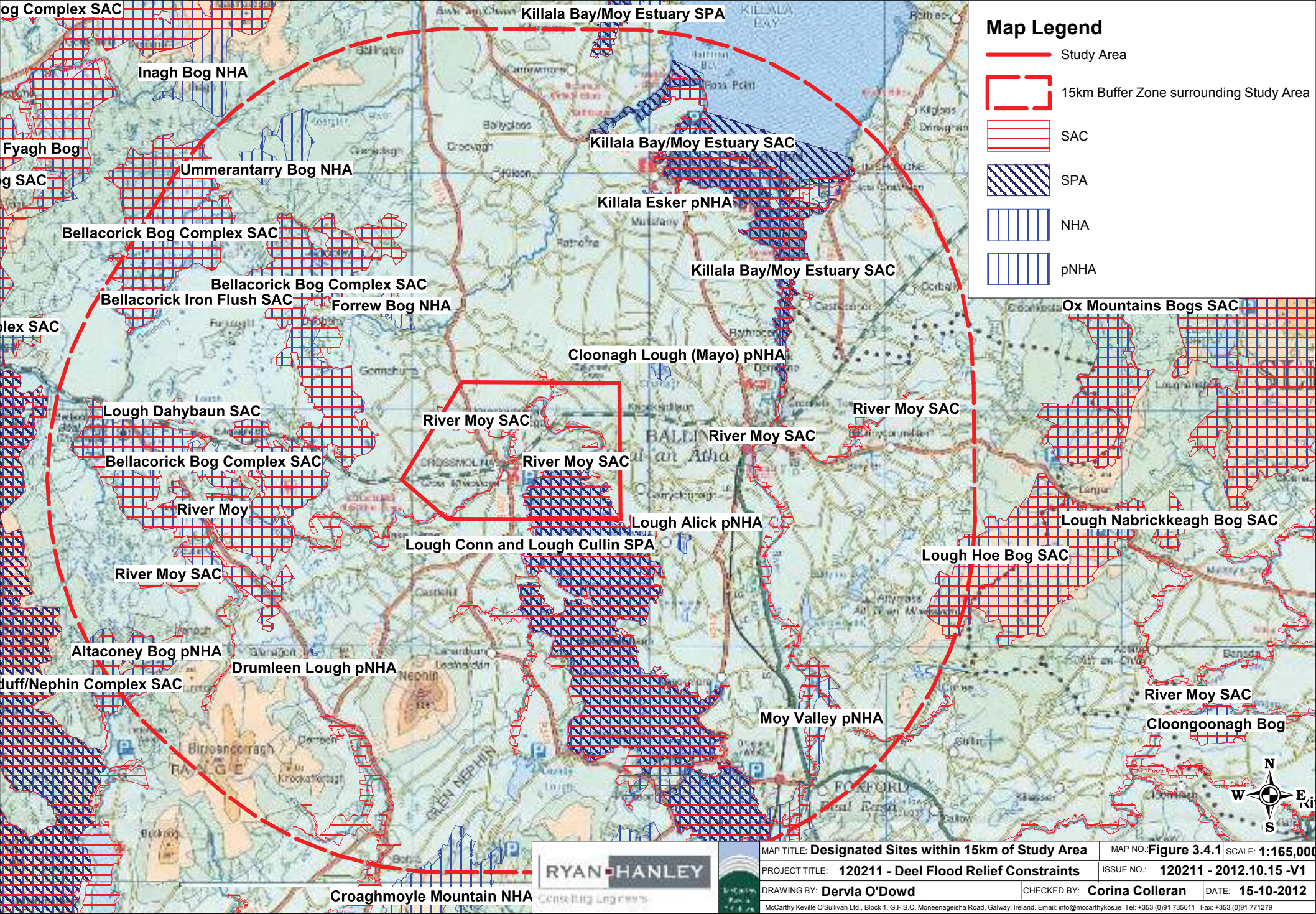
## **Appendix C**

### **Details of Ecological Designations in Vicinity of Study Area**

C1  
C2

**Figure 3.4.1 – Study Area and Designations  
Conservation Objectives of Natura 2000 Sites**







## Conservation Objectives for River Moy SAC [002298]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [1092] *Austropotamobius pallipes*
- ◆ [1095] *Petromyzon marinus*
- ◆ [1096] *Lampetra planeri*
- ◆ [1106] *Salmo salar* (only in fresh water)
- ◆ [1355] *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*)

### Citation:

NPWS (2011) Conservation objectives for River Moy SAC [002298]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: [www.npws.ie/protectedsites/conservationmanagementplanning](http://www.npws.ie/protectedsites/conservationmanagementplanning)

## Conservation Objectives for Lough Conn and Lough Cullin SPA [004228]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

◆ <i>Aythya fuligula</i>	[wintering]
◆ <i>Melanitta nigra</i>	[breeding]
◆ <i>Larus canus</i>	[breeding]
◆ <i>Anser albifrons flavirostris</i>	[wintering]
◆ Wetlands	[]

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### Citation:

NPWS (2011) Conservation objectives for Lough Conn and Lough Cullin SPA [004228]. Generic Version 4.0.  
Department of Arts, Heritage & the Gaeltacht.

For more information please go to: [www.npws.ie/protectedsites/conservationmanagementplanning](http://www.npws.ie/protectedsites/conservationmanagementplanning)





## Appendix D

### Aquifers and Water Abstractions

D1

D2

Figure 3.5.1 – Well Locations

Figure 3.5.2 – Aquifers in Study Area

Figure 3.5.1 Well Locations

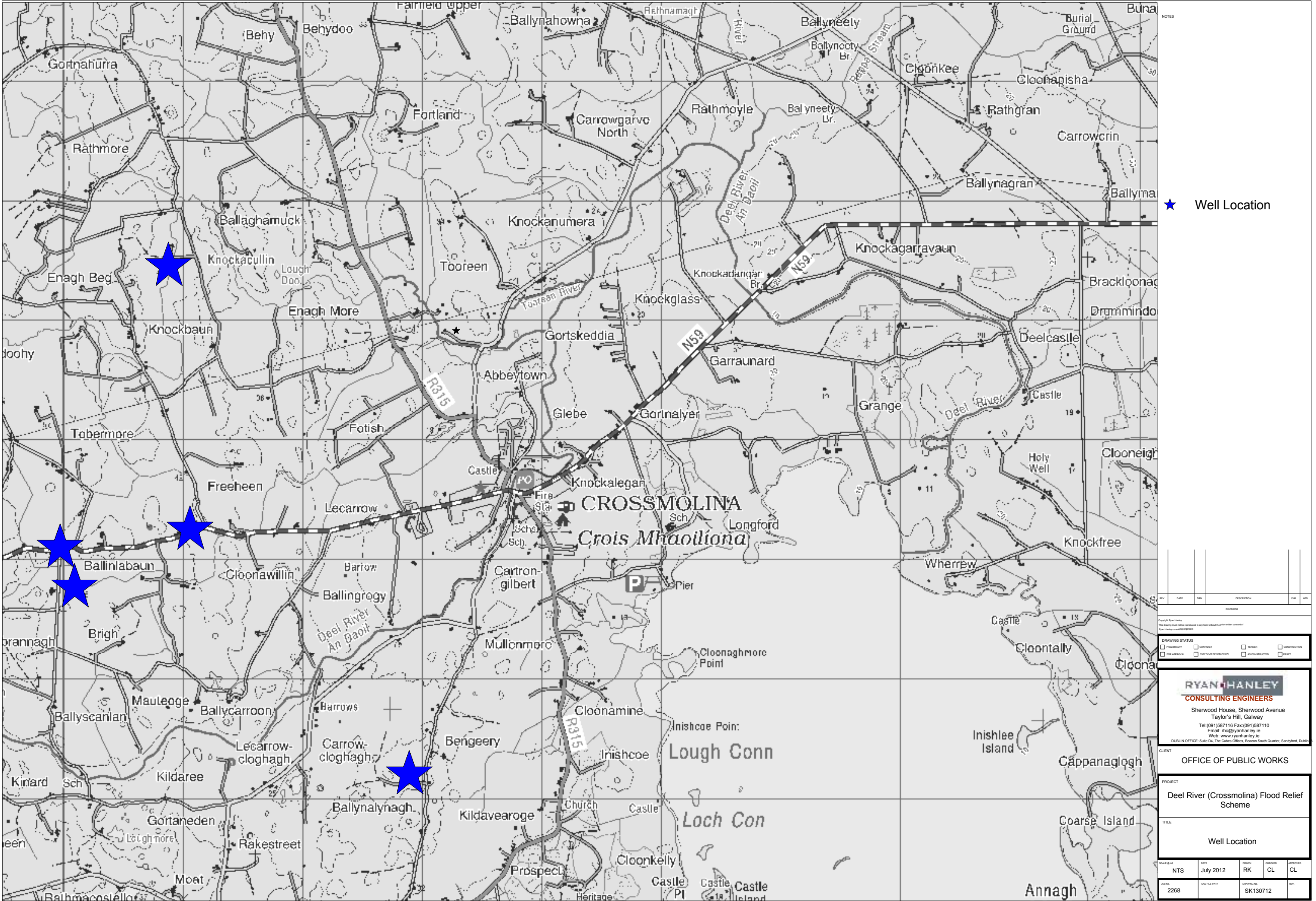
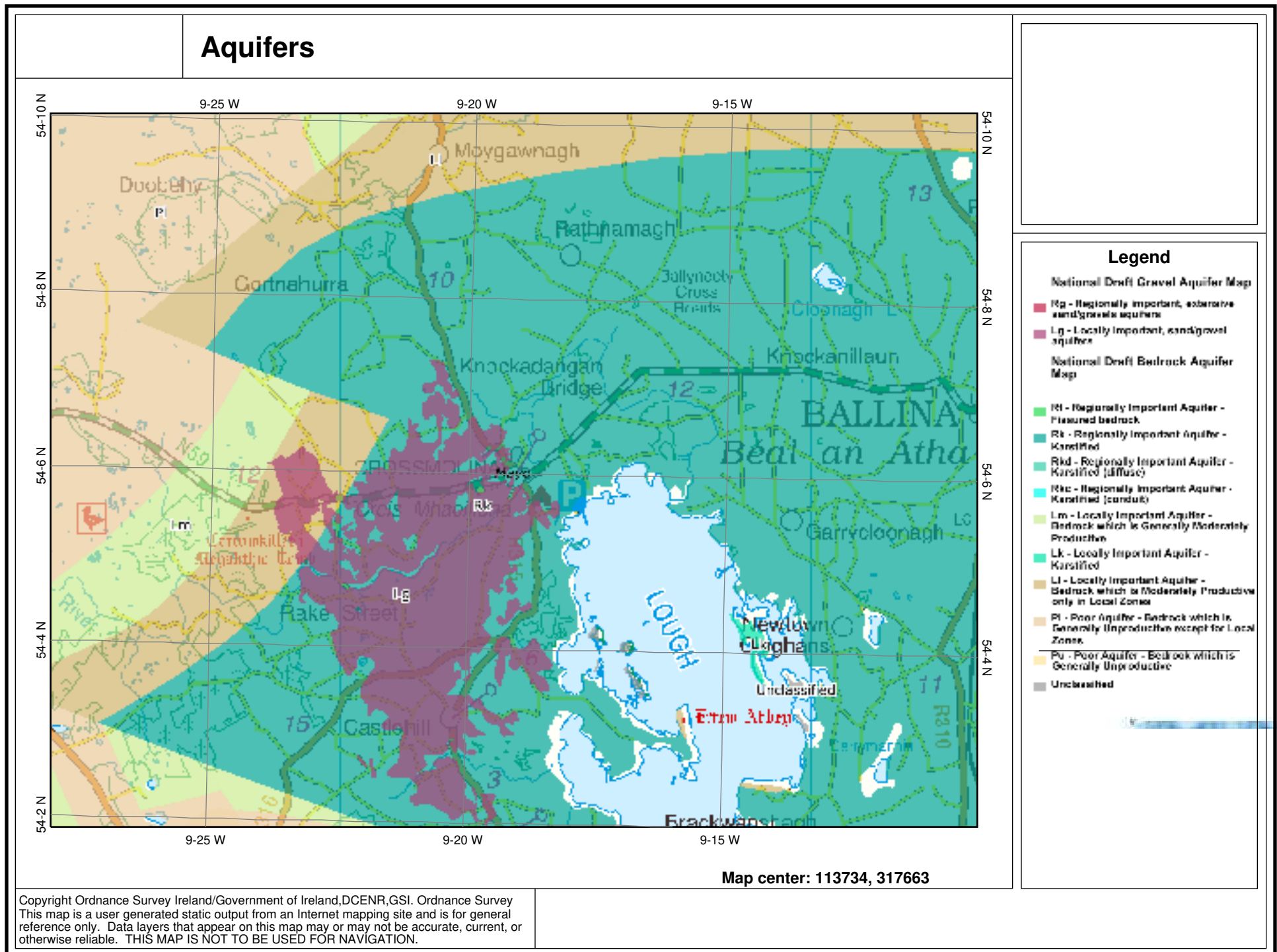


Figure 3.5.2 Aquifers





## **Appendix E**

### **Soils & Geology**

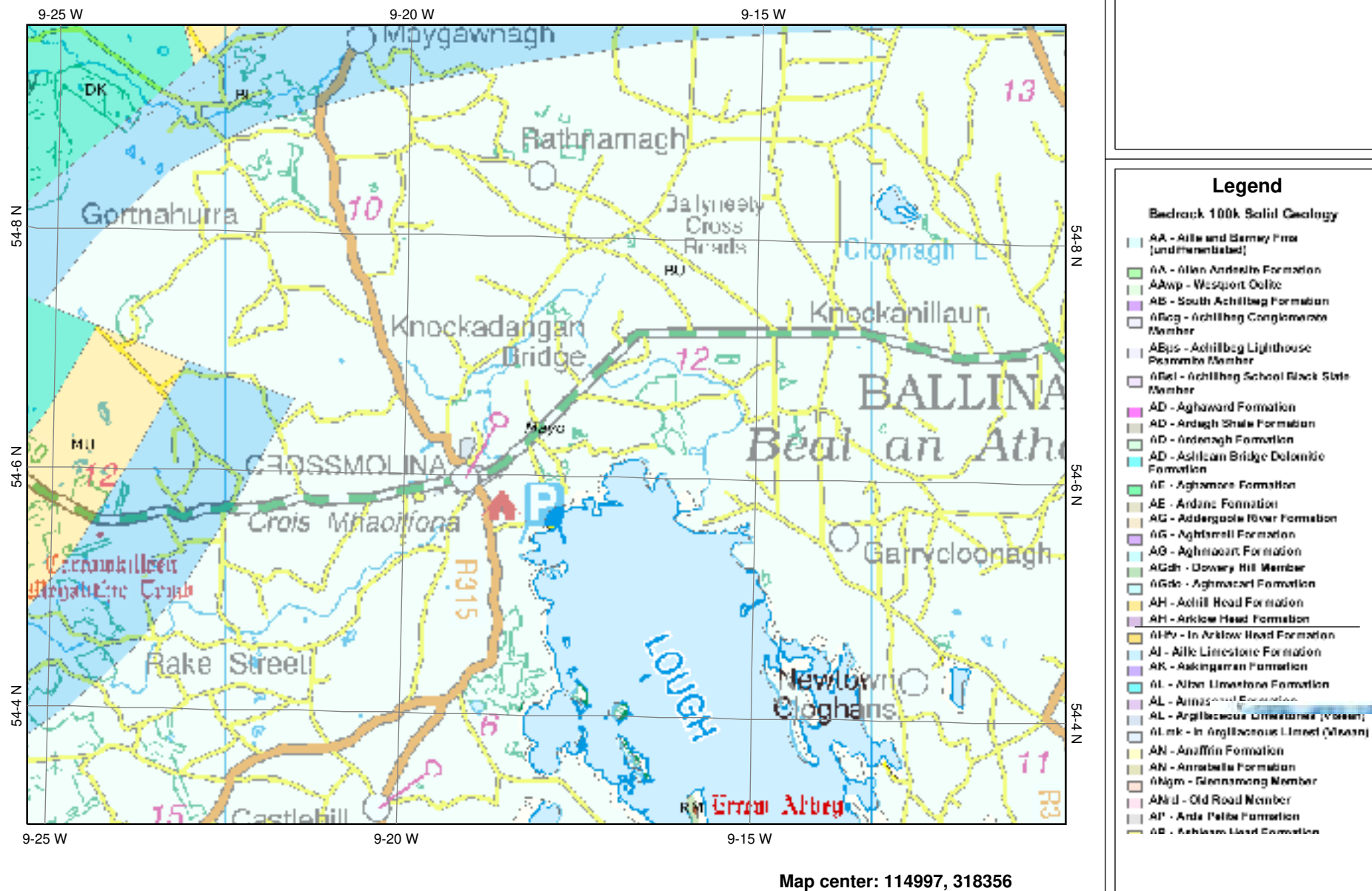
#### **E1**

#### **Figure 3.6.1 – Bedrock Geology in Study Area**



Figure 3.6.1

# Bedrock Geology



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This map is a user generated static output from an Internet mapping site and is for general  
reference only. Data layers that appear on this map may or may not be accurate, current, or  
otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

## **Appendix F**

### **Archaeological Constraints Study Report**



# **1       ARCHAEOLOGICAL & ARCHITECTURAL HERITAGE**

## **1.1       INTRODUCTION**

John Cronin & Associates, commissioned by Ryan Hanley, Consulting Engineers, have prepared this constraint report outlining the features of archaeological, architectural and cultural heritage significance within the Study Area for the proposed Crossmolina Flood Relief Scheme. The Study Area is centred on the River Deel and incorporates the water channels, banks and lands extending along the main channel upstream and downstream of Crossmolina, Co. Mayo.

The purpose of this study is to inform the Design Team of the key cultural heritage issues that may impose constraints on the viability and/or design of elements of possible flood alleviation measures. The study also seeks to identify any heretofore unrecorded areas of heritage potential, such as the potential for underwater archaeological remains, which may impose constraints on the proposed scheme. It is envisioned that as the proposed scheme progresses into the Design Phase that more detailed background information and specific details on potential impacts and mitigation will be presented and assessed in the Environmental Assessment of preferred Option and Environmental Impact Assessment reports.

The main text of this chapter outlines the methodology followed for this constraints study and provides the legislative framework for both the archaeological and architectural heritage resource. The overall context for the archaeological and historical background to the Study Area is summarised and all protected cultural heritage features are listed in Table formats in Appendix 1.1. A number of riverine and lacustrine areas of archaeological potential were identified during the desktop study and are also listed in Appendix 1.1.

## **1.2       METHODOLOGY**

This study is based on a detailed desk study of the archaeological, architectural and cultural heritage resource within the Study Area (published & non-published datasets). This information has provided an insight into the development of the Study Area over time and an evaluation of both recorded and potential cultural heritage sites.

A list of published sources consulted in the preparation of this document is provided in Section 1.6. The principal sources reviewed for the archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). The Record of Protected Structures (RPS), as published by Mayo County Council and was reviewed in order to assess the architectural heritage. The following sources were also consulted:

- Various editions of Ordnance Survey maps;
- Excavations Database ([www.excavations.ie](http://www.excavations.ie));
- County Mayo Heritage Plan 2011-2016
- Mayo County Development Plan 2008-2014;
- National Inventory of Architectural Heritage;
- Aerial imagery; and
- Various published sources.

### *Framework for the Protection of Cultural Heritage*

The management and protection of cultural heritage in Ireland is achieved through a framework of international conventions and national laws and policies (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This framework was established in accordance with the provisions of the 'European Convention on the Protection of the Archaeological

Heritage' (the Valletta Convention) and 'European Convention on the Protection of Architectural Heritage' (Grenada Convention). Cultural heritage can be divided loosely into the archaeological resource covering sites and monuments from the prehistoric period until the post-medieval period and the architectural heritage resource, encompassing standing structures and sites of cultural importance dating from the post-medieval and modern period. In addition, local place-names, folklore and traditions are considered part of our cultural heritage.

In summary, the national policy statements, guidelines and advice notes relevant to this assessment include:-

- National Monuments Act 1930 (and subsequent amendments in 1954, 1987, 1994 and 2004);
- Heritage Act (1995);
- National Cultural Institutions Act (1997);
- Policy for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands 1999);
- Architectural Heritage (National Inventory) and National Monuments Act (1999);
- Local Government (Planning and Development) Act (2000); and
- Department of Environment, Heritage, and Local Government's Architectural Heritage Protection: Guidelines for Planning Authorities (2004).

### *The Archaeological Resource*

The National Monuments Service (Department of Arts, Heritage and Gaeltacht) is responsible for the statutory functions and the administration of the national policy in relation to archaeological heritage management. The National Monuments Act 1930 (and subsequent amendments in 1954, 1987, 1994 and 2004), the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which are held to include all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A national monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (Section 2, National Monument Act, 1930).

There are a number of mechanisms under the National Monuments Act that are applied to secure the protection of archaeological monuments. These include the designation of National Monument status, the Register of Historic Monuments, the Record of Monuments and Places (formerly the Sites and Monuments Record), and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

The term 'national monument' as defined in Section 2 of the National Monuments Act (1930) means a monument 'the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest'. The State or Local Authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments may also appoint the Minister or the Local Authority as guardian of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State it may not be interfered with without the written consent of the Minister. There are no National Monuments in state ownership/guardianship within the Study Area.

Section 12 (1) of the 1994 Act provides for the establishment of a Record of Monuments and Places (RMP). The record comprises a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect of each county in the State. Archaeological sites recorded on the RMP receive statutory protection under the National Monuments Act 1994. Section 12 (3) of the 1994 Act provides that 'where the owner or occupier of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the National Monuments Service to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice.'

### *Architectural Heritage*

Protection of architectural or built heritage is provided for through a range of legal instruments that include the Heritage Act, 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act, 1999, and the Local Government (Planning and Development) Act 2000. Section 2.1 of the Heritage Act, 1995, describes architectural heritage as 'all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents, and, without prejudice to the generality of the foregoing, includes railways and related buildings and structures and any place comprising the remains or traces of any such railway, building or structure'.

Under the Local Government (Planning and Development) Act, 2000, all Planning Authorities are obliged to keep a 'Record of Protected Structures' of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. If a protected structure is endangered, planning authorities may issue a notice to the owner or occupier requiring works to be carried out. The Act contains comprehensive powers for local authorities to require the owners and occupiers to do works on a protected structure if it is endangered, or a protected structure or a townscape of special character that ought to be restored.

Since 2000 planning authorities have the statutory power to define Architectural Conservation Areas. An Architectural Conservation Area is defined as "a place, area, group of structures, taking account of building lines and heights, that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or that contributes to the appreciation of a protected structure, and whose character it is an objective of a development plan to preserve" (Architectural Heritage Protection: Guidelines for Planning Authorities, p.41).

### 1.3 ARCHAEOLOGICAL & HISTORICAL CONTEXT

#### *Early Prehistoric Period*

The earliest recorded evidence for human settlement in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the heavily forested island. While these Mesolithic settlers did not construct settlements or monuments that have left any above ground traces, their presence can often be identified by scatters of worked flint in ploughed fields. There are no recorded Mesolithic sites within the study area. The Neolithic period (4000–2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of the agricultural economy, new settlement and ritual monuments, such as substantial rectangular timber houses and megalithic tombs, begin to appear in the archaeological record during this period. The presence of one portal tomb within Enagh Beg townland (MA029-035) demonstrates the presence of early farming communities with the Study Area during the Neolithic period. The topographical files of the National Museum of Ireland record the discovery of a polished stone axe, of potential Neolithic date, from the shore of the River Deel during a 1960s drainage scheme (ref. 1961:169).

#### *The Bronze Age*

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC). This new technology introduced a new artefactual assemblage into the Irish archaeological record and this period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and *fulachta fiadh*. The development of new burial practices meant that the construction of funerary monuments such as cairns, barrows, boulder burials and tumuli or cists was fairly common during this period. There are five barrows within the Study Area (MA038-015, MA038-051, MA038-052, MA038-053001- and MA038-053002-), which also contains two mounds (MA038-050 & MA038-146) and one cairn (MA038-053003-) that may also be funerary monuments of Bronze Age date.

The name *fulachta fiadh* translates as ‘cooking places of the wild’ (or of deer) and they comprise the burnt spreads/mounds that form the most common site associated with the Bronze Age. They can occur individually or in groups of up to ten; sites in a group being perfectly inter-visible and within a few metres of each other and the majority of radiocarbon dates produced by excavated examples place these monuments in the Bronze Age. There are four recorded burnt spreads (MA038-172/173/174/175) within Mauteoge townland in the southwest quadrant of the Study Area.

The topographical files of the National Museum of Ireland record the discovery of two Bronze Age artefacts within the Study Area: a socketed bronze axehead in Lecarrow townland (ref. 1931: 111) and a flat bronze axehead of probable provenance in Lough Conn (1939: 134).

#### *The Iron Age*

The later first millennium BC and the early centuries AD, which comprise the Iron Age, are amongst the most obscure in Irish prehistoric archaeology. There is general agreement that the development of an iron technology was a significant factor in the eventual demise of bronze working on a large scale, but how, why and when this came about in Ireland is far from clear. While the Study Area does contain examples of sites, such as enclosures and burnt spreads, which may conceivably date to this period, none can be definitely assigned an Iron Age date. Many of the settlement and burial sites of the period leave no above ground traces although they have often been detected in recent years during the course of archaeological investigations in advance and during development projects.

### *Early Medieval*

This period began with the introduction of Christianity in the 4<sup>th</sup>-century and continued up to the arrival of the Anglo-Normans in 1169 AD. The establishment of the Irish Church was to have profound implications for the political, social and economic spheres, in no small part due to the introduction of writing into the country. The origins and establishment of Christianity in Ireland is attested to in the archaeological record by the presence of church sites, associated places for burial and holy wells. While this period saw the emergence of the first phases of urbanisation around both the large monasteries and the Hiberno-Norse ports the dominant site types of the period are rural-based, such as ringforts, souterrains and monuments associated with early ecclesiastical activity. Generally enclosures are considered likely to be ringforts but insufficient evidence survives to classify them as such without recourse to archaeological excavation.

Ringforts are the most widespread archaeological field monument in the Irish countryside and are usually known by the names *dun* or *lios*, which form some of the most common place-name elements in the countryside. They are basically composed of a roughly circular area enclosed by an earthen bank formed of earth thrown up from a concentric external ditch. The evidence from the excavations at these sites indicates that they were enclosed farmsteads. Crannogs are early medieval lacustrine sites composed of wholly artificial (or partially enhanced) islands often connected to the shore by constructed causeways. The name derives from the Irish word for tree (*crann*), which refers to their main construction material, and they are typically interpreted as the defended high-status residences. Souterrains (underground chambers) are often found in association with ringforts, although isolated examples, perhaps associated with unenclosed settlements, are also recorded. The Study Area contains twenty three recorded ringforts and eleven enclosures. One of the ringforts (MA029-036001) contains a known souterrain (MA029-036002) while there is also one isolated souterrain within the Study Area (MA029-048). A crannog (MA038-158001) in the north end of Lough Conn is connected to the shoreline in Gortnaraby townland by a causeway (MA038-158001).

The early ecclesiastical sites were morphologically similar to ringforts and cashels but are often differentiated by the presence of features such as church buildings, graves, stone crosses and shrines. Many Irish churches continued to be developed into modern times and the various medieval and post-medieval churches within the Study Area (see below) may indicate the presence of early medieval ecclesiastical sites. ). The presence of early ecclesiastical activity in the Study Area is also indicated by the presence of two holy wells in Garraunard (MA029-040001-) and Knockfree (MA039-001) townlands.

### *Late Medieval*

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th-century broadly marks the advent of the Irish late medieval period, which continued up until the beginning of the post-medieval period in c.1550. The initial phase of the Anglo-Norman colonisation saw the construction of timber castles, i.e. mottes and ringworks, which were later replaced by more substantial masonry castles. By the 15th-century the native Irish chieftains and lords began to establish tower houses and smaller castles as their own centres of territorial control. As the late medieval period continued many of the existing Irish towns became established as local and regional market centres. The Study Area contains one motte site (MA039-003) in Cloontally townland, the townlands of Crossmolina (MA029-039) and Deelcastle (MA030-064001) each contain a tower house, an unclassified castle is within Enagh More (MA029-037) and a fortified house in Deelcastle (MA030-064002).

### *Post-medieval (1550 AD+)*

The post-medieval period saw the development of high and low status housing and urban settlements throughout Ireland. In particular local landlords improved their estates and built residences for themselves. During this period any given settlement cluster is likely to have

consisted primarily of single-storey thatched cottages with associated farm buildings. From later Victorian times onwards, two-storey farm houses became more common. In the latter half of the twentieth-century, there was a radical change in the nature and character of Irish domestic architecture manifested by the replacement of older stone-built structures with modern bungalows of concrete blockwork construction. The wider Study Area contains a wide range of buildings and structures, while not listed or protected, may be of architectural heritage interest. These various structures include country houses, demesne lands and vernacular buildings such as farmhouses, outbuildings, cottages, bridges, field walls.

Crossmolina town forms the main post-medieval settlement within the Study Area, although its origins probably lie much earlier in the medieval period. The town was described in the 19<sup>th</sup>-century as follows, "It stands on the river Deel, over which is a large stone bridge, on the direct road to the barony of Erris from Castlebar, and consists of a good main street and two converging ones, containing 310 houses... About a mile from the town, on the bank of the river Deel, are quarries of very fine stone; and limestone and freestone abound" (Lewis 1837).

The RMP/SMR includes a number of the post-medieval structures situated within the Study Area. These include a number of church sites such as the example (MA039-114001) on Inishlee Island, which has a children's burial ground (MA039-114003) within the surrounding graveyard (MA039-114002). The RMP/SMR also lists a church in Crossmolina (MA029-051001), its graveyard (MA029-051002) and an associated architectural fragment (MA029-051003). The site of an unclassified religious house in Abbeytown townland is also listed (MA029-038) as are a country house in Deelcastle (MA030-063) and a demesne tree-ring feature in Knockglass townland (MA029-050).

As outlined below, a number of the vernacular, church and transport features from the post-medieval period that are located within the Study Area have also been listed in the Record of Protected Structures (Appendix 1.1; Table 1.2).

#### *Potential Riverine and Lacustrine archaeological features based on Cartographic review*

A review of the 1st edition 6" OS map (1842) and the 25" OS map (1888-1913) for the Study Area revealed a number of riverine features that, while not included in the Record of Monuments and Places or the Record of Protected Structures, may indicate potential location for archaeological features or artefacts. The cartographic sources are available for consultation on the Ordnance Survey (OS) website (<http://maps.osi.ie/publicviewer>). The Record of Monuments and Places does not include all underwater archaeological sites and as a result development could potentially impact negatively on unrecorded underwater cultural resources. A review of the cartographic sources has identified a number of features such as bridges, weirs, millraces, stepping stones in the River Deel and these are listed in Table 1.4 of this report. While many of these features may be of recent origin it is possible that some may have been sited at advantageous crossing points, fishing spots and landing areas that were also utilised in antiquity. As such they are presented as areas of heritage potential rather than constraints. These crossing points are likely to have been utilised in antiquity and, therefore, identified as areas that have a raised heritage potential. One example of their importance is the potential for the presence of artefacts that may have been accidentally lost during centuries of repeated use of localised crossing points.

#### *Excavation Database*

The Excavation Database contains summary accounts of all the archaeological excavations carried out in Ireland (North and South) from 1970 to 2008. It has been compiled from the published Excavations Bulletins from those years, with a similar format. The database gives access to almost 6000 reports and can be browsed or searched using multiple fields, including year, county, site type, grid reference, license number, Sites and Monuments Record number and author. The database contains summaries of fourteen archaeological excavations within the Study Area and these are provided in Appendix 1.2.



### *Architectural Heritage Context*

The proposed scheme extends through the Mayo County Council local authority area. This planning authority has published a development plan that provides a Records of Protected Structures (RPS) for features of architectural heritage interest within the areas under its aegis. The Mayo County Council Development Plan 2008-2014 lists a total of eight RPS sites in the Crossolina Area (Table 1.2). The Record of Protected Structures does not provide co-ordinates for the protected structures and mapping is not provided in the published Development Plan. The National Inventory of Architectural Inventory (NIAH) does not include any townlands within the Study Area. The architectural stock within the Study Area may also contain unrecorded features of architectural heritage significance, including bridges, vernacular and agricultural buildings and associated boundary features. These structures may not be considered as constraints during the design of the scheme but should be recorded and assessed during the compilation of the EIS for the project.

### *Placename Evidence*

The Study Area is within the parish of Crossmolina, which is within the barony of Tirawley, and it encompasses 46 townlands. The townland is the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of the Irish townlands was recorded and standardised by the work of the Ordnance Survey in the 19th-century. The Irish roots of townland names often refer to natural topographical features but some name elements may also give an indication of the presence of past human activity within the townland. For instance, the placename elements dun, lios or rath indicate the presence of a ringfort within the townland while temple, kill, saggart suggest an association with a church site. The Irish root names for the townlands within the study area and their translations were published by [www.logainm.ie](http://www.logainm.ie) and are listed in Appendix 1.1 (Table 1.4).

## **1.4 HERITAGE CONSTRAINTS**

The desktop survey of the Study Area for the proposed Crossmolina Flood Relief scheme was undertaken in order to identify all known protected heritage sites that may act as constraints in order to ensure that they are afforded full weighting during the design phase. All of the recorded/protected archaeological and architectural heritage sites listed in the available sources have been identified within the defined Study Area for the proposed scheme. These include recorded archaeological monuments based on **a)** the Record of Monuments and Places (RMP) maintained by the National Monuments Service and **b)** the Record of Protected Structures (RPS) as designated by Mayo County Council.

A review of the cartographic sources has also identified a number of riverine features, such as weirs, a millrace, stepping stones, fording points that, while not protected features, may indicate advantageous areas of the river channels that may have been utilised in antiquity. The cartographic sources have indicated the locations of a number of bridges, fords and stepping stones that formed crossing points on the River Deel in recent centuries. These crossing points are likely to have been utilised in antiquity and, therefore, identified as areas that have a raised heritage potential.

The tables presented in Appendix 1.1 provide lists of the various protected archaeological and architectural heritage sites within the Study Area. The key constraints that are protected by legislation comprise the recorded archaeological monuments (RMP Table 1.1) and protected structures (RPS Table 1.2). There may be some overlap between these two categories as built structures can be listed in both the RMP and RPS. In addition, a number of areas of cultural heritage potential identified through consultation of cartographical sources have also been included (Table 1.3). These are not protected structures or recorded archaeological monuments but may indicate the presence of potential unrecorded cultural heritage features.

## **1.5 RECOMMENDATIONS**

As the proposed flood relief scheme has yet to be designed the recommendations outlined here are general in nature. It is envisioned that more detailed mitigation strategies will be formulated as the scheme progresses through the design phase and will be addressed in the Environmental Assessment of Options and EIS stages of assessment for the scheme.

It is recommended that, where possible, the scheme be designed to avoid any impacts on the 70 archaeological sites listed in Table 1.1. Given the provisions of the National Monuments Acts, no disturbance or interference to any archaeological sites listed in the RMP can take place without first consulting the National Monuments Service. In the event that any flood defense works, or increased potential for flooding, are required in the vicinity of any of recorded archaeological sites it is recommended that appropriate mitigation measures be designed in consultation with the National Monuments Service.

There is also the potential for the presence of unrecorded archaeological sites and artefacts within the Study Area. This is demonstrated by the recovery of a bronze axehead on the shores of the River Deel during 1960s drainage works and the discovery of a number of previous archaeological sites during previous site investigation works in the Study Area (Appendix 1.2). Any lands that may be impacted by ground disturbance works required by the proposed scheme (e.g. access tracks, compounds, site clearance works, trial-pits) may require archaeological investigations, such as test trenching or monitoring of works. The appropriate mitigation measures will be determined during the design phase in consultation with the National Monuments Service.

In the event that dredging, channel widening or embankment works along the river will be required as part of flood relief works then there will be the potential for impacts on both recorded and unrecorded heritage features within the river channel, such as bridges, weirs, fords, wrecks, landing features, etc. If such works are to be considered as part of the design it is recommended that the Underwater Archaeological Unit, National Monuments Service be consulted in order to agree the appropriate underwater archaeological assessment and mitigation strategies. The riverine assessments required may consist of river bank and underwater archaeological surveys, test trenching around the bridges and other potential heritage sites along the river course and full monitoring of all sediment extraction works.

All Record of Protected Structures sites have statutory protection and avoidance of these features is recommended. In the event that works are required that may have a negative impact on protected structures then prior consultation with Mayo County Council will be required.

Should works be required in the vicinity of recorded archaeological monuments and protected structures then the formulation of site specific mitigation strategies is recommended. This will be carried out in consultation with the National Monuments Service and Mayo County Council. It is advised that this takes place well in advance of main construction works in order to allocate adequate time and resources to implement the agreed mitigation measures. Depending on the nature and extent of the works the mitigation measures may take the form of pre-works assessment (including test trenching) and/or monitoring of construction works carried out during the scheme.

It is also recommended that consideration should be given to the avoidance of visual impacts on protected archaeological and architectural heritage sites as part of the design of the proposed scheme.

It should be noted that the above recommendations are subject to approval by the National Monuments Service and the Local Authority, who should be consulted at all stages of the scheme development.

## 1.6 PROJECT REFERENCES

Aalen, F.H.A. *et al* 1997 *Atlas of the Irish Rural Landscape*. Cork University Press

Lewis, S. (1837) *The Topographical Survey of Ireland*

Mayo County Council 2009 *Development Plan 2008-2014*

Mayo County Council 2011 *County Mayo Heritage Plan 2011-2016*

### Web resources

Mayo County Council website: [www.mayococo.ie](http://www.mayococo.ie)

National Monuments Service website: [www.archaeology.ie](http://www.archaeology.ie)

National Inventory of Architectural Heritage website: [www.buildingsofireland.ie](http://www.buildingsofireland.ie)

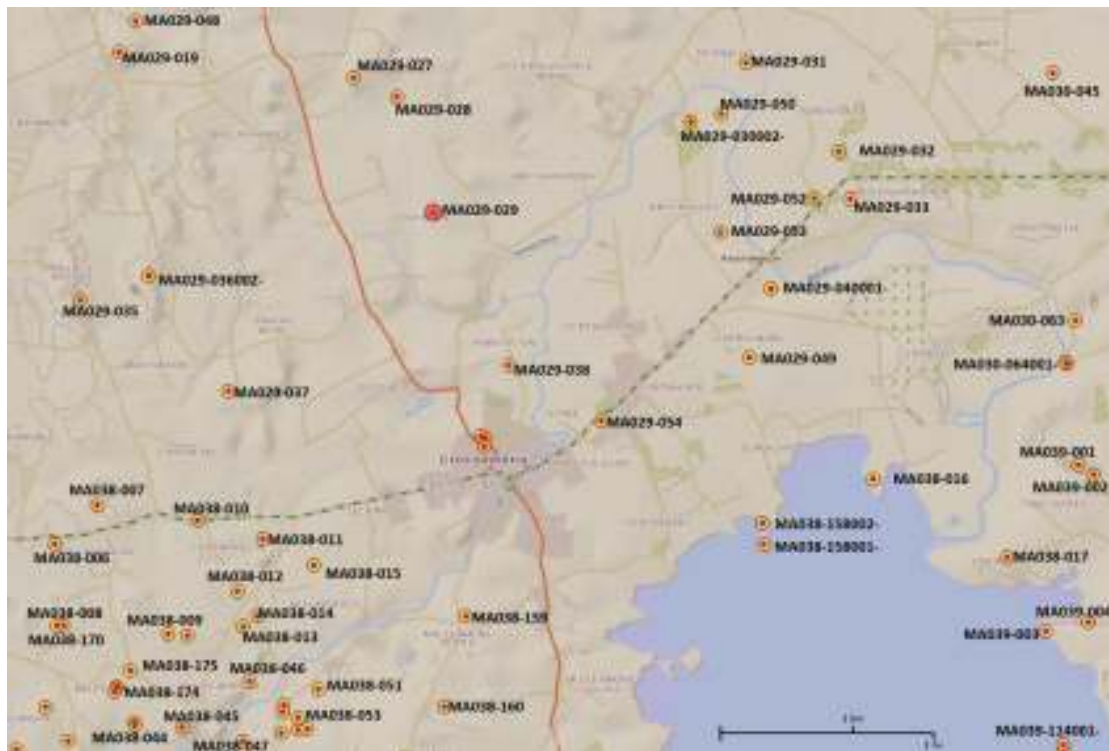
Excavations database: [www.excavations.ie](http://www.excavations.ie)

Placenames database of Ireland: [www.logainm.ie](http://www.logainm.ie)

Irish wrecks database (unofficial website): [irishwrecksonline@yahoo.co.uk](mailto:irishwrecksonline@yahoo.co.uk)

Ordnance Survey of Ireland: [www.osi.ie](http://www.osi.ie)

## APPENDIX 1.1: TABLES & FIGURES



**Figure 1.1:** Extract from RMP mapping with archaeological sites within the Study Area numbered

**Table 1.1: Archaeological sites within Study Area listed in RMP**

SMR No	Classification	Townland	ITM E	ITM N
MA029-019----	Ringfort - rath	RATHMORE	510856	820748
MA038-028----	Ringfort - rath	BALLYSCANLAN	510300	815816
MA038-029----	Redundant record	BALLYSCANLAN	510083	815494
MA038-030----	Ringfort - rath	BALLYSCANLAN	510472	815563
MA039-001----	Ritual site - holy well	KNOCKFREE	518095	817637
MA039-002----	Mill - unclassified	KNOCKFREE	518213	817564
MA039-003----	Castle - motte	CLOONTALLY	517845	816388
MA039-004----	Ringfort - rath	CLOONTALLY	518169	816454
MA038-053002-	Barrow - ring-barrow	CARROWCLOGHAGH	512276	815656
MA038-053003-	Cairn - unclassified	CARROWCLOGHAGH	512207	815649
MA038-059----	Ringfort - rath	BENGEERY	513013	815431
MA038-146----	Mound	CARROWCLOGHAGH	512098	815831
MA038-016----	Redundant record	GRANGE	516547	817530
MA038-017----	Enclosure	WHERREW	517558	816945
MA039-114002-	Burial ground	INISHLEE ISLAND	517983	815473
MA039-114003-	Children's burial ground	INISHLEE ISLAND	517981	815535
MA038-006----	Ringfort - rath	BALLINLABAUN	510376	817044
MA038-007----	Ringfort - rath	BALLINLABAUN	510692	817333
MA038-008----	Enclosure	BALLINLABAUN	510438	816433
MA038-009----	Ringfort - rath	BALLINLABAUN	511227	816369
MA038-010----	Ringfort - rath	FREEHEEN (Tirawley By.)	511453	817224

MA038-011----	Ringfort - rath	CLOONAWILLIN	511941	817084
MA038-012----	Ringfort - rath	BALLYCARROON	511752	816685
MA038-013----	Enclosure	BALLYCARROON	511794	816424
MA038-014----	Enclosure	BALLYCARROON	511901	816502
MA038-015----	Barrow - embanked	LECARROW	512326	816886
MA038-044001-	Enclosure	MAUTEOGE	510968	815704
MA038-044002-	Ringfort - rath	MAUTEOGE	510977	815679
MA038-045----	Ringfort - rath	BALLYCARROON	511332	815666
MA038-046----	Enclosure	BALLYCARROON	511841	816008
MA038-047----	Ringfort - rath	LECARROWCLOGHAGH	511788	815564
MA038-050----	Mound	CARROWCLOGHAGH	512096	815781
MA038-051----	Barrow - ring-barrow	CARROWCLOGHAGH	512360	815949
MA038-052----	Barrow - ring-barrow	CARROWCLOGHAGH	512083	815623
MA038-053001-	Barrow - ring-barrow	CARROWCLOGHAGH	512208	815737
MA038-158001-	Crannog	LOUGH CONN	515721	817040
MA038-158002-	Causeway	LOUGH CONN	515709	817200
MA038-159----	Enclosure	MULLENMORE NORTH	513473	816501
MA038-160----	Enclosure	BENGEEERY, MULLENMORE NORTH, MULLENMORE SOUTH	513311,	815819
MA039-114001-	Church	INISHLEE ISLAND	517983	815474
MA029-040002-	Mound	GARRAUNARD	515772	818969
MA029-051002-	Graveyard	CROSSMOLINA	513620,	817839
MA029-051003-	Architectural fragment	CROSSMOLINA	513620	817839
MA029-048----	Ringfort - rath	RATHMORE	510980	820979
MA029-049----	Souterrain	GARRAUNARD	515609	818449
MA029-050----	Designed landscape - tree-ring	KNOCKGLASS (Tirawley By.)	515400	820282
MA029-051001-	Church	CROSSMOLINA	513586, 817857	817857
MA029-027----	Ringfort - rath	FORTLAND	512624	820555
MA029-028----	Enclosure	FORTLAND	512952, 820407	820407
MA029-029----	Ringfort - rath	TOOREEN (Tirawley By., Crossmolina Par.)	513227, 819540	819540
MA029-030001-	Castle - unclassified	KNOCKGLASS (Tirawley By.)	515163	820222
MA029-030002-	Redundant record	KNOCKGLASS (Tirawley By.)	515163	820223
MA029-031----	Ringfort - rath	RATHMOYLE	515585	820664
MA029-032----	Ringfort - rath	BUNDEELEN	516283	819998
MA029-033----	Enclosure	KNOCKAGARRAVAUN	516369	819639
MA029-035----	Megalithic tomb - portal tomb	ENAGH BEG	510561	818881
MA029-036001-	Ringfort - rath	KNOCKBAUN (Tirawley By.)	511076	819062
MA029-036002-	Souterrain	KNOCKBAUN (Tirawley By.)	511076	819062
MA029-037----	Castle - unclassified	ENAGH MORE	511682	818192
MA029-038----	Religious house - unclassified	ABBEYTOWN	513800	818389
MA029-039----	Castle - tower house	CROSSMOLINA	513610	817779
MA029-040001-	Ritual site - holy well	GARRAUNARD	515772	818969



MA030-045----	Ringfort - unclassified	CLOONKEE	517898	820589
MA030-064002-	House - fortified house	DEELCASTLE	518001	818405
MA030-063----	Country house	DEELCASTLE	518069	818729
MA030-064001-	Castle - tower house	DEELCASTLE	517994	818418
MA029-052----	Ringfort - rath	KNOCKADANGAN	516099	819650
MA029-053----	Redundant record	KNOCKGLASS (Tirawley By.)	515394	819391
MA029-054----	Redundant record	KNOCKALEGAN (Tirawley By.)	514493	817968
MA038-175----	Burnt mound	MAUTEUGE	510940	816088
MA038-170----	Ringfort - rath	BALLINLABAUN	510384	816425
MA038-171----	Enclosure	BALLINLABAUN	511372	816354
MA038-172----	Burnt mound	MAUTEUGE	510840	815969
MA038-173----	Burnt mound	MAUTEUGE	510835	815957
MA038-174----	Burnt mound	MAUTEUGE	510823	815932

**Table 1.2: Mayo County Council's Record of Protected Structures (Development Plan 2008-2014)**

RPS No.	Site Type	RPS Description
0014	Deel Castle	At the north end of Lough Carra is a medieval tower house with a 17th Century house added to the south.
0021	Castlegore Bridge	Beautifully sited, five arched bridge.
0151	Enniscoe House	Detached seven bay two storey over basement rendered house, c. 1780. To the rear is an extensive series of stone outbuildings with varying uses.
0152	St. Tiernan's RCC	Free-standing cruciform plan, double height Gothic Revival barn style rendered church, c.1860.
0153	Crossmolina C of I	Free-standing four bay single cell rendered church, c. 1810. On an east-west orientation having a square profile bell tower located to the west end
0154	Knockglass House	Detached five bay two storey rendered and painted house, c. 1820. Having a centrally located entrance.
0155	Owenmore House	Detached five bay two storey over raised basement rendered house, c. 1825. Having a centrally located Doric entrance porch accessed by a flight of stone steps.
0156	Glenmore House	Detached three bay two storey over concealed basement limestone rubble house, c.1840. To the rear there is a range of rubble stone out buildings arranged in an L-plan.

**Table 1.3: Potential Archaeological/Architectural Heritage Sites Based on Cartographic Review**

Townland	Site Type	1 <sup>st</sup> Ed	25"	ITM E	ITM N
<b>River Deel</b>					
Ballycarroon	Stepping stones	Yes	Yes	512098	816095
Crossmolina	Road bridge	Yes	Yes	513726	817591
Knockglass	Footbridge	No	Yes	515059	820322
Knockglass	Ford	Yes	Yes	515112	820380
Knockadangan	Road bridge	Yes	Yes	515732	819176
Deelcastle	Bridge	Yes	Yes	517845	818894
Deelcastle	Boat house	No	Yes	517960	818434
<b>Lough Conn</b>					
Longford	Boat Quay	No	Yes	515904	817389
Grange	Lakeside buildings ("Ranns")	Yes	Yes	516868	817563
Wherrew	Corn kiln	Yes	No	517751	816763

Cloontally	Corn kiln	Yes	No	518303	815935
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**Table 1.4: Translation of Townland Names within Study Area**

<b>Townland</b>	<b>Translation</b>
ABBEYTOWN	<i>Baile na mainistreach</i>
BALLAGHAMUCK	<i>Bealach a muc road of the pigs</i>
BALLINLABAUN	<i>Baile an lábain, town of the labourer, now Streamstown</i>
BALLINGROGY	<i>Baile an Ghrugaigh, town of the Gruagach, or long haired person</i>
BALLYCARROON	<i>Baile Carrún, 'town of the Carews'</i>
BALLYNAGRAN	<i>Baile na gcrann, 'town of the trees'</i>
BALLYSCANLAN	<i>Baile Uí Scanláin, 'O'Scanlan's town'</i>
BENGEEERY	<i>Binn gaoirigh, 'peak of the sheep'</i>
BRIGH	<i>Bríoch, 'a hill'</i>
BUNDEELEN	<i>Bun Daoilín, 'mouth of the stream called Deelin, or little Deel'</i>
CARROWCLOGHAGH	<i>Ceathramhadh clochach, 'stony quarter'</i>
CARROWGARVE NORTH	<i>Ceathramhadh gharbh, 'rough quarter'</i>
CLOONAWILLIN	<i>Cluain a' mhuillinn, 'lawn or meadow of the mill'</i>
CLOONKEE	<i>Cluain caoich, 'lawn or meadow of the blindman'</i>
CLOONTALLY	<i>Cluain Taichligh, 'Tahly's or Talty's lawn or meadow'</i>
CROSSMOLINA	<i>Crois Uí Mhaoilfíona, 'O'Molina's cross'</i>
DEELCASTLE	<i>Caisleán na Daoile, 'Castle of the [river] Deel'</i>
ENAGH BEG	<i>Aonach beag, 'small fair green, or cut-out bog'</i>
FORTLAND	-
FOTISH	<i>Fód-tais / fóta</i>
FREEHEEN (Tirawley By.)	<i>Fraoithin, 'small heath'</i>
GARRAUNARD	<i>Garrán árd, 'high copse'</i>
GORTNALYER	<i>Gort na ladhar, 'field of the forks,</i>
GORTNARABY	<i>Gort na ráibe, 'field of the rape or rape-field'</i>
GORTSKEDDIA	<i>Gort sceide, 'field of the fright'</i>
GRANGE	<i>Gráinseach, 'a grange'</i>
KNOCKADANGAN	<i>Cnoc a' daingin, 'hill of the fastness'</i>
KNOCKAGARRAUAUN	<i>Cnoc a' gheara bháin, 'hill of the white cut'</i>
KNOCKALEGAN (Tirawley By.)	<i>Cnoc a' liagáin, 'hill of the standing stone' ("The 'liagan' has been removed from this hill." OS notes</i>
KNOCKANUMERA	<i>Cnoc an iomaire, 'hill of the ridge'</i>
KNOCKBAUN (Tirawley By.)	<i>Cnoc bán, 'white hill'</i>
KNOCKFREE (39)	<i>Cnoc fraoigh, 'hill of the heath'</i>
KNOCKGLASS (Tirawley By.)	<i>An cnoc glas, 'the green hill'</i>
INISLEE ISLAND	<i>Inis Lao "island of the calves"</i>
LECARROW	<i>Leath-cheathramhadh, 'half quarter'</i>
LECARROWCLOGHAGH	<i>Leth-cheathramhadh cloch, 'half quarter of the stones'</i>
LONGFORD	<i>Long phort, 'an encampment, a fort'</i>
LOUGH CONN	<i>Loch Con, "lake of the hounds"</i>
MAUTEUGE	<i>Maiteóg, 'flooded land, land subject to inundations'</i>
MULLENMORE NORTH	<i>Muillenn mór, 'great mill'</i>
MULLENMORE SOUTH	<i>Muillenn mór, 'great mill'</i>

RATHGRAN	<i>Rath Ghráin:, 'fort of the grain'</i>
RATHMORE	<i>Rath mór, 'great fort'</i>
RATHMOYLE	<i>Rath maol, 'flat fort'</i>
TOOREEN (Tirawley By., Crossmolina Par.)	<i>Tuairín, 'small bleach or green field'</i>
WHERREW	<i>Foirriú</i>

## **APPENDIX 1.2**

### **ARCHAEOLOGICAL EXCAVATIONS WITHIN THE STUDY AREA TOWNLANDS**

(source: Excavations Bulletin)

#### **1998:491**

LECARROW

No archaeological significance

98E0458

Pre-development testing was undertaken on the site of a proposed modern graveyard extension, west of Crossmolina, Co. Mayo. This writer had noted a previously unrecorded possible archaeological mound on top of a natural hill at the rear of the graveyard. Three test-trenches were excavated by machine adjacent to the mound. In Trenches 1 and 2 the sod/topsoil layer overlay boulder clay or bedrock. In the southern half of Trench 3 the sod/topsoil directly overlay the limestone bedrock. At a point 15m from the northern end of the trench the stratigraphy changed. It appears that in the recent past some gravel had been extracted from the hill and some small stones, possibly collected from field clearance, were backfilled into the gravel pit. For a distance of c. 10m a stone fill layer, 0.65m thick, directly underlay the sod. Underlying this stone fill layer was a layer of brown clay 0.5m thick, which in turn overlay another layer of stone fill, 0.4m thick. This lower layer of stone fill directly overlay the bedrock. The layers of fill were backfilled and graded to coincide with the contours of the hill. No archaeological features or small finds were recovered from any of the test-trenches.

*Gerry Walsh, Áras An Chondae, Mayo County Council, Castlebar, Co. Mayo.*

#### **2001:903**

Crossmolina

Monitoring

01E0347

Monitoring is ongoing of a sewerage scheme in the town of Crossmolina. To date a small number of stone culverts have been uncovered at various locations around the town. However, there is no dating evidence for these features. No other features have been uncovered. An excavation was conducted at the location of known archaeological sites before development (see No. 904 below, 01E0530).

*Christine Grant, Crossard, Kilnaboy, Co. Clare.*

#### **2001:904**

Crossmolina

Pits

RMP 29:39, 29:51

01E0530

Excavation took place on the Ballycastle Road of Crossmolina town in advance of pipe-laying for a sewerage scheme. The excavation took place within the public road corridor between the castle (29:39) and the church and graveyard (29:51). Several earlier road surfaces were uncovered. None of these surfaces contained definitive dating material. Below the level of the earliest road a small number of features were excavated, including a layer containing organic material and several small pits. A few fragments of badly corroded iron artefacts were recovered from one of the pits. A significant amount of animal bone was also recovered from the lower levels. Proper dating of this material will be dependent on radiocarbon determinations.

*Christine Grant, Crossard, Kilnaboy, Co. Clare.*

#### **2002:1404**

Moylaw/Crossmolina

Monitoring

G099172

02E0596

Monitoring of topsoil removal took place over 1.5km during the realignment of the N59 west of Crossmolina town. Three separate areas of heat-fractured stone consistent with the remains of levelled fulachta fiadh were uncovered. Further evidence of fulachta fiadh was found outside the road-take. A hollow-based flint arrowhead was found in a disturbed context close to an area of heat-fractured stone in Carrowkilleen townland. The final phase of the monitoring is expected to take place in 2003.

*Sue Zajac, 1 Chapel Lane, Killala, Co. Mayo.*

#### **2004:1147**

ENAGH MORE

No archaeological significance

11171 31818

04E0758

Pre-development testing was carried out on 1 June 2004 at a site in advance of its development at Enagh More, Crossmolina, Co. Mayo. The proposed development was within the archaeological constraint for a castle site (SMR 29:37). There were no extant features within the proposed development site. The testing comprised the excavation (by machine) of four trenches, which measured 16.9m, 9.2m, 7m and 15m long respectively, 1.0-2.1m wide and 0.3-1.7m deep. The stratigraphy was the same in all trenches. Below the concrete and topsoil on the surface was grey loose gravel, backfill and grey/orange/brown firm-plastic clay. Two of the trenches were located in a farmyard close to a cottage dating from the first half of the 20th century. The concrete and backfill were associated with this period and activity. The backfill appeared to be a soakage pit associated with the cottage, which was located a few metres away. It contained a plastic bag near its base. The loose grey gravel and grey/orange/brown firm-plastic clay were sterile natural deposits.

*Richard Crumlish, 61 An Cladrach, Castlebar Road, Ballinrobe, Co. Mayo.*

#### **2003:1299**

Ballinlabaun

Fulacht fiadh

11041 31700

03E0381

Topsoil-stripping during realignment of the N59 west of Crossmolina uncovered a spread of burnt soil and heat-fractured stone. A rescue excavation was carried out and the base timbers of a wooden trough were found set in natural subsoil. The trough lay adjacent to a stream in low-lying reclaimed pasture. The burnt material was thinly distributed around the trough for a radius of c. 5m. No small finds were associated with the site. It was identified as the remains of a fulacht fiadh that had been levelled, probably during land reclamation.

*Suzanne Zajac, Mayo County Council, Civic Offices, Ballina, Co. Mayo.*

#### **2006:1444**

Crossmolina

Medieval cemetery and deposits

137176 to 188271

06E0764

Stage 4 of the Ballina regional water supply scheme involved the construction of c. 11km of pipeline between Crossmolina and Cloonfadda crossroads, c. 4km south-west of Kilalla. The vast majority of the proposed pipeline was inserted into wayleaves parallel to the existing road. These wayleaves ranged from 15 to 25m in width. Two small burnt spreads were exposed during monitoring of wayleaves. One was excavated in Raheens townland to the north of the scheme and a second was excavated at Treangarrow c. 5km to the south (see No. 1484 below, 06E0744). The route of this pipeline only impacted on one previously known archaeologically sensitive area, between MA029-039, a tower-house, and MA029-051, ecclesiastical remains (possible). Pipe trench was excavated along an existing road between these sites. A sewerage scheme had been excavated through this area in 2002. The water pipes were placed in the sewer trench throughout most of this sensitive area. There were several small sections where the pipe trench diverged from the line of the sewer and in these sections archaeological deposits were exposed. It was difficult to determine the precise nature of deposits under the road surface, due to the narrowness of the trench (0.8m in width). The evidence from testing and monitoring at this location would suggest at least three or more phases of stratigraphy. A possible burial was exposed at the west end of the pipe trench adjacent to the modern Anglican graveyard. Local information suggests 19th- and early 20th-century burials were left in situ when the boundary wall around the graveyard was moved by FÁS workers in the 1980s. The pipe trench was rerouted to avoid impacting on these possible burials. According to the present vicar in Crossmolina, the burials in this area are likely to be those of wealthy local Catholic families who would have been buried in the west portion of the graveyard up until 1870. The area close to the existing farmhouse adjacent to the castle has possible medieval organic-type deposits with animal bone and an old ground surface. Some human remains fragments were exposed at this location. These remains may be associated with the Anglican graveyard but could also be associated with the castle or perhaps with an earlier medieval foundation.

All human and animal bone fragments encountered are currently undergoing specialist analysis. A radiocarbon date for bones exposed at this location may prove useful in determining whether there was an early medieval (ad 400-800) settlement at this location pre-dating the construction of the castle (ad 1172).

*Angela Wallace, Sylane, Tuam, Co. Galway, for Mayo County Council.*

#### **2007:1214**

Ballina to Crossmolina

Monitoring

11364 31777 to 12299 31941

07E0796

Monitoring was conducted between the towns of Crossmolina, Co. Mayo (the town itself was a separate route), and Ballina, Co. Mayo (inclusive of the town), from 13 August 2007 and is ongoing. A single trench was dug to lay the pipe; it was 0.4–0.65m in width, 1–1.2m in depth and it was dug exclusively on public roads or on the verge at the side of the roads. A small section of stone wall was found during the excavation of a trench on Abbey Street (Ballina) c. 80m from the southern end of the trench. The trench was diverted around this wall so it could be preserved in situ. The wall stretched for c. 10m and had a maximum height of 1m. It was located c. 0.4–0.45m below the level of the current road. The wall consisted of regular and irregular limestones that appeared to be bound by a soft lime mortar. The southernmost 5m portion of the wall was missing its facing; this exposed a core of limestone rubble. The wall was abutted by modern road fill and in three different areas the wall was cut by modern service pipes. When the wall had been recorded and photographed the pipe was laid and surrounded by sand and backfilled with the wall preserved in situ. A culvert was located 72m south of the section of wall. This was mostly intact and was also preserved in situ. This was located c. 10m from the riverbank. The culvert retained some of its original flagstones; other parts of it were retouched with cement. No further archaeological remains have as yet been recorded on this route.

*Terry Connell, Archaeological Consultancy Services, Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth.*

#### **2007:1216**

BALLINLABAUN, CLOONAWILLIN and FREEHEEN

Fulacht fiadh

11148 31718

02E0596 ext.

Monitoring was carried out during Phase 2 of the realignment of the N59 west of Crossmolina, Co. Mayo. Phase 1 of the same scheme had been completed in 2004. Burnt soil, heat-fractured stone and charcoal came to light in Freeheen townland. The material was seen running under the existing road and in places it extended out from the road into a narrow valley beside a stream. The material under the road was left in situ but the remainder was recorded and removed. It appeared to have been in a disturbed location but was considered to be the debris from fulacht fiadh activity. The deposit of fulacht fiadh material under the road seems to have been used as road foundation possibly during the 19th century. No small finds or evidence for a trough were uncovered. Radiocarbon dating of the material revealed dates from two separate areas of 3780 bp and 4090 bp for the disturbed material.

*Sue Zajac, Ballina Civic Offices, Mayo County Council, Dillion Terrace, Ballina, Co. Mayo.*

#### **2007:1230**

CLOONAWILLIN

Fulachta fiadh

11148 31718

07E0987

Three unrecorded fulachta fiadh were excavated during Phase 2 of the realignment of the N59 west of Crossmolina, Co. Mayo. They were located in close proximity to each other, in a shallow valley beside a stream. The most westerly was seen to be a shallow spread of burnt soil and heat-fractured stone with a wood-lined trough. Two further wood-lined troughs and associated burnt spreads were located beside each other just east of this. One of these troughs had been cut into peat which had preserved the remains of an impressive wicker lining and a complex arrangement of over 50 stakes holding the arrangement of wicker in place. No small finds were associated with any of the areas of fulachta fiadh activity. Radiocarbon dating of wood from the three features revealed dates of 3870, 3530 and 3730 bp.

*Sue Zajac, Ballina Civic Offices, Mayo County Council, Dillion Terrace, Ballina, Co. Mayo.*

#### **2007:1233**

FREEHEEN AND BALLINLABAUN

No archaeological significance

11148 31718 and 11041 31700

07E0698

Testing took place beside two ringforts, MA03–010 and MA0038–006, during Phase 2 of the realignment of the N59 west of Crossmolina, Co. Mayo. Nothing of archaeological significance was uncovered in the test-trenches.

*Sue Zajac, Ballina Civic Offices, Mayo County Council, Dillion Terrace, Ballina, Co. Mayo.*

#### **2008:867**

Ballina–Crossmolina

No archaeological significance

11364 31777 to 12299 31941

07E0796



Monitoring of trenching associated with the installation of a gas pipeline by Bord Gáis Éireann was carried out from and including the town of Ballina to the south-western outskirts of the town of Crossmolina from August 2007 (Excavations 2007, No. 1214) and is ongoing. The pipeline extends through the townlands of Rahans, Commons, Ballina, Abbeyhalfquarter, Ardoughan, Laghtadawannagh, Gorteen, Coolcran, Cloonglasney, Knockanillaun, Ballymanagh, Fairgreen, Knockadangan, Garraunard and Gortnalyer. The pipeline is located within the zones of archaeological potential associated with several monuments. The trench ranges from 0.45–0.95m in width and has a maximum depth of 1.2m. All works to date were carried out along public roads within previously disturbed areas. Trench fills included sands and gravels and other construction fills. Undisturbed subsoil was also occasionally encountered. No archaeological features were exposed during monitoring of this section of pipeline.

*Terry Connell, Archaeological Consultancy Services, Unit 21, Boyne Business Park, Greenhills, Drogheda, Co. Louth.*

#### **2009:591**

##### **BENGEERY GROUP WATER SCHEME**

Monitoring

113045 315192

09E110

Bengeery group water scheme project involved pipe-laying in the townlands of Mullenmore North, Bengeery, Ballymalynagh and Ballybrinoge, c. 1km south of Crossmolina in north Co. Mayo. The scheme involved the laying of c. 3.2km of water pipe to service houses, farms and water troughs. The pipeline diameter varied from 20mm connections to a maximum of 90mm. Pipe-laying took place in road verge, within roads and in fields. No archaeological finds, features or deposits were encountered during monitoring.

*Bernard Guinan, Coosan, Athlone, Co. Westmeath.*

#### **2009:613**

##### **GURRAUNARD**

Enclosure (platform rath?) and possible souterrain

124829 296256

09E109

Monitoring was undertaken of the topsoil-stripping and excavation of a trench for the laying of new water pipes in Gurraunard as part of Straide group water scheme refurbishment contract (Phase 4) on behalf of Blue Hills Consulting Civil and Structural Engineers.

The pre-existing road in Gurraunard truncated MA070–11301, an enclosure, with MA070–11302, a souterrain, located within the enclosure. The excavation of a trench for a new section of water pipe was designed to be located immediately beside the road surface on the road verge. This resulted in exposure of a ditch section of the enclosure and of a damaged and heavily disturbed probable section of a possible souterrain. Works were immediately stopped and redesign of the route of the water main was implemented. Features uncovered included an enclosing ditch 2.4m in width and 0.92m in depth; however, the base of the depth was not uncovered. This ditch section was filled with one homogenous fill composed of mid-grey/brown sandy clay. A further 6–7.5m north, after the initial hand-cleaning of the trench, what appeared to be orthostats were revealed. Due to the width and depth of the trench little detail was gathered on these. However, they appeared to be limestone, 0.7m in depth and placed upright forming one side of a subterranean passage or souterrain. Above the souterrain and located in the interior of the enclosure was a deposit of grey/brown clay with pockets of sand. A maximum depth of 0.7m was recorded for this deposit. This appeared to constitute a deliberate attempt to increase the height of the surface in the interior of the enclosure, suggesting the enclosure may be an example of a platform rath.

*Niall O'Neill, Headland Archaeology (Ireland) Ltd, Unit 25, Liosbaun Industrial Estate, Tuam Road, Galway.*



## Appendix G

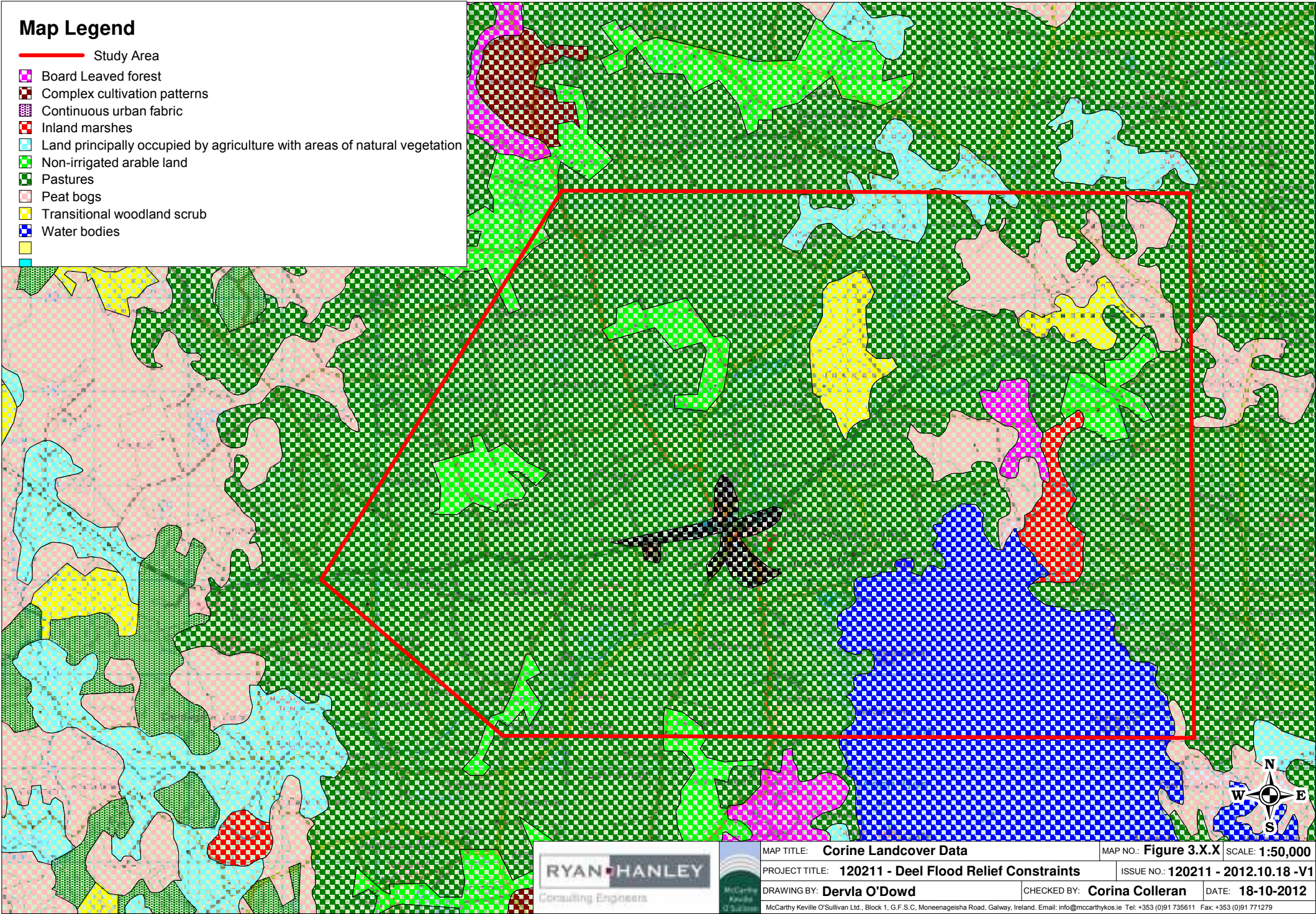
### Landscape Mapping

G1

Figure 3.8.2 CORINE Landscape Map

Map Legend

- Study Area
- Board Leaved forest
- Complex cultivation patterns
- Continuous urban fabric
- Inland marshes
- Land principally occupied by agriculture with areas of natural vegetation
- Non-irrigated arable land
- Pastures
- Peat bogs
- Transitional woodland scrub
- Water bodies



**RYAN HANLEY**  
Consulting Engineers

MAP TITLE: <b>Corine Landcover Data</b>	MAP NO.: <b>Figure 3.X.X</b>	SCALE: <b>1:50,000</b>
PROJECT TITLE: <b>120211 - Deel Flood Relief Constraints</b>	ISSUE NO.: <b>120211 - 2012.10.18 -V1</b>	
DRAWING BY: <b>Dervla O'Dowd</b>	CHECKED BY: <b>Corina Colleran</b>	DATE: <b>18-10-2012</b>
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## **Appendix                    H**

### **Public Consultation**

H1  
H2  
H3

**Brochure  
Questionnaire  
Posters**



## WHAT HAPPENS NEXT?

All comments received in response to this Public Consultation will be considered by the OPW and will be taken into account in the preparation of the first stage in the River Deel (Crossmolina) Flood Relief Scheme Environmental Study and Engineering Study.

The Environmental Study and Engineering Study for the River Deel (Crossmolina) Flood Relief Scheme will be delivered in the following Stages:

Environmental Study		Engineering Study	
Stage I	Constraints Study ( <i>this stage</i> ) Screening for Appropriate Assessment	Stage I (a)	Engineering Design
Stage II	Environmental Assessment of Viable Options Appropriate Assessment	Stage I (b)	EIS & Screening for AA (see Environmental Study)
Stage III	Environmental Impact Statement	Stage I (c)	Valuation Survey
Stage IV	Public Exhibition	Stage II	Public Exhibition
		Stage III	Detailed Design & Confirmation

## YOUR OPPORTUNITY TO TAKE PART

The OPW wishes to consider all viewpoints in relation to the development of a proposed flood relief scheme for the River Deel in the Crossmolina area. This is your opportunity to take part at the early stages of the planning of the River Deel (Crossmolina) Flood Relief Scheme. The time spent by you in communicating your views to the OPW is appreciated.

The general public and all interested parties are invited to give their opinions at this initial stage of development of the scheme. Please let your views be known by either completing the enclosed questionnaire or writing to the address below, giving your comments. Your opinion is appreciated and will be given full consideration. The responses received will be analysed and reported in the Constraints Study Report. Completed questionnaires may be handed in at the exhibition or posted to the address below using the stamped and addressed envelope provided, by **Friday 21<sup>st</sup> September 2012**.

## FURTHER INFORMATION

All queries, questionnaires and comments in relation to this project can be addressed to:

Contact Name: Corina Collieran  
Contact Title: Project Manager

McCarthy Keville O'Sullivan Ltd.  
Planning & Environmental Consultants  
Block 1, G.F.S.C., Moneenageisha Road,

Tel: +353 (091) 735611  
Fax: +353 (091) 771279  
Email: [ccollieran@mccarthykos.ie](mailto:ccollieran@mccarthykos.ie)



RYAN HANLEY  
Consulting Engineers



Planning & Environmental Consultants



## Public Information Event

## Information Brochure

## River Deel (Crossmolina)

## Flood Relief Scheme

September 2012



**OPW**

The Office of Public Works  
Oifig na nOibreacha Poiblí





## PURPOSE OF THE PROJECT

The purpose of the River Deel (Crossmolina) Flood Relief Scheme is to identify the most appropriate flood relief scheme to alleviate flooding in Crossmolina town. The Office of Public Works (OPW) has appointed consultants to carry out both an Engineering Study and an Environmental Study in order to determine an appropriate scheme on the basis of technical, social and environmental criteria.

## CURRENT POSITION

This first phase of the scheme involves the identification of a Study Area and the preparation of a Constraints Study to inform the Engineering Study for the scheme. The initial phase of the Engineering Study will involve the identification of the most appropriate flood relief scheme for the Crossmolina area. Preliminary fieldwork has commenced and surveys of the River Deel will be carried out in the coming weeks, following which a hydraulic model of the relevant reach of the River Deel and its catchment will be prepared. This model will be used to inform the selection of the most appropriate flood relief scheme for Crossmolina.

The first phase of the Environmental Study involves the preparation of a Constraints Study (see below) which will inform the Engineering Study.

Ryan Hanley in association with JBA Consulting will carry out the Engineering Study and Ryan Hanley in association with McCarthy Keville O'Sullivan will carry out the Environmental Study on behalf of the OPW. Mayo County Council will be involved in the planning of the scheme in conjunction with the OPW.

This is the first public consultation and its objective is to seek initial views from the public in relation to the key issues that the Constraints Study should address, and highlight points of local importance that may constrain the design of potential flood risk management measures.

## WHAT IS A CONSTRAINTS STUDY?

The purpose of a Constraints Study is to identify the key environmental issues in a Study Area which might be impacted by possible flood alleviation measures and/ or which may impose constraints on the viability and/ or design of these measures. The sketch overleaf shows the proposed Study Area (outlined in red) for the River Deel Flood Relief Scheme. The Constraints Study will identify the constraints within this Study Area that need to be considered, for example, the River Moy Special Area of Conservation, which aims to protect species including white-clawed crayfish, lamprey, salmon and otter. There are freshwater pearl mussels present on the River Deel, which are protected by law. There are also a number of archaeological sites in the area. Factors such as these must be considered in the selection of flood risk management options for Crossmolina.

## ENGINEERING STUDY

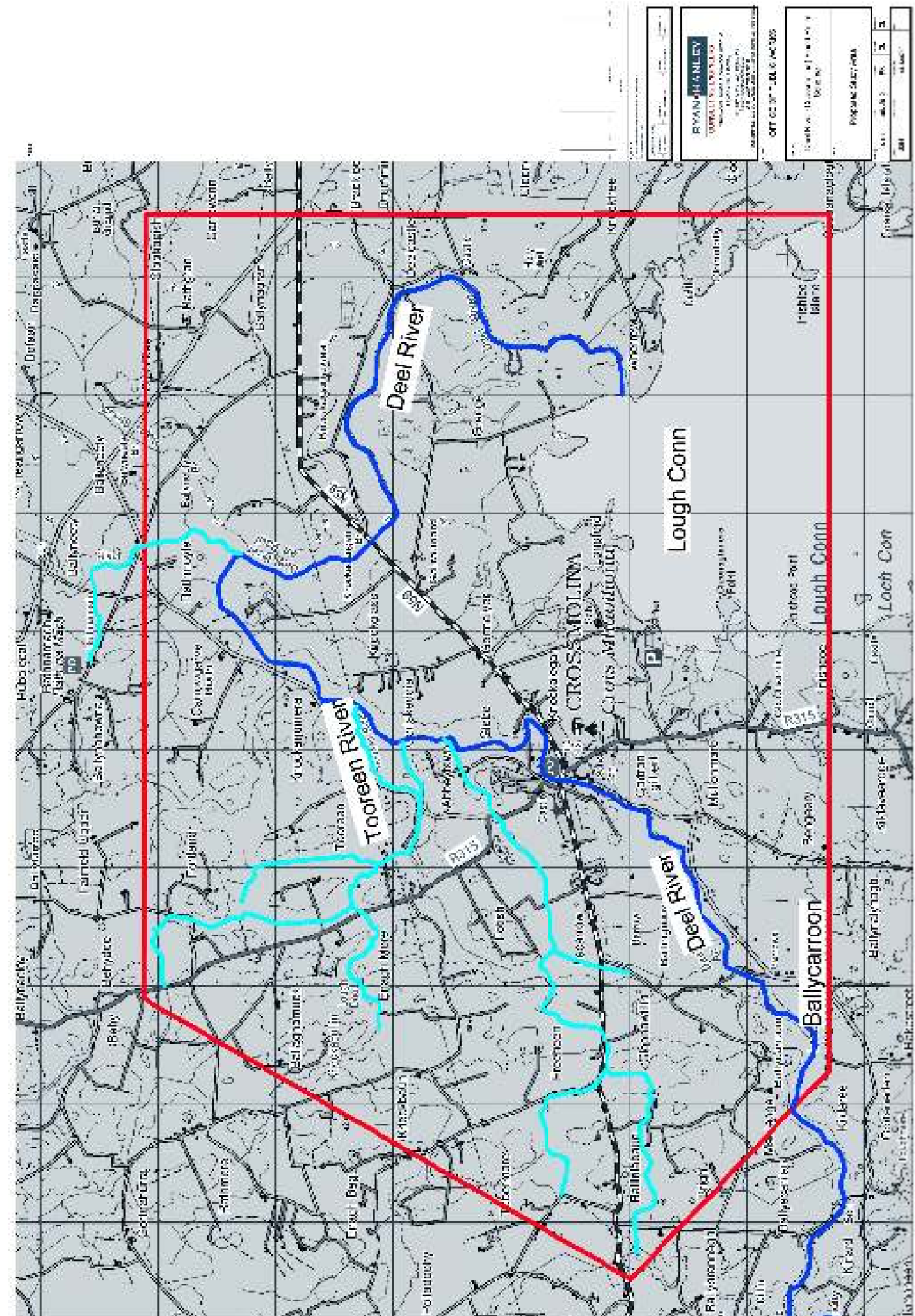
The range of engineering measures typically considered for possible flood alleviation schemes in an Engineering Study include, but are not limited to those listed below.

## POTENTIAL FLOOD RISK MANAGEMENT MEASURES

The following are the type of flood risk management measures that will be considered as part of the Engineering Study:

- Do Nothing
- Non-Structural Measures (e.g. flood warning system or individual property protection)
- Relocation of Properties and/or infrastructure
- Reconstruction of Properties and/or infrastructure to a higher level
- Flow Diversion (e.g. river diversion or flood flow bypass channel)
- Flow Reduction (e.g. upstream catchment management or flood storage)
- Flood Containment through Construction of Flood Defences
- Increase Conveyance of Channel (upstream and/ or through and/or downstream of the town)

The Engineering Study will assess the viability of options that may be suitable for the Crossmolina area. A Cost Benefit Analysis will also be prepared as part of the Engineering Study.







# RIVER DEEL (CROSSMOLINA) FLOOD RELIEF SCHEME

## PUBLIC CONSULTATION No.1

### QUESTIONNAIRE

(Please complete this questionnaire and hand it in at the Public Information Day or place in the stamped addressed envelope provided, and return by Friday 21<sup>st</sup> September 2012)

1. **Name (optional):** \_\_\_\_\_
- Address:** \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- Phone (optional):** \_\_\_\_\_
- Email (optional):** \_\_\_\_\_

2. **Do you own, rent or occupy a property within the study area being considered?** Yes ☐ No ☐

3. **Address of property (if different from home address)**

\_\_\_\_\_

4. **Have you had any personal experience of flooding?** Yes ☐ No ☐

5. **If yes, please give date(s):**
- |             |       |
|-------------|-------|
| Most recent | _____ |
| Previous    | _____ |
| Previous    | _____ |
| Previous    | _____ |

6. **Type of property flooded:**
- |                    |                          |
|--------------------|--------------------------|
| Residential        | <input type="checkbox"/> |
| Retail             | <input type="checkbox"/> |
| Office             | <input type="checkbox"/> |
| Warehouse/Workshop | <input type="checkbox"/> |
| Open Space/Garden  | <input type="checkbox"/> |
| Other              | <input type="checkbox"/> |

7. **Approximate maximum depth of flooding:** \_\_\_\_\_

8. **Source of Flooding:**
- |                                 |                          |
|---------------------------------|--------------------------|
| Directly from River/ Stream     | <input type="checkbox"/> |
| From Drains                     | <input type="checkbox"/> |
| Overground flow (surface water) | <input type="checkbox"/> |

9. Do you have photographs of flooding?

Yes ☐

No ☐

10. If you do, may the OPW have permission to use them?

Yes ☐

No ☐

*Note: Photographs will be collected at a later date*

11. Have you put in place measures to prevent or reduce the impact of flooding?

Yes ☐

No ☐

If so, please describe:

12. Please indicate, in order of preference, what you feel is the most appropriate Flood Risk Management Scheme for the Crossmolina area. *(please score from 1-6 as appropriate)*

No Works ☐

Early Flood Warning System ☐

Walls/ Embankments ☐

River Dredging ☐

Compound River Channel (River widening) ☐

Relocation of Properties ☐

Other (please specify) \_\_\_\_\_ ☐

13. How do you think the issue of flooding in the area can be resolved?

**14. In your opinion, how important are the following environmental constraints to the development of a Flood Risk Management Scheme for the Crossmolina area:** *(please tick appropriate boxes)*

<b>Issue</b>	<b>Very Important</b>	<b>Important</b>	<b>Moderately Important</b>	<b>Of Little Importance</b>	<b>Unimportant</b>
Flora and Fauna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local Fisheries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Habitats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Architectural and Cultural Heritage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landscape and Visual Amenity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angling, Tourism & Recreation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**If you have any comments in relation to the proposed scheme or the constraints, please record them here:**

**Flora and Fauna**

*Comment:*

**Local Fisheries**

*Comment:*

**Habitats**

*Comment:*

**Water Quality**

*Comment:*

**Architectural & Cultural Heritage**

*Comment:*

**Landscape & Visual Amenity**

*Comment:*

**Angling, Tourism & Recreation**

*Comment:*

**Other**

*Comment:*

The Office of Public Works (OPW) undertakes to hold any information provided to it by individuals or others on a confidential basis, subject to the OPW's obligations under law, including the Freedom of Information Act. If, for any reason, it is intended that information provided to the OPW should not be disclosed due to the sensitive nature of such information, it is incumbent on the person or body supplying the information to make clear this wish and to specify the reasons for the information's sensitivity. The OPW will consult with any individual or body so supplying sensitive information before making a decision on any freedom of information request received.

**THANK YOU FOR YOUR CO-OPERATION**

# River Deel (Crossmolina) Flood Relief Scheme



## Scheme Objectives & Overview

The purpose of the River Deel (Crossmolina) Flood Relief Scheme is to identify a preferred flood relief scheme to reduce the frequency and impact of flooding of the River Deel in the Crossmolina area and to bring the preferred scheme through the planning stage.

The process of identifying the preferred scheme includes a detailed assessment of a range of flood risk management measures to determine their technical, economic and environmental viability.

The Project Team includes the OPW, Mayo County Council, Engineering Consultants and Environmental Consultants.

A broad study area has been identified and the initial stages of the project have commenced, including the Constraints Study and Preliminary Surveys.

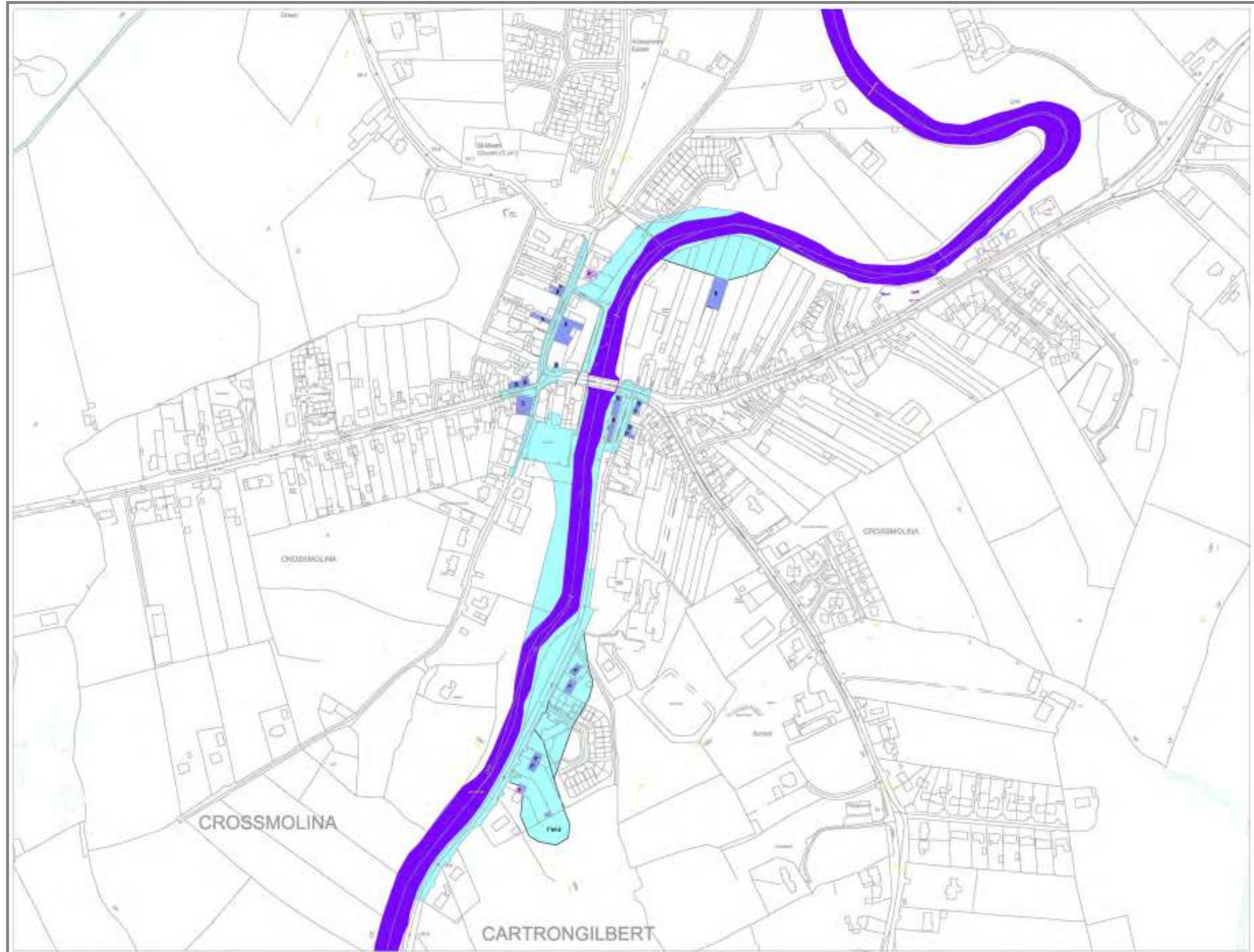


Planning & Environmental Consultants



# River Deel (Crossmolina) Flood Relief Scheme

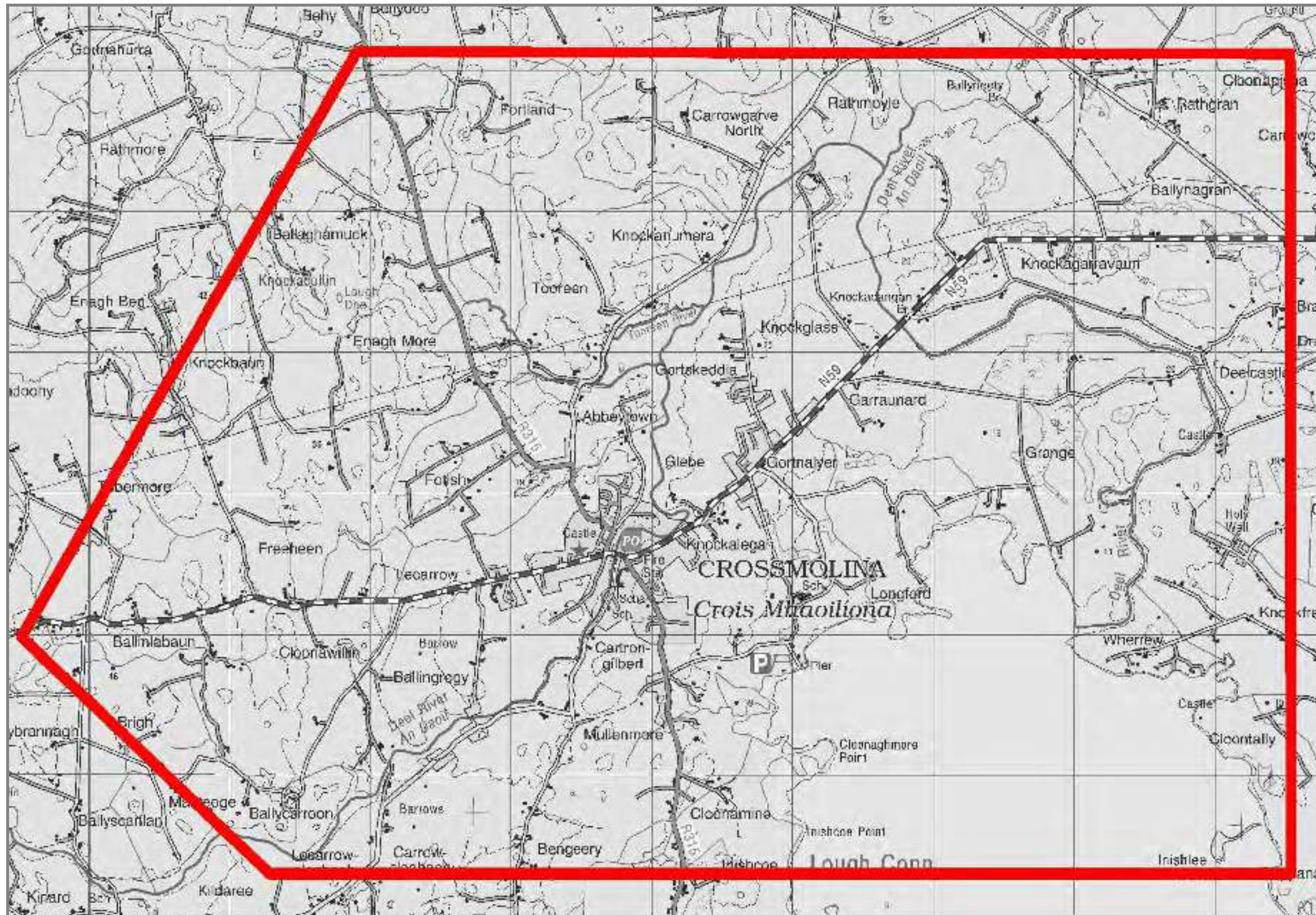
## December 2006 Flood Event





# River Deel (Crossmolina) Flood Relief Scheme

## Constraints Study Area





# River Deel (Crossmolina) Flood Relief Scheme

## Constraints Study

A Constraints Study is currently being undertaken by the Environmental Consultants for the project. The purpose of the Constraints Study is to determine and document any relevant constraints that may inform the selection and design of a Flood Relief Scheme for the area. The area which is being considered as part of the Constraints Study is shown on a separate poster.

## Primary Constraints

A range of constraints are being considered including the following:

- **Flora and Fauna**
- **Fisheries**
- **Habitats**
- **Water Quality**
- **Archaeological, Architectural and Cultural Heritage**
- **Landscape and Visual Amenity**
- **Angling, Tourism and Recreational Use**
- **Flood Related Socio-Economic and Social Issues**



# River Deel (Crossmolina) Flood Relief Scheme

## Public Involvement

Consultation will be undertaken throughout the process to ensure that the views of the public and other stakeholders are taken into account.

The purpose of this first Public Consultation is to:

- Provide information about the Objectives of the Scheme
- Outline the Design and Statutory Process
- Provide an Opportunity for Comment at an Early Stage
- Gather information about Environmental Constraints
- Obtain other information relevant to the Scheme

Following this initial public consultation, there will be further opportunities for involvement through attendance at future information days, when updates on the scheme progress will be presented. A questionnaire is available for you to complete and return with your own comments.

Members of the project teams are present today to answer any questions you have, or take note of any relevant information.



# River Deel (Crossmolina) Flood Relief Scheme

## Formal Public Exhibition Process



Once a preferred Flood Relief Scheme has been determined and an outline design completed, the OPW will seek consent for the proposed scheme in accordance with the Arterial Drainage Act.

This statutory process includes a four week Public Exhibition, during which the plans and particulars of the proposed scheme will be put on Public Display.

Representatives of the Project Team will attend the Public Exhibition on various dates to explain the scheme to members of the public and to address queries.

Copies of the EIS for the scheme will be available for sale to the public during this time.

Members of the public will be invited to submit written observations which will be considered and responded to.

An Exhibition Report, including all observations received will be sent to the Minister for Finance before formal approval of the Scheme.

