# i. PREFACE

THIS NATURA IMPACT STATEMENT CONSISTS OF THE FOLLOWING DOCUMENTS:

## Volume 1

- MAIN REPORT
- APPENDICES

### Document Control

| Status | Issued For | Undertaken By | | | Client Checking and Formatting | | |
|---|---|---|---|---|---|---|---|
| | | Signed | Date | Approved | Signed | Date | Approved |
| *FINAL* | *Publication* | *DMcD*[1] | *December 2013* | *W'O'C*[2] | *FM*[3] | *December 2013* | *AS*[4] |

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# ii. COMPILATION

This Natura Impact Statement (NIS) has been prepared by Ecofact Environmental Consultants Ltd. on the behalf of Sligo County Council. It has been prepared to inform the Appropriate Assessment process for the N4 Collooney to Castlebaldwin *Proposed Road Development*. The preparation of the NIS follows the iterative process of Appropriate Assessment; whereby an initial Screening Assessment to inform the Appropriate Assessment for the *Proposed Road Development* was prepared and progressed to Natura Impact Statement.

The NIS has been informed by various documents which form part of the EIS for the *Proposed Road Development.* Specifically extracted documents from the EIS which form appendices to this NIS include.

| Study/Element | Body Responsible |
|---|---|
| Outline Erosion and Sediment Control Plan; | National Road Design Department,<br>Sligo County Council,<br>Business Centre,<br>Market Yard,<br>Sligo. |

# iii. ADDITIONAL INFORMATION

Additional Information not included in this NIS but which may be made available to interested parties includes *inter-alia*:

- The Aquatic and Fisheries Report which forms an appendix to the Environmental Impact Statement for the *Proposed Road Development*;
- The Non Volant Mammals Report which forms an appendix to the Environmental Impact Statement for the *Proposed Road Development*;
- The Bird Survey Report which forms an appendix to the Environmental Impact Statement for the *Proposed Road Development*;
- The Description of the *Proposed Road Development* Chapter of the Environmental Impact Statement for the *Proposed Road Development* including its relevant Figures and Appendices;
- The Hydrological and Hydro-Geological Chapter of the Environmental Impact Statement for the *Proposed Road Development* including its relevant Figures and Appendices;
- The Air Quality and Climate Change Chapter of the Environmental Impact Statement for the *Proposed Road Development*;
- The Screening Report for Appropriate Assessment and the associated direction received from An Bord Pleanála (Ref: 21.JN002).

# iv. DOCUMENT LAYOUT

## Main Report

- Introduction;
- Methodology;
- Identification of Natura 2000 sites potentially affected;
- Stage 2: NIS to inform Appropriate Assessment

## Appendices

- Plates;
- NPWS Natura 2000 Site Synopses;
- Extracts from the Environmental Impact Statement:- Outline Erosion and Sediment Control Plan;

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# 1 Introduction

Ecofact Environmental Consultants Ltd. has been commissioned by Sligo County Council to prepare a Natura Impact Statement (NIS) to inform the Appropriate Assessment process. The preparation of the NIS follows the iterative process of Appropriate Assessment, whereby an initial Screening Assessment to inform the Appropriate Assessment for the *Proposed Road Development* was prepared and progressed to Natura Impact Statement.

The proposed N4 realignment is a *Proposed Road Development*, as defined in the Roads Act, and consists predominately of a Type 2 Dual Carriageway cross section with a Standard Single Carriageway tie in south of Castlebaldwin. It extends from the townlands of Collooney/Toberbride south of Collooney to the townland of Cloghoge Lower south of Castlebaldwin village. It will involve construction of a new Greenfield route with some online upgrades to the existing network. Figure 1 shows the N4 Collooney to Castlebaldwin Realignment, which is the subject of this Natura Impact Statement (NIS) and includes the location of the Natura 2000 sites within close proximity of the *Proposed Road Development*. The preparation of this NIS follows the Habitats Directive as transposed into Irish law (in this case pursuant to Section 177T (4) of the Planning and Development Act, 2000 as amended in light of the definition of proposed development as including development under section 51 of the Roads Act, 1993 as contained in section 177R of the said Act as amended). The guidance published by the National Parks and Wildlife Service (NPWS, 2010 '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*') is also followed. The methodology utilised in the preparation of this document is outlined in detail in Chapter 2 of this report.

The screening process has identified the likely impacts upon a European Site (i.e. a Natura 2000 site) of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant. This process aims to determine whether or not an Appropriate Assessment is required. The Screening Assessment for the proposed realignment concluded that the development could potentially have direct impacts on the wintering bird populations of the Lough Arrow SPA and adverse effects on the qualifying interests and conservation objectives of the Unshin River cSAC, the Lough Arrow cSAC and the Lough Arrow SPA Natura 2000 sites. The requirement for the current NIS also takes account of the direction from An Bord Pleanála (Ref: 21.JN002) on the 11th July 2012 which identifies the requirement for a NIS on the basis that the *Proposed Road Development*, by reason of its size and scale, and its location with regard to the hydrological and hydrogeological relationship with the Unshin River cSAC and the Lough Arrow cSAC and SPA sites, would be likely to have significant effects on these European sites.

The current document is a NIS which provides information for the Appropriate Assessment of the proposed N4 Collooney to Castlebaldwin Road Development (as set out in Chapter 4 of the EIS). This Natura Impact Statement (NIS) assesses whether the proposed project, alone or in combination with other projects or plans, will not, beyond reasonable scientific doubt, have adverse effects on the integrity of a Natura 2000 site; and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The integrity of a site relates to its conservation objectives with regard to the conservation status of the qualifying interests and conservation interests for which the site is designated. This NIS for the current proposal has been carried out with particular reference to the Unshin River candidate Special Areas of Conservation (cSAC), Lough Arrow candidate Special Area of Conservation (cSAC) and Special Protection Area (SPA), as all the watercourses within the proposed route drain into these designated sites. Effects upon the conservation objectives and qualifying interests (including habitats and species) within the affected designated areas are considered. These sites are of European Importance and have been designated in accordance with the requirements of the EU Habitats Directive (1992) and the EU Birds Directive (2009). The character and qualifying interests of the Unshin River cSAC and Lough Arrow cSAC and SPA are identified and the overall impacts and relative significance of the N4 Realignment on the conservation objectives of these Natura 2000 sites are evaluated.

## 1.1 Legislative Context

The current document in the context of a *Proposed Road Development* takes account of Section 57 of the Planning and Development (Amendment) Act, 2010, which inserted Part XAB into the Planning and Development Act, 2000. The context of Appropriate Assessment is with regard to Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora - '*The Habitats Directive*' which was originally transposed into Irish law by the '*European Community (Natural Habitats) Regulations 1997*' (S.I. No. 94/1997). The most recent transposition of this legislation is the European Communities (Birds and Natural

Habitats) Regulations 2011 (S.I. No. 477 of 2011); with cognisance of the Planning and Development (Amendment) Act, (2010). The Birds Directive (2009/147/EC) which is now included in the former Regulations seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs), whereas the Habitats Directive does the same for habitats and other species groups within Special Areas of Conservation (SACs), which are currently designated as candidate Special Areas of Conservation (cSAC) in Ireland. Under current legislation, both SPA and cSAC sites are designated as 'European Sites' in Ireland; irrespective of the status of their formal inclusion at a Community level. It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected areas throughout the European Union. Article 6, paragraphs 3 and 4 of the EC 'Habitats' Directive (1992) state that:

6(3) *'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.'*

6(4) *'If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted*

*Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*

In addition the European Court of Justice in Case C-127/02 (the "Waddenzee Ruling") has made a relevant ruling in relation to Appropriate Assessment:

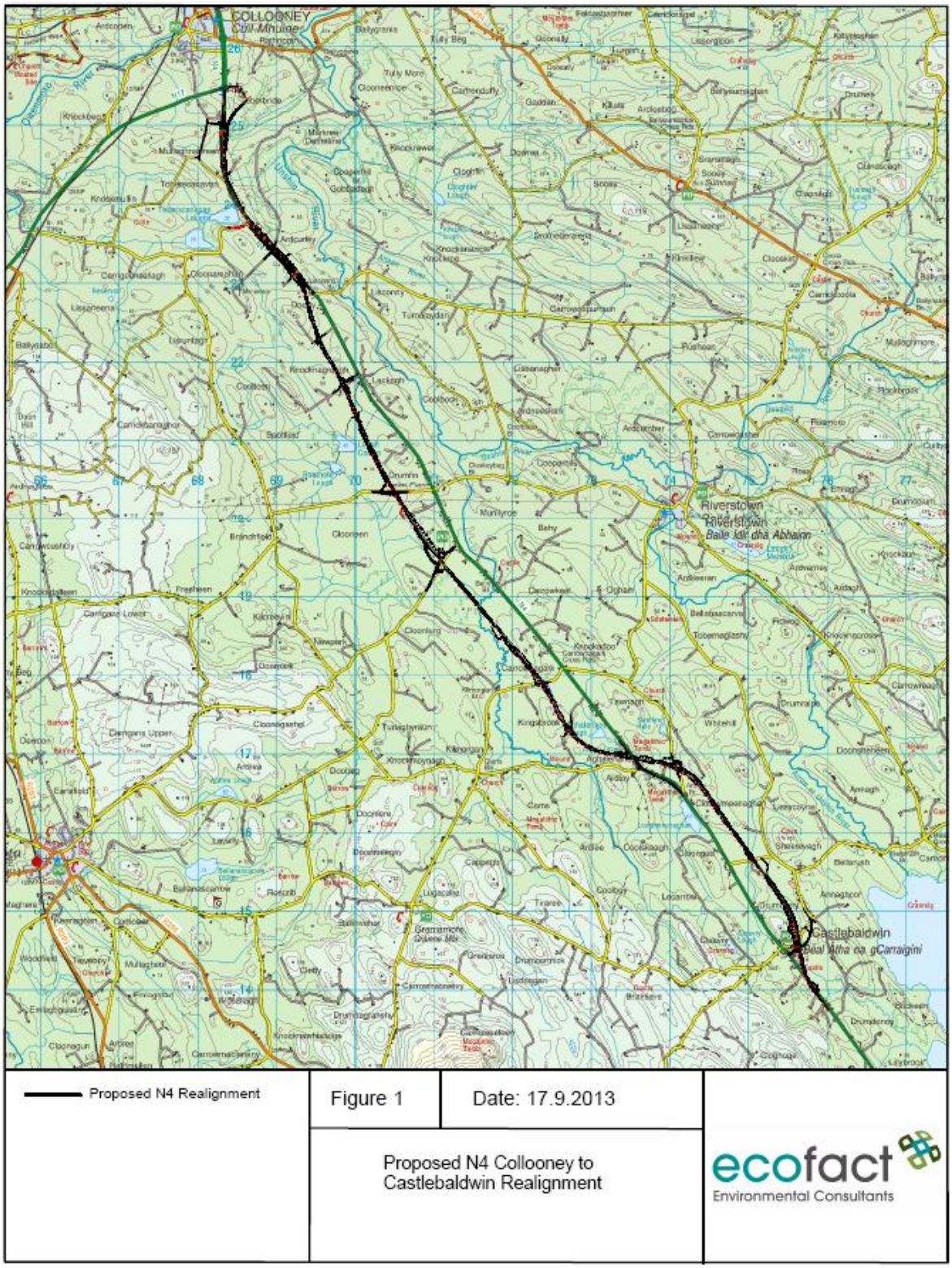
"*Any plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects" and that the plan or project may only be authorised "where no reasonable scientific doubt remains as to the absence of such effects*".

## 1.2 Consultation

Consultation for the current proposal has been undertaken with the Department of Arts, Heritage and the Gaeltacht; specifically with the National Parks and Wildlife Service (NPWS). The Screening Assessment for the *Proposed Road Development* was submitted to An Bord Pleanála by Sligo County Council for review; following this a direction was issued by An Bord Pleanála (ref: 21.JN0002; 11th July, 2012) requesting that a Natura Impact Statement be prepared for the *Proposed Road Development*, having regard to the potential for significant effects on European Sites.

*Figure 1: The location of the proposed N4 Collooney to Castlebaldwin Realignment.*

**Proposed N4 Collooney to Castlebaldwin Realignment**



# 2 METHODOLOGY

## 2.1 Desk study

During the Screening assessment to inform the Appropriate Assessment process, a desktop study was undertaken to identify the extent and scope of the potentially affected designated Natura 2000 sites within the current study area in relation to the proposed N4 Collooney to Castlebaldwin Realignment. The desktop study identified the designated Natura 2000 sites within a 15km radius of the study area.

Further desk study research included publically available information from statutory bodies including the National Parks and Wildlife Service, the Environmental Protection Agency, WFD Ireland, the National Biodiversity Data Centre and Sligo County Council. The desk study included data gathering with regard to ecological interests and current and historical water quality and hydrological data within the Ballysadare / Unshin River catchment, which includes Lough Arrow at the upstream end. Local and national bodies with information relating to ecological conservation interests within the study area were also consulted or reviewed, these included the Irish Wildlife Trust; the Botanical Society of the British Isles; Birdwatch Ireland; Bat Conservation Ireland; and Butterfly Ireland. Relevant chapters of the current Environmental Impact Statement (EIS) prepared for the *Proposed Road Development* have been reviewed, these included:

- Chapter 4 Description of the *Proposed Road Development*; and
- Chapter 14 Hydrological & Hydro-geological Impact Assessment with regard to potential impacts affecting water-dependant qualifying interests, as well as water quality related mitigation measures.

## 2.2 Ecological surveys

Ecological field surveys of the *Proposed Road Development* were carried out by Ecofact Environmental Consultants Ltd (2005-2013) for the purposes of the preparation for the ecology section of the Environmental Impact Statement. These surveys included bird surveys and aquatic ecological assessments with reference to the conservation interests of the Unshin River cSAC and the Lough Arrow cSAC and SPA complex; with particular regard to the potential for qualifying interests of these sites to occur within the study area (i.e. Annex I bird species and Annex II species such as Atlantic salmon and otter). The connection between the *Proposed Road Development* site and the designated Natura 2000 sites within the study area and pathways for impacts were also examined.

## 2.3 Appropriate Assessment Methodology

This Natura Impact Statement follows the guidance published by the National Parks and Wildlife Service (NPWS, 2010) '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*'. The Appropriate Assessment process set out by the NPWS is a staged approach which proceeds according to the requirements of the proposal and the evaluation of potential impacts, as described below:

- *Stage One: Screening / Test of Significance* - The process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;
- *Stage Two: Appropriate Assessment* - The consideration of the impact of the project or plan on the integrity of the Natura 2000 site, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;
- *Stage Three: Assessment of Alternative Solutions* - The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site; and
- *Stage Four: Assessment Where Adverse Impacts Remain* - An assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

The safeguards set out in Article 6(3) and (4) of the Habitats Directive are triggered not by certainty but by the possibility of significant effects. Thus, in line with the precautionary principle, it is unacceptable to fail to undertake an appropriate assessment on the basis that it is not certain that there are significant effects.

### 2.3.1 Screening for Appropriate Assessment

Screening for Appropriate Assessment is the process of determining whether or not Appropriate Assessment is required. Following the guidelines set out by NPWS (2010) Appropriate Assessment Stage 1: Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3); i.e. whether a plan or project can be excluded from Appropriate Assessment requirements because it is directly connected with or necessary to the management of the site; and the potential effects of a project or plan, either alone or in combination with other projects or plans, on a Natura 2000 site in view of its conservation objectives, and considering whether these effects will be significant. According to NPWS (2010), screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive:

- Whether a plan or project is directly connected to or necessary for the management of the site; and
- Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site or sites in view of its conservation objectives.

As concluded in the Screening Assessment, the proposed N4 Collooney to Castlebaldwin Realignment does not fulfil the first test of the Screening exercise i.e. the proposed works are not directly connected to or necessary for the management of any Natura 2000 site. The Screening Assessment therefore determines whether the proposed project, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 sites within the study area. The Screening Assessment completed for the proposed N4 Collooney to Castlebaldwin Realignment concluded that due to the uncertainty of effects and the likelihood of significant impacts on Natura 2000 sites (taking account of direction from An Bord Pleanála) a Natura Impact Statement was required to inform the Appropriate Assessment.

### 2.3.2 Natura Impact Statement to inform the Appropriate Assessment

The Natura Impact Statement (NIS) considers whether the plan or project, alone or in combination with other projects or plans, will not, beyond reasonable scientific doubt, have adverse effects on the integrity of a Natura 2000 site; and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The NIS provides the basis for the Appropriate Assessment, which is undertaken by the competent authority (in this case An Bord Pleanála). This NIS comprises a scientific examination of the plan / project and the relevant Natura 2000 sites; to identify and characterise any possible implications for the site in view of the site's conservation objectives, structure and function, taking account of any and/or all direct, indirect, cumulative and in combination effects. The requirements for Appropriate Assessment derive directly from Article 6(3) of the EU Habitats Directive (1992).

Direct and indirect impacts in isolation or in combination with other plans and projects on the identified Natura 2000 sites in view of the sites conservation objectives have been examined. Case law of the European Court of Justice (ECJ) has established that Appropriate Assessment must be based on best scientific knowledge in the field. The conservation objectives for Natura sites (cSACs and SPAs) are determined under Article 4 of the Habitats Directive and are intended to ensure that the relevant qualifying interests i.e. Annex I habitats and Annex II species present within the designated site, for which that site has been selected, are maintained at, or where appropriate, restored to, favourable conservation status.

The current report comprises a Natura Impact Statement which will be used to inform the Appropriate Assessment process. This provides a description of the project and the receiving environment. The conservation objectives of Natura 2000 sites potentially affected by the *Proposed Road Development* are listed and potential impacts outlined with respect to the integrity of the Natura 2000 site. Mitigation measures have been proposed for the protection of the conservation interests and the avoidance of impacts to the Natura 2000 sites located in close proximity to the *Proposed Road Development*.

# 3 Identification of Natura 2000 sites potentially affected

## 3.1 Description of the proposed project

The project is a *Proposed Road Development* as defined in the Roads Act and consists predominately of a Type 2 Dual Carriageway cross section with a Standard Single Carriageway tie in section to the south of Castlebaldwin. It extends from the townlands of Collooney/Toberbride south of Collooney to the townland of Cloghoge Lower south of Castlebaldwin village. The proposed route does not pass within any designated conservation site. However, there are hydrological connections between the watercourses the proposed road crosses and designated Natura 2000 conservation sites, the Unshin River cSAC and the Lough Arrow cSAC and SPA.

## 3.2 Identification of relevant Natura 2000 sites

### 3.2.1 Screening of Natura 2000 sites within 15km of the study area

Designated Natura 2000 sites which are located within a 15km radius of the proposed N4 Collooney to Castlebaldwin Realignment in Co. Sligo were included in the screening assessment following the guidance published by the NPWS (2010). Furthermore, any additional sites beyond this radius which are identified to lie within the zone of influence of the *Proposed Road Development* were also included. It is often but not exclusively the case that the greater the distance the less likely it is that a Natura 2000 site may be affected by the proposal. Exceptions primarily occur via hydrological or hydrogeological pathways where impacts can be transported over longer distances.

#### 3.2.1.1 Unshin River cSAC (site code: 001898)

The Unshin River cSAC (site code: 001898) runs parallel and to the east of the existing N4, from Lough Arrow to Ballysadare Bay. The cSAC boundary is within 300m of the east side of the existing N4 where the proposed realignment rejoins it at Doorly. This area was surveyed and it was found that the pasture fields nearest the road contained no protected habitats or species associated with the cSAC designation. A number of the link roads adjoin this cSAC; however, the cSAC site boundary is approximately 40m from the *Proposed Road Development* at its nearest point (at Lackagh). The Unshin River is notable as an example of a pristine river corridor that has not been drained and retains natural habitats along its margins. The Unshin is protected under the Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora). The Unshin River cSAC is designated for its Annex I habitats floating river vegetation [3260] and alluvial wet woodlands [91E0]. The site is also selected for the Annex II species Atlantic salmon (*Salmo salar*) [1106] and Otter (*Lutra lutra*) [1355].

*Evaluation:* The proposed realignment crosses a number of watercourses that drain into the Unshin River cSAC. This gives rise to at least the potential for impacts on water quality or transport of invasive species to this Natura 2000 designation that may affect the water dependent conservation interests of the site.

#### 3.2.1.2 Bricklieve Mountains and Keishcorran cSAC (site code: 001656)

Bricklieve Mountains and Keishcorran cSAC (site code: 001656) is located approximately 1.05km south-west from the proposed route at Cloghoge Lower. It covers an upland area of limestone outcrop with a wide variety of habitats and high floral diversity. This cSAC is designated for the conservation of Annex I habitats: Turloughs [3180]; Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*) (*important orchid sites) [6210]; Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]; Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) [8120]. Annex II species listed as qualifying interests of the site include Marsh fritillary (*Euphydryas aurinia*) [1065] and White-clawed crayfish (*Austropotamobius pallipes*) [1092].

*Evaluation:* According to the Hydrogeological Impact Assessment prepared for the EIS, this Natura 2000 site is not connected via hydrological or hydrogeological pathways to the proposed N4 realignment. There are no

pathways for direct, indirect or cumulative impacts affecting this designated site with regard to the habitats or species listed as conservation interests of this site. There is no aspect of the proposed works which may result in adverse affects on this designated site.

#### 3.2.1.3 Lough Arrow cSAC (site code: 001673)

Lough Arrow cSAC (site code: 001673) is located approximately 350m south-east from the proposed route at its closest point, due south of Castlebaldwin Village. The site is a spring-fed lake designated for the Annex I habitat hard oligo-mesotrophic waters [3140], with the Annex II species Otter [1355] also being recorded at the site.

*Evaluation:* The proposed realignment crosses two streams which join to the south of Castlebaldwin and drain into Lough Arrow cSAC. This gives rise to at least the potential for impacts on water quality or transport of invasive species to this Natura 2000 designation that may affect the water dependent conservation interests of the site.

#### 3.2.1.4 Lough Arrow SPA (site code: 004050)

Lough Arrow SPA (site code: 004050) is located approximately 700m to the south of the *Proposed Road Development*, due east of Castlebaldwin village. This site is designated as a SPA for the conservation of Little grebe (*Tachybaptus ruficollis*) [A004], Tufted duck (*Aythya fuligula*) [A061] and wetlands & waterbirds [A999]; the Whooper swan [A038] which is also listed on Annex I of the EU Birds Directive (2009) occurs on the lake and is listed in the Natura 2000 Standard Data Form for this site.

*Evaluation:* The proposed realignment crosses the Drumderry Stream and a tributary of the Drumderry Stream, which drains into Lough Arrow SPA. This gives rise to at least the potential for impacts on water quality or transport of invasive species to this Natura 2000 designation that may affect the water dependent conservation interests of the site.

#### 3.2.1.5 Union Wood cSAC (site code: 000638)

Union Wood cSAC (site code: 000638) is located approximately 1.9km north from the proposed route at its closest point. The site is designated for its Annex I habitat old oak woodland [91A0]. Union Wood is important as it is one of the largest remaining oak woodlands in the region. The wood is situated on acidic soils with the ground flora typical of an acidic wood. The site also contains an area of heath at Union Rock.

*Evaluation:* This Natura 2000 site is located at a distance of 1.9km from the *Proposed Road Development* and there is no aspect of the proposed works which may result in adverse affects on this designated site, where there are no pathways for direct, indirect or cumulative impacts arising from the proposal which could potentially affect the oak woodland habitats for which this site is designated.

#### 3.2.1.6 Ballysadare Bay cSAC (site code: 004129)

Ballysadare Bay cSAC (site code: 004129) is the southerly of three inlets of the larger Sligo Bay which is situated approximately 4.5 km north of the proposed route. The Bay is underlain by sedimentary rocks of limestone, sandstone and shale. It is designated for estuaries [1130], extensive intertidal sand and mudflats [1140], shifting dunes with marram [2120], dune grassland [2130], humid dune slacks [2190] and shifting dunes [2110], all of which are Annex I listed habitats. The Bay also supports a colony of Common seals (*Phoca vitulina*) [1365] and the rare snail [1014], *Vertigo angustior*, with both species listed on Annex II of the EU Habitats Directive.

*Evaluation:* The Unshin River catchment which dominates the current study area meets the sea at Ballysadare Bay. This Natura 2000 site is located approximately 4.5km north of the *Proposed Road Development* over land and approximately 12 river kilometres downstream of the nearest watercourse crossing within the Unshin catchment affected by the *Proposed Road Development*. There are no direct, indirect or cumulative impacts arising from the *Proposed Road Development* which would have the potential to adversely affect the coastal and intertidal habitats / fauna listed as qualifying interests of this Natura 2000 site.

#### 3.2.1.7 Ballysadare Bay SPA (site code: 004129)

Ballysadare Bay SPA (site code: 004129) is located approximately 4.6km from the *Proposed Road Development* as the Ballysadare Bay cSAC, by land and via the hydrological connection. This site is designated as a SPA for

the conservation of Whooper swan [A038], Bar-tailed godwit [A157] and Golden plover [A140] that are listed on Annex I of the EU Birds Directive. The site is also noted for Light-bellied Brent goose (*Branta bernicla* hrota) [A046], Grey plover (*Pluvialis squatarola*) [A141], Dunlin (*Calidris alpina*) [A149], Redshank (*Tringa totanus*) [A162] and wetlands & waterbirds [A999].

*Evaluation:* The Unshin River catchment which dominates the current study area meets the sea at Ballysadare Bay. This Natura 2000 site is located approximately 4.6km north of the *Proposed Road Development* over land and approximately 12.5 river kilometres downstream of the nearest watercourse crossing within the Unshin catchment affected by the *Proposed Road Development*. There are no direct, indirect or cumulative impacts identified which would have the potential to affect the Annex I bird species or their wetland habitats within this Natura 2000 site arising from the *Proposed Road Development*.

#### 3.2.1.8 Templehouse and Cloonacleigha Loughs cSAC (site code: 000636)

Templehouse and Cloonacleigha Loughs cSAC (site code: 000636) is located approximately 7km west from the proposed route. Both cSACs are hard water lakes situated on Carboniferous limestone that are interconnected by the Owenmore River. The site is designated as a cSAC for its Annex I habitats of hard water lake [3140], floating river vegetation habitats [3260], purple moor-grass meadows [6410], alluvial wet woodlands [91E0] and degraded raised bog [7120].

*Evaluation:* Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.9 Lough Gill cSAC (site code: 001976)

Lough Gill cSAC (site code: 001976) is located approximately 7km north-east from the proposed route. The site is a large natural eutrophic lake [3150], representing a habitat listed on Annex I of the EU Habitats Directive. The site is also selected as a cSAC for its alluvial wet woodlands [91E0] and old oak woodlands [91A0], both listed on Annex I of the EU Habitats Directive. The site is also selected for Sea lamprey (*Petromyzon marinus*) [1095], River lamprey (*Lampetra fluviatilis*) [1099], Brook lamprey (*Lampetra planeri*) [1096], White-clawed crayfish [1092], Atlantic salmon [1106] and Otter [1355] that are listed on Annex II of the same directive.

*Evaluation:* Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.10 Cummeen Strand/Drumcliff Bay cSAC (site code: 000627)

Cummeen Strand/Drumcliff Bay cSAC (site code: 000627) is located approximately 11km north of the proposed route from its closest point. This large coastal site is mainly underlain by Carboniferous limestone, although acidic rocks are also found on the Rosses Point peninsula. The site is designated for its estuaries [1130], intertidal sand and mud flats [1140], Juniper of heaths or calcareous grasslands [5130], hard-water springs depositing lime [7220], shifting dunes [2110], dune grassland [2130] and shifting dunes with marram [2120], which are listed on Annex I of the EU Habitats Directive. In addition, the site is selected for Common seal [1365] and the rare snail [1014], Vertigo angustior, with both species listed on Annex II of the EU Habitats Directive.

Evaluation: Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.11 Cummeen Strand SPA (site codes: 004035)

Cummeen Strand SPA (site codes: 004035) is located at the same distance from the *Proposed Road Development* as the Cummeen Strand/Drumcliff Bay cSAC, by land and via the hydrological connection. This site is designated as a SPA for the conservation of Golden plover [A140] and Bar-tailed godwit [A157] that are listed on Annex I of the EU Birds Directive. The site is also noted for Light-bellied Brent goose (Branta bernicla

hrota) [A046], Oystercatcher (Haematopus ostralegus), Redshank (Tringa totanus) [A162] and wetlands & waterbirds [A999].

Evaluation: Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.12 Lough Gara SPA (site code: 004048)

Lough Gara SPA (site code: 004048) is situated approximately 12.4km south-west from the proposed route. The SPA is a shallow, medium sized mesotrophic lake overlying Carboniferous limestone and shale, and Devonian sandstone. This SPA is of high ornithological importance and is designated for high numbers of Whooper swan [A038], Greenland White-fronted goose (Anser albifrons flavirostris) [A395] and Golden plover [A140], all listed on Annex I of the EU Birds Directive.

Evaluation: Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.13 Ox Mountains Bogs cSAC (site code: 002006)

Ox Mountains Bogs cSAC (site code: 002006) is located approximately 14km west of the proposed route. The site is designated for its extensive areas of blanket bog [7130], wet heathland [4010], natural dystrophic lakes and ponds [3160], oligotrophic lakes [3110] and depressions on peat substrates [7150] that are all listed on Annex I of the EU Habitats Directive. The site is also selected for the rare snail [1013], Vertigo geyeri, listed on Annex II of the EU Habitats Directive.

Evaluation: This Natura 2000 site is not connected via hydrological or hydrogeological pathways to the proposed N4 realignment. There is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.14 Flughany Bog cSAC (site code: 000497)

Flughany Bog cSAC (site code: 000497) is a raised bog that is situated approximately 14km south-west of the proposed route. This site is designated for its degraded raised bog [7120], active raised bog [7110] and depressions on peat substrates [7150], all of which are listed on Annex I of the EU Habitats Directive.

Evaluation: This Natura 2000 site is not connected via hydrological or hydrogeological pathways to the proposed N4 realignment. There is no aspect of the *Proposed Road Development* which may result in a significant effect on this site, either individually or in combination with other plans or projects.

#### 3.2.1.15 River Moy cSAC (site code: 002298)

River Moy cSAC (site code: 002298) is located approximately 14km to the west of the *Proposed Road Development*. The site is a candidate SAC selected for degraded raised bog [7120], alluvial wet woodlands [91E0], old oak woodlands [91A0], depressions on peat substrates [7150] and active raised bog [7110], all habitats if which are listed on Annex I of the E.U. Habitats Directive. The site is selected for the following species listed on Annex II of the same directive – Atlantic salmon [1106], Otter [1355], Sea lamprey [1095], Brook lamprey [1096] and White-clawed Crayfish [1092].

Evaluation: Taking account of the distance between the *Proposed Road Development* and due to insignificant hydrological or hydrogeological connections to this Natura 2000 site with the proposed N4 realignment there is no potential for the *Proposed Road Development* to have a significant effect on this site, either individually or in combination with other plans or projects.

*Table 1: Summary of Screening for Natura 2000 Sites within 15km of the proposed N4 Collooney to Castlebaldwin Realignment in Co. Sligo.*

| Site Name | Distance from the Proposed Road Development | Evaluation of potential for significant effects |
|---|---|---|
| Unshin River cSAC (site code: 001898) | 40m | The *Proposed Road Development* may indirectly affect this designated site, as a number of watercourses within the proposed route drain into the designated site. It was therefore not possible to exclude at Screening stage that the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Bricklieve Mountains and Keishcorran cSAC (site code: 001656) | 1.05km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Lough Arrow cSAC (site code: 001673) | 350m | The *Proposed Road Development* may indirectly affect this designated site, as the Drumderry Stream and its tributary, within the proposed route, drains into the designated site. It was therefore not possible to exclude at Screening stage that the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Lough Arrow SPA (site code: 004050) | 700m | The *Proposed Road Development* may indirectly affect this designated site, as the Drumderry Stream and its tributary, within the proposed route, drains into the designated site. It was therefore not possible to exclude at Screening stage that the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Union Wood cSAC (site code: 000638) | 1.9km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Ballysadare Bay cSAC (site code: 000622) | 4.5km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Ballysadare Bay SPA (site code: 004129) | 4.6km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Templehouse and Cloonacleigha Loughs cSAC (site code: 000636) | 7km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Lough Gill cSAC (site code: 001976) | 7km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Cummeen Strand/Drumcliff Bay cSAC (site code: 000627) | 11km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Cummeen Strand SPA (site code: 004035) | 11km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Lough Gara SPA (site code: 004048) | 12.4km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Ox Mountains Bogs cSAC (site code: 002006) | 14km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| Flughany Bog cSAC (site code: 000497) | 14km | There are no hydrological or geographical pathways or connections by which the *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |
| River Moy cSAC (site code: | 14km | There are no hydrological or geographical pathways or connections by which the |

| Site Name | Distance from the Proposed Road Development | Evaluation of potential for significant effects |
|---|---|---|
| 002298) | | *Proposed Road Development* may result in a significant effect on this site, either individually or in combination with other plans or projects. |

*Figure 2: Special Areas of Conservation (SAC) within 15 km of the proposed N4 Collooney to Castlebaldwin Realignment.*

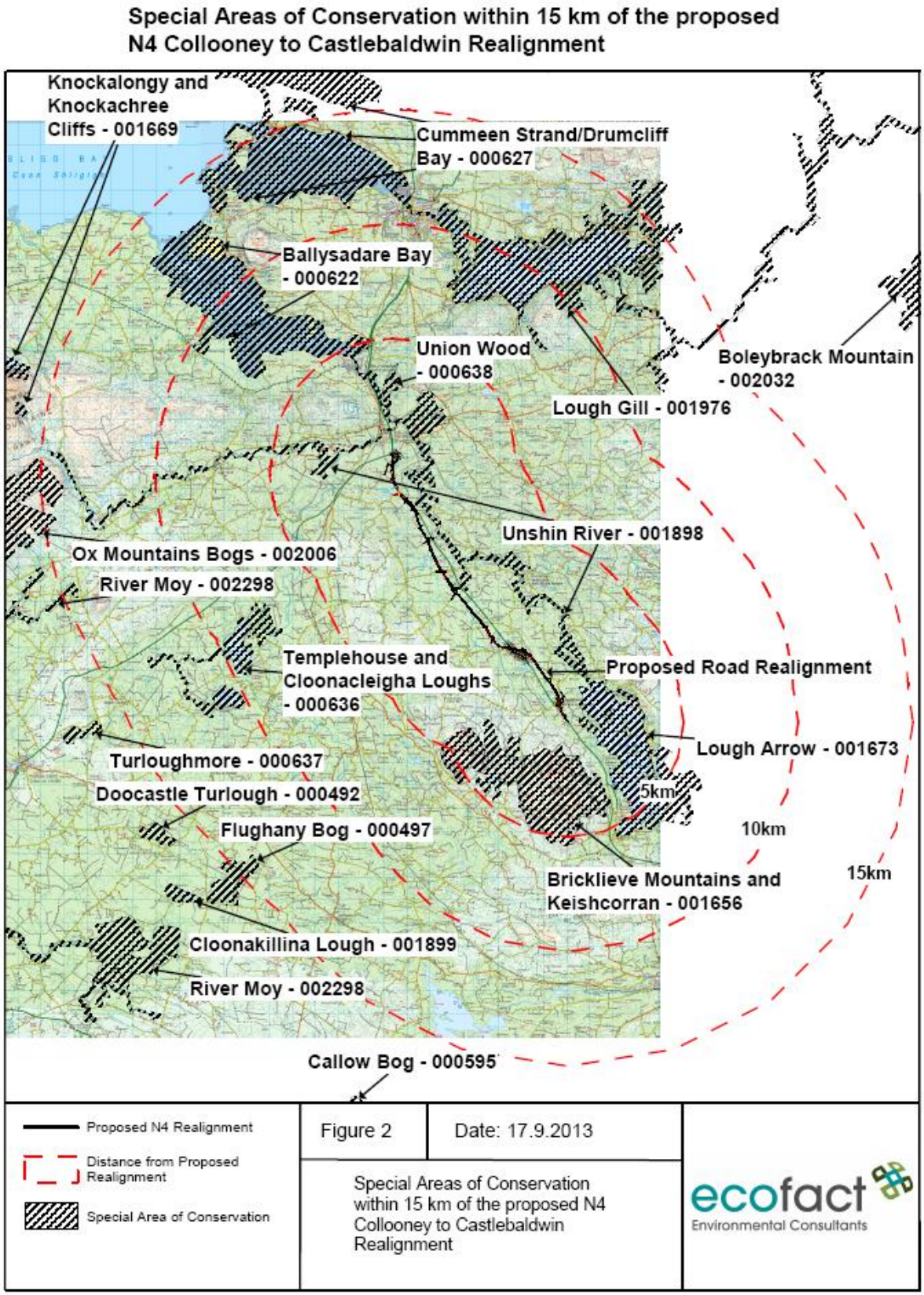
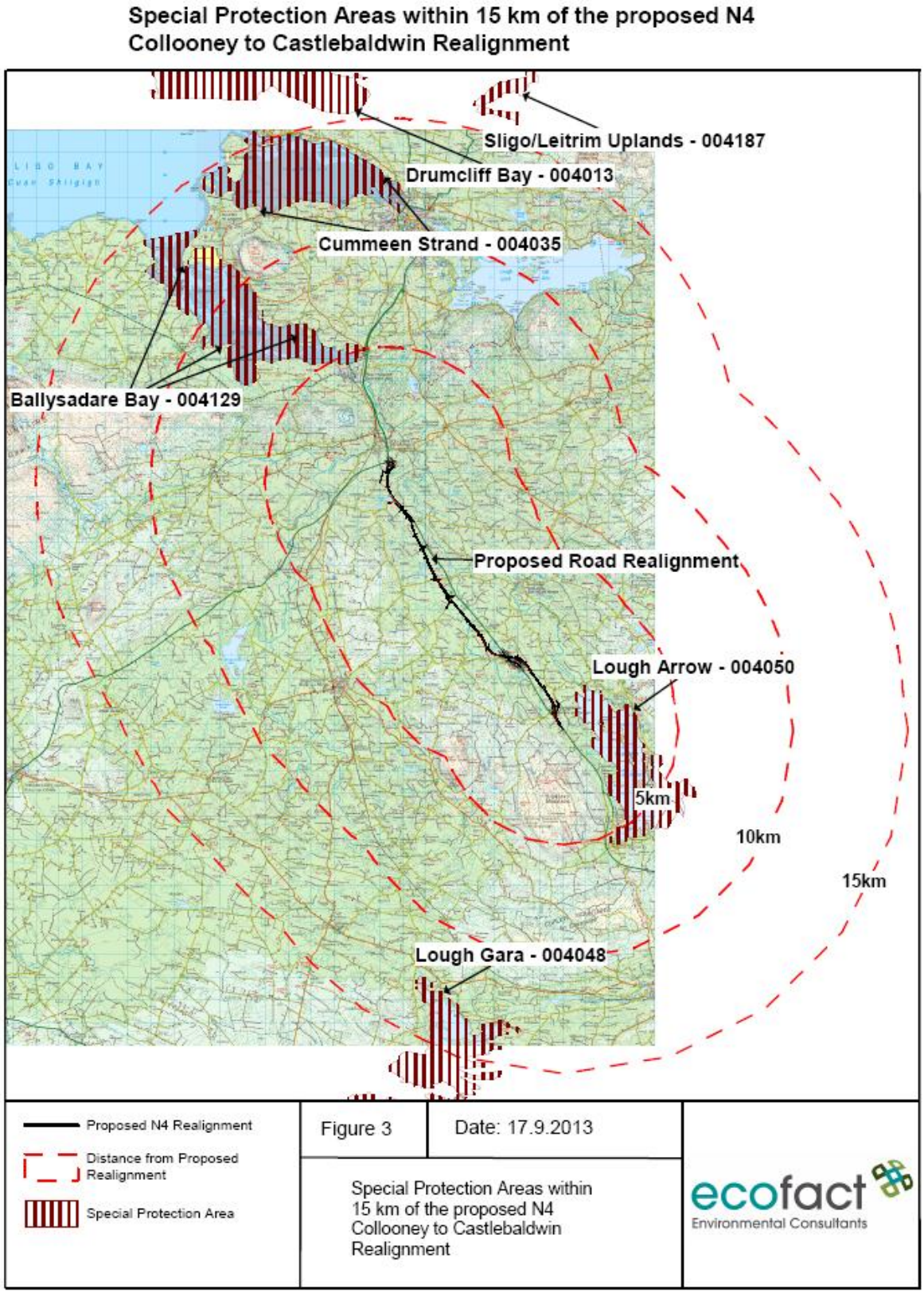


*Figure 3: Special Protection Areas (SPA) within 15 km of the proposed N4 Collooney to Castlebaldwin realignment*



## 3.3 Description of Natura 2000 sites potentially affected by the *Proposed Road Development*

### 3.3.1 Unshin River cSAC

The Unshin River cSAC runs parallel and to the east of the existing N4, from Lough Arrow to Ballysadare Bay. The proposed road crosses a number of watercourses which drain into the Unshin River. The cSAC boundary is in close proximity to the east side of the existing N4 where the *Proposed Road Development* rejoins it at Doorly; a number of link roads also adjoin this cSAC (c. 40m at the tie in of the L-55016-0 to the existing N4 at Knocknagroagh Td.); however the main road corridor (national primary element) is approximately 190m away from the cSAC boundary at its nearest point, at the Turnalaydan Stream. The cSAC is also indirectly connected to the *Proposed Road Development* by the crossing of the Drumfin River approximately 2 km upstream of its confluence with the Unshin River. This site has therefore been identified as being hydrologically connected to the proposed N4 Collooney to Castlebaldwin Realignment.

The site is notable as an example of a pristine river corridor that has not been drained and retains natural habitats along its margins. The Unshin is protected under the Habitats Directive, as transposed into Irish legislation under the EC (Birds and Habitats) Regulations (2011). It contains the Annex I habitats floating river vegetation and alluvial wet woodlands. The Unshin and its tributaries form a very important system for the Annex II species Atlantic Salmon and is the most important salmon producing river in Co. Sligo. The site is also selected for otters, another Annex II listed species of the EU Habitats Directive. The cSAC boundary is adjacent to the east side of the existing N4 where the proposed realignment rejoins it at Doorly. The likely presence of these conservation interests within the designated Unshin River cSAC potentially affected by the *Proposed Road Development* is outlined in Table 2.

*Table 2: Qualifying Interests of the Unshin River cSAC.*

| Natura Code | Qualifying interest |
|---|---|
| 91E0 | Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) |
| 3260 | Rivers with floating vegetation often dominated by Water-crowfoot |
| 1106 | Atlantic salmon (*Salmo salar*) |
| 1355 | Otter (Lutra lutra) |

### 3.3.2 Lough Arrow cSAC

Lough Arrow cSAC lies approximately 0.5km south-east from the proposed route at its closest point. The road crosses a tributary of the Drumderry Stream, which drains into Lough Arrow downstream. This site has also been identified as being hydrologically connected to the proposed N4 via this minor watercourse.

The Lough Arrow cSAC is a large limestone lake that conforms to a type listed on Annex I of the EU Habitats Directive. The lake is sheltered on three sides by hills and is the source of the Unshin River. Lough Arrow is unusual in being a largely spring-fed, mesotrophic natural lake which has changed little in the last 40 years. The shores of the lake are for the most part stony; several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur. The lakeshore vegetation which includes sedges (*Carex* spp.); Water Mint (*Mentha aquatica*); and Water Horsetail (*Equisetum fluviatile*); grades into areas of mossy boulders and woodland. The lakes support a diverse submerged aquatic flora. The Annex I listed habitat '[3140] hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.' is the sole qualifying interest of the site. The likely presence of the conservation interests within the designated Lough Arrow cSAC potentially affected by the *Proposed Road Development* is outlined in Table 3.

*Table 3: Qualifying Interests of the Lough Arrow cSAC.*

| Natura Code | Qualifying interest |
|---|---|
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. |

### 3.3.3 Lough Arrow SPA

The Lough Arrow SPA is designated for the conservation of internationally important populations of Little grebe (*Tachybaptus ruficollis*) [A004] and Tufted duck (*Aythya fuligula*) [A061] and also for the presence of wetlands and waterbirds [A999] within the lake. Whooper swan [A038], listed on Annex I of the EU Birds Directive is listed on the Natura 2000 Standard Data Form for the site. Lough Arrow supports moderate numbers of wintering waterfowl. Diving ducks are well represented with Pochard (*Fuligule milouin*) and Goldeneye (*Bucephala clangula*) occurring in numbers of regional importance. High numbers of other species have been recorded, including Coot (*Fulica atra*) and Mallard (*Anas platyrhynchos*). The Lough Arrow SPA is located approximately 700m to the south of the proposed development, due east of Castlebaldwin village. The likely presence of these conservation interests within the designated Lough Arrow SPA and the potential for adverse effects arising from the *Proposed Road Development* is outlined in Table 4.

*Table 4: Qualifying Interests of the Lough Arrow SPA, and records of these interests from the study area.*

| Natura Code | Qualifying interest |
|---|---|
| A004 | Little grebe (Tachybaptus ruficollis) |
| A061 | Tufted duck (Aythya fuligula) |
| A999 | Wetlands & Waterbirds |

## 3.4 Assessment of potential impacts affecting the Natura 2000 sites

### 3.4.1 Assessment of potential direct impacts affecting the Natura 2000 sites

The proposed N4 *Proposed Road Development* does not overlap with the boundaries of any Natura 2000 site. The closest designated site to the *Proposed Road Development* is the Unshin River cSAC, which comes to within approximately 40m of the Proposed Road Development at its closest point. There will therefore be no direct habitat loss affecting any designated Natura 2000 site including the Unshin River cSAC, Lough Arrow cSAC or Lough Arrow SPA.

### 3.4.2 Assessment of potential indirect impacts affecting the Natura 2000 sites

The *Proposed Road Development* crosses a number of watercourses which drain into the Unshin River and Lough Arrow; both of which are identified as cSAC sites. The crossing of the watercourses within the surface water catchment of these designated sites, in addition to proximity to the Unshin River cSAC, gives rise to the potential for indirect impacts affecting the Unshin River cSAC and Lough Arrow cSAC and SPA complex with the following pathways for impacts identified:

- Potential adverse affects on the aquatic environment arising from suspended solid laden runoff or releases of other polluting substance during the construction phase;
- Potential adverse effects arising from the introduction, spread, or acceleration of spread of invasive, non-native species into the designated sites via the affected watercourse during the construction phase;
- Potential adverse affects on the aquatic environment arising from watercourses receiving untreated road runoff or be at risk from any accidental spills on the new road during the operational phase in the absence of an effective drainage design system.

The qualifying interests of the Unshin River cSAC and the Lough Arrow cSAC and Lough Arrow SPA Natura 2000 sites are predominantly water dependant; therefore water quality has been identified as a key indicator of conservation value for these sites. Water quality impacts have the potential to affect the conservation status of the Annex I habitats and Annex II species for which the cSAC sites are designated and the wetland habitats

and waterbirds, including wintering waterbirds for which the SPA is designated. The scale of water quality impacts arising from the *Proposed Road Development* are identified as being potentially significant in the absence of appropriate design/mitigation measures.

Aquatic habitats and the riparian corridor of the Unshin River cSAC and Lough Arrow cSAC and SPA are significantly at risk with regard to invasive non-native species. Road works and construction projects such as the current proposal are acknowledged pathways for the spread of these species and therefore these must be considered. It is possible (in the absence of mitigation measures designed to avoid the spread of invasive species) that other invasive species could potentially be introduced into the study area and spread downstream into the designated sites.

The potential for indirect effects arising from air quality impacts were assessed in the Air Quality Chapter of the EIS for the Proposed Road Development (Section 9.4.4 of Chapter 9). Of the designated Natura 2000 sites identified within the study area, only the River Unshin cSAC lies within 200m of the proposed development and was subject to air quality assessment. The *Proposed Road Development* is closest to the Unshin River cSAC at Doorly (the boundary of the cSAC is c. 110m from the *Proposed Road Development* at c. Ch.2,500), Knocknagroagh (the boundary of the cSAC is c. 50m from the *Proposed Road Development* at c. Ch. 4,000) and Drumfin (the boundary of the cSAC is c. 80m from the *Proposed Road Development* at c. Ch. 6,500). Dispersion modelling and prediction was carried out at typical traffic speeds at both of these locations. The predicted annual average $NO_x$ level in the Unshin River cSAC near Doorly is below the limit value of 30 µg/m$^3$ for the "do minimum" scenario in 2017 and 2032, with $NO_x$ concentrations reaching 46% of this limit in 2017 and 30% in 2032. Levels with the *Proposed Road Development* in place are similar reaching 46% of the limit value for the "do something" scenario in 2017 and 30% of the limit value in 2032. The predicted annual average $NO_x$ levels at the Unshin River cSAC near Doorly are below the limit value of 30 µg/m$^3$ for the "do something" scenario in both the opening and design years. The impact of the *Proposed Road Development* leads to an increase in $NO_x$ concentrations of at most 0.07 µg/m$^3$ within the Unshin River cSAC; at no stage are the prescribed air quality limits exceeded. These values are considered to be not significant and no mitigation measures are prescribed.

Due to the proximity of the Lough Arrow SPA to the proposed N4 corridor there is the potential for adverse affects on wintering bird populations utilising this designated waterbody; particularly in relation to larger wintering birds such as Whooper Swan and geese. Potential pathways for impacts affecting wintering birds are identified with regard to collisions with vehicles on the new road during the operational phase of the *Proposed Road Development* and increased disturbance during the construction phase of the works with large machinery operating on the site.

### 3.4.3 Assessment of potential cumulative impacts affecting the Natura 2000 sites

Cumulative impacts or effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways: first, through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects (Bowers-Marriott, 1997). As part of the Screening for an Appropriate Assessment, in addition to the proposed works, other relevant projects and plans in the region were considered at this stage. This step aims to identify at this stage any possible significant in-combination or cumulative effects/impacts of the *Proposed Road Development* with other such plans and projects on the Natura 2000 sites.

From a review of the publically available planning files for proposed projects or development within the proposed route corridor there are no known proposals which would have the potential to give rise to in-combination impacts affecting the designated Natura 2000 sites within the study area with regard to the *Proposed Road Development*. Furthermore, any development within the study area which is subject to Planning Permission and which would have the potential for adverse effects on a designated Natura 2000 site will be required to have its own Screening Assessment to inform the Appropriate Assessment process.

A separate Screening Assessment has been undertaken for the Sligo County Development Plan (2011-2017) which has concluded that the Plan has been formulated to ensure that uses, developments and effects arising from permissions based upon the Plan (either individually or in combination with other plans or projects) shall not give rise to significant effects on the integrity of any Natura 2000 sites. There are therefore no in-combination effects potentially giving rise to cumulative impacts on the Natura 2000 sites identified with regard to the current proposal. There are no Conservation Management Plans for the designated Natura 2000 sites identified as being potentially affected by the *Proposed Road Development*.

Background water quality pressures in the Unshin River and Lough Arrow have been identified as a potential cumulative impact with respect to potential water quality impacts arising from the *Proposed Road Development*; where further impacts arising during the construction phase may result in significant cumulative impacts on water quality in the Unshin River and Lough Arrow due to poor assimilation capacity. The Castlebaldwin and Environs WWTP discharges to Lough Arrow and gives rise to the potential for cumulative impacts on water quality within the study area with regard to the *Proposed Road Development*.

## 3.5 Summary of findings leading to potential for adverse effects

From the Screening Report to inform the Appropriate Assessment the following has been concluded:

- **Is the development in a nature conservation site?** No, the N4 Collooney to Castlebaldwin realignment in Co. Sligo is not within any designated Natura 2000 site.
- **Is the development in the surface water catchment of a nature conservation site (or part of such a site)?** Yes, a number of watercourses the proposed route crosses drain into the Unshin River cSAC and Lough Arrow cSAC and SPA.
- **Are the qualifying habitats and species of the site water dependant?** Yes, aquatic and water-dependant Annex I habitats and Annex II species (Habitats Directive) and Annex 1 (Birds Directive) species are listed as qualifying interests of the sites.
- **Is there a WFD sub-basin management plan for the site or its protected habitats/species?** There is no sub-basin management plan for the Unshin River cSAC and Lough Arrow cSAC and SPA.
- **Does this plan cover all potential receptors (habitats/species)?** No, therefore the Screening process must conclude that further impact assessment is required.

According to NPWS (2010), the Appropriate Assessment Screening exercise can either identify that an Appropriate Assessment is not required; or that there is no potential for significant effects (i.e. Appropriate Assessment is not required); or that significant effects are certain, likely or uncertain (i.e. the project must either proceed to Stage 2 (AA) or be rejected). From the examination of the information available it has been concluded that the proposed N4 Collooney to Castlebaldwin Realignment in Co. Sligo has the potential for indirect impacts affecting the Unshin River cSAC and Lough Arrow cSAC and SPA; with particular reference to the sensitive aquatic receptors located directly downstream of the works area, which comprise the key conservation interests of designated sites.

The potential for indirect impacts affecting the Unshin River cSAC and Lough Arrow cSAC and Lough Arrow SPA has been identified with particular reference to the water-dependant qualifying interests of these sites which occur directly downstream of the *Proposed Road Development*. Water quality has been identified as a key indicator of conservation value for these Natura 2000 sites. The potential exists for indirect water quality impacts affecting the Unshin River cSAC and Lough Arrow cSAC and SPA during the construction and operation of the *Proposed Road Development*. There are also potential indirect impacts associated with the importation and / or spread of non-native invasive species.

It is considered that the *Proposed Road Development* gives rise to the potential for significant adverse effects on the qualifying interests and conservation objectives of the Unshin River cSAC, the Lough Arrow cSAC and the Lough Arrow SPA Natura 2000 sites. The significance of these impacts is evaluated as being uncertain. Based on the information provided, the current Natura Impact Statement, as part of the Appropriate Assessment process has been prepared; with regard to the potential for direct, indirect, cumulative and in combination impacts affecting the Natura 2000 network arising from the N4 Collooney to Castlebaldwin *Proposed Road Development*.

# 4 STAGE 2: NIS TO INFORM APPROPRIATE ASSESSMENT

At this stage the impact of a project or plan alone and in combination with other projects or plans on the integrity of the Natura 2000 sites is considered with respect to the conservation objectives of the sites and to their structure and function (NPWS, 2010). This Natura Impact Statement provides information to aid the competent authority in making the Appropriate Assessment. It provides a description of the proposed N4 Collooney to Castlebaldwin Realignment in Co. Sligo with regard to the potential for impacts affecting the Unshin River cSAC and Lough Arrow cSAC and SPA. The conservation objectives of these designated sites are identified, where those potentially affected by the proposed project are listed and potential impacts outlined.

## 4.1 Description of Natura 2000 Sites potentially affected

The conservation interests of the Unshin River cSAC and Lough Arrow cSAC and SPA include both Annex I Habitats and Annex II species listed on the EU Habitats Directive, as well as Annex I species listed on the EU Birds Directive. An overview of these designated sites is provided in Section 3.3. The qualifying interests of these designated sites are presented in Tables 2, 3 and 4.

At a national level the conservation status of qualifying interests for which the Unshin River cSAC and Lough Arrow cSAC and SPA has been designated have been provided in the NPWS Conservation Status Report (2008) '*The status of EU Protected Habitats and Species in Ireland*'. In the absence of a completed Conservation Management Plan for these Natura 2000 sites, the conservation objectives for the Unshin River cSAC, the Lough Arrow cSAC and the Lough Arrow SPA are identified individually as follows:

- **Unshin River cSAC Conservation Objectives (NPWS, 2011a):** 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 i.e. [1106] *Salmo salar* (only in fresh water); [1355] *Lutra lutra*; Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation; and [3260] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*).
- **Lough Arrow cSAC Conservation Objectives (NPWS, 2011b):** To maintain or restore the favourable conservation condition of the Annex I habitat(s) for which the SAC has been selected i.e. [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
- **Lough Arrow SPA Conservation Objectives (NPWS, 2011c):** To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA i.e. *Tachybaptus ruficollis* [wintering]; *Aythya fuligula* [wintering]; and Wetlands.

Water quality has been identified as a key indicator of conservation value for both the Unshin River cSAC and Lough Arrow cSAC and SPA. Deleterious impacts on water quality can directly interfere with the structure and function of the designated sites; where the conservation objectives of the sites are focussed on maintaining the qualifying interests and special conservation interests they support at favourable conservation status.

### 4.1.1 SAC Qualifying Interests: Annex I Habitats

The Unshin River cSAC is one of the last undrained limestone rivers in Ireland. It is selected for its alluvial wet woodlands, which are listed as priority habitats on Annex I of the EU Habitats Directive. The site is also selected for the Annex I habitat floating river vegetation, listed on the same directive.

These habitats do not occur within the current proposed realignment. At its nearest point the river is approximately 300 m from the proposed road corridor, however along most of the route the road is more than 1 km away from the Unshin River. However, the proposed road crosses a number of tributaries that drain into the Unshin River. The pathways identified by which these habitats within the Unshin River cSAC could potentially be affected by the proposed realignment would be through pollution during both the construction and operation of the proposed road and the water-borne spread of invasive, non-native plant species.

In the absence of a specific conservation status assessment for these habitats within the Unshin River cSAC the national conservation status assessment (NPWS, 2008) is taken into account. Therefore the evaluation of the

alluvial wet woodland priority Annex I habitat takes account of the overall national conservation status i.e. 'Bad'; where the range is identified as 'Good'; with the reference area 'Bad'; structure and functions 'Bad'; and future prospects 'Bad'. Similarly, the conservation status of the floating river vegetation Annex I habitat takes account of the overall national conservation status i.e. 'Bad'; where the range is identified as 'Good'; with the reference area 'Good'; structure and functions 'Bad'; and future prospects 'Bad'.

Lough Arrow cSAC is a large limestone lake that is largely spring-fed. The site is selected as an SAC for the Annex I habitat hard oligo-mesotrophic waters, listed on the EU Habitats Directive. This habitat does not lie within the current proposed realignment, with the site boundary lying approximately 1 km from the proposed route at its closest point. However, the proposed realignment crosses the Drumderry Stream south of Castlebaldwin which drains into Lough Arrow. The pathways identified by which this habitat within Lough Arrow could be affected by the proposed realignment would again be through pollution during both the construction and operation of the proposed road in the absence of an effective drainage design and the water-borne spread of invasive, non-native plant species.

In the absence of a conservation status assessment for this habitat within Lough Arrow the conservation status of the hard oligo-mesotrophic water Annex I habitat takes account of the overall national conservation status i.e. 'Bad'; where the range is identified as 'Good'; with the reference area 'Good'; structure and functions 'Bad'; and future prospects 'Bad'.

### 4.1.2 SAC Qualifying interests: Annex II Species

Annex II species listed as conservation interests of the Unshin River cSAC and Lough Arrow cSAC are identified as being water-dependant and primarily aquatic; these are the Atlantic Salmon *Salmo salar* and the Otter *Lutra lutra*.

#### 4.1.2.1 **Atlantic** salmon (Salmo salar)

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Berne Convention and is a qualifying interest of the Unshin River cSAC. The Unshin River and its tributaries is the most important salmon producing river in Co. Sligo, with the Ballysadare catchment being of international importance to salmon. Poor water quality will affect the conservation status of salmon in the Unshin River; this species requires clean water (Q4) for spawning and early life stages. Salmonid fish would be particularly vulnerable to run-off pollutants at the egg and early juvenile stages. These stages are present in the mid winter to late spring period. The conservation status of this species within the Unshin River cSAC is not currently available. The conservation status for this species is evaluated as being overall 'Bad' at a national level (NPWS, 2008).

#### 4.1.2.2 Otter (Lutra lutra)

The otter is listed under Annex II of the EU Habitats Directive and under Annex II of the Berne Convention. It is also a legally protected species under the Wildlife Act, 1976 (and Wildlife (Amendment) Act, 2000). This species is listed as one of the qualifying interests of the Unshin River cSAC and Lough Arrow cSAC. The conservation status of this species is dependent on fish stocks, which are ultimately dependent on water quality. The conservation status of this species within the Unshin River cSAC and Lough Arrow cSAC is not currently available; however, the national conservation status is evaluated as being 'Inadequate'.

Otter are found throughout Ireland and tend to occupy linear territories along watercourses. River and wetland drainage and clearance of riparian vegetation are the main causes of otter habitat destruction in Ireland.

### 4.1.3 SPA Special Conservation Interests: Bird species & Wetlands (Birds Directive, 2009)

#### 4.1.3.1 Little Grebe (Tachybaptus ruficollis)

The Little Grebe [A004] is Amber-listed in Ireland due to a contraction in the breeding range. The European population is regarded as Secure by Bird Life International. Breeding sites are relatively widely scattered with slightly higher densities in the northeast of Ireland. Pairs are highly territorial, nesting mostly on floating plant material hidden in dense vegetation at the margins of shallow, freshwater rivers, streams, loughs and ponds.

#### 4.1.3.2 Tufted Duck (Aythya fuligula)

Tufted Duck [A061] is a resident and winter visitor to Ireland. The species is Amber-listed in Ireland for its localised wintering range. Their breeding habitat is close to marshes and lakes with plenty of vegetation to conceal the nest. They are also found on coastal lagoons, the seashore, and sheltered ponds. The European population has been evaluated as Declining due to several key populations undergoing moderate ongoing declines.

Wetlands are identified as a special conservation interest within the Lough Arrow SPA site, supporting the Annex I bird species for which the site is designated. The wetlands within this SPA correspond to the lake itself i.e. the Annex I hard oligo-mesotrophic waters designated within the Lough Arrow cSAC, and also the reed fringe and associated wetlands supporting Little Grebe and Tufted Duck.

#### 4.1.3.3 Other notable Annex I species (Birds Directive, 2009) in the study area

Protected birds found along the Unshin River include Whooper swan (*Cygnus cygnus*) [A038] and Kingfisher (*Alcedo atthis*) [A229], with both species listed on Annex I of the EU Birds Directive**.** The whooper swan is also identified as being of interest within the Lough Arrow SPA complex, although is not specifically listed as a special conservation interest of this SPA site.

The Kingfisher is listed under Annex I of the Birds Directive and Annex II of the Berne Convention. The conservation status of this species is dependent on fish stocks and aquatic insects, which are ultimately dependent on water quality. The conservation status of this species within the Unshin River cSAC is not currently available; however, they are amber listed in 'Birds of Conservation Concern in Ireland'. This species is widespread and fairly common on fish-rich rivers and lakes in Ireland.

Whooper swan is listed under Annex I of the Birds Directive and Annex II of the Berne Convention. The Whooper swan is a winter visitor to wetlands throughout Ireland, especially north and west of a line between Limerick and Dublin, from breeding grounds in Iceland. They generally arrive in October and leave to return to their breeding grounds in late March/early April. They winter mostly on lowland open farmland around inland wetlands, regularly seen while feeding on grasslands and stubble. Whooper swans usually feed during the daylight hours and leave the feeding sites at dusk to congregate at evening roosts.

Only a single Whooper swan was recorded on one occasion during the current study. Three Whooper Swans were recorded on two occasions on Loughymeenaghan. This number is also insignificant and it is noteworthy that the proposed new road corridor is located further away from Loughymeenaghan than the existing N4 road. The new road and the existing road are equidistant from the Lough Arrow SPA.

## 4.2 Impact Prediction

As part of the Natura Impact Statement the impact of the project proposal affecting the *integrity* of a Natura 2000 site is considered with respect to the conservation objectives of the site. Integrity is defined as: '*the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified*'. Therefore the integrity of a site is principally related to the structure and function of the site with regard to its qualifying interests. The conservation status of these qualifying interests comprises the primary conservation objectives for all designated Natura 2000 sites. Favourable conservation status is defined for Annex I habitats and Annex II species in the Habitat Directive (1992):

- Article 1 (e) Conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2.
  The conservative status of a natural habitat will be taken as 'favourable' when: its natural range and areas 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.
- Article 1 (i) Conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2;

The conservation status will be taken as 'favourable' 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.

### 4.2.1 Impacts potentially affecting Annex I Habitats within cSAC sites

#### 4.2.1.1 Construction phase impacts

No Annex I habitats listed as qualifying interests of the Unshin River cSAC and Lough Arrow cSAC will be directly affected by the construction phase of the *Proposed Road Development*. This is because the *Proposed Road Development* will be constructed outside of the designated site boundaries.

During the construction phase of the proposed realignment there is the potential for indirect water quality impacts affecting the Annex I listed habitats for Unshin River cSAC and Lough Arrow cSAC. This is due to the proposed realignment crossing a number of watercourses which drain into Unshin River and Lough Arrow. Water quality within the Unshin River and Lough Arrow has been identified as a key indicator of conservation value for the designated sites. Water quality impacts have the potential to affect the conservation status of the Annex I habitats for which the sites are designated and may be significant.

Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, may potentially have a significant impact on these aquatic habitats. The potential also exists for a range of serious pollutants to enter watercourses during new road construction that may have a significant impact on these aquatic habitats further downstream. For example uncured concrete and grouts; wash down water from site vehicles, fuels, lubricants and hydraulic fluids and from waste from on site toilet and wash facilities would have deleterious effects on plants if allowed to enter watercourses. Pollution by suspended solids and substances associated with the construction process would be a potential problem at all points where the new road is constructed close to or over watercourses, particularly where this involves instream works, construction of culverts or river diversion.

The potential spread of invasive, non-native species has been identified as a pathway for the transmission of indirect impacts affecting Annex I habitats listed as qualifying interests of the Unshin River cSAC and Lough Arrow cSAC. The requirement for fill material or machinery employed within the site during the construction phase may potentially result in the importation of non-native species such as Japanese knotweed, Himalayan balsam, Himalayan knotweed, *Gunnera* sp. or Giant hogweed – all of which are recognised as having significant impacts on the ecological diversity and naturalness within riparian corridors. The proposed works affecting the watercourses within the study area gives rise to the potential for the transportation of fragments of invasive species downstream into the Unshin River cSAC and Lough Arrow cSAC; however, it is noted that non-native invasive species were not recorded at the crossing points of these watercourses during the surveys to inform this impact assessment. The risk of this impact is evaluated as being in line with current trends – where road side works and low-level movement of soil and sub-soil material within the Ballysadare / Unshin River catchment gives rise to the potential for the spread of invasive species on an ongoing basis.

Stringent and robust mitigation measures are proposed for the avoidance of impacts affecting water quality during the construction phase of the *Proposed Road Development* in order to protect the water-dependant Annex I habitats of the Unshin River and Lough Arrow.

#### 4.2.1.2 Operational phase impacts

No Annex I habitat listed as qualifying interests of the Unshin River cSAC and Lough Arrow cSAC will be directly affected by the operational phase of the *Proposed Road Development*. This is because the *Proposed Road Development* will be constructed outside of the designated site boundaries and no Annex I habitats were identified within the development site contiguous with those within the cSAC designation.

In the absence of an effective drainage design system, there is potential for indirect water quality impacts affecting Annex I habitats within the Unshin River and Lough Arrow during the operation phase of the *Proposed Road Development*. This is due to the proposed realignment crossing a number of watercourses which drain into Unshin River and Lough Arrow. Water quality within the Unshin River cSAC and Lough Arrow cSAC has been identified as a key indicator of conservation value for the designated sites. Water quality impacts have the potential to affect the conservation status of the Annex I habitats for which the sites are

designated and may be significant. The main potential impact on these aquatic habitats associated with the operational phase of the proposed realignment would be the pollution of rivers/streams from storm water run-off from the road. Storm water run-off from roads is composed of rainwater and contaminants, which are mobilised from the surface and boundaries of the road corridor.

In relation to potential operational phase impacts affecting the river itself mitigation measures have been proposed with cognisance of the sensitivity of the Unshin River cSAC and Lough Arrow cSAC Annex I habitats.

### 4.2.2 Impacts potentially affecting Annex II Species within cSAC sites

#### 4.2.2.1 Construction phase impacts

The *Proposed Road Development* does not lie within or directly adjacent to any designated European Site and there is therefore no potential for direct impacts affecting the Annex II qualifying interests of the cSAC sites identified. However, there is potential for indirect water quality impacts to occur during construction. This is due to the proposed realignment crossing a number of watercourses which drain into the Unshin River and Lough Arrow. As the species listed on Annex II of the EU Habitats Directive for which both the Unshin River cSAC and Lough Arrow cSAC is designated are water dependant, water quality has been identified as a key indicator of conservation value for this site. Water quality impacts have the potential to affect the conservation status of the Annex II species for which the sites are designated and may be significant.

Water quality impacts arising during the construction phase of the *Proposed Road Development* would have the potential to affect salmon, a species requiring clean water at good ecological status i.e. Q4. Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on all life stages of salmonid fish. Suspended solids in small quantities may have a serious effect on the spawning sites of salmonids (O'Connor & Andrew, 1998; Turnpenny & Williams R., 1980; Shackle et al, 1999). The effects of suspended solids are a function of concentration and exposure duration. The main mechanism used by adult fish to deal with elevated concentrations of suspended solids is to move away from the area. However, this action is not possible for ova and larval salmonids and restrictions on instream/riparian working times will be necessary in some areas.

The potential exists for a range of serious pollutants to enter watercourses during new road construction that may have a significant impact on the Annex II species further downstream. For example uncured concrete and grouts; wash down water from site vehicles, fuels, lubricants and hydraulic fluids and from waste from on site toilet and wash facilities would have deleterious effects on fish if allowed to enter watercourses. Impact of pollution by substances associated with the construction process would be less in areas where no salmonid population exists for a considerable distance downstream. Pollution by substances associated with the construction process would be a potential problem at all points where the new road is constructed close to or over watercourses, particularly where this involves instream works, construction of culverts or river diversion.

Otters are known to utilise both the Unshin River and Lough Arrow. The conservation status of this species within the designated sites is dependent on fish stocks, which are ultimately dependent on water quality. There is the potential for pollution of the waterbodies during the construction phase to affect otter populations indirectly, where this may impact on the fisheries potential of both the Unshin River and Lough Arrow system.

#### 4.2.2.2 Operational phase impacts

As the *Proposed Road Development* lies outside of any European Site, there is no potential for direct impacts arising that may adversely affect Annex II species within a Natura 2000 site boundary. However, there is potential for indirect water quality impacts to occur during the operational phase. This is due to the proposed realignment crossing a number of watercourses which drain into the Unshin River and Lough Arrow. As the species listed on Annex II of the EU Habitats Directive for which both the Unshin River cSAC and Lough Arrow cSAC is designated are water dependant, water quality has been identified as a key indicator of conservation value for this site. Water quality impacts have the potential to affect the conservation status of the Annex II species for which the sites are designated and may be significant.

The main potential impact on water quality and fisheries associated with the operational phase of the proposed realignment would be the pollution of rivers/streams from storm water run-off from the road. Storm

water run-off from roads is composed of rainwater and contaminants, which are mobilised from the surface and boundaries of the road corridor.

There are significant differences between the sources that contribute to routine discharges and accidental discharges. Accidental spillages can consist of almost any polluting substance, and their impact would vary from incident to incident. More than 30 potential polluting substances have been identified in highway runoff. The effects of these may range from aesthetic nuisance, to causing biochemical and ecological deterioration of the receiving body of water.

Salmonid fish would be particularly vulnerable to run-off pollutants at the egg and early juvenile stages. These stages are present in the mid winter to late spring period. There is the potential for pollution of the waterbodies during the operational phase to affect otter populations indirectly, where this may impact on the fisheries potential of both the Unshin River and Lough Arrow system.

A detailed drainage design (set out in chapter 4 of the EIS) and Erosion and Sediment Control Plan (appended to the NIS) have been included in the project proposal for implementation to ensure the long-term operation of the *Proposed Road Development* will not impact on the qualifying interests of the Unshin River cSAC and Lough Arrow cSAC. The management of surface water run-off from the new road surface will effectively ameliorate the potential for impacts affecting water quality within the Unshin River and Lough Arrow. Mitigation measures outlining the required parameters within which the *Proposed Road Development* must operate are provided.

### 4.2.3 Impacts potentially affecting Special Conservation interests within SPA sites

#### 4.2.3.1 Construction phase impacts

There is no potential for direct impacts affecting the special conservation interests of the Lough Arrow SPA during the construction phase, as the *Proposed Road Development* is not located within or directly adjacent to this site. There is the potential for indirect water quality impacts to occur during construction. This is due to the proposed realignment crossing a number of watercourses which drain into Unshin River and Lough Arrow. As the species listed on Annex I of the EU Birds Directive (2009) for which both the Unshin River cSAC and Lough Arrow SPA is designated are water dependant, water quality has been identified as a key indicator of conservation value for this site. Water quality impacts have the potential to affect the conservation status of the Annex I species for which the sites are designated and may be significant.

Suspended sediment due to runoff of soil from construction areas, or due to disturbance of fine sub-surface sediments in the course of instream construction and excavation, can have severe negative impacts on invertebrate and plant life and on all life stages of fish species. The potential exists for a range of serious pollutants to enter watercourses during new road construction that may have a significant impact on the special conservation interests of this site; particularly with regard to the Wetland habitats supporting the Annex I bird species. For example uncured concrete and grouts; wash down water from site vehicles, fuels, lubricants and hydraulic fluids and from waste from on site toilet and wash facilities would have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses. Such impacts, potentially affecting the aquatic habitats of Lough Arrow would have the potential to adversely affect the Annex I special conservation interests of the SPA, where both Little Grebe and Tufted Duck are dependent on aquatic invertebrate and fish communities within the lake.

Whooper swans are known to utilise both the Unshin River and Lough Arrow, with Kingfishers also known to be supported by the Unshin River. The conservation status of these species within the designated sites is dependent on fish stocks, aquatic insects and vegetation that are ultimately dependent on water quality. There is the potential for pollution of the waterbodies during the construction phase to indirectly affect Whooper swan and Kingfisher populations; where this may impact on the fisheries, aquatic insect and vegetation within both the Unshin River and Lough Arrow system.

Based on bird survey work carried out during the period October 2011 to March 2012, the study area (route corridor to 500m each side) is rated as being sub-optimal and insignificant for wintering birds in terms of roosting and daytime feeding. Significant numbers of wintering birds were not recorded using Lough Corran and Boathole Loughs; the main focus of the study. Only a single Whooper swan was recorded on one occasion during the current study. Three Whooper Swans were recorded on two occasions on Loughymeenaghan. This number is also insignificant and it is noteworthy that the proposed new road corridor is located further away from Loughymeenaghan than the existing N4 road. The new road and the existing road are equidistant from

the Lough Arrow SPA. It is concluded therefore that the proposed realignment will not have any significant impact on wintering birds, such as Whooper Swans. There are no breeding sites for Kingfisher on the watercourses affected by the *Proposed Road Development*, and there will be no significant impact on this species.

Effective mitigation of water quality impacts potentially arising during the construction phase will avoid impacts affecting the population density or future prospects of these species.

#### 4.2.3.2 Operational phase impacts

The *Proposed Road Development* does not occur within or directly adjacent to any SPA site and there are no direct impacts identified during the operation phase. There is, however, the potential for indirect water quality impacts to occur during the operational phase. This is due to the proposed realignment crossing minor watercourses which drain into Lough Arrow SPA. As the Annex I bird species listed as special conservation interests for the site are water dependant; water quality has been identified as a key indicator of conservation value for this site. Water quality impacts have the potential to affect the conservation status of the Annex I species and also Wetland habitats for which the site has been designated and may be significant. The main potential impact on water quality associated with the operational phase of the proposed realignment would be the pollution of rivers/streams from surface water run-off from the road. Surface water run-off from roads is composed of rainwater and contaminants, which are mobilised from the surface and boundaries of the road corridor.

Mitigation measures outlining the required parameters within which the *Proposed Road Development* must operate are provided. A detailed drainage design has been included in the proposal to ensure the long-term operation of the *Proposed Road Development* will not impact on the qualifying interests of the Lough Arrow SPA.

There is potential for indirect impacts during the operational phase of the *Proposed Road Development* with regard to Whooper swans, an Annex I species listed on the Natura 2000 data form for the Lough Arrow SPA site. The potential for increased collision risk for swans commuting between feeding and roosting sites was examined in the wintering bird's survey within the current study. Likewise there is a potential for displacement of this species from roosting or daytime feeding sites if such sites were located near the *Proposed Road Development*. The wintering bird's survey determined that this species would not be adversely affected by the *Proposed Road Development*, where important feeding habitats and flight lines do not occur within the proposed road alignment.

## 4.3 Mitigation measures

The construction of the proposed N4 Collooney to Castlebaldwin Realignment in Co. Sligo, in close proximity to the Unshin River cSAC and Lough Arrow cSAC and SPA requires the incorporation of effective mitigation measures into the proposal. The most significant potential impacts arising from the *Proposed Road Development* have been identified in relation to construction and operational phase impacts affecting water-dependant qualifying interests of the Unshin River cSAC and Lough Arrow cSAC and SPA. These may arise via indirect water quality impacts and spread of invasive, non-native species into the designated sites downstream affecting the Unshin River and Lough Arrow waterbodies. Therefore the proposed measures are principally aimed at avoiding impacts to the aquatic environment.

### 4.3.1 Design stage mitigations

The current Natura Impact Statement for the N4 Collooney to Castlebaldwin road development, Co. Sligo is based on the road design made available by Sligo County Council and takes account of the proposed drainage design for the development which constitutes significant design stage mitigation. As the *Proposed Road Development* requires works on a National Road, all elements of the development, including culvert design, realignments and construction methodologies are compliant with the relevant National Roads Authority (NRA) standards and guidelines, with regard to the potential adverse effects identified. The proposed drainage design for the route is set out in detail in Chapter 4 of the Environmental Impact Statement.

All design elements interacting with the aquatic environment; including watercourse crossings; management of surface water; and management of hydrological regimes within the study area take account of the ecological requirements and mitigations prescribed for the protection of the Unshin River cSAC and Lough Arrow cSAC and SPA.

### 4.3.2 Construction phase mitigations

The effective protection of water quality and the management of invasive, non-native species within the proposed realignment during construction and operation phases will significantly reduce the significance of impacts potentially affecting the Unshin River cSAC and Lough Arrow cSAC and SPA. Mitigations for avoidance, reduction and remediation of impacts are prescribed below. The implementation of these mitigations for the protection of the designated Natura 2000 sites and their qualifying interests inform the conclusion evaluation of the NIS.

Pollution control measures are required when working in and near the watercourses affected by the *Proposed Road Development* to prevent the transport of deleterious substances to the Unshin River and Lough Arrow, both of which are Natura 2000 sites designated for water-dependant qualifying interests.

As a mitigation measure for the protection of water quality and the avoidance of impacts affecting the Unshin River cSAC and Lough Arrow cSAC and SPA downstream, an Erosion and Sediment Control Plan has been prepared at EIS stage (appended to this NIS). This report details the construction elements of the *Proposed Road Development* with particular regard to instream works, concrete works and drainage works. The provision of such a plan ensures commitments and management regulations are in place to enable the contractor to manage water quality protection measures on the site. The plan includes monitoring of water quality within the affected watercourses during the proposed works and the supervision of the works by an Environmental Assurance Officer (EAO) to be employed as a representative of the Local Authority with a 'stop works' authority in the event of breaches of environmental / water quality measures. The EAO will also liaise directly, during the construction period, with the National Parks and Wildlife Service and the Inland Fisheries Ireland with regard to the implementation of mitigation measures for the protection of sensitive water quality receptors that are set out in the Erosion and Sediment Control Plan (appended to this NIS).

Good site management practices will be implemented to reduce risks of spills, including regular monitoring and inspection of storage vessels, ensuring plant is properly maintained and serviced etc. A supply of materials suitable for absorbing / containing spillages and sealing leaks will be maintained on site.

The timing of instream works will be subject to seasonal restriction to avoid the Salmon spawning season (October to March); with further restrictions proposed to the end of May in order to limit the potential for suspended solids and siltation impacts on salmonid ova. Taking account of the presence of Annex II listed Brook lamprey within the watercourses affected by the proposed works (with reference to Article 10 of the EU Habitats Directive) it is proposed that the timing restrictions include the lamprey spawning season. The window for instream works, that is, works within the aquatic environment, should be undertaken during the period July to September inclusive.

Any plant or equipment that may have worked in environments where invasive species are present (including but not restricted to zebra mussel *Dreissena polymorpha*, curly waterweed *Lagarosiphon major,* Japanese knotweed *Fallopia japonica*, Indian balsam *Impatiens glandulifera,* giant hogweed *Heracleum mantegazzianum*, rhododendron *Rhododendron ponticum*, New Zealand flatworm *Arthurdendyus triangulata*), shall be suitably cleaned by high pressure hose before being used in the N4 Collooney to Castlebaldwin site to prevent the spread of invasive species. Water used for this washing process shall always be intercepted and prevented from draining back into watercourses.

The source of any soil or fill material imported to site will be checked in advance at the source by a qualified ecologist to ensure that invasive, non-native species are not imported into this location, in direct proximity to the Unshin River cSAC and Lough Arrow cSAC and SPA.

### 4.3.3 Operational phase mitigations

In order to protect surface water quality during operation stage, mitigations in relation to surface water treatment are proposed. Mitigations are detailed in Chapter 4 Section 4.8.2 of the EIS (Description of the *Proposed Road Development*) stipulating that the principle of Sustainable Drainage Systems (SUDS) has been applied as far as is reasonably practicable for the *Proposed Road Development*. This principle seeks to minimise the environmental impact of the drainage system through quality and quantity control within a system which attempts to mimic the processes that occur in nature, additionally it is foreseen that the drainage design developed in this manner will blend in more harmoniously within the existing landscape considering the biodiversity values of the surrounding environment. Petrol interceptors, grit traps and containment facilities are to be constructed at each outfall point along the *Proposed Road Development* to mitigate for the risk of pollution from road runoff and accidental spillages. All drainage outfalls are designed to be served by suitably

sized constructed wetlands / interceptor ponds to reduce run-off rates to Greenfield (based on QBAR) rates. Operational phase mitigations, including detailed mitigations for the protection of water quality in the Unshin River and Lough Arrow cSAC's, are also set out in the Hydrological & Hydrogeological Assessment, Chapter 14 of the EIS. The proposed attenuation balancing ponds are designed to accommodate a 100-year return period flow and are designed to have adequate storage to allow a permissible outlet flow similar to the maximum existing flow from the catchment in accordance with UK Highways Agency publication Vegetative Treatment Systems For Highway Runoff HA103/06 and UK Highways Agency (2009) Surface and Sub-surface Drainage Systems for Highways HD33/06.

## 4.4 Impacts potentially affecting the conservation objectives of the cSAC and SPA

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as candidate Special Areas of Conservation, Special Areas of Conservation and Special Protection Areas. The Government and its agencies (i.e. the NPWS, local authorities and other statutory bodies) are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites. According to the EU Habitats Directive (1992), favourable conservation status of a habitat is achieved when:

> "...its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that 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 data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or 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".

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines 'integrity' as the '*coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is or will be classified*'.

Water quality has been identified as a key indicator of conservation value for the Unshin River cSAC and Lough Arrow cSAC and SPA. Deleterious impacts on water quality may potentially indirectly interfere with the structure and function of these designated sites affecting their integrity, where the conservation objectives of the sites are focussed on maintaining the conservation interests (Annex I habitats, Annex II species and Annex I bird species) at favourable conservation status. Water quality impacts have the potential to affect the range, distribution, population density and structure and function of these water dependant conservation interests. Indirect impacts potentially affecting the relevant qualifying interests also include adverse effects arising from the introduction/dispersion of alien invasive species. In the absence of mitigation, including mitigation by design in the form of effective drainage design, the *Proposed Road Development* is considered to have the potential to give rise to water quality impacts potentially affecting the integrity of the Unshin River cSAC and Lough Arrow cSAC and SPA complex.

With regard to the Annex I species listed as special conservation interests of the Lough Arrow SPA (Little Grebe and Tufted Duck) it is evaluated that the proposed realignment will not have any potential for adverse effects on the conservation status of these species, or on the conservation objectives of this Natura 2000 site.

Project specific mitigation measures for the protection of designated European Sites have been provided for in the design of the *Proposed Road Development*, in addition to measures prescribed in the EIS and this NIS for the avoidance of impacts potentially affecting the conservation objectives of the European Sites within the study area.

## 4.5 Natura Impact Statement Conclusions

The N4 Collooney to Castlebaldwin *Proposed Road Development*, Co. Sligo comprises the construction of a Type 2 Dual Carriageway cross section with a Standard Single Carriageway tie in section south of Castlebaldwin. It extends from the townlands of Collooney/Toberbride, due south of Collooney, to the townland of Cloghoge Lower, due south of Castlebaldwin village. It will involve construction of a new greenfield route with some online upgrades to the existing network.

The *Proposed Road Development* does not cross or directly impact on any designated European Site (i.e. Natura 2000 site). However, there are hydrological connections between the watercourses crossed by the proposed route and designated Natura 2000 conservation sites, where the *Proposed Road Development* lies within the catchment of the Unshin River cSAC and the Lough Arrow cSAC and SPA. As the watercourses drain into these sites, there would be the potential for indirect effects on these designated areas.

The Unshin River cSAC is selected for alluvial wet woodlands (priority habitat) and floating river vegetation both of which are listed on Annex I of the E.U. Habitats Directive (1992). The Lough Arrow cSAC is selected for the Annex I listed habitat '*Hard oligo-mesotrophic waters [3140]*' and is classified as being oligo-mesotrophic by the EPA. Pathways for impacts affecting these Annex I habitats are indirect impacts associated with the potential spread of invasive, non-native species during the construction phase and impacts on water quality through pollution during both the construction and operational phases of the realignment. Annex II species listed as conservation interests of the Unshin River cSAC are Atlantic salmon and Otter; both of which occur within the Unshin River downstream of the influent tributaries which are crossed by the *Proposed Road Development*. The watercourses crossed by the *Proposed Road Development*, upstream of these designated waterbodies gives rise to the potential for downstream water quality impacts potentially affecting these water-dependant qualifying interests, in the absence of mitigation.

Annex II species and Annex I bird species for which the Lough Arrow cSAC and SPA are designated are limited to four water-dependant species; Atlantic salmon and Otter for the cSAC and Tufted Duck and Little Grebe for the SPA, in addition to wetland habitats which are also listed as a conservation interest of the SPA. As these conservation interests are water dependant, water quality has been identified as a key indicator of conservation value for these species. Water quality impacts during the construction and operational phase have the potential to indirectly affect the conservation status of these species for which the sites are designated, in the absence of mitigation.

Effective measures to mitigate potential impacts have been provided by design and avoidance. Design stage mitigation measures, with specific reference to operational stage water quality protection, have been included in the project proposal. The detailed drainage design for the *Proposed Road Development* is presented in the EIS in Chapter 4 (Description of the Proposed Road Development) and expanded upon in Chapter 14 of the EIS (Hydrological and Hydrogeological Impact Assessment). The scope of these mitigations with reference to the potential for adverse effects on the qualifying interests of the Natura 2000 sites within the study area have been discussed in the mitigation section of this report. Details of mitigation proposals for the protection of water quality and aquatic conservation interests during the construction stage are set out in the Erosion and Sediment Control Plan, which is appended to this NIS and which will effectively limit any potential water quality impacts to the local context, thus avoiding the potential for downstream water quality impacts within the designated Natura 2000 sites. The incorporation of these measures into the *Proposed Road Development* design and their subsequent implementation on site will ensure that there will be no significant effects, either individually or in combination with other plans or projects affecting the conservation interests or conservation objectives of the Unshin River cSAC or the Lough Arrow cSAC and SPA complex, i.e. the integrity of these Natura 2000 sites. It is therefore concluded that the Proposed Road Development will not, beyond reasonable scientific doubt, adversely affect the integrity of any European Site (Natura 2000 site) whether directly, indirectly or cumulatively.

# 5 APPENDIX 1: Plates

**Plate 1** Lough Corran (November 2011).

**Plate 2** Whooper Swan on Lough Corran at dawn (January 2012).

**Plate 3** Drumfin River immediately upstream of existing N4 Bridge.

**Plate 4** Lough Corran River immediately downstream of the existing N4.

**Plate 5** The 'Swallow Hole' complex, November 2009.

**Plate 6** Lough Arrow (November 2011).

**Plate 7** Whooper Swans grazing beside Lough Arrow (February 2012).

**Plate 8** Whooper Swans (*ad hoc* sighting) near Lough Arrow (February 2012).

**Plate 9** Japanese knotweed *Fallopia japonica* at the boundary of Lough Arrow SPA at Ballinafad.

# 6 APPENDIX 2: NPWS Natura 2000 site synopses

**SITE NAME: UNSHIN RIVER cSAC**

**SITE CODE: 001898**

The Unshin River runs from Lough Arrow north to Ballysadare Bay, Co. Sligo. This site consists of a pristine unmanaged, undrained river and its marginal vegetation. Other rivers included within the site are the Owenboy/Owenbeg and a number of smaller tributaries. To protect the river, natural and semi-natural habitats adjacent to its course have been included; many of these are interesting in their own right. The site is a candidate SAC selected for alluvial wet woodlands, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, also 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 and Otter.

The Unshin River flows across a number of geological boundaries between sandstone, shale's and limestone. This results in unusual physio-chemical qualities which in turn are reflected in the rich and varied plant and animal populations. The river supports an excellent example of floating river vegetation, a habitat listed on Annex I of the E.U. Habitats Directive. The diversity of aquatic macrophytes is exceptional and to an extent the unusual combinations and richness of species can be accounted for by the good quality water being discharged from Lough Arrow upstream. The lake also imparts a stabilising influence on the flow regime and provides a source of lacustrine species (e.g. Long-stalked Pondweed, *Potamogeton praelongus*). Plant species present which indicate base-rich conditions include Lesser Waterparsnip (*Berula erecta*), Blunt-fruited Water-starwort (*Callitriche obtusangula*), Fanleaved Water Crowfoot (*Ranunculus circinatus*) and the internationally rare River Water-dropwort (*Oenanthe fluviatilis*), while Lesser Marshwort (*Apium inundatum*), normally associated with more acidic peat pools, also occurs. Fen and floating mire communities are represented by Bogbean (*Menyanthes trifoliata*), Cowbane (*Cicuta virosa*), Yellow Loosestrife (*Lysimachia vulgaris*) and Water Avens (*Geum rivale*). A rare and unusual alga *Nostoc parmelioides* is also present. Additional interest is gained by the inclusion of marginal woodlands and extensive wetland areas within the site. These latter contain the Red Data Book plant Swamp Meadow-grass (*Poa palustris*).

The Unshin and its tributaries form a very important system for Atlantic Salmon, a species that is listed on Annex II of the E.U. Habitats Directive. The Owenboy/Owenbeg River is the principle spawning and nursery tributary for the system's salmon fishery. The Unshin and its tributaries is the most important salmon producing river in Co. Sligo. The system also supports a good population of trout Two notable bird species which occur along the river are Whooper Swan, which feeds in the wet grasslands that flank the river, and Kingfisher. Both are listed on Annex I of the E.U. Birds Directive.

The trophic status of the river increases downstream indicating that some enrichment is taking place, however, the quality of the Unshin River and particularly its aquatic macrophyte communities make it rare in both an Irish and European context.

**SITE NAME: LOUGH ARROW cSAC**

**SITE CODE: 001673**

Lough Arrow in Co. Sligo is a large limestone lake that conforms to a type listed on Annex I of the EU Habitats Directive. The lake is sheltered on three sides by hills and is the source of the Unshin River. Lough Arrow is unusual in being a mesotrophic natural lake which has changed little in the last 40 years. It is largely spring-fed and very sheltered for its size, and, as such, is hydrologically different from most lakes. The shores of the lake are for the most part stony; several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur. The lakeshore vegetation, which includes sedges (*Carex* spp.), Water Mint (*Mentha aquatica*) and Water Horsetail (*Equisetum fluviatile*), grades into areas of mossy boulders and woodland. The lakes support a diverse submerged aquatic flora. An area of wet woodland in the north-west of the site is dominated by willows (*Salix* spp.) and some Alder (*Alnus glutinosa*). The ground flora is composed of Yellow Iris, Common Reed, rushes (*Juncus* spp.), Marsh-marigold (*Caltha palustris*), sedges and Common Marsh-bedstraw (*Galium palustre*).

Areas of dry woodland to the north and south of the lake are included in the site. The dominant species here are Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*) and Sycamore (*Acer pseudoplatanus*). The ground flora includes Herb-Robert (*Geranium robertianum*), Bramble (*Rubus fruticosus* agg.), Great Wood-rush (*Luzula sylvatica*), Cleavers (*Galium aparine*), Primrose (*Primula vulgaris*), and a variety of fern, moss and liverwort species.

The wooded islands and some areas along the shore are used by nesting Tufted Duck, while the reedbeds are also used by nesting wildfowl. In winter the lake is frequented by flocks of Tufted Duck (226), Coot (325), Little Grebe (35), Wigeon (87), Mallard (27), Pochard (36) and Goldeneye (49) - (data for 2 counts over 1 season, 1984/85 - 1986/87). Lough Arrow supports the highest density of breeding Great Crested Grebe, Merganser and Tufted Duck of any of the large lakes in western Ireland. The lake is notable for its Brown Trout and Eel populations, both of which are fished. Otter, a Red Data Book species which is legally protected under the 1976 Wildlife Act and is listed on Annex II of the EU Habitats Directive, has been recorded at the site. Lough Arrow and its environs incorporate a variety of habitats; including the Habitats Directive Annex I listed habitat, hard water lake, and supports important numbers of birds. The diversity of lakeshore vegetation and the presence of protected species, in particular Otter, adds to the conservation significance of the site.

**SITE NAME: LOUGH ARROW SPA**

**SITE CODE: 004050**

Lough Arrow is a large limestone lake sheltered on three sides by hills. It has a small catchment and is fed largely by springs on the lake bed. Average depth is 9 m, to a maximum of 33 m. The lake is classified as a mesotrophic system. There is a well developed submerged aquatic flora, with a notable charophyte community which includes the Red Data Book species *Chara curta*. The shores of the lake are for the most part stony, though several bays occur in which Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*) are found in abundance. In places the reedbeds extend out into the lake and Bogbean (*Menyanthes trifoliata*) and Yellow Iris (*Iris pseudacorus*) occur.

Lough Arrow supports moderate numbers of wintering waterfowl. Diving ducks are well represented, with Tufted Duck (301), Pochard (111) and Goldeneye (132) occurring in numbers of regional importance (figures given refer to the 1997/98 season only). High numbers of other species have been recorded, including Little Grebe (194) and Coot (187), as well as small numbers of Whooper Swan (11) and Mallard (65). The site has been poorly monitored in recent years and regular monitoring may show that some of the species have populations of national importance.

Lough Arrow is an excellent site for breeding Great Crested Grebe, with the population being of national importance (23 pairs). The grebes breed within the swamp vegetation. A range of duck species breed on the lake, including the rare Common Scoter (12 individuals in 1999 - breeding proved), Tufted Duck (*c*. 50 pairs) and Red-breasted Merganser (26 pairs). Common Gull (84 individuals in 1993) and Lesser Black-backed Gull (110 individuals in 1993) breed on islands in the lake. Lough Arrow is an important game fishery, with good stocks of Brown Trout and Eels. There are no apparent significant threats to the bird populations and the entire site is a Wildfowl Sanctuary. Agricultural intensification within the catchment could have detrimental effects on water quality, which could affect some of the bird species. Feral Mink are a potential threat to nesting birds.

Lough Arrow SPA is at least of regional importance for wintering waterfowl but more regular monitoring of the bird populations is required. It is a prime site for nesting Great Crested Grebe. A range of nesting ducks is found on the lake in summer, including the very rare Common Scoter.

# 7 APPENDIX 3: Erosion and Sediment Control Plan

## 7.1 Preface to this Appendix

The appendix attached has been extracted directly from volume 4 of the EIS where it is referred to therein as appendix 4.5.

Direct references are made to various chapters of the EIS therein, as already discussed these specific chapters will be provided on request to interested parties.

# N4 Collooney to Castlebaldwin, *Proposed Road Development*

## APPENDIX NO. 4.5

(as per the appendix number in the EIS)

## OUTLINE Erosion and Sediment Control Plan

**PREPARED BY:** **National Road Design Department, Sligo County Council;**

# Document Control

| Status | Issued For | Developed | Approved | On behalf of |
|---|---|---|---|---|
| *FINAL* | *Publication* | *FM* | *AS* | *NRDD SCC* |

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## Tables

# 1 Introduction

## 1.1 General

This Outline Erosion and Sediment Control (OESC) Plan has been prepared as a method of water quality mitigation to offset potential Construction Stage pollution impacts from the *Proposed Road Development* (PRD) to adjacent watercourses including the Unshin River cSAC/NHA and Lough Arrow cSAC/pNHA/SPA and their respective tributaries/inflow streams.

The Plan is intended to be a **working** document and has been prepared to inform the Construction Stage Erosion and Sediment Control Plan which, in turn, will form an integral part of the Environmental Operating Plan for the PRD. In particular, the **mitigation, control, monitoring and emergency measures** for the PRD in relation to Erosion and Sediment Control are described in this document. The Plan is also used to:

- Inform the Hydrological & Hydro-geological and in turn the Flora, Fauna & Fisheries Impact Assessments; and
- Ensure sufficient lands have been included on a permanent and temporary basis within the CPO to treat sediment runoff during the Construction Stage for the PRD;

Numerous references are contained herein. However, the main body of this report is guided by the technical guidance document, *Control of water pollution from linear road projects*, published by CIRIA (C648). Additionally plans prepared by other design offices for similar projects have been reviewed and in this regard acknowledgement is to Roscommon NRDO for their assistance.

## 1.2 Description of the *Proposed Road Development*

Chapter 4 of the EIS (Volume 2) provides a detailed description of the PRD.

In general terms the mainline realignment will comprise two separate forms of Road Type with the change in cross section defined by a roundabout in the townland of *Castlebaldwin*.

The main part (c. 13.82km of c. 14.71km) of the proposal consists of a Type 2 Dual Carriageway between the townland's of *Toberbride* and *Castlebaldwin.* The PRD will tie back into the existing N4 to the south of the aforementioned Roundabout with a Standard Single Carriageway alignment.

The Type 2 Dual Carriageway road consists of two lanes in both directions. For safety reasons a 4 lane undivided road is considered unacceptable on rural sections of the network where a 100kph speed limit applies. Therefore on this type of road it is proposed to use a segregating barrier within the paved median to separate the traffic streams.

On Type 2 Dual Carriageway road projects cyclists and pedestrians will be encouraged by signage to use an alternative route, for example the old national primary route. Nevertheless, for safety reasons, appropriate hard standings within verges will be provided for emergency breakdown usage. These hard standings will be a minimum of 1.0m wide and will be of light construction such as compacted granular material.

The road is designed so as to minimise the number of junctions and to provide drivers with straightforward junction layouts. There will be no gaps provided in the central reserve and there will be no direct access from land or houses onto the road.

The section of road which is proposed to be Standard Single Carriageway will be commensurate with the existing improved section of the existing National Primary route at *Cloghoge Lower Td*. This consists of a single carriageway and hard shoulder in each direction.

The main activities likely to give rise to sediment pollution include the construction of Earthworks and River/Stream/Drain crossings.

## 1.3 Contract Procurement

The Contract Procurement as outlined in Chapter 4 of the EIS is expected to be that of a Design/Build Contract. At the heart of the Design/Build approach is the concept that better value for money can be achieved through the utilisation of private sector enterprise due to the enhanced scope for innovation and by allocating the risk to the party best able to manage it. This type of contract places a responsibility on the appointed contractor to design and construct the project in accordance with the obligations of the EIS.

In this regard although this plan outlines various details of control measures etc., it should be considered a demonstration of the level of control which is required. The Construction Stage ESCP may incorporate alternative details provided it can be demonstrated that it provides the same performance criteria (or higher) than those outlined in this plan.

## 1.4 Consultations

This Plan has been prepared in ongoing liaison with the following specialists carrying out impact assessments for the EIS:

- Flora, Fauna & Fisheries: Ecofact Ltd.;
- Hydrology and Hydrogeology: Minerex Environmental;
- Soils & Geology: Minerex Environmental;
- Flood Risk: Hydro Environmental Ltd.

In addition consultation has taken place with the National Parks and Wildlife Services (NPWS) and the Inland Fisheries Ireland (IFI) and their comments/observations with regard to practical measures for water quality protected have been adopted within the Plan.

## 1.5 Principles of Erosion and Sediment Control

The principles of erosion and sediment control during the construction stage of a Roads Project as outlined in CIRIA C648 include.

(1) Erosion control (preventing runoff) is much more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall, requires less maintenance and is also less costly;
(2) Plan erosion and sediment control at the design stage, as far as practicable, so that requirements can be built into the design and land requirement for the project and to inform the details of the Construction Stage Erosion and Sediment Control Plan;
(3) Minimise erosion and potential for soiled water to be generated by minimising runoff;
(4) Install drainage and runoff controls BEFORE starting site clearance and earthworks;
(5) Minimise the area of exposed ground;
(6) Prevent runoff entering the site from adjacent ground, as this creates additional polluted water;
(7) Provide appropriate control and containment measures on site;
(8) Monitor and maintain erosion and sediment controls throughout the project;
(9) Establish vegetation as soon as practical on all areas where soil has been exposed.

This Outline ESC plan will initiate these principles for eventual incorporation and expansion in the Construction Stage ESC Plan.

## 1.6 Contents of Outline Plan

This plan contains the following information:

(1) An identification of existing land use, surface water features, low-lying areas and natural drainage ways;
(2) An outline of the main construction activities likely to be relevant in relation to erosion and sediment generation;
(3) An outline of the relevant S-P-R linkage which may cause potential for sediment pollution. S-P-R for this purpose can be described as:
    a. (S) Source: The construction activities which are likely to generate sediment runoff;

b. (P) Pathway: The potential pathways for the above mentioned pollution to reach sensitive areas;
c. (R) Receptor: Areas which are considered sensitive in terms of sediment laden runoff;

(4) An outline of available site information which allows for an appreciable understanding for the sediment runoff which is likely to be generated and particular risks which may be encountered in specific areas;
(5) An outline of the controls determined at the current plan stage for incorporation and expansion within the detailed ESCP;
(6) An overview of Monitoring and Audit Requirements; and
(7) Emergency Procedures.

# 2 Site Characteristics

### 2.1.1.1 General

The following gives a general overview of the Landscape Character and the main Natural Drainage ways which are relevant in terms of Erosion and Sediment Control.

### 2.1.1.2 Landscape Character[1]

The *PRD* passes through the margins of a drumlin zone, comprising a series of low interlocking hills aligned in a northwest to southeast direction. The area is relatively low lying, ranging in elevation from about 40m ASL to 100m ASL. Extensive wetland and peatlands and several small lakes are found throughout this area. A relatively low hill range can be found a few kilometres to the west at Carrickbanagher and Carrigans Upper, with higher hills at Bricklieve Mountains and Kesh Corran (5km southwest and south of Castlebaldwin).

*Plate 2-1: Drumlin and wetland character of much of the study area*

In terms of land use and landcover, the area is used primarily for agriculture. Land quality is marginal and much of the land is being infested by rush. A network of hedgerows and shelterbelts, often comprising conifers, covers much of this landscape extending over hill tops to the peatland fringes. Angular conifer plantations are also frequently located within the larger peatland basins. Hedgerows mostly comprise broadleaf mixed species, including thorn, ash, sycamore and willow species. There are some large areas of conifer afforestation close to the PRD. Lastly, dips in the drumlin landscape serving rivers and streams are mostly flanked by riparian vegetation.

*Plate 2-2: Marginal farm land in inter-drumlin flats*

[1] Information extracted from EIS Chapter 10

## 2.1.2 Natural Drainage Ways[2]

### 2.1.2.1 The River Unshin

#### 2.1.2.1.1 *Unshin River Catchment*

The *Proposed Road Development* passes wholly through the Unshin River Catchment. Surface water land runoff discharges directly to the Unshin via land drains between circa Ch. -190m to c. Ch. 1,100m and between c. Ch. 2,100m to c. Ch. 3,000m. In other areas it discharges indirectly via various streams and rivers whose cathment areas are described below (See Fig. 14.1 of volume 3). A section to the south discharges to Lough Arrow which is the source of the Unshin.

The surface drainage within this catchment flows in a predominantly north-north easterly direction, before joining with the Owenmore River to form the Ballysadare River. The Office of Public Works (OPW) estimates the Unshin River catchment area to be 202km$^2$, inclusive of Lough Arrow and the Unshin River.

The proposed road realignment crosses one tributary of the Unshin River in these areas which is labelled as DX1. DX1 is a small stream (land drain) which flows east of the Unshin River near the townland of Mullaghnabreena. This crossing is located along the existing N4 alignment.

*Table 2-1: Road crossings occurring directly with the Unshin River Catchment*

| Crossing ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX1 | Ch. 450m | 0.5 x 0.5 | Silt |

The following describes the various sub-catchments of the River Unshin which the *Proposed Road Development* intercepts.

##### 2.1.2.1.1.1 *Markree Demesne Stream Catchment*

The proposed road realignment crosses two (2 no.) tributaries of the Unshin River, DX2 and DX3. DX3 is the outflow from the Toberscanavan Loughs. These crossings are located along the existing N4 alignment with a catchment which is known as the Markree Demesne Stream Catchment.

*Table 2-2: Road crossings in Unshin River Catchment*

| Crossing ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX2 | Ch. 950m | 0.5 x 0.5 | Gravel |
| DX3 | Ch. 1200m | 2 x 1.0 | Gravel |

##### 2.1.2.1.1.2 *Turnalaydan Stream Catchment*

The *Proposed Road Development* passes through the Unshin River Catchment between c. Ch. 3,300m and c. Ch. 6,500m (Figure 14.1 contained within volume 3 of this EIS). The Turnalaydan Stream drains an area south, west and north of the Boathole Lough and Lough Corran. The stream flows first into the Boathole Lough before draining into Lough Corran and from there flows in a northeasterly direction for 2km before joining the Unshin River 0.5km east of the existing N4 road. The catchment drains an area of approximately 18km$^{2.}$

The *Proposed Road Development* crosses two (2 no.) tributaries of the Unshin River; these crossings are referenced as DX4 and DX5 in Figure 14.1 (volume 3). DX4 crosses the Turnalaydan Stream 400m downstream of Lough Corran to the west of the existing N4. DX5 crosses a small stream to the west of Drumfin crossroads. This stream flows into the Boathole Lough 1km northwest of DX5.

[2] Information extracted from EIS Chapters 12 and 14

*Table 2-3: Road crossings in* Turnalaydan Stream *Catchment*

| Crossing ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX4 | Ch. 4,450m | 3.0 x 1.6 | Marl |
| DX5 | Ch. 5,550m | 1.0 x 1.0 | Peat |

#### 2.1.2.1.1.3 *Drumfin River Catchment*

The *Proposed Road Development* passes through the Drumfin River catchment between c. Ch 6,500m and c. Ch 8,400m (Figure 14.1, volume 3). The Drumfin River rises in the Bricklieve Mountains and flows in a predominantly north-north easterly direction, before joining with the Unshin River near the Drumfin crossroads. The catchment area is estimated to be 23km$^2$.

The *Proposed Road Development* crosses two (2 no.) tributaries of the Unshin River; these crossings are referenced as DX 6 & 7 in Figure 14.1 (volume 3). DX6 is a small stream which rises from several seepages or springs along the base of the topographical high of Doon Hill and Carrickbanagher. DX7 crosses the Drumfin River itself which rises from several seepages or springs along the northern slopes of the Bricklieve Mountains.

*Table 2-4: Road crossings in Drumfin River Catchment*

| Stream ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX6 | Ch. 6,600m | 1.0 x 1.4 | Marl/Till |
| DX7 | Ch. 7,350m | 3.5 x 0.5 | Gravel |

#### 2.1.2.1.1.4 *Springfield Stream Catchment*

The *Proposed Road Development* passes through the Springfield Stream catchment between c. Ch 8,400m and c. Ch 11,300m (See Figure 14.1 of Volume 3 and appendix 12.2 of volume 4). The Springfield Stream catchment extends from the northern side of the Bricklieve Hills from where it drains into Loughymeenaghan and from there into a lake at Tawnagh. Springfield Stream then flows in a north easterly direction joining the Unshin River c. 2km north of the lake at Tawnagh. The catchment area is estimated to be in the region of 5.5m$^2$.

The *Proposed Road Development* crosses one (1 no.) tributary of the Unshin River (Springfield Stream); this crossing is referenced as DX8 in Figure 14.1 (volume 3). DX8 drains Loughymeenaghan in a northerly direction into the lake at Tawnagh.

*Table 2-5: Road crossings in Springfield Stream Catchment*

| Stream ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX8 | Ch. 10,800m | 2.0 x 2.0 | Gravel/Bedrock |

#### 2.1.2.1.1.5 *Lissycoyne Catchment*

The *Proposed Road Development* passes through the Lissycoyne catchment between c. Ch 11,300m and c. Ch 13,200m (See Figure 14.1 of Volume 3 and appendix 12.2 of volume 4). The Lissycoyne catchment flows north-northeast before joining the Unshin River 1km east of the lake at Tawnagh. The catchment area is estimated to be in the region of 3.5km$^2$.

The *Proposed Road Development* crosses one (1 no.) tributary of the Unshin River (Lissycoyne Stream); this crossing is referenced as DX9 in Figure 14.1 (volume 3). DX9 rises along the base of the northern slopes of the Bricklieve Mountains in the townland of Cleavry.

*Table 2-6: Road crossings in Lissycoyne River Catchment*

| Stream ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX9 | Ch. 12,250m | 1.8 x 0.2 | Marl/Till |

#### 2.1.2.1.1.6 *Drumderry Stream Catchment*

The *Proposed Road Development* passes through the Drumderry stream catchment between c. Ch 13,200m and the end of the *Proposed Road Development* (Figure 14.1 of volume 3). The Drumderry Stream rises from springs located in the townland of Cloghoge Upper and flows in a predominantly southeasterly direction, crossing the road at c. Ch 13,800m. The catchment area is estimated to be in the region of 4km$^2$.

The *Proposed Road Development* crosses two tributaries of Lough Arrow (Drumderry Stream and a tributary known as a tributary of the Drumderry Stream). The crossing point is referenced on the Drumderry Stream as DX 10 in Figure 14.1 (volume 3). A tributary of the Drumderry Stream (DX11) rises from a spring along the base of the eastern slopes of the Bricklieve Mountains.

*Table 2-7: Road crossings in Drumderry Stream Catchment*

| Stream ID | Chainage (approx.) | Approx. dimensions Width x height (m) | Substrate |
|---|---|---|---|
| DX10 | Ch. 13,800m | 1.9 x 0.15 | Gravel/Peat/Marl |
| DX11 | Ch 14,220m | 1.5 x 1.0 | Gravel/Peat/Marl |

### 2.1.2.2 Lakes

Additional water-bodies of note in the area include various lakes populated along the route, the most significant of these include those described below.

#### 2.1.2.2.1 *Lough Arrow*

Lough Arrow is a large, limestone lake located at the head of the Unshin River system. It is a candidate SAC (Site Code 001673) and is one of the most important brown trout fisheries in Ireland. It is a spring-fed lake. Lough Arrow is located in the catchment of the *PRD*, with a hydrological connection between the PRD and the lake via the Drumderry Stream, but would not be directly affected by the proposal. At its nearest point the lake is over 1 km from the proposed road. It receives some drainage from the Drumderry Stream discussed above and would therefore be at risk from pollution via contaminated run-off / accidental spills.

#### 2.1.2.2.2 *Toberscanavan Lough*

Toberscanavan Lough is located in the townland of Ardcurley/Mullaghnabreena/Cloonamahan, at the northern end of the PRD. The proposed road runs on-line with the existing N4 corridor at this location and crosses the outflow from Toberscanavan Lough (Markree Demesne Stream). The Proposed Road Development requires construction works along this area (including the replacement of an existing culvert from the outflow stream) along this section, directly adjacent to the Lough, giving rise to the potential for water quality impacts and downstream pollution in the absence of mitigation.

#### 2.1.2.2.3 *Boathole and Lough Corran*

These loughs are located to the west of Drumfin village, they are connected to the Unshin River by an outflow river stream (Turnalaydan stream) and this is large enough to facilitate movements of fish into the lakes. Boathole and Corran Loughs would not be directly affected by the PRD. However, the PRD passes within 50m of this wetland complex.

#### 2.1.2.2.4 *Aghalenane and Ardloy Loughs*

These loughs are connected to the Unshin River by a small stream that goes underground. This stream is approximately 0.5 m wide and has a mean depth of 0.3 m. The Aghalenane and Ardloy Loughs and their

efferent stream would not be directly affected by the *PRD*. However, the proposed road passes within 50 m of the loughs.

# 3 Source – Pathway - Receptor

## 3.1 General

In order to establish the main effects which runoff from the Construction Stage of the PRD will have on the receiving environment, it is important to establish the:

- Source of such pollution;
- Potential pathway for this pollution to migrate; and
- Key receptors which this pollution could cause effects to;

Where there is a link between these three criteria it is important that appropriate mitigation in the form of erosion and sediment control is provided.

## 3.2 Potential **Sources** of Pollution

The following paragraph outlines what are considered to be the main sources of pollution arising from the Construction Stage of the PRD.

### 3.2.1 Earthworks

The most significant area of concern regarding erosion and sediment control on any road construction project is those soil, subsoil and peat surfaces which are exposed during the earthworks operations.

Typically these surfaces are exposed during:

- The initial site clearance works;
- Excavation of cut slopes;
- Construction of fill slopes with acceptable glacial till material;
- Excavation and backfilling of soft spots underneath proposed embankments;
- The construction of borrow pits;
- The construction of spoil repositories;
- Construction of haul roads for earthworks operations;
- Stockpiling of acceptable and unacceptable earthworks material for reuse or removal offsite;

These sources of pollution have been reviewed through a detailed review of the project design.

### 3.2.2 Structures & Concrete

Concrete, grout and other cement-based products which would typically be used in the construction of structures are highly alkaline and corrosive and can have a devastating effect upon water quality. Cement-based products generate very fine, highly alkaline silt (11.5 pH) that can physically damage fish by burning their skin and blocking their gills. This alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by changing the water's pH. Concrete and grout pollution is often highly visible.

Particular risks are posed to water quality when construction is taking place over or near surface waters (eg bridges or headwalls).

### 3.2.3 Watercourse Crossings

There are numerous watercourse crossings associated with this Proposed Road Development including the construction of new culverts on off-line sections and amendment/ replacement of the existing crossing at on-line sections. Many of these are over minor watercourses, 10 are watercourses identified on the Discovery Series Mapping of which 4 are considered to be aquatically sensitive watercourses. Diversion or maintenance of these channels has the potential to generate sediment laden pollution.

### 3.2.4 Construction Compounds & Machinery Re-fuelling/lubrication

The location of construction compounds will be determined by the contractor during Phase 5 of the NRA PMG. Particular considerations in relation to the location of such facilities and their generation of pollution during the construction stage include:

- Sanitary Wastewater treatment;
- Hard-standing runoff;
- Potential for hydrocarbon pollution to groundwater and surface water;

## 3.3 Potential **Pathways**

The potential pathway link is the flow path from an area of exposed ground to an adjacent watercourse or sensitive habitat. This might include for example sheet flow over the edge of an exposed embankment which subsequently has a route via the ground topography to enter into adjacent land drains discharging to watercourses. Additionally there is potential for pathways to be exacerbated by the potential for flooding which has been identified in some areas.

In general, potential pathways have been examined based on:

- An examination of watercourses mapped on the EPA Envision website;
- Reference to watercourses mapped on the OSi mapping;
- Additional ditches mapped in the Digital Terrain Model (DTM);
- An examination of the topography of the area in the vicinity of the PRD using detailed Digital Terrain Model (DTM) information;
- An examination of the Flood Risk Assessment (FRA) carried out for the PRD;
- An examination of karst features in the area;

## 3.4 Key **Receptors**

The key receptors as a result of sediment laden runoff are generally considered to be those relating to aquatic ecology and fisheries as outlined below.

### 3.4.1 Aquatic ecology and fisheries[3]

#### 3.4.1.1 Protected Aquatic Fauna (Annex II species)

The status and occurrence of aquatic fauna listed on Annex II of the EU Habitats Directive (1992) in the study area are discussed as follows:

##### 3.4.1.1.1 *White-clawed crayfish*

The white-clawed crayfish is the only freshwater crayfish recorded in Ireland. Populations of the species in the rest of Europe have declined dramatically and Ireland is seen as a unique stronghold for this species in a European context (Reynolds 1998). It is classified as vulnerable and rare in the IUCN Red List and is protected in Ireland under the schedules of the Wildlife Act 1976. It is also listed in Annexes II and V of the Habitats Directive (1992). It is generally considered to be widespread in lakes and rivers which are underlain by Carboniferous limestone, or its derivative - glacial drift (Reynolds, 1998). According to Reynolds (1998) crayfish occur in Hydrometric Area 35, which includes the Ballysadare catchment. One white-clawed crayfish was recorded on the Turnalaydan Stream (Lough Corran outflow) during the aquatic survey undertaken in 2006; however, crayfish were not recorded during the 2013 survey of the study area.

##### 3.4.1.1.2 *Brook lamprey*

The brook lamprey is the smallest of the three lamprey species native to Ireland and it is the only one of the three species present within the study area. This species is non-parasitic and spends all its life in freshwater (Maitland & Campbell 1992). The brook lamprey is listed both in Appendix II of the Habitats Directive and Appendix III of the Bern Convention. Kurz and Costello (1999) reported Brook lamprey ammocoetes in a

[3] Information extracted from EIS Chapter 12

tributary of the Unshin River. Juvenile lamprey populations were recorded at the Turnalaydan Stream (Lough Corran outflow).

#### 3.4.1.1.3 *Atlantic salmon*

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention. It an economically important species and the Ballysadare catchment is of international importance to salmon. Salmon spawning and nursery areas are present within the study area. Juvenile salmon were present at both sites investigated on the Drumfin River and also on the site surveyed on the Turnalaydan Stream (Lough Corran outflow).

### 3.4.1.2 Existing environment at individual aquatic areas

The main rivers directly affected are the Drumfin River and the Turnalaydan Stream, which is the Lough Corran outflow stream. A number of other minor streams / drains would also be crossed. A summary description and evaluation of the aquatic habitats at these locations is provided in Table 3-1. Total macroinvertebrate groups and aquatic macrophyte plants recorded at the selected aquatic areas are presented as species lists in Appendix 12.6, Volume 4 of the EIS.

As already mentioned, the Unshin River will not be crossed by the *PRD*, but could be indirectly affected, as the main line of the road would run within 300m of this river and run-off from the construction site could enter this river via affected minor watercourses. No aquatic areas designated as Natura 2000 sites under the EU Habitats Directive (1992) would be directly affected by the proposal.

*Table 3-1: Description and evaluation of aquatic habitats within the zone of influence of the N4 Collooney to Castlebaldwin Realignment.*

| Waterbody | Aquatic habitat and evaluation | Fisheries value and evaluation | Presence of protected aquatic fauna | Overall evaluation of aquatic habitats |
|---|---|---|---|---|
| Toberscanavan Lough | Important habitats with a high botanical diversity | Maybe of local fisheries value | Otters likely to occur, crayfish may occur | *County importance* |
| Markree Demesne Stream | Small modified stream with generalised aquatic flora community | Spawning nursery area and tributary of the Unshin River cSAC | Salmon, Brook lamprey, White clawed crayfish, otter may also occur | *Local importance (higher value)* |
| Boathole and Lough Corran | Ecologically sensitive areas with a diverse array of habitats. | Maybe of local fisheries value | Otters likely to occur, crayfish may occur | *County importance* |
| Turnalaydan Stream (Lough Corran Outflow) | Small drained river with gravel substrate and moderate naturalness | Spawning / nursery habitat within this watercourse downstream. This river is a tributary of the Unshin River SAC. | Salmon, otter, brook lamprey, White clawed crayfish | *County Importance* |
| Drumfin River (Behy Bridge) | Small river with cobble/gravel bottom and a high degree of naturalness. Good water quality. | Spawning / nursery habitat within this watercourse downstream. This river is a tributary of the Unshin River SAC. | Salmon, otter, brook lamprey | *County Importance* |
| Drumfin River tributary | Small stream with generalised aquatic flora community. | No fisheries value. | None. | *Local importance (lower value)* |
| Aghalenane and Ardloy Loughs | Important habitats with a high floral diversity. | No fisheries value. | None | *Local importance (higher value)* |
| Lissycoyne Stream (Cleavry Lough outflow) | Minor drain with generalised flora community | No fisheries value. | None | *Local importance (lower value)* |
| Springfield Stream | Small stream with impoverished | No fisheries value. | None | *Local importance* |

| Waterbody | Aquatic habitat and evaluation | Fisheries value and evaluation | Presence of protected aquatic fauna | Overall evaluation of aquatic habitats |
|---|---|---|---|---|
| | aquatic flora. | | | *(lower value)* |
| Drumderry Stream and its tributary | Minor drain with generalised flora community | High fisheries value. Spawning tributary for trout in Lough Arrow SAC. | Otter and maybe brook lamprey | *Local importance (higher value)* |
| Lough Arrow | Large limestone lake with important aquatic flora community; lake habitat corresponds to Annex I 'Hard oligo-mesotrophic waters' | High fisheries value as a brown trout fishery | Otter, possibly brook lamprey within the afferent streams. | *International importance (designated cSAC)* |

### 3.4.2 **Other**

In addition to the above, there are also instances where the route passes adjacent to habitats which are considered to be of importance in terms of the Annex I habitats or Annex II species which they might contain, the most significant of these in terms of value and proximity include:

- Toberscanavan Loughs;
- Lackagh Fen;
- Boathole Lough and Lough Corran;
- Cuileencroobagh Lough;
- Springfield Swallow Hole Complex; and
- Ardloy & Aghalenane Loughs;

# 4 Investigation and Survey Information

## 4.1 Soils and Geotechnical

A considerable amount of geotechnical information is available for the site including two number Ground Investigation Factual Reports, 3 number Geophysical Reports and a Preliminary Geotechnical Interpretive Report. These allow for an appreciable understanding of the:

- Soil Geology;
- Subsoil Geology;
- Areas of soft ground which require excavation; and
- Potential sensitive locations in terms of aquifer vulnerability and karst features;

### 4.1.1 Soils Geology[4]

According to the soil geology mapping compiled by Teagasc, the *PRD* and study area are underlain predominantly by acid brown earths and brown podzolics (AminDW) derived chiefly from non-calcareous sandstone/ shale till parent material, interspersed with pockets of surface and groundwater gleys (AminPD), peaty gleys (AminPDPT), basin peats and blanket peats (Cut), renzinas and lithosols (BminSW) and alluvium type soils (A).

*Table 4-1: Soil Types*

| Code | Soil type | Drainage characteristics | Parent material |
|---|---|---|---|
| AminDW | Acid brown earths & brown podzolics | Deep well-drained mineral soil | Non calcareous sandstone/ shale till |
| AminPD | Surface & groundwater gleys | Deep poorly-drained mineral soil | Non calcareous sandstone/ shale till |
| AminPDPT | Peaty gleys | Peaty gleys | Non calcareous sandstone/ shale till |
| Cut | Basin peats & blanket peats | Cutaway/ cutover peat | Cutaway/ cutover peat |
| BminSW | Renzinas & lithosols | Shallow well-drained mineral soil | Calcareous - limestone till |
| AlluvMin | Alluvium | Variable | Variable |

The results of site investigations conducted by Priority Geotechnical recorded the soil type as brown CLAY, slightly sandy to sandy to slightly gravelly to gravelly in places, with numerous roots and rootlets or dark brown slightly sandy to sandy PEAT or peaty/ organic CLAY with numerous roots and rootlets. The 'topsoil' depths range from 0.1m to 0.3m.

This indicates that sediment generation may be quite variable ranging from heavier particles in the sandy/gravelly clays which will settle out more readily to lighter particles which may be exhibited by the PEAT material.

### 4.1.2 Subsoil Geology[5]

The subsoil classification map for the scheme is shown in Figure 4-1 with the route plotted in black. The alignment passes through 4 No. distinct subsoil regions:

- TNSSs - Shale and sandstone till (Namurian);
- Cut – Cutover Peat;

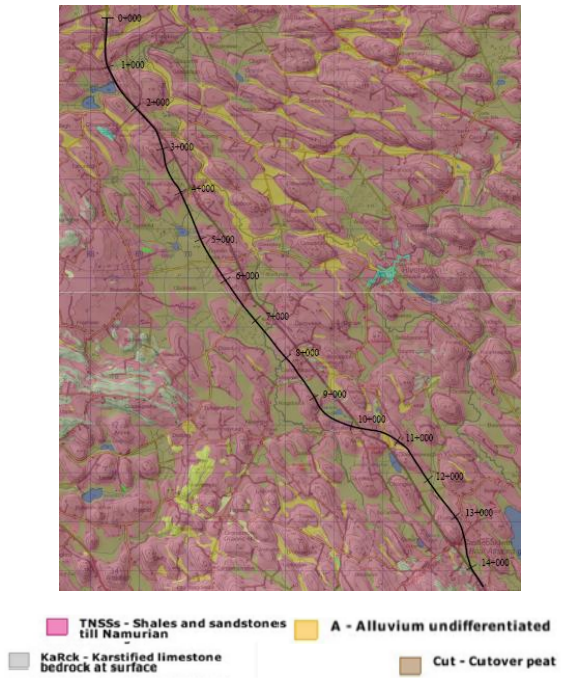
[4] Information extracted from EIS Chapter 13

[5] Information extracted from Preliminary Geotechnical Interpretive Report (AGL)

- A - Undifferentiated Alluvium (Localised);
- KaRck – Karstified Limestone bedrock at surface;

The shale and sandstone till is the most prominent subsoil in the area, with all of the drumlins along the alignment comprising of it. Where the route crosses the lower lying areas peat is generally found except for a section at Ch. 500m and a watercourse at Ch. 10,850m which show alluvium. Alluvium is also shown at the start of the route. Karstified limestone rock at the ground surface is shown near the road alignment in 3 No. locations.

*Figure 4-1: EPA Subsoil Map (with proposed route shown in black), (GSI, online 2012)*




The alignment crosses zones of shale and sandstone till at the following locations:

- C. Ch. 150m – Ch. 450m;
- C. Ch. 550m – 3400m;
- C. Ch. 3900m – 4200m;
- C. Ch. 4800m – 5050m;
- C. Ch. 5600m – 6650m;
- C. Ch. 7500m – 8500m;
- C. Ch. 8600m – 9300m;
- C. Ch. 9700m – 10700m;
- C. Ch. 10900m – 11800m;
- C. Ch. 12750m – 13800m;
- C. Ch. 14125m – 14510m;

It crosses numerous areas of soft ground encountering peat and organic subsoil's as described below:

*Table 4-2: Indicative locations of soft ground conditions anticipated to be encountered*

| Chainage location (indicative limits only) | | Preliminary Ground Investigation/Preliminary Geotechnical Interpretive Report observations |
|---|---|---|
| From | To | |
| 1,280m | 1,600m | Potentially soft material underneath the existing road foundation. However, the design process assumes that this will be left in place. |
| 2,120m | 2,360m | Indicates a localised area of c. 2m at c. Ch. 2,300m<br><br>Potentially soft material underneath the existing road. Excavation may be required for the south bound embankment in this area. |
| 3,430m | 3,730 | Indicates a localised area of c. 2m at c. Ch. 3,510m |

| Chainage location (indicative limits only) | | Preliminary Ground Investigation/Preliminary Geotechnical Interpretive Report observations |
|---|---|---|
| From | To | |
| 4,250m | 4,770 | Indicates a maximum depth of c. 5m between c. Ch. 4,590m and 4,690m |
| 5,000m | 5,760 | Indicates a maximum depth of c. 4.1m at c. Ch. 5,400m |
| 6,760m | 7,690 | Indicates a maximum depth of c. 4.5m at c. Ch. 7,250m |
| 9,480m | 9,500m | Indicates a localised area of a maximum of 1m underneath the south bound embankment. |
| 9,590m | 9,630m | Indicates a localised area of a maximum of 1m underneath the south bound embankment. |
| 10,080m | 10,270 | Indicates a depth of c. 1m throughout |
| 10,620m | 10,900 | Indicates a maximum depth of c. 6.3m between c. Ch. 10,290m and 10,790m |
| 11,900m | 12,420 | Indicates a maximum depth of c. 3m at c. Ch. 12,280m |
| 13,670m | 13,980 | Indicates a maximum depth of c. 4.5m at c. Ch. 13,920m |
| Eastern Parallel Link (c. Ch. 500m to 800m) | | Indicates a depth a maximum depth of c. 2.5m throughout |
| Eastern Parallel Link (c. Ch. 2,220m to 2,480m) | | Indicates a depth a maximum depth of c. 2m throughout |
| Sections of the L-55016-0 at Knocknagroagh | | Indicates a depth of c. 1.5m throughout |
| Sections of the L-5502-0 at Drumfin | | Indicates a maximum depth of c. 6m |
| Sections of the realigned L-1404-0 at Castlebaldwin and Cloghoge Upper | | Indicates a depth of c. 1m throughout |

The 3 No. areas of karstified limestone are shown in the following locations;

- C. Ch. 100m – 150m;
- C. Ch. 8500m – 8600m;
- C. Ch. 14100m – 14125m;

This gives an appreciation of the areas of soft ground which will require to be excavated from underneath proposed embankments and an indication of the sensitivities of the bedrock geology in the area.

## 4.2 Water Quality[6]

Similar to the above a significant body of information has been compiled in order to describe the existing environment as part of the Hydrological and Hydrogeological Chapter of the EIS. The following outlines information which is relevant in terms of the general environment which the outfalls along the PRD will be discharging into.

### 4.2.1 **Water Quality**

Water quality in the Unshin River is generally good, rated as 'Good Status' (Q4) throughout the study area, with the exception of the most upstream section, at the Lough Arrow outflow which was rated 'Moderate Status' (Q3-4) by the EPA during the 2012 monitoring survey. The downstream stations on the Unshin, below the study area of the PRD, and the lower reaches of the Ballysadare River were rated 'High Status' (Q4-5) during the EPA's monitoring in 2012. The Drumfin River was rated as 'Good Status' (Q4) during the 2012 EPA monitoring at Closkeybeg Bridge (St. 0800), this site is approximately 1.5 kilometres downstream of Behy Bridge, where biological sampling was undertaken for the current report. The upstream monitoring station on the Drumfin River at Kilmorgan Bridge was most recently surveyed by the EPA in 2006 and was found to be 'Moderate Status' (Q3-4). None of the additional minor watercourses within the study area are monitored by the EPA, however site specific test results are outlined in chapter 14 of the EIS and referred to below.

[6] Information extracted from EIS Chapter 12 and 14

#### 4.2.1.1 Surface Water Hydrochemistry

Baseline surface water quality monitoring was carried out downstream of all drainage outfalls and at the inflow and outflow points of all lakes or wetlands with the potential to be impacted by the PRD. The water samples were submitted to an accredited laboratory for analysis of the test parameters as recommended in the NRA guidance: Temperature, pH, Conductivity, Dissolved Oxygen, Biochemical Oxygen Demand, Ammoniacal Nitrogen, Suspended Solids, Nitrate, Orthophosphate, Total Hardness, Zinc (Total), Copper (Dissolved) and Petroleum Hydrocarbons. In addition, the water samples from lakes were submitted for analysis of Chlorophyll and Transparency. The analytical results of winter and summer sampling in 2011 are detailed in Appendix 14.3 contained within volume 4 of the EIS.

The significance is that the baseline water quality at various locations to which road runoff is to discharge are contaminated with respect to Ammonia, EPH, Dissolved Oxygen, pH, Phosphate and Total Suspended Solids; the majority of outfalls are discharging to waters classified as having good or moderate status.

#### 4.2.1.2 Flow Measurements

Baseline flow measurements were taken at previously ungauged watercourses where it is proposed to discharge road runoff. These measurements were taken in January 2011 and in June 2011, using an EM flow meter where possible. The monthly rainfall totals recorded at the nearest operational meteorological station at Claremorris, Co. Mayo for January and May /early June (1st – 3rd) are 88.6mm and 123.0/0.1mm respectively, suggesting that flow measurements in June represent relatively dry conditions, while flow measurements in January represent relatively wet conditions due to the much lower evapotranspiration which occurs in winter months which means a much higher proportion of rainfall becomes runoff during winter months compared to summer months. The following table summarises these flow measurements.

*Table 4-3: Flows in previously un-gauged water courses*

| Stream ID | Chainage (approx.) | Flow ($m^3/s$) (January 2011) | Flow ($m^3/s$) (June 2011) |
|---|---|---|---|
| DX1 | Ch. 600 | 0.0 | 0 |
| DX2 | Ch. 1,100 | 0.02 | 0.01 |
| DX3 | Ch. 1,300 | 0.08 | 0.05 |
| DX4 | Ch. 1,500 | 0.06 | 0.03 |
| DX4 | Ch. 4,450 | 0.2 | 0.2 |
| DX5 | Ch. 5,550 | 0 | 0 |
| DX6 | Ch. 6,600 | 0.005 | 0.005 |
| DX7 | Ch. 7,350 | 0.273 | 0.230 |
| DX8 | Ch. 10,800 | 0.02 | 0.015 |
| DX9 | Ch. 12,250 | 0.012 | 0.012 |
| DX10 | Ch. 13,800 | 0.01 | 0.018 |

#### 4.2.1.3 Flooding

According to the flood mapping compiled by the OPW, there are several locations within the study area prone to recurring flooding. The following table summarises these locations, of which the majority are along the existing N4 road (Figure 14.1 contained within volume 3). Computer-based flood risk modelling carried out as part of this PRD has identified two areas where the proposed road crosses through extensive flood plains. One area is located at the outflow of Lough Corran (Turnalaydan Stream) and the other is located around Carrowkeel Wet Woodland at the point where the road alignment crosses the Drumfin River. The PRD also passes through small flood plain areas at the Springfield Stream, Lissycoyne Stream and at the tributary of the Drumderry Stream (downstream of N4) crossings.

*Table 4-4: Recorded areas of recurrent flooding*

| Stream/ River | Location | Chainage (approx.) | Location relative to proposed road |
|---|---|---|---|
| DX1 | Lackagh | Ch 4,200m | 500m to east |
| Unshin River | Coolbock Bridge | Ch 5,700m | 1.5km to east |
| Unshin River | Bellarush Bridge | Ch 13,100m | 1.4km to east |

The significance of flooding is that streams and rivers which are crossed by the *Proposed Road Development* are prone to recurring flooding in places. The flooding in itself is not considered to be particularly sensitive, apart from the Turnalaydan Stream and Drumfin River potentially. The flood risk to the road associated with the existing crossings of Markree Demesne Stream, Springfield Stream, Lissycoyne Stream and the tributary of the Drumderry Stream will be alleviated following the replacement of the culverts as part of the PRD.

# 5 Erosion and Sediment Controls

## 5.1 General

The principal objectives in relation to erosion and sediment control during the earthworks operation as already outlined in section 1.5 will be:

- To keep the area exposed to the elements to an absolute minimum;
- To minimise the amount of runoff from the site;
- To organise the work so that it progresses from the low point towards the high point within each outfall catchment;
- To have an efficient earthworks operation to ensure that fill is placed as material is removed;
- To ensure that the unacceptable material is removed and placed in controlled repository areas in an efficient manner;

## 5.2 Principal Avoidance Measures

The protection of watercourses from pollution from construction works is achieved by avoidance in the first instance. In this regard, the following measures will be implemented during the construction phase:

(1) Site clearance involving topsoil stripping will progress with the earthworks and will not be carried out over large areas in advance resulting in these areas being exposed for long periods of time;

(2) It is estimated that there will be approximately 790,000 $m^3$ of soft subsoil, organic clays and peat material excavated during the course of the earthworks operation. The *Spoil Management Report* included as appendix 4.3 to the EIS estimates that almost all of this material is likely to remain on site whether that be for:

a. Embankment Construction following processing;
b. Landscaping Measures;
c. Identified Spoil Repositories;

Overall the spoil repository sites are generally located within circa 2k radius of the areas where the *spoil* material is expected to be generated. This will facilitate:

a. An earthworks construction period that is as short as possible thus minimising the period during which open ground is exposed
b. Minimisation of the transportation/journey lengths involved thus minimising the opportunity for material to be spilled on haulage rotes and enter the water system via road runoff;
c. Efficient earthworks operations by providing that material can be removed and replaced with fill in the minimum amount of time thus reducing the ingress of water into the construction works and limiting the amount of dewatering of the works;
d. Identification of appropriate control and mitigation measures for the these spoil repository sites;

(3) Haul Roads will be limited to the confines of the Land Made Available (LMA). Haul roads outside the limits of the site or permanent earthworks are not anticipated;

(4) As far as is practicable, construction works shall proceed within predetermined Construction Areas on a phased basis. These areas will be determined by the contractor during Phase 5 of the NRA PMG. The areas will be developed so that that bulk of the soft ground materials arising during the earthworks process can be deposited at predetermined Spoil Repositories in a progressive manner. This will allow the earthworks to be carried out in phases and is an integral part of 1 to 2 above.

## 5.3 Principal Control Measures

### 5.3.1 **General**

The mitigation measures for specific construction tasks and in relation to particular features are outlined in the following sections. General mitigation measures for the protection of the water environment are included in Chapter 14 Hydrology & Hydrogeology, of Volume 2 of the EIS.

(1) The Local Authority shall employ an Environmental Assurance Officer (EAO) (see section 6.2.4) who will be based on-site for the duration of the construction works and will form part of the Employer's Site Representative Team. The EAO shall have suitable qualifications and report directly to the Local Authority. The Local Authority will ensure that the EAO is delegated sufficient powers under the construction contract so that he/ she will be able to instruct the contractor to stop works and to direct the carrying out of emergency mitigation/ clean-up operations. The EAO will also be the Client's Liaison for the purposes of consulting environmental bodies including the National Parks and Wildlife Service and Inland Fisheries Ireland. The EAO shall be responsible for carrying out regular Audits of the Contractor's EOP on behalf of the Local Authority. In addition, the EAO shall be the primary person involved in the Client monitoring role described in detail in Section 6 of this plan.

(2) Before works commence on site, the contractor will be required to prepare an Environmental Operating Plan in accordance with the NRA guidance document. The contractor will be required to incorporate a fully developed construction stage Erosion and Sediment Plan for the proposed works based on this Outline Plan. The contractor will be required to incorporate all of the avoidance and mitigation measures outlined in this Plan in the Construction Stage Plan. In addition, the Contractor shall consult with the NPWS and IFI in relation to the final detail of the Plan and shall include their requirements in this regard.

(3) Before earthworks commence on site and before they are needed - drainage, erosion control and sediment control measures must be in place and functioning.

(4) Silt Fences will be erected along or just in front of the permanent land acquisition boundary in the following cases (sited inside any separate land drainage systems conveying land runoff from the lands outside the CPO (pt. 5 below) and in accordance with the manufacturer's recommendations and in compliance with the Design Criteria outlined in CIRIA C648 Control of Water Pollution from Linear Construction Projects:
    a. At all sections of road construction where the works are at or above existing ground level and to extend linearly 50m along the adjacent cut section;
    b. Along any other identified surface pathways for sediment laden runoff;

(5) Where land drains intersect the site boundary or where the adjacent land falls towards the construction site – temporary cut-off drains will be provided to intercept this clean runoff water and divert to the nearest watercourse. Small check dams will be constructed in these cut-off drains to trap any sediment and prevent erosion. Silt fences will be provided immediately before the outfall to existing watercourses as a precaution and to allow a response time in the event of an emergency.

(6) All minor watercourses (those not identified on the Discovery Series Mapping but that are not identified as sensitive in terms of key aquatic ecological receptors downstream) will be fenced off with silt fences set back at least 5m from the bank until the road crossing is constructed. Watercourses identified as sensitive (see section 5.3.3.1.3) will be fenced off with double silt fences located at least 10m back from the watercourse bank.

(7) All silt fences at watercourse crossings will be inspected on a daily basis and repairs or replacements carried out as required. A record of such inspections/ repairs/ replacements will be maintained as part of the Environmental Operating Plan.

(8) Dewatering and surface water runoff discharges from the construction site, including any advance works, during and for the duration of the construction works will be controlled, collected and routed via appropriate treatment measures. These measures will be in accordance with the CIRIA publication Control of Water from Linear Construction Projects. As a minimum, the measures will include appropriately sized settlement ponds (providing at least 24 hours retention time for the 1 in 100 year flood flow). The settlement ponds may include the permanent constructed wetlands ponds preceded by a temporary construction stage settlement pond to provide sufficient capacity. Each pond will be provided with a double silt curtain at the outfall from the pond and a further double silt fence located before the discharge point. These facilities will be inspected/ maintained at least on a daily basis and the maintenance record will be available for inspection by the Client and other statutory organisations as part of the EOP.

(9) As far as is practicable, where treatment measures (e.g. settlement ponds) are being provided they shall be located at the locations identified for the operational constructed wetlands at each of the proposed road drainage outfalls. There are areas where it has been identified through an examination of the topography that this may not be possible, in these instances sufficient lands within the CPO have been identified to be available and shall be utilised by the appointed contractor.

(10) Haul roads shall be constructed so that the natural contour is followed as clearly as possible, so that the slope does not exceed 15% and so that runoff is diverted to a treatment area
(11) Check dams and sediment traps shall be placed along constructed drains to reduce the velocity of concentrated runoff;
(12) Direct connections between the settlement pond outfalls and the watercourse will not be allowed. Instead, the outfall will be allowed to disperse across at least 3m of undisturbed vegetated ground, covered with a coir mesh or similar matting prior to reaching the watercourse.
(13) Where these ponds cannot be constructed in the dry, then they shall be formed by constructing bunds and placing an appropriate geotextile liner on top. Alternative methods of ensuring that the temporary settlement ponds are constructed in a manner that prevents sediment reaching the water environment may be included in the Construction Erosion and Sediment Control Plan providing this can be demonstrated to achieve the same or better level of treatment. Any/ all materials arising from the construction of the temporary settlement ponds shall be removed to the Spoil Repository Areas or removed offsite to a licensed facility.
(14) Locations associated with the proposed main watercourse crossings that are at risk of flooding, based on the 1 in 100 year flood event, have been identified in the PRD Flood Risk Assessment– and are summarised in Table 5-1 below. The proposed Settlement Ponds and associated treatment measures have been as far as practicable located outside these flood areas. The settlement ponds constructed adjacent to these areas will be bunded so that the top of the bund is at least 500mm above the 1 in 100 year flood event. This will prevent the control facility for being inundated during periods of exceptionally high river levels.

*Table 5-1: Potential Flood Locations*

| Watercourse Ref | Chainage | 1:100yr Flood level (mOD Malin) | Chainage | 1:100yr Flood level (mOD Malin) |
|---|---|---|---|---|
| Markree Demesne Stream and Toberscanvan Lakes | 1+100 | 30.42 | 1+400 | 30.52 |
| Turnalaydan Stream | 4+250 | 42.00 | 4+850 | 42.06 |
| Drumfin River | 6+650 | 51.14 | 8+100 | 51.81 |
| Springfield Stream | 10+700 | 61.40 | 10+900 | 62.50 |
| Lissycoyne Stream | 11+950 | 63.75 | 12+350 | 65.10 |
| Drumderry Stream and its tributary | 13+830 | | 14+250 | 63.60 |

(15) Landscaping of the constructed road will be carried out in stages as the works progress and will commence as soon as is practicable in each of the outfall catchment areas. The Spoil Repository Areas will be reseeded with a seed mix as prescribed in chapters 10 & 12 of the EIS which will encourage rapid re-colonisation. In relation to the areas where peat is being spread on the surface, it is proposed to mulch the cleared surface vegetation and distribute same over the finished peat surface or alternatively consider the use of mulched straw, wood chips etc.;
(16) If seeding of cut/fill slopes is not practical, the use of roughened slope surfaces shall be considered by the contractor which will encourage water infiltration, and decrease runoff velocity;
(17) Silt fencing shall remain in place until ground vegetation has recovered. Any accumulated silt will then be removed and disposed of to a licensed facility.
(18) Ensure that control measures are correctly installed and adequately sized prior to commencing site clearance and earthworks;
(19) Develop a maintenance checklist for control measures and inspect controls measures regularly throughout the project, particularly after heavy rainfall;
(20) Maintain controls through project such as removing sediment in silt traps once half full.

## 5.3.2 Earthworks[7]

### 5.3.2.1 Cuts and Embankment Excavation

The material excavated during the earthworks operation has been estimated to be approximate to:

- circa 307,000m$^3$ of PEAT requiring transport (this allows a factor of safety of 20% in recognition of the preliminary nature of the GI);
- circa 234,000m$^3$ of soft alluvial clay requiring transport;
- circa 195,000m$^3$ of unsuitable subsoil will require transport;
- circa 600,000m$^3$ of suitable subsoil will require placement embankment sites;
- circa 1,100,000m$^3$ of fill sourced from adjacent borrow pits (or sourced offsite) will require placement in embankment and excavated sites;

The following principal controls will be put in place:

(1) The area of the earthworks operation will be kept to an absolute minimum at any one time. Earthworks operations will be as self-contained as is practicable within the predefined Construction Areas having regard to the locations of Spoil Repository sites and environmental constraints. The importation and placement of road foundation fill will be carried out in an integrated operation such that fill will be placed as soon as practicable after excavation.

(2) The excavation of peat and other soft materials will be carried out in a manner that minimises the amount of water entering the face of the works. This will be achieved by placing fill in the excavated area as soon as is practicable (generally the same day).

(3) Where pumping out of the excavation is necessary, this will be carried out using appropriately sized pumps. A clean stone filled perforated pipe (or similar) will be used as a sump for the pump intake. The pumped out water will be directed to the earthworks drainage system and to the settlement pond (or other) treatment system. The outlet from the pump shall be designed so as not to mobilise additional sediment – e.g. shall discharge onto plastic sheeting, rock pile, etc.

### 5.3.2.2 Subsoil Stabilisation

Given the surplus volumes of unsuitable subsoil generated it is likely (as described in the Spoil Management Report) that the contractor will seek to stabilise some of this material through the use of lime application. This activity involves spreading powdered lime evenly over the surface of thin loose lifts (150-350 mm) of the Class U1 material, mixing it with the clay by rotavating, and then allowing the mix to dry or cure over a short period of time prior to compaction. In terms of water quality protection the following controls will be applied to this activity:

(1) The activity shall only be carried out under calm, clear and dry metrological conditions. Lime application shall not be exposed to wind and where any risk occurs will be misted/sprayed down immediately. Other handling systems shall be carried out with regard to the mitigation measures set out in the Air Quality Impact Assessment Chapter of this EIS;

(2) The activity will not take place within 25m of any of the minor watercourses;

(3) The activity will not take place within 100m of any of the aquatically sensitive (see section 5.3.3.1.3) watercourses;

(4) Following mixing (which should take place generally within 15 minutes of spreading the lime on the surface) the material shall be compacted within 1 hour and appropriately sealed. In no case will this material be allowed to be left unsealed overnight;

### 5.3.2.3 Borrow Pit Excavation

Water discharged into the surface water system must be within the limits set out in the second schedule to the European Communities (Quality of Salmonid Waters) Regulations, 1988, measured at the point of discharge to the nearest watercourse. If groundwater inflows are encountered which are greater than this, then recharging

[7] The following is in addition to those points outlined under 5.3.1 and in volume 2 of the EIS

this groundwater to the ground outside the borrow pit via recharge wells or pits could be carried out. If such groundwater recharging was not possible and if it was then impossible to keep discharges to the surface water system within acceptable limits then the cell in question shall be closed at that point for commencement of the repository stage;

It would also be possible if required to use a combination of groundwater recharge and discharge to surface waters. Groundwater recharging methods and locations should be chosen and overseen by a suitably hydro-geologist with the relevant experience.

#### 5.3.2.4 Transportation

The transportation of materials will be carried out in an efficient manner so as to minimise the number of trips, minimise the length of individual trips, minimise the escape of material from the trucks. The following principal controls will be put in place:

(1) The construction operation will be managed so as to minimise journey lengths;
(2) The *Spoil Management Report* appended as Appendix 4.3 to the EIS has identified that the majority of spoil material generated by the PRD will remain on site, this will reduce the transportation of material off site;
(3) Where any excavated material is "sloppy" and presents a risk of splashing over the top of the trucks the capacity of the trucks will be limited to 75% of the height of the lowest side of the truck;
(4) Trucks leaving and entering the site will do so via a stabilised construction entrance;
(5) Road cleaning will be carried out at least daily to ensure that there is no build-up of sediment on the public road;
(6) In the unforeseen event of a substantial quantity of spoil material being required to be exported offsite, or, in the event of unforeseen access being required to the spoil repository areas from the public road network, then a proprietary mobile truck wheel wash system shall be installed at the relevant locations. All trucks leaving such sites will be required to pass through this facility. The water from the sediment tanks shall be discharged via the site runoff treatment system (i.e. settlement ponds, etc.) and the sediment portion shall be removed to the Repository Areas.

#### 5.3.2.5 Spoil Repositories

The PRD includes:

- 3 No. Spoil Repository/Land Infill sites
- 4 No. Type 1 Spoil Repository/Borrow Pit sites;
- 3 No. Type 2 Spoil Repository/Borrow Pit sites;

These areas are within the land acquisition boundary (See Chapter 4 (Volume 2) and appendix 4.3 (volume 4) of the EIS for more details).

These areas have been established following a detailed assessment as outlined in the aforementioned appendix (*Spoil Management Report*), and a detailed assessment of the anticipated earthworks quantities, the environmental constraints and in particular with the overall objective of minimising the environmental impacts of the PRD. Consultation has been undertaken with the NPWS and IFI in the selection and specification of these sites.

##### 5.3.2.5.1 *Spoil Repository/Land Infill Sites*

(1) The material in each area will be retained either by natural contours of the ground or by bunds constructed from suitable material of adequate engineering properties. All bunds will be extended 500mm above fill level and where natural contours provide containment a similar allowance will be provided;
(2) Existing vegetation in the repository areas shall be left in place where that area is not being used to win additional road fill material;
(3) Existing minor watercourses shall be either piped through the area where appropriate (pipes to be sealed), diverted or setback at least 5m and a bund constructed to contain the deposited material. A silt fence shall be installed at least 3m from the watercourse before deposition works commence and shall be maintained in place until vegetation has re-established.
(4) A setback of at least 5m to be maintained from existing watercourses identified on the Discovery Series Mapping and a bund to be constructed to contain the deposited material. A silt fence shall be

installed at least 3m from the watercourse before deposition works commence and shall be maintained in place until vegetation has re-established;

(5) Each Repository will be provided with a runoff collection and treatment system (which may be an adjacent permanent Constructed Wetland location). The runoff system will consist of a shallow swale (approx. 2m wide by 0.25m deep); to enhance sediment control the surface of the swales shall be constructed from well vegetated turfs cut in rolls and sourced from elsewhere on site. In addition check dams shall be placed at 50m centres to encourage settlement.

(6) . The surface of the repository will be shaped to drain towards the perimeter swale and shallow surface drains will be installed to accommodate this. The perimeter swale will discharge to a surface drain which will discharge temporarily to the closest adjacent Constructed Wetland Pond (provided for the operation stage). A treatment system will remain in place until such time as the operational stage drainage treatment system requires to be established, at that time a grass sward shall have established itself on the repository and the constructed wetland shall be carefully dredged if required.

#### 5.3.2.5.2 *Type 1 Spoil Repository/Borrow Pit Sites*

(1) In general these repositories are an extension of the road cuts therefore application of the points outlined in sections 5.3.1 and 5.3.2 are deemed adequate;

#### 5.3.2.5.3 *Type 2 Spoil Repository/Borrow Pit Sites*

(1) The material is generally contained below ground level, any protrusion above ground level shall be to maintain the existing topography and shall be retained by bunds constructed from suitable material of adequate engineering properties;

(2) Existing minor watercourses shall be diverted or setback at least 5m from the edge of the repository. A silt fence shall be installed at least 3m from the watercourse before deposition works commence and shall be maintained in place until vegetation has re-established.

(3) A setback of at least 5m to be maintained from existing watercourses identified on the Discovery Series Mapping and a bund to be constructed to contain the deposited material. A silt fence shall be installed at least 3m from the watercourse before deposition works commence and shall be maintained in place until vegetation has re-established;

(4) Each Repository will be provided with a runoff collection and treatment system. This will consist of a shallow swale which will discharge to the watercourse via a sedimentation pond which will be provided for the specific purpose of treating the runoff from these sites. To enhance sediment control the surface of the swales shall be constructed from well vegetated turfs cut in rolls and sourced from elsewhere on site. In addition check dams shall be placed at 50m centres to encourage settlement.
The settlement system will be designed to facilitate settlement of suspended solids. It will provide 24hours settlement time for the 1 in 100 year 1 hour rainfall event (33.9mm) and will include control devices, at the discharge from the swale and from the pond, to ensure this is achieved.

(5) These areas will be monitored (bi annually) for a period of 3 years from the date of completion of the filling operation. The results of the monitoring will be made available to the NPWS and IFI. Where the results indicate that any further remedial or other measures are required then these shall be carried out following consultation with IFI and NPWS.

### 5.3.2.6 Stockpiles

It is envisaged that topsoil will be the main material which will require to be stockpiled during the course of the PRD; that said, it is likely, although on a more temporary basis that spoil material (including soft subsoil, peat and organic clays) may require stockpiling while they await deposition in the relevant repository.

(1) Topsoil stripping over large areas in advance of main excavation works will not be permitted. It will be restricted to the minimum required for efficient earthworks operations and in any case will only be carried out in Construction Area Units where earthworks is on-going.

(2) Each construction area unit will be topsoiled as the works proceeds thus limiting both the amount and the length of time for which materials have to be stockpiled.

(3) Stockpiles will not be located within 10m of a watercourse or land drain or within 25m of a sensitive watercourse (i.e. those with Atlantic Salmon downstream of the crossing) and shall be surrounded with a continuous silt fence.

(4) Runoff from a stockpile will be collected via a shallow toe drain, located outside the silt fence, which will have check dams at regular intervals and will be designed to have a retention time of at least 5

hours. Prior to outfall straw wrapped in geotextile bags and inset into the base of the drain by at least 100mm shall be provided followed by a silt fence upstream of the outlet.
(5) Stockpiles of non-granular materials shall be limited in height to not more than 2.5m.
(6) Where stockpiling of peat or organic clays is required they shall be limited in height to 1m (with 1V:5H side slopes) or fully contained within an appropriately designed bund;

### 5.3.3 Waterbodies and Sensitive Habitats[8]

#### 5.3.3.1 Introduction

As outlined in section 3.4, some of the rivers and lakes in the vicinity of the PRD are sensitive with respect to fisheries and or habitat. The following outlines the control measures that will be put in place to protect these water bodies from sediment ingress during the construction stage – these are in parallel to the measures outlined above and elsewhere in this document and in Volume 2 of the EIS.

(1) Preserve natural vegetation near watercourses and along the perimeter of the site as much as practically possible;
(2) Leave a 5m grassed strip next to river banks when stripping topsoil or place grassed soil bunds along river banks to prevent site runoff directly entering watercourses;
(3) Place straw bales or sand bags along the sides of temporary or existing bridges to prevent runoff entering the watercourse.

##### 5.3.3.1.1 *Minor Watercourses*

(1) All of these watercourse crossings will be replaced by piped (or box) crossings of at least 900mm diameter;
(2) The works will be programmed so that where watercourses are dry for a portion of the year then the crossing will be constructed "in the dry" during that period;
(3) Crossings in wet watercourses will be provided with a silt trap and a sedimat immediately downstream of the crossing point;
(4) The silt trap shall be left in place for at least 6 weeks following completion of the work and shall be inspected and maintained at least 3 times per week;
(5) The area of disturbance of the watercourse bed and bank shall be the absolute minimum required for the installation of the crossing;
(6) Only precast Concrete pipes/ units will be used in the installation of these crossings

##### 5.3.3.1.2 *Watercourses identified on the OSi Discovery Series Mapping*

(1) All of these watercourse crossings will be maintained by piped crossings of at least 900mm diameter;
(2) Crossings will be provided with a silt trap and a sedimat immediately downstream of the crossing point;
(3) The silt trap shall be left in place for at least 6 weeks following completion of the work and shall be inspected and maintained at least 3 times per week;
(4) The area of disturbance of the watercourse bed and bank shall be the absolute minimum required for the installation of the crossing;
(5) Only precast Concrete pipes/ units will be used in the installation of these crossings or a clear-span structure in the case of the Turnalaydan Stream and the Drumfin River.

##### 5.3.3.1.3 *Sensitive Watercourses*

There are 4 crossings on what is considered to be aquatically sensitive watercourses – which include:

###### 5.3.3.1.3.1 *Markree Demesne Stream (Toberscanavan Lough Outflow)*

This is a high flood risk stream – the predicted 1:100 year flood level is approx. 30.42mOD. It is proposed to replace the existing 1200mm diameter pipe culvert with a 3.0m x 1.9m box culvert. This culvert replacement will involve in-stream works. Where this is required a temporary channel will be provided using plastic sheet lined channel or other non-sediment producing method.

[8] The following is in addition to those points outlined under 5.3.1 and in volume 2 of the EIS

#### 5.3.3.1.3.2 *Turnalaydan Stream (Lough Corran Outflow)*

This is a high flood risk stream (located in a flood plain) – the predicted 1:100 year flood level is approx. 42.0mOD. It is proposed to realign the watercourse channel at the crossing and construct a 20m clear span bridge. It is proposed to undertake the works in the dry. In-stream works will be required to connect the realigned section to the existing channel. Section 5.3.3.4 in relation to stream diversions will apply to this crossing.

#### 5.3.3.1.3.3 *Drumfin River*

This is a high flood risk river – the predicted 1:100 year flood level is approx51.2mOD. It is proposed to construct a 20m clear span bridge at the proposed crossing. This construction method proposed avoids in-stream works; however, the proposed bridge site is in a flood plain.

#### 5.3.3.1.3.4 *Tributary of the Drumderry Stream*

This is a high flood risk stream – the predicted 1:100 year flood level at the upstream end of the existing N4-crossing is approx. 63.60mOD. It is proposed to replace the existing 900mm diameter pipe culvert with a 2.1x2.1m box culvert. This culvert replacement will involve in-stream works. it is proposed to construct the N4-crossing in parallel to the existing culvert to allow the culvert to be constructed in the dry . At both culvert sites the stream flow will be temporarily diverted around the works using plastic sheet lined channel or other non-sediment producing method.

#### 5.3.3.1.3.5 *Principal avoidance and control measures*

The principal avoidance and control measures to be adopted at these crossings include:

(1) No in-stream works will be carried out between 1st October and 1st May;
(2) All works will be carried out under the supervision of the EAO;
(3) In-stream working will be kept to an absolute minimum, will be carried out in the close season only, NPWS and IFI will be informed at least 2 weeks prior to commencement, in-stream works will be allowed on a Permit-to-Work basis that must be signed by the EAO at the commencement of the works and on a weekly basis thereafter;
(4) Where in-stream or bank side works is for the purpose of constructing a structural element that requires the placing of concrete then a cofferdam shall be constructed and made as water tight as possible. Pumping out from the cofferdam shall be to a settlement tank of sufficient capacity to allow solids to settle prior to discharge;
(5) Sand bags shall be double bagged and use washed sand only. Each bag shall be marked with a reference number and a record of placing and removal shall be maintained in the EOP;
(6) Where concrete is required for foundations, blinding, and bridge deck the controls outlined in Chapter 14 Hydrology will be strictly followed in full;
(7) There will be no machinery working in-stream. Where excavation, breaking, etc. is required at the bank, it will be carried out with machinery operating from the bank;
(8) Machinery operating from the bank will work on “bog mats” to minimise damage to the vegetated banks;
(9) A silt trap and a double sedimat shall be placed immediately downstream of the works. The sedimats shall be replaced as per the manufacturer’s recommendations with that mat closest to the works being removed first;
(10) Precast structural elements shall be used for all structures thus generally minimising the use of fresh concrete to the placement of foundations, bridge cover slabs and such works.

### 5.3.3.2 Lakes & Seasonal Waterbodies

The PRD passes adjacent to or crosses inflow streams to the following lakes:

- Toberscanavan Lough (including its periphery habitats) ;
- Boathole and Lough Corran (including its periphery habitats);
- Cuileencroobagh Lough(including its periphery habitats);
- Ardloy and Aghalenane Loughs (including its periphery habitats);

- Swallow Holes complex (inflow stream and seasonal waterbody)

The following are the principal control measures:

(1) A double silt curtain on the side of the PRD which is closest to the Lakes for the duration of the works in this area. These will be inspected on a daily basis and maintained as required.

#### 5.3.3.3 Sensitive Habitats

The PRD passes adjacent to the following sensitive habitats:

- Lackagh Fen;
- Ardloy and Aghalenane Loughs.

The following are the principal control measures:

(1) A double silt curtain on the side of the PRD which is closest to the habitat for the duration of the works in this area. These will be inspected on a daily basis and maintained as required;

#### 5.3.3.4 Diversions

A permanent diversion is proposed on the Turnalaydan, Springfield and Lissycoyne Streams as outlined in Chapter 4 and 12 of the EIS. The channels shall be free of any erosion potential prior to their opening, this may include fully established vegetation or the use of sediment control mats which are biodegradable. The opening shall be carried out in a carefully controlled manner and under the supervision of the EAO and an IFI representative.

Some additional minor drains and other minor channels will be diverted or cut-off drains will be constructed to divert water away from the construction site. Small check dams will be constructed in these cut-off drains to trap any sediment and silt fences will be provided immediately before the outfall to existing watercourses.

### 5.3.4 **Concrete Works**[9]

#### 5.3.4.1 Introduction

The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. Where the use of concrete near and in watercourses cannot be avoided the following control measures will be employed:

(1) Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
(2) When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
(3) Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
(4) Placing of concrete in or near watercourses will be carried out only under the supervision of the EAO;
(5) There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering the watercourse;
(6) Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses;
(7) On- site concrete batching and mixing activities shall only be permitted following a considered site selection process which shall consider the contents of this plan. Site Selection shall require the approval of the Environmental Assurance Officer, the NPWS and the IFI;
(8) Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer);

[9] The following is in addition to those points outlined under 5.3.1 and in volume 2 of the EIS

Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival on site.

Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the contractor's Waste Management Plan included in the EOP.

### 5.3.5 Construction Compounds[10]

#### 5.3.5.1 Introduction

It is likely that there will be a number of site construction compounds including main and ancillary compounds. While the exact location of these will be determined by the contractor, same will be subject to the controls outlined below.

Construction compounds may include stores, offices, materials storage areas, materials processing areas, plant storage, parking of site and staff vehicles, and other ancillary facilities and activities.

#### 5.3.5.2 Location

Construction compounds shall be located on dry land and set back from lakes, river and stream channels, ecological sensitive areas (internationally and nationally important habitats, wet areas such as wetland habitats, marshes and fens, etc.) and away from potential floodplain areas.

Construction compounds shall not be located in European Sites or within 50m of the boundary of same.

Construction compounds shall not be located within other designated environmental sites or other ecologically sensitive sites.

The storage of fuels, other hydrocarbons, and other chemicals within the construction compounds will not be permitted within 50m of a sensitive watercourse or lake and 10m from other watercourses.

Compounds shall not be located within 75m of an inhabited dwelling house.

#### 5.3.5.3 Other Controls

All compounds will have appropriate levels of security to deter vandalism, theft and unauthorised access.

Surface runoff from compounds will be minimised by ensuring that the paved/ impervious area is minimised. All surface water runoff will be intercepted and directed to appropriate treatment systems for the removal of pollutants prior to discharge.

All site compounds will be fenced off and a silt fence erected and maintained on the site boundary. Where a site boundary is near a non-sensitive watercourse the fence/ silt fence shall be located at least 5m from the watercourse.

Wastewater drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent water pollution and in accordance with the relevant statutory requirements.

The storage of fuels, other hydrocarbons and other chemicals within the construction compounds shall be in accordance with relevant legislation and with best practice. In particular:

- All fuel/ Hydrocarbon/ Chemical (fluid) storage areas shall be bunded to 110% of storage capacity;
- Storage of these materials shall not be within 50m of a sensitive watercourse and the storage location within the compound shall be organised so as to be as far away from all water bodies as is practicable;
- The Emergency Response Plan shall include arrangements for dealing with accidental spillage and relevant staff shall be trained in these procedures;

[10] The following is in addition to those points outlined under 5.3.1

## 5.4 Runoff Estimation

For the purposes of the current stage of the design and in order to determine landtake requirements as per section 5.5, runoff from the exposed surfaces has been calculated using the Rational Method and applying extreme rainfall information obtained from Met Eireann and specific to the area.

Modified Rational Formula: Q = C **x** i **x** A

Where Q = the peak discharge ($m^3$/hour);

C = Coefficient of permeability taken conservatively at 0.6 for a stripped construction site

i = rainfall intensity (m/hour);

- *The depth of rainfall constituting a 1 in 100 year (1 hour) flood event is 33.9 mm/hr*

A = the contributing area (10,000$m^2$);

Resulting in:

Q = 0.6 **x** 0.0339 (m/hour) **x** 10,000$m^2$

Q = 203.4 $m^3$/hour for a 1Ha site

## 5.5 Land Availability

The PRD has been examined in terms of suitable locations for sediment control treatment points. In the main these locations can be sited on the sites of the proposed Constructed Wetlands for the operational stage road runoff. Additional areas are however required and have been provided for in the landtake of the PRD.

# 6 Monitoring and Audit

## 6.1 Introduction

This Outline Erosion and Sediment Control Plan will be developed by the contractor into the Construction Erosion and Sediment Control Plan (CESCP) and will form part of the Environmental Operating Plan (EOP). While the final details of the CESCP will require agreement with the NPWS and IFI, the minimum requirements of same shall include all of the controls, measures, mitigations and monitoring described in this document. The monitoring of all aspects of the EOP, including the CESCP, will be carried out by the contractor as the responsible party. The responsibilities of the Employer will be discharged by the Employer's Site Representative staff and in particular the Environmental Assurance Officer (EAO).

## 6.2 Monitoring and Audit

### 6.2.1 General

The avoidance, control and mitigation measures outlined in this document will ensure that erosion and sediment arising from the works is controlled. They have been developed in accordance with best practice, in consultation with environmental organisations including NPWS and IFI, and have been shown to work on other projects. As with all systems, there is a requirement to have monitoring, audit and feedback loops to demonstrate the operation of the system. The following describes the framework Pre-construction Monitoring and Construction Monitoring regime and the detailed construction stage monitoring by the Contractor and the EAO are described in the subsequent paragraphs.

### 6.2.2 Pre-Construction and Construction Stage

Permanent continuous monitoring for Turbidity will commence 6 months in advance of construction and will continue through to completion of same. Monitors will be placed on the Markree Demesne Stream, the Turnalaydan Stream, the Drumfin River and the Drumderry Stream (downstream of the junction with its tributary) at locations determined following consultation with IFI and NPWS. In addition, the suspended solids concentration in the watercourses will be measured at each location on a weekly basis.

This monitoring will be reviewed on an ongoing basis during construction. Should investigatory levels (a breach of the limits set out in the second schedule to the European Communities (Quality of Salmonid Waters) Regulations, 1988, measured at the point of discharge to the nearest watercourse) be reached then corrective action shall be taken.

The downstream turbidity monitors will be equipped with a means of sending a message to the EAO if investigatory levels are reached.

### 6.2.3 Contractor

The procedures and monitoring and audit regime outlined in this section shall be used by the contractor to ensure and demonstrate the effective operation of the avoidance, control and mitigation measures for Erosion and Sediment control. It will facilitate use as a feedback loop to target any issues that may arise.

The following are the main procedures that will be followed:

(1) The contractor will be obliged to hold a full day training course for all site staff immediately before works commence on site on the EOP and in particular the CESCP. The subject of this course shall be the measures that have been put in place to protect the environment and the procedures and monitoring and recording that is to be undertaken in accordance with the EOP.

(2) Environmental Checklists shall be prepared for each operation. Responsibility for completion of these checklists will be assigned to individual members of the contractor's staff. The following operations will also require a Permit-to-Work before operations can commence each of which must be counter signed by the EAO:

   (a) Any in-stream works;

   (b) Placing of concrete in or within 50m of watercourses;

(c) Completion of sediment removal facilities prior to initial discharge to watercourse
(d) Restart of works following any pollution incident

(3) All environmental monitoring and checklists shall be recorded and added to the EOP on a daily basis;
(4) The EOP shall assign particular responsibility and monitoring duties to particular named staff and the Site Agent/ Manager shall ensure that this is implemented in full. Training for each member of staff on their specific area of responsibility shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the EOP and a further copy issued to the EAO;
(5) Monitoring for Turbidity shall be undertaken as described at section 6.2.2. The results shall be relayed to the EAO and to the Local Authority's website;
(6) All other watercourses in the vicinity of the works shall be monitored on a daily basis and turbidity readings taken. The results shall be issued to the EAO on a daily basis;
(7) All mitigation/control measures shall be inspected daily by designated contractor staff and maintenance and repairs carried out immediately;
(8) Any direct release of sediment to a watercourse causing plumes or exceedance's of the turbidity investigatory level shall trigger an investigation commencing with notification to the EAO who shall determine the appropriate course of action which may involve the cessation of works, the initiation of emergency procedures and the notification to the NPWS and the IFI. In such a case of cessation, works shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the EAO following consultation with the NPWS and IFI.

### 6.2.4 Environmental Assurance Officer (EAO)

Separate from the on-going and detailed monitoring carried out by the contractor as part of the EOP, the EAO shall carry out the inspection/ monitoring regime described below on behalf of the employer. The results will be stored in the EAO's Monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI staff. All inspections/ monitoring/ results will be recorded on standard forms.

(a) Inspect the Principal Control Measures outlined in this plan on a weekly basis. Report findings to the Contractor;
(b) Inspect surface water treatment measures (ponds, tanks, mini-dams, sandbags, etc.) on a daily basis and obtain turbidity readings;
(c) Inspect all outfalls to watercourses on a daily basis and obtain turbidity readings. Where excavation, deposition, pumping out or concreting works are on-going in the vicinity obtain turbidity readings three times per day;
(d) Daily visual inspection of watercourses to which there is a discharge from the works and those where there is construction works in the vicinity;
(e) Wheel wash facilities shall be inspected on a weekly basis;
(f) Borrow Pits shall be inspected on a daily basis while in operation and on a weekly basis thereafter;
(g) Spoil Repositories shall be inspected on a daily basis while in operation and on a weekly basis thereafter;
(h) Stockpiles shall be monitored on a daily basis while being filled or emptied and otherwise on a weekly basis;
(i) Control measures for works at or near water bodies shall be inspected on a daily basis;
(j) Concrete operations at or near watercourses shall be supervised and designated chute washing out facilities shall be inspected on a daily basis;
(k) Site Compounds and satellite compounds shall be inspected on a weekly basis;
(l) The Contractor's EOP monitoring results shall be audited on a frequent basis (6 times per quarter at a minimum);
(m) Any and all exceedance of the investigatory level for turbidity shall be reported where deemed necessary to the NPWS and IFI and shall be investigated thoroughly by the EAO and the Contractor. Where the works are identified as the source causing the exceedance, the procedure outlined in Item "n(i) to n(iv)" below shall be followed;
(n) Any direct release of sediment to a watercourse causing plumes or exceedance of the turbidity investigatory levels shall result in:
    (i) the relevant NPWS and IFI staff being notified immediately;
    (ii) the contractor will be required to take immediate action and to implement measures to ensure that such discharges do not re-occur;

(iii) Works if stopped shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the EAO following consultation with the NPWS and IFI;

(iv) Works and/ or discharges from the works shall not recommence until written consent is received from the EAO

(o) Where the EAO considers that the risk of a sediment release is high, he/she shall inform the contractor and request protective action to be taken. Where the contractor does not take immediate action the EAO shall instruct the contractor to take action and same shall be reported to the Contract Manager and the Client;

(p) The EAO will be delegated powers under the contract sufficient for these instructions to be issued and for an instruction

# 7 Emergency Procedures

## 7.1 Introduction

Prior to commencing works, the Contractor shall prepare an Emergency Response Plan based on a thorough risk assessment. The plan shall detail the procedures to be undertaken in the event of the release of any sediment into a watercourse, serious spillage of chemical, fuel or other hazardous wastes (e.g. concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.

## 7.2 Resources

Relevant staff, including cover staff, shall be trained in the implementation of the Emergency Response Plan and the use of any spill kit/ control equipment as necessary. The contractor shall provide a list of all such staff to the Employer's Site Representative detailing the name, contact number, and training received, and the date of that training.

The Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment to the Employer's Site Representative. All such plant and equipment shall be maintained in place and in working order for the duration of the works.

## 7.3 Spill Response

The Emergency Response Plan shall include a simplified Spill Response with the following as a minimum:

(1) Instruction to stop work;
(2) Instruction to contain the spill;
(3) Details of spill clean-up material location;
(4) Name and contact details of responsible staff;
(5) Measures particular to the location and the activity;
(6) Instruction to contact the EAO (including Name and Contact Details).

This Spill Response shall be displayed at several locations throughout the site and at all sensitive locations.

The EAO shall be responsible for notifying the IFI/NPWS and shall also determine if and when works may proceed once corrective actions have been completed.

## 7.4 References

*Control of water pollution from linear road projects*: CIRIA (C648);

*Guidelines for the Crossing of Watercourses during the Construction of Road Projects:* National Roads Authority (2006);

*Preliminary Soils and Geology Report for the N4 Realignment - Collooney to Castlebaldwin road scheme*: AGL Consulting Engineers, 2012

*NRA Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan:* National Roads Authority (2007);

*N4 Collooney to Castlebaldwin PRD EIS*: Sligo County Council and various sub-consultants;

Other EIS's for similar projects;