



Arterial Drainage Maintenance & High Risk Channel Designation Programme 2011 – 2015

Stage 2

Natura Impact Statement

&

Appropriate Assessment Conclusion Statement

**Environment Section
Engineering Services
Office of Public Works**

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Report prepared by the Office of Public Works Environment Section, with ecological input from McCarthy Keville O'Sullivan Planning and Environmental Consultants.

1 Introduction

Strategic Environmental Assessment (SEA) is a process for evaluating, at the earliest appropriate stage, the environmental effects of plans or programmes before they are adopted. The assessment process under Article 6 of the Habitats Directive 92/43/EEC is a complementary process to SEA and is specifically designed to protect European sites. Habitats assessment allows for the assessment of the effects of a plan or project on a European site to enable a judgment to be made on whether there will be an adverse effect on the site's integrity.

1.1 Habitats Directive Article 6

The Habitats Directive provides a framework for the legal protection of habitats and species of European importance. Articles 3 to 9 of the directive provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network. The Habitats Directive and the Birds Directive, and sites designated under them form this network of European protected sites that are better known as the Natura 2000 network. This consists of:

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Sites that are being considered for designation as one of the above, cSAC (candidate) or pSPA (proposed).

Article 6 sets out provisions, which govern the conservation and management of Natura 2000 sites. Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for the plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment:

“Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have significant effect thereon, either individually or in combination with other plans and projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication 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.”

This assessment is underpinned by the precautionary principle, especially in the assessment of potential impacts and their resolution. If it is not possible to rule out a risk of harm on the evidence available then it is assumed that a risk may exist and it needs to be dealt with in the assessment process, preferably through changes to the proposed measure or through options such as avoidance or mitigation if possible.

1.2 Background to Appropriate Assessment

1.2.1 Stages of the Appropriate Assessment

The stages of a Habitats Assessment are outlined in the European Commission guidance *“Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provision of Article 6(3) and 6(4) of the “Habitats” directive 92/43/EEC”* (EC, 2000). The Habitats Directive promotes a hierarchy of avoidance/protection, mitigation and compensatory measures. First the proposed plan/programme should aim to avoid any negative impacts on European sites by identifying possible impacts early in the plan/programme making and designing the plan/programme in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the appropriate assessment process to the point, where no adverse impacts on the site(s) remain. If the proposal is still likely to result in adverse effects, and no

further practicable mitigation is possible, then it is rejected. If no alternative solutions are identified and the plan is required for imperative reasons of overriding public interest (IROPI test) under Article 6(4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

Stage 1 Screening

The first stage is to determine if the plan/programme is directly connected with or necessary to the site management for nature conservation. If the answer is no it must be determined if the plan/programme is likely to have significant effects on a Natura 2000. If the answer is yes, then the assessment advances to Stage 2. Stage 1 screening involves the identification of the plan/project objectives, and a review of alternative methods to achieving the objectives.

Stage 2 Appropriate Assessment

The second stage is to determine if the plan/programme will adversely affect the integrity of the Natura 2000 site. An assessment of cumulative impacts (both from the plan/programme objectives, and other policies, plans and programmes) should be carried, and mitigation measures proposed for potential impacts if possible. These mitigation measures should then be consulted upon with the relevant agencies and the public, and following the receipt of comments, if it can be concluded that no adverse impacts are found on the integrity of the site, the plan/programme may proceed for approval. If not, then the assessment advances to Stage 3.

Stage 3 Assessment of Alternative Solutions

Stage 3 involves the identification of alternative solutions following a review of the outcomes of Stage 2. Alternative solutions should be developed, and Stage 1 and Stage 2 assessment completed for these alternatives. If no alternative solutions are identified, then the assessment advances to Stage 4.

Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain

Stage 4 assessment examines whether there are imperative reasons of overriding public interest (IROPI) for the plan/programme to go ahead. If the answer is yes, then compensatory measures need to be agreed with the European Commission, before the plan/programme can proceed. If not the plan/programme is rejected.

1.3 Relevant Guidance Publications

While there are a number of publications and papers on Article 6, the following publications were used as the primary guidance documents:

- *Managing Natura 2000 sites: The provisions of Article 6 of the Habitats Directive 92/43/EEC* (European Communities, 2000).
- *Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC* (European Communities, 2000).
- *National legislation and practices regarding the implementation of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, in particular Article 6.* (Directorate General For Internal Policies, 2009).
- *Appropriate Assessment of Plans & Projects in Ireland – Guidance for Planning Authorities.* (Dept. Environment Heritage & Local Government, 2009).

1.4 Requirements for Appropriate Assessment

1.4.1 Arterial Drainage Maintenance

Works under the Arterial Drainage Acts, 1945 & 1995, are contained in the Second Schedule, European Communities (Birds and Natural Habitats) Regulations 2011 with the Office of Public Works (OPW) designated as a Public Authority. Requirements for Appropriate Assessment (AA) are carried out in compliance with Section 42. In accordance with Section 42 (1):

“A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.”.

Accordingly, arterial drainage maintenance operations require the completion of an AA when they are located within, or where they could affect a Natura 2000 Site.

1.4.2 High Risk Channel Designation

As referred to in the SEA Environmental Report, no legislation currently exists which directly enacts high risk channel designation. Any future amendments to the Arterial Drainage Acts to facilitate ‘designation’ will be in effect under the remit of the Second Schedule European Communities (Birds and Natural Habitats) Regulations 2011. Alternatively, cases may arise where other legislation such as Local Authorities (Works) Act, 1949 is utilised for ‘designation’ type projects. In this case, there are a number of sections within the Birds and Natural Habitat Regulations, which can apply depending on the nature and scale of the project. Irrespective, all relevant legislation sections require AA compliance and any ‘designation’ project either within, or where they could affect a Natura 2000 Site will conduct the AA process.

2. Description of the Programme

2.1 Programme Overview

There is no existing overarching plan / programme which is directly applicable to the concept of carrying out an SEA. However, there are activities ongoing in the State in respect of arterial drainage maintenance and in screening consultations with the Environmental Protection Agency (EPA), it has been deemed appropriate for an SEA to be carried out on these activities. Accordingly, for this SEA, the programme is not a document formulated from a statutory requirement such as a County Development Plan (CDP), River Basin Management Plan (RBMP) or Catchment Flood Risk Assessment & Management Study (CFRAMS). The Programme has been produced to facilitate the SEA process and is in effect a statement of the ongoing annual statutory activities bundled into a five-year period. The SEA and associated AA will consider the five-year period from 2011 – 2015.

2.1.1 Programme Timescale

The 2011 – 2015 timescale has been adopted to facilitate future more effective coordination with the RBMP and CFRAMS. Both these plans will be reviewed in 2015 in accordance with the Water Framework (WFD) and Flood Directives respectively, both are carrying out their individual SEAs, and with both sets of plans being managed at a River Basin District (RBD) scale, it is envisaged that opportunities to form more synergies will arise in 2015 which may subsume or alter the scope of many other water sector SEAs such as this one. In the event that the activities covered in this SEA are not subsumed in to the RBMP and CFRAMS framework, it is envisaged that a further SEA will be carried out on these activities for 2016 – 2021 to align with the RBD management process.

2.1.2. The Programme – Part 1 - Arterial Drainage Maintenance

Statutory arterial drainage maintenance entails the maintenance of completed Arterial Drainage Schemes, completed Flood Relief Schemes, and the associated Scheme structures. The OPW is responsible for the maintenance of 11,500km of channel, 730km of embankments, some 18,500 bridges and 750 ancillary structures such as sluice gates, pumping stations and tidal barrages.

Maintenance referred to under the Arterial Drainage Acts 1945 to 1995 includes:

- The maintenance of river channels in a condition that ensures they are free-flowing, thus reducing flood risk and providing adequate outfall for land drainage
- The maintenance of river and coastal embankments in a condition that protects benefiting land. To the extent defined in the Scheme, from risk of flooding
- The maintenance, repair and/or replacement of all structures forming part of a Scheme, including accommodation bridges, weirs, sluice barrages, sluices, pumping stations and tidal flap gates

The Maintenance function is divided into three regions for the purpose of programming and executing the work. Each region has a main regional office with at least one sub office. The annual maintenance budget is circa €17 Million. The OPW maintains its own transport and excavator fleet and other specialised equipment such as weed cutting boats. Maintenance is carried out by a trained direct labour work force numbering circa 300. A fleet of approximately seventy hydraulic excavators nationwide is used to execute the maintenance programme.

The majority of arterial drainage maintenance works is on channel maintenance with the average channel requiring maintenance every four to six years. While this varies, with some channels requiring maintenance annually and others only requiring maintenance every twenty years, circa 2,000km of channels are maintained annually and nearly all of the 11,500km of channels will have been maintained at least once over the Programme cycle of six years. Accordingly, the approach in terms of this SEA is to apply to all the 11,500km of arterial drainage channels. Of the 750km of embankments, the frequency of maintenance tends to be more variable than that for channels with

embankments scheduled for maintenance works as the need arises. To date there have been thirteen Flood Relief Schemes carried by the OPW and statutory arterial drainage maintenance includes the maintenance of these Schemes. In respect of the various bridges and structures associated with the Schemes, a relatively small number are maintained annually i.e. circa 170 bridges and 30 other structures which are restricted to the most critical structures. Note that a portion of the 18,500 bridges are road bridges where the Local Authorities are responsible for the structural integrity, hence OPW maintenance operations typically exclude bridge deck or arch repair works on road bridges.

Channel maintenance can be broadly classified under five headings:

- A – Silt and Vegetation Management
- B – Aquatic Vegetation Cutting
- C – Bank Protection
- D – Bush Cutting / Branch Trimming
- E – Tree Cutting

Category A. Silt and Vegetation Management

Silt and vegetation management are mostly undertaken using a hydraulic excavator, and in general, the material removed is small in volume and spread in a narrow band along the bank tops.

The removal of heavy instream silt and vegetation requires the use of a hydraulic excavator with a 1.5m wide (approx) bucket (capacity approx 500litres). For standard excavators, works progress at a rate of 700m to 900m per week. In relation to long-reach excavators, works progress at a slower rate of between 200m and 350m per week. Rates may change due to channel width or ground conditions.

Silt and other alluvial substrates are often deposited on meanders and along the banks of rivers and streams forming berms. Where the capacity of a channel is affected by a berm, it is managed by topping it to form a two-stage channel.

Category B. Aquatic Vegetation Cutting

Channels that experience prolific growth of instream aquatic vegetation, where removal of silt or heavy material is not required, are preferably maintained using a weed-cutting bucket in place of a standard excavator bucket. This piece of equipment allows for the instream vegetation to be cut without disturbing the channel bed. Channels with prolific vegetation growth may require maintenance annually, particularly where downstream bridges are at risk of blockage due to the flow of decaying vegetation in autumn. Such blockages can cause flood damage to properties and roads.

Weed cutting boats are used in circumstances where access is not possible (via the bankside) due to the width of the river, or where bank conditions are too unstable to allow for maintenance by way of excavators. In general the weed cutting boats are used on deeper, sluggish channels, and cut approximately to a maximum depth of 1.3m, leaving the bed and base of the weeds untouched. The species generally cut include *Scirpus* and *Sparganium* emerging in the open channel.

Category C. Bank Protection

Restrictions in channels due to bank slippage or damage are generally regraded to their original profile. Channel breaches due to bank erosion are resolved by reprofiling the channel in-situ or by importing bank protection material such as rock armour or log poles. Bank protection works are generally required along discrete stretches of channels where erosion or instability is present due to the absence of vegetation cover.

Category D. Bush Cutting/Branch Trimming

The removal of branches which hang into or just above the water during periods of low flow are generally targeted for removal as these branches will serve to impede the passage of debris during periods of high flow or flood events. Such work is carried out manually or with a hydraulic shears fitted to an excavator. This gives greater flexibility in selective and clean removal of woody

vegetation.

Maintenance Operation Category E. Tree Cutting

Tree cutting is required, where the capacity of the channel is reduced by trees growing in the channel, or where trees have fallen into the channel.

In other cases, tree removal may be carried out in consultation with Inland Fisheries Ireland (IFI) where tunnelling is reducing the biological productivity of the channel. A selective approach to tree removal is devised to retain a dappling of shade along the channel length.

2.1.3 The Programme – Part 2 - High Risk Channel Designation

Following major floods in 2000 and 2002, a review of national flood policy was initiated by the then Minister of State with responsibility for the OPW, Mr. Tom Parlon, T.D. This review was aimed at determining policy on flood risk management for the future, and clarifying roles and responsibilities among the various Departments, the Local Authorities and other organisations involved with managing and responding to floods. The recommendations of the Report of the Flood Policy Review Group were approved by Government in September 2004, setting the framework for how Ireland is to manage flood risk in the future.

The Report of the Flood Policy Review Group identified, among other things, that:

- There are a substantial number of watercourses for which no State authority has legislative responsibility for flood management.
- The lack of maintenance of watercourses and their associated defences and structures is a potential major cause of flooding due to its influence on flood processes.

The report recommended that a system be put in place to designate high-risk channels and give permissive powers of maintenance to the central authority (OPW). The general objective of 'designation' is to ensure that potentially high-risk channels or defences are maintained to reduce the flood risk that may otherwise arise. This system is intended however, only to be applicable to channels or defences that pose a significant risk, or that are of strategic importance. The report also recommended that an asset register be developed to aid in identifying and prioritising watercourses and structures for 'designation'.

The Commissioners of Public Works have introduced a funding mechanism to Local Authorities for localised works to alleviate flooding where the following conditions are satisfied:

- There is a technically viable option to mitigate or eliminate flooding.
- A legal mechanism is available to carry out the option and the necessary consents, agreements and licenses are in place.
- The option is cost effective and government requirements for assessing costs and benefits have been met. A simple method of assessing benefits is used for less expensive proposals, and full cost benefit analysis may be used for more expensive options.

Typically works funded under this means cost between €30,000 and €0.5 million and usually are sub-threshold Environmental Impact Assessment (EIA) scale projects.

No legal mechanism is yet in place to allow the OPW to designate particular channels or other structures. In many cases, minor works in excess of maintenance are required to address specific issues. The minor works funding mechanism has proved effective in addressing this type of issue. In addition, there are complex responsibilities, rights and interests in the management of watercourses. As a result, careful consideration of the incentives that arise for the various stakeholders is necessary to ensure that appropriate action is taken.

3. Screening of Natura 2000 Sites

3.1 Stage 1 Screening for Appropriate Assessment

A total of 31 Schemes were assessed during the overall screening of the Programme Part 1– Arterial Drainage Maintenance: Brosna, Glyde & Dee, Feale, Corrib (Corrib Clare, Corrib Headford, Corrib Mask), Maine, Inny, Boyle, Moy, Boyne, Lower Shannon (Maigue, Groody, Deel, Mulkear/Newport Flood Relief Scheme (FRS), Mulkear/Cappaghmore FRS, Sixmilebridge FRS, Shannon Embankments, Fergus Embankments, Owenagarney Embankments), Blackwater (Monaghan), Nenagh, Ballyteige/Kilmore, Broadmeadow & Ward, Killimor/Cappagh, Bonet, Matt, Ouvane, Kilcoo, Duff, Brickey, Abbey, Knockcroghery, Creegh, Clareen, Owenavorrigh, Carrigahorig, Donegal (Deele & Swillyburn, Cloonburn, Swilly Embankments, Burnfoot/Skeoge), Dunmanway FRS, Hazelhatch FRS and Duleek FRS. Some larger Schemes such as Corrib, Lower Shannon and Donegal have component sub-schemes but were screened in their entirety for the purposes of this screening exercise.

The Programme Part 2 – High Risk Channel Designation is a 'high-level' plan and as a consequence lacks spatial specificity. The approach to screening of the Programme Part 1 will therefore be applied to any projects developed under Part 2 – High Risk Channel Designation, as and when individual projects are identified.

3.1.1 Screening Method

The methodology employed during the screening process was map-based and involved the use of GIS. Examination of a GIS layer showing the entire channel network maintained by the OPW, and the most up-to-date GIS layers showing the extent and location of Natura 2000 sites in the Republic of Ireland, downloaded from the National Parks & Wildlife Service website (www.npws.ie as per updated GIS information, August 2011), enabled the identification of all Natura 2000 sites within a 15 kilometre radius of each individual scheme.

Natura 2000 sites within 15 kilometres of each Scheme were initially considered. Those located outside of the Scheme's catchment were screened out on the basis that there would be no impact on Natura 2000 sites due to drainage maintenance works outside of the catchment. Those sites within Scheme catchments then proceeded to a more detailed review by a suitably qualified ecologist and were either screened in or out on the basis of the following criteria:

- Distance from the Drainage Scheme
- Hydrological connectivity to channels under maintenance
- If the Natura 2000 site was more than 500m away and no surface hydrological features appear to link the Drainage Scheme.
- Qualifying interests and special conservation interests for which the site was selected and their sensitivities, and
- The conservation objectives for those sites.

For those Natura 2000 sites that were screened in, the following data was collated:

- Site code
- Site name
- Conservation objectives
- Qualifying interests and special conservation interests for which the site was selected including habitats and species listed under Annex I and Annex II of the Habitats Directive and Annex I of the Birds Directive,

3.2 Preliminary Findings of the Screening Exercise Programme – Part 1

Thirty-one Arterial Drainage Schemes were assessed as part of this screening exercise. Twenty-five of the Schemes were found to have the potential to have significant impacts on the conservation objectives or the general ecological integrity of one or multiple Natura 2000 sites. On the basis of the methodology described above, it was possible to exclude six Schemes from the assessment process as no potential for significant impacts as a result of any maintenance works on channels within these Schemes on any Natura 2000 sites was identified. The six Schemes screened out entirely include Blackwater (Monaghan), Matt, Ouvane, Owenavorrigh, Hazelhatch FRS and Duleek FRS.

Of the twenty-five remaining Schemes, the potential for impacts on one or more Natura 2000 sites could not initially be excluded as a result of the OPW's drainage maintenance programme.

Table 3.1 below provides details of the twenty-five Schemes in terms of the Natura 2000 sites with the potential to be affected as a result of maintenance works within their catchments and the channels on which further assessment would be required in the event of maintenance works being proposed. These Schemes are the subject of this Stage 2 – Natura Impact Statement.

Table 3.1 Programme – Part 1 – Screened in Drainage Schemes

No.	Scheme Name	SACs with the potential to be affected by works	SPAs with the potential to be affected by works
1	Abbey	Lough Golagh And Breesy Hill SAC	Donegal Bay SPA
2	Ballyteige/Kilmore	Ballyteigue Burrow SAC	Ballyteigue Burrow SPA
3	Brickey		Dungarvan Harbour SPA
4	Bonet	Glenade Lough SAC, Lough Gill SAC	N/A
5	Boyle	Bellanagare Bog SAC, Urlaur Loughs SAC, Tullaghanrock Bog SAC, Derrinea Bog SAC, Cloonshanville Bog SAC, Callow Bog SAC	Bellanagare Bog SPA, Lough Gara SPA
6	Boyne	Lough Lene SAC, White Lough Ben Lough & Lough Doo SAC, Lough Bane & Lough Glass SAC, Boyne Coast and Estuary SAC, River Boyne & River Blackwater SAC, Killconny Bog SAC, Mount Hevey Bog SAC	Boyne Estuary SPA, River Boyne & River Blackwater SPA
7	Broadmeadow & Ward	Malahide Estuary SAC	Malahide Estuary SPA
8	Brosna	Clonaslee Eskers & Derry Bog SAC, Clara Bog SAC, Split Hills and Longhill Esker SAC, River Shannon Callows SAC, Lough Ennell SAC, Charleville Wood SAC	Middle Shannon Callows SPA, Lough Ennell SPA
9	Carrigahorig	Kilcarren-Firville Bog SAC, Lough Derg North East Shore SAC	Lough Derg (Shannon) SPA
10	Clareen		Lough Derg (Shannon) SPA
11	Corrib	Lough Lurgeen Bog/Glenamaddy Turlough SAC, Lisnageeragh Bog and Ballinastack Turlough SAC, Galway Bay Complex SAC, Monivea Bog SAC, Levally Lough SAC, Cloughmoyne SAC, Shrute Turlough SAC, Kilglassan/ Cahervoostia Turlough SAC, Carrowkeel Turlough SAC, Towerhill House SAC, Connemara Bog Complex SAC, Maumturk Mountains SAC, Lough Carra/Mask Complex SAC, Ross Lake & Woods SAC, Lough Corrib SAC	Lough Carra SPA, Lough Mask SPA, Lough Corrib SPA

No.	Scheme Name	SACs with the potential to be affected by works	SPAs with the potential to be affected by works
12	Creegh	Carrowmore Dunes SAC	Mid Clare Coast SPA
13	Donegal	River Finn SAC, Lough Swilly SAC	Lough Swilly SPA
14	Duff	Bunduff Lough And Machair/Trawalua/Mullaghmore SAC	
15	Dunmanway FRS	Bandon River SAC	
16	Feale	Moanveanlagh Bog SAC, Lower River Shannon SAC	
17	Glyde & Dee	Dundalk Bay SAC	Dundalk Bay SPA, Stabannan-Braganstown SPA
18	Inny	Lough Owel SAC, Garriskill Bog SAC, Ballymore Fen cSAC, Moneybeg & Clareisland Bog SAC, Lough Ree SAC	Lough Owel SPA, Glen Lough SPA, Garriskill Bog SPA, Lough Kinale & Derragh Lough SPA, Lough Sheelin SPA, Lough Ree SPA, Lough Iron SPA, Lough Derravarragh SPA,
19	Kilcoo	Lough Melvin SAC	
20	Killimor/Cappagh	Derrycrag Wood SAC, Barroughter Bog SAC, Lough Derg North East Shore SAC	Lough Derg (Shannon) SPA, Slieve Aughty Mountains SPA
21	Knockcroghery	Lough Ree SAC	Lough Ree SPA
22	Lower Shannon	Glen Bog SAC, Tory Hill SAC, Curraghchase Woods SAC, Askeaton Fen Complex SAC, Lower River Shannon SAC	River Shannon and River Fergus Estuaries SPA
23	Maine	Castlemaine Harbour SAC	Castlemaine Harbour SPA
24	Moy	River Moy SAC, Killala Bay/Moy Estuary SAC	Lough Conn & Lough Cullin SPA, Killala Bay/Moy Estuary SPA
25	Nenagh		Lough Derg (Shannon) SPA

A total of 64 Special Areas of Conservation (SAC) were screened in along with 31 Special Protection Areas (SPA). The conservation objectives of each site were identified along with the qualifying interests of the SACs and the special conservation interests of the SPAs.

4. Further assessment of Natura 2000 Sites

4.1 Analysis of Qualifying Interests

The AA Screening identified the SAC qualifying interests and the SPA special conservation interests either directly where available or indirectly through the site synopsis forms where not readily available. By reviewing each of the relevant 95 'screened-in' Natura 2000 sites as listed in Table 3.1 above, Tables 4.1, 4.2, 4.3 below show the relevant qualifying interests and special conservation interests for the Programme – Part 1, against the number of relevant 'screened-in' Natura 2000 sites for each habitat and species. There are ranked in accordance with their frequency of occurrence, thereby indicating the most important habitats and species in terms of the scale of their overlap with the Programme Part 1 - Arterial Drainage Maintenance.

Table 4.1 Summary of Relevant Qualifying Interests for SACs – Annex I Habitats

Annex I Habitats as Qualifying Interest within Screened-In SACs	No. of applicable Screened-In SACs
Depressions on peat substrates of the Rhynchosporion [7150]	19
Degraded raised bogs still capable of natural regeneration [7120]	19
Active raised bogs [7110]	18
Alkaline fens [7230]	14
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incana</i> , <i>Salicion albae</i>) [91E0]	11
Mudflats and sandflats not covered by seawater at low tide [1140]	9
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]	9
Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) [6210]	8
<i>Salicornia</i> and other annuals colonizing mud and sand [1310]	8
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0]	8
Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140]	8
Turloughs [3180]	7
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	7
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	7
Limestone pavements [8240]	7
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	7
Estuaries [1130]	7
Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210]	6
Reefs [1170]	5
Perennial vegetation of stony banks [1220]	5
Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]	5
Embryonic shifting dunes [2110]	5
Coastal lagoons [1150]	5
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260]	4
Transition mires and quaking bogs [7140]	4
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]	4
Bog woodland [91D0]	4
Blanket bog (*active only) [7130]	4
Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]	3

Annex I Habitats as Qualifying Interest within Screened-In SACs	No. of applicable Screened-In SACs
Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150]	3
Large shallow inlets and bays [1160]	3
<i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]	3
Annual vegetation of drift lines [1210]	3
<i>Taxus baccata</i> woods of the British Isles [91J0]	2
<i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320]	2
Humid dune slacks [2190]	2
European dry heaths [4030]	2
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	1
Siliceous rocky slopes with chasmophytic vegetation [8220]	1
Sandbanks which are slightly covered by sea water all the time [1110]	1
Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]	1
Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorellatea uniflorae</i> and/or the <i>Isoeto-Nanojuncetea</i> [3130]	1
Natural dystrophic lakes and ponds [3160]	1
Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) [1420]	1
Machairs (* in Ireland) [21A0]	1
Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) [6510]	1
Dunes with <i>Salix repens ssp. argentea</i> (<i>Salix arenariae</i>) [2170]	1
Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>) [2150]	1
Alpine and Boreal heaths [4060]	1

Table 4.2 Summary of Relevant Qualifying Interests for SACs – Annex II Species

Annex II Species as Qualifying Interest within Screened-In SACs	No. of applicable Screened-In SACs
Otter (<i>Lutra lutra</i>) [1355]	14
Atlantic Salmon (<i>Salmo salar</i>) (in freshwater only) [1106]	10
White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092]	8
Sea lamprey (<i>Petromyzon marinus</i>) [1095]	6
Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303]	5
Brook lamprey (<i>Lampetra planeri</i>) [1096]	5
Slender naiad (<i>Najas flexilis</i>) [1833]	4
River lamprey (<i>Lampetra fluviatilis</i>) [1099]	4
Marsh Fritillary (<i>Euphydryas aurinia</i>) [1065]	4
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029]	3
Shining sickle moss (<i>Drepanocladus vernicosus</i>) [1393]	2
Petalwort (<i>Petalophyllum ralphsii</i>) [1395]	2
Narrow-mouthed Whorl Snail (<i>Vertigo angustior</i>) [1014]	2
Common seal (<i>Phoca vitulina</i>) [1365]	2
Desmoulins Whorl Snail (<i>Vertigo moulinsiana</i>) [1016]	1
Geyer's Whorl Snail (<i>Vertigo geyeri</i>) [1013]	1
Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349]	1

Table 4.3 Summary of Relevant Special Conservation Interests for SPAs

Bird species as Special Conservation Interests within Screened-In SPAs	No. of applicable Screened-In SPAs
Wetlands & Waterbirds [A999]	23
Golden Plover (<i>Pluvialis apricaria</i>) [A140]	11
Whooper Swan (<i>Cygnus cygnus</i>) [A038]	8
Tufted Duck (<i>Aythya fuligula</i>) [A061]	8
Shelduck (<i>Tadorna tadorna</i>) [A048]	8
Redshank (<i>Tringa totanus</i>) [A162]	8
Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395]	8
Black-tailed Godwit (<i>Limosa limosa</i>) [A156]	8
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]	7
Lapwing (<i>Vanellus vanellus</i>) [A142]	7
Grey Plover (<i>Pluvialis squatarola</i>) [A141]	7
Dunlin (<i>Calidris alpina</i>) [A149]	7
Coot (<i>Fulica atra</i>) [A125]	7
Wigeon (<i>Anas penelope</i>) [A050]	6
Shoveler (<i>Anas clypeata</i>) [A056]	6
Oystercatcher (<i>Haematopus ostralegus</i>) [A130]	6
Knot (<i>Calidris canutus</i>) [A143]	6
Common Scoter (<i>Melanitta nigra</i>) [A065]	6
Common Gull (<i>Larus canus</i>) [A182]	6
Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]	6
Turnstone (<i>Arenaria interpres</i>) [A169]	5
Teal (<i>Anas crecca</i>) [A052]	5
Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	5
Red-breasted Merganser (<i>Mergus serrator</i>) [A069]	5
Pochard (<i>Aythya ferina</i>) [A059]	5
Great Crested Grebe (<i>Podiceps cristatus</i>) [A005]	5
Goldeneye (<i>Bucephala clangula</i>) [A067]	5
Curlew (<i>Numenius arquata</i>) [A160]	5
Common Tern (<i>Sterna hirundo</i>) [A193]	5
Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]	5
Sanderling (<i>Calidris alba</i>) [A144]	4
Pintail (<i>Anas acuta</i>) [A054]	4
Mallard (<i>Anas platyrhynchos</i>) [A053]	4
Cormorant (<i>Phalacrocorax carbo</i>) [A017]	4
Greylag Goose (<i>Anser anser</i>) [A043]	3
Greenshank (<i>Tringa nebularia</i>) [A164]	3
Scaup (<i>Aythya marila</i>) [A062]	2
Hen Harrier (<i>Circus cyaneus</i>) [A082]	2
Sandwich Tern (<i>Sterna sandvicensis</i>) [A191]	1
Red-throated Diver (<i>Gavia stellata</i>) [A001]	1
Purple Sandpiper (<i>Calidris maritima</i>) [A148]	1
Merlin (<i>Falco columbarius</i>) [A098]	1
Little Tern (<i>Sterna albifrons</i>) [A195]	1
Little Grebe (<i>Tachybaptus ruficollis</i>) [A004]	1
Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]	1
Kingfisher (<i>Alcedo atthis</i>) [A229]	1
Herring Gull (<i>Larus argentatus</i>) [A184]	1
Grey Heron (<i>Ardea cinerea</i>) [A028]	1

Bird species as Special Conservation Interests within Screened-In SPAs	No. of applicable Screened-In SPAs
Great Northern Diver (<i>Gavia immer</i>) [A003]	1
Gadwall (<i>Anas strepera</i>) [A051]	1
Corncrake (<i>Crex crex</i>) [A122]	1
Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346]	1
Barnacle Goose (<i>Branta leucopsis</i>) [A396]	1
Arctic Tern (<i>Sterna paradisaea</i>) [A194]	1

4.2 Individual Channel Identification

Further analysis of the twenty five 'screened-in' Schemes was conducted to identify the individual maintained channels within each scheme, which could have a potential impact on the identified Natura 2000 sites. This was completed in two phases.

The first phase involved identifying all channels which had some form of hydrological connectivity with a Natura 2000 site, which included all channels that are either fully within a Natura 2000 site or any channels flowing into or out of an Natura 2000 site. This incorporates 4414km of channel, which includes all channels extending upstream or downstream from a Natura 2000 site, irrespective of the distances involved.

The second phase involved analysis of the channels identified in phase one to identify more precise areas that would benefit from ecological site surveys as part of the assessment process. This involved identifying all channel lengths which are either within a Natura 2000 site itself or are in very close proximity i.e. within 100m of any part of a Natura 2000 site boundary. This identifies the channel lengths which are more likely to have a potential impact on an identified Natura 2000 site. Including all full channels and channel segments as an individual entity, there are a total of 1324 channels identified in this second phase incorporating 1646km of channel. The primary reduction in length by phase two is the removal of large lengths of channel which lie upstream or downstream of a Natura 2000 site. This phase two channel list is displayed in Table 4.5 and includes the individual channels for each individual Arterial Drainage Scheme where it has been subsumed into a larger Scheme for the purposes of Appropriate Assessment as described in the AA Screening report. Appendix 1, details the channels identified in phase two, categorised by Drainage Scheme and Natura 2000 site, in combination with a series of data for each Natura 2000 site such as conservation objectives, qualifying interests and if a Conservation Management Plan for the Natura 2000 site is available.

Table 4.5 Summary of individual channels identified for ecological site survey

Scheme Name	No. of Channels	Channels identified for ecological site survey
Abbey	1	C1.
Ballyteige / Kilmore	14	C1, C1/1, C1/2, C1/2/1, C1/2/1A, C2, C2/1, C2/12, C2/2, C2/2/1A, C2/3, C2/4, C2/5, D5.
Brickey	3	C1, C1/1, C1/2.
Bonet	26	C1, C1/1, C1/1/1, C1/1/1/1, C1/1/1/2, C1/1/2, C1/10, C1/11, C1/12, C1/13, C1/13/1, C1/13/1/1, C1/13/2, C1/13/3, C1/14, C1/15, C1/2, C1/3, C1/3/1, C1/4, C1/5, C1/6, C1/7, C1/8, C1/9, C1/9/1.
Boyle	27	C0, C1, C1/1, C1/2, C1/24, C1/24/1, C1/3, C1/3/1, C10, C11, C12, C12/1, C19, C2, C2/1, C2/2, C20, C3, C4, C5, C6, C6/5, C6/7/1/2/1, C6/7/1/2/1/1, C7, C8, C9.
Boyne	191	C1, C1 (Tidal), C1/1, C1/10, C1/11, C1/12, C1/13, C1/14, C1/15, C1/16, C1/16/4, C1/17, C1/18, C1/19, C1/2, C1/21, C1/21/1, C1/21/10, C1/21/11, C1/21/12, C1/21/13, C1/21/14, C1/21/15, C1/21/16, C1/21/17, C1/21/18, C1/21/2, C1/21/20, C1/21/21, C1/21/21/2/1, C1/21/22, C1/21/23, C1/21/24, C1/21/25,

Scheme Name	No. of Channels	Channels identified for ecological site survey
		C1/21/26, C1/21/27, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/8, C1/21/9, C1/21/9/1, C1/23, C1/24, C1/25, C1/26, C1/27, C1/27/1, C1/27/2, C1/29, C1/3, C1/30, C1/31, C1/32, C1/32/1, C1/32/10, C1/32/11, C1/32/12, C1/32/13, C1/32/16, C1/32/17, C1/32/18, C1/32/19, C1/32/2, C1/32/21, C1/32/22, C1/32/23, C1/32/24, C1/32/25, C1/32/27, C1/32/28, C1/32/29, C1/32/29/1, C1/32/3, C1/32/30, C1/32/31, C1/32/32, C1/32/33, C1/32/33/2, C1/32/33/2/1, C1/32/33/2/2, C1/32/33/3, C1/32/34, C1/32/4, C1/32/5, C1/32/7, C1/32/8, C1/32/9, C1/33, C1/35, C1/36, C1/37, C1/37/1, C1/37/10, C1/37/11, C1/37/12, C1/37/12/1, C1/37/13, C1/37/14, C1/37/15, C1/37/15/1, C1/37/15/3, C1/37/15/4, C1/37/15/5, C1/37/17, C1/37/18, C1/37/19, C1/37/2, C1/37/2/2, C1/37/2/3, C1/37/20, C1/37/20/1, C1/37/21, C1/37/22, C1/37/23, C1/37/24, C1/37/26, C1/37/27, C1/37/28, C1/37/29, C1/37/3, C1/37/30, C1/37/31, C1/37/32, C1/37/33, C1/37/34, C1/37/35, C1/37/35/1, C1/37/35/2, C1/37/36, C1/37/37, C1/37/37/2, C1/37/37/3, C1/37/38, C1/37/4, C1/37/5, C1/37/6, C1/37/7, C1/37/7/3, C1/37/7/3/1, C1/37/8, C1/37/8/3, C1/37/9, C1/38, C1/39, C1/4, C1/40, C1/44/10, C1/44/11, C1/44/11/1, C1/5, C1/6, C1/7, C1/8, C1/8/1, C1/8/10, C1/8/11, C1/8/12, C1/8/13, C1/8/13/1, C1/8/14, C1/8/15, C1/8/16, C1/8/17, C1/8/18, C1/8/19, C1/8/2, C1/8/20, C1/8/21, C1/8/22, C1/8/23/2, C1/8/3, C1/8/4, C1/8/5, C1/8/6, C1/8/7, C1/8/8, C1/8/9, X1C1/37, X2C1, X2C1/8/23/2, X3C1, X4C1, X5C1, X6C1, XC1/32, XC1/32/15, XC1/37/15, XC1/37/16, XC1/37/37, XC1/44/11.
Broadmeadow & Ward	1	C1.
Brosna	26	C1(1), C10(1), C18(4), C18(4C), C3(13), C3(13C), C3(13F), C3(14), C35(1), C35(2), C36(1), C37(1), C38(1), C39(1), C40(1), C41(1), C42(1), C43(1), C44(1), C45(1), C8(1), C8(10), C8(7), C8(8), C8(9), C9(4).
Carrigahorig	6	C1, C1/2/2, C1/2/2/1, C2, C2/1, C3.
Clareen	3	C1, C2, C3.
Corrib	337	<u>Corrib Mask:</u> CM1, CM1/1, CM10, CM11, CM2, CM2/1, CM2/2, CM2/3, CM3, CM4, CM5, CM5/1, CM5/10, CM5/10/3, CM5/10/4, CM5/11, CM5/13, CM5/14, CM5/15, CM5/16, CM5/2, CM5/3, CM5/4, CM5/5, CM5/6, CM5/7, CM5/8, CM5/8/1, CM5/9, CM5A, CM6, CM7, CM8, CM8/1, CM8/2, CM8/3, CM8/4, CM9, CM9/1, F287(A), SM 111/1. <u>Corrib Headford:</u> CH1, CH10, CH10/1, CH10/2, CH10/3, CH10/4, CH10/5, CH10/5/1, CH11, CH2, CH3, CH4, CH4/1, CH4/10, CH4/10/1, CH4/2, CH4/3, CH4/4, CH4/4/1, CH4/4/2, CH4/5, CH4/5/1, CH4/6, CH4/6/1, CH4/6/2, CH4/6/3, CH4/7, CH4/8, CH4/9, CH4/9/1, CH5, CH6, CH7, CH8, CH16, CH9, CH9/1, CH9/2, Cornamona River, F.102, F.129, F.145, F.193, F.205, F.23, F.28, F.316, F.321, F.78, SM122/1, SM122/2, SM122/2/1. <u>Corrib Clare:</u> C1, C10, C11, C12, C13, C14/1, C14/2, C14/3, C14/4, C15, C16/, C17, C18, C19, C2, C20, C20/1, C21, C21/1, C23, C24, C25, C25/1, C25/2, C26, C27, C28, C29, C3, C3/1, C3/10, C3/11, C3/12, C3/13, C3/14, C3/15, C3/16, C3/17, C3/18, C3/19, C3/2, C3/20, C3/21, C3/22, C3/23, C3/24, C3/25, C3/26, C3/26/1, C3/26/1/1, C3/26/2, C3/26/3, C3/26/4, C3/26/5, C3/26/6, C3/26/7, C3/27, C3/28, C3/3, C3/30, C3/30/1, C3/31, C3/32, C3/32/1, C3/33, C3/34, C3/35 Sect. 1, C3/35/1, C3/35/10,

Scheme Name	No. of Channels	Channels identified for ecological site survey
		C3/35/11, C3/35/11/1, C3/35/11/2, C3/35/11/3, C3/35/12, C3/35/12/1, C3/35/13, C3/35/2, C3/35/3, C3/35/4, C3/35/5, C3/35/7, C3/35/8, C3/35/9, C3/36, C3/37, C3/38, C3/39, C3/4, C3/40, C3/41, C3/42, C3/43, C3/44, C3/45, C3/46, C3/46, C3/46, C3/47, C3/47/1, C3/47/2, C3/47/3, C3/47/4, C3/5, C3/6, C3/7, C3/8, C3/8/10, C3/8/11, C3/8/11/1, C3/8/11/1/1, C3/8/11/2, C3/8/11/5, C3/8/12, C3/8/13, C3/8/14, C3/8/15, C3/8/16, C3/8/17, C3/8/18, C3/8/19, C3/8/2, C3/8/20, C3/8/22, C3/8/23, C3/8/23/1, C3/8/23/2, C3/8/23/3, C3/8/24, C3/8/3, C3/8/4, C3/8/6, C3/8/7, C3/8/8, C3/8/9, C3/9, C3/9/1, C3/9/10, C3/9/12, C3/9/12/1, C3/9/13, C3/9/14, C3/9/15, C3/9/16, C3/9/17, C3/9/18, C3/9/19, C3/9/2, C3/9/3, C3/9/4, C3/9/5, C3/9/6, C3/9/7, C3/9/8, C3/9/8/2, C3/9/8/3, C3/9/8/4, C3/9/8/5, C3/9/9, C30, C31, C32, C32/1, C32/10, C32/2, C32/2A, C32/3, C32/4, C32/5, C32/6, C32/6/1, C32/7, C32/8, C32/9, C33, C34, C34/1, C35, C4, C4/1, C4/2, C4/3, C4/4, C5, C6, C8, C9, ED @ Ballyglunin, ED @ Montiagh, EXT on C32, F.1215A, F.1215B, F.1215C, F.129, F.1290, F.137, F.138, F.154 A2-B2, F.159, F.180, F.242, F.242/1, F.391, F.459, F.466, F.475, F.53, F.534, F.551, F.565, F.573, F.583, F.604, F.604/1, F.623A, F.623B, F.652A, F.652B, F.711, F.722, F.746, F.75, F.772/5, F.776, F.808, F.814, F.837, F.898, F.987/1, F.987/2, P196/1, P196/5, P196/6 L5-M5 F.154, P196/8 P5-Q5, S.G.68/5, S.G.68/6, S.G.68/7, S.G.68/7/1, SG.18/2, SG.18/4, SG.18/4/1, SG.18/4/1/1, SG.18/4/2, SG.18/4/2/1, SG.18/4/3, SG.30/3. <u>Maam Flood Relief: C1.</u>
Creegh	3	C1, C2/1, C3.
Donegal	59	<u>Blanket Nook:</u> C1, C1/1, C1/2, C1/3, C2, C3, C3/1, C3/1/1, D 2, D1, D1/1, D1/1/1, D1/1/2, D1/2. <u>Cloonburn:</u> C1 Sect.A. <u>Deele & Swillyburn:</u> C1 Sect.A, C2, Sect.A, C2/1, C3, D1, D14, D2, D22, D23, D3, D5, D6, Ext D2A, Ext on D2. <u>Skeoge Burnfoot:</u> C1, C1/1, C1/2, D1, D2. <u>Swilly Embankments:</u> C 1, C1/1, C1/2, C1/3, C1/4, D 1, D 1 D 14, D 2, D 2 D 15, D 20, D 21, D 21/1, D 3, D 3, D 4, D 4, D 5, D 8, D 9, D.1, D19, D2, D3, D4A, D4A, Isleburn.
Duff	1	C1.
Dunmanway FRS	6	C1, C2, C2/1, C2/2, C3, C4.
Feale	93	C1, C1/1, C1/10, C1/11, C1/12, C1/14, C1/14/1, C1/14/10, C1/14/11, C1/14/12, C1/14/13, C1/14/14, C1/14/15, C1/14/16, C1/14/16/1, C1/14/16/2, C1/14/16/3, C1/14/2, C1/14/3, C1/14/4, C1/14/5, C1/14/6, C1/14/7, C1/14/8, C1/15, C1/16, C1/17, C1/18, C1/18/1, C1/18/10, C1/18/11, C1/18/12, C1/18/13, C1/18/14, C1/18/15, C1/18/15/1, C1/18/15/1/1/1, C1/18/15/2, C1/18/16, C1/18/17, C1/18/18, C1/18/19, C1/18/2, C1/18/2/1, C1/18/20, C1/18/3, C1/18/4, C1/18/5, C1/18/6, C1/18/7, C1/18/8, C1/18/9, C1/19, C1/2, C1/20, C1/21, C1/22, C1/23, C1/24, C1/25, C1/26, C1/3, C1/3/1, C1/5, C1/6, C1/7, C1/8, C1/9, D1, D10, D11, D12, D13, D14, D19, D2, D20, D21, D23, D25, D26, D27, D28, D29, D3, D30, D31, D32, D4, D5, D6, D7, D9.
Glyde & Dee	6	C1(1), C10(1), C10(3), C10(4), C11(1), C9(1).
Inny	41	C1, C1/1, C1/2, C2, C29, C3, C30, C31, C31A, C31A/1, C31A/2, C33, C33/1, C33/1/1, C34, C37, C38, C39, C3A, C3A/1, C4, C40, C41, C42, C43, C5, C55, C56, C57, C59, C5A, C6, C6 Outfal, C6/2, C60, C60/1, C61, C62, C63, C8/7/3, XC60/1.

Scheme Name	No. of Channels	Channels identified for ecological site survey
Kilcoo	1	C1.
Killimor/Cappagh	11	C1, C1/1, C1/1/1, D1, D1/1, C2/10, C2/10/1, C2/10/1/1, C2/14, C2/17/1, C2/2, C2/2/5.
Knockcroghery	1	C1.
Lower Shannon	203	<u>Ballinacclough:</u> C1, C1/1, D1, D2, D4. <u>Bunratty Rineanna:</u> C1, C1/1, C2, D1, D2, D3, D4. <u>Coonagh Embankment:</u> C1, C10, C10/2, C10/3, C11, C12, C13, C2, C3, C5, C6, C7, C7/1, C7/2, C7/3, C7/4, C7/5, C8, C9, C9/1, D1, D12, D13, D2, D22, D24, D25. <u>Deel:</u> C1. <u>Fergus:</u> C10, C12, C13, C14, C15, C16, C16/1/1, C17, C18, C19, C2, C20, C21, C22, C22A, C3, C4/1, C4/1/1, C6, C7, C8, C9, D1, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D2, D20, D27, D3, D4, D6, D7, D8, D9.7, D8, D9. <u>Groody:</u> C1. <u>Maigue:</u> C1, C1/13, C1/15, C1/17/4, C1/17/4/7, C1/23, C1/23/2, C1/23/3, C1/23/4, C1/25/22/1, C1/25/22/1A, Drain. <u>Maigue Outfall:</u> C1 Maigue Outfall, C1/10, C1/11, C1/12, C1/14, C1/14/2, C1/15A, C1/17, C1/2, C1/3, C1/4, C1/4/1, C1/5, C1/6, C1/7, C1/8, C18, D10, D11, D12, D14, D15, D16, D17, D18, D19, D2, D20, D21, D22, D23, D24, D3, D4, D41, D42, D43, D7. <u>Mulkear Ballymackeogh:</u> C1, C1/1, C1/1/0, C1/1/1, C1/1/2, C1/1/3. <u>Mulkear Cappamore:</u> C1, C1/1, C1/2, C1/3, C1/4, C1/5. <u>Newtown Tervoe:</u> C1, D1, D2. <u>Owenagarney:</u> C1, C2, C2/1, C2/1A, C3, C4, C5, D1, D15, D18, D2, D3, D4, D5, D6, D7, D8, D9, Owenagarney River. <u>Polefield:</u> C1. <u>Ringmoylan Mellon:</u> C1, C1/1, C2, C3, C4, D1, D2, D3. <u>Ringmoylan-Foynes (Ballymartin section):</u> C1, C1/A, C2, D1, D2, D3. <u>Ringmoylan-Foynes (Foynes Section):</u> C1, C2, C3, D1, D2, D3, D4, D5.
Maine	42	C1, C1/1, C1/2, C1/3, C1/3/1, C1/4, C1/5, C1/6, C10, C10A, C11, C2, C3, C4, C4/1, C5, C6, C7, C8, C9, D1, D14, D15, D16, D17, D2, D20, D3, D35, D36, D37, D38, D39, D41, D42, D43, D43A, D44, D45, D46, D47, D47A, D7, D8, D9, Outfall Creek.
Moy	231	C1, C1/1, C1/10, C1/11, C1/12, C1/13, C1/14, C1/15, C1/16, C1/17, C1/17/1, C1/18, C1/19, C1/2, C1/20, C1/21, C1/21/1, C1/21/1/1, C1/21/1/10, C1/21/1/2, C1/21/1/3, C1/21/1/4, C1/21/1/5, C1/21/1/5/1, C1/21/1/5/10, C1/21/1/5/11, C1/21/1/5/12, C1/21/1/5/13, C1/21/1/5/14, C1/21/1/5/15, C1/21/1/5/16, C1/21/1/5/17, C1/21/1/5/18, C1/21/1/5/18/1, C1/21/1/5/18/2, C1/21/1/5/18/3, C1/21/1/5/18/4, C1/21/1/5/18/5, C1/21/1/5/18/6, C1/21/1/5/2, C1/21/1/5/3, C1/21/1/5/4, C1/21/1/5/5, C1/21/1/5/6, C1/21/1/5/6/1, C1/21/1/5/7, C1/21/1/5/8, C1/21/1/5/9, C1/21/1/6, C1/21/1/7, C1/21/1/8, C1/21/1/9, C1/21/10, C1/21/10/1, C1/21/11, C1/21/12, C1/21/13, C1/21/13/1, C1/21/14, C1/21/14/1, C1/21/14/2, C1/21/14/2/1, C1/21/14/2/2, C1/21/14/3, C1/21/14/4, C1/21/14/5, C1/21/14/5/1, C1/21/14/5/2, C1/21/14/6, C1/21/2, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/7/1, C1/21/7/1/1, C1/21/8, C1/21/9, C1/21/9/1, C1/21A, C1/22, C1/23, C1/23/1, C1/23/2, C1/24, C1/25, C1/26, C1/27, C1/28, C1/29, C1/3, C1/30, C1/30/1, C1/30/10, C1/30/11, C1/30/12, C1/30/13, C1/30/2, C1/30/2/1,

Scheme Name	No. of Channels	Channels identified for ecological site survey
		C1/30/3, C1/30/4, C1/30/5, C1/30/5/1, C1/30/5/10, C1/30/5/2, C1/30/5/3, C1/30/5/4, C1/30/5/4/1, C1/30/5/5, C1/30/5/6, C1/30/5/7, C1/30/5/8, C1/30/6, C1/30/7, C1/30/7/1, C1/30/7/11, C1/30/7/12, C1/30/7/12/1, C1/30/7/13, C1/30/7/14, C1/30/7/15, C1/30/7/16, C1/30/7/16/1, C1/30/7/2, C1/30/7/3, C1/30/7/4, C1/30/7/5, C1/30/7/6, C1/30/7/7, C1/30/7/8, C1/30/7/9, C1/30/7/9A, C1/30/8, C1/30/9, C1/31, C1/31/1, C1/31/2, C1/32, C1/33, C1/34, C1/35, C1/35/1, C1/35/2, C1/36, C1/37, C1/38, C1/39, C1/4, C1/40, C1/41, C1/42, C1/43, C1/44, C1/45, C1/45/1, C1/45/2, C1/45/2/1, C1/45/2/1/1, C1/45/2/2, C1/45/3, C1/45/4, C1/46, C1/47, C1/47/1, C1/48, C1/48/1, C1/48/2, C1/48/3, C1/48/4, C1/48/5, C1/48/6, C1/48/6/1, C1/48/7, C1/48/7/1, C1/48/8, C1/49, C1/49/1, C1/49/2, C1/49/3, C1/49/4, C1/49/5, C1/49/6, C1/5, C1/5/1, C1/5/2, C1/5/3, C1/5/4, C1/5/4/1, C1/5/5, C1/5/5/1, C1/5/6, C1/5/6/1, C1/5/7, C1/50, C1/50/1, C1/51, C1/52, C1/53, C1/54, C1/54/1, C1/55, C1/56, C1/57, C1/57/1, C1/57/2, C1/57/3, C1/57/4, C1/58, C1/7, C1/8, C1/9, F/1070, F/1070B, F/1155, F/1181, F/1314, F/1390, F/1465, F/149, F/1536, F/1597, F/1599, F/200, F/210A, F/242, F/290, F/312, F/673, F/909, F/961.
Nenagh	5	C1, C3, C4, D1, D2.

5. Impact Assessment

The SEA Environmental Report has identified the more significant potential positive and negative environmental impacts from the implementation of the Arterial Drainage Maintenance and High Risk Channel Designation Programme. These impacts are discussed in detail in Chapter 9 of the SEA Environmental Report.

5.1 Impact Assessment Programme Part 1 – Arterial Drainage Maintenance

The designation process for SACs and SPAs commenced in Ireland in the mid 1990's and 1980's respectively. The national programme of Arterial Drainage Schemes commenced in 1948 with the larger Schemes and finished in 1995 with the completion of one of the smallest Schemes. In terms of the area of catchments, 99% of the national Arterial Drainage Scheme programme was completed by 1990. Accordingly, effectively all Natura 2000 designations are of conservation aspects in a post drainage scheme environment.

Within the 64 SACs that have been screened in for the Programme Part 1, 49 habitats and 17 species, which are qualifying interests of the sites, are encapsulated. Similarly for the 31 SPAs that have been screened in, 53 special conservation interests are protected within the sites in addition to the generic wetlands and waterbirds interest category. The Qualifying Interests of the SACs and the Special Conservation Interests of the SPAs were reviewed and categorised. This information was then used to focus assessments on the most sensitive conservation aspects.

5.2 Categorisation of Qualifying Interests

In 2007, OPW completed a national screening of the Natura 2000 network for the impacts of arterial drainage maintenance operations and a research strategy developed. This screening was published by OPW in 2007 as "*Screening of Natura 2000 Sites for Impacts of Arterial Drainage Maintenance Operations*". This research strategy was in recognition that statutory drainage maintenance operations are an ongoing activity across the State and overlap with many Natura 2000 sites to varying degrees, resulting in a possible requirement for multiple individual environmental assessments for the same conservation aspects. The strategy set out a strategic and reasonable, practical approach that could be followed by the OPW. The objective was to identify the more sensitive habitats and species and the key environmental impacts. Resources were then targeted on this more focused list of environmental research topics through a coordinated nationwide approach to gather understanding on the conservation aspects of primary concern.

The methodology used by this screening strategy to identify the key conservation aspects was as follows:

- Identify all SAC & SPA sites nationwide that contain statutory drainage channels.
- Identify all the conservation aspects that are relevant to these sites.
- Develop a matrix of conservation aspects and Natura 2000 sites that impinge on drainage channels and assess scale of overlap.
- Briefly assess each conservation aspect to determine if a possible impact could be significant and categorise the results.
- Categories can be grouped into:
 - Category I - Realistic possibility that a significant effect could occur.
 - Category II - Requires more detailed analysis to decide if impact is either possibly significant or highly unlikely.
 - Category III - Significant impact is highly unlikely.
- Record the reasoning used to assign conservation aspects into Category III i.e. why it is that a significant impact is highly unlikely.

This research strategy has now been implemented including the categorisation of all SAC and SPA qualifying interests and a whole series of formally published Ecological Impact Assessments (EclA) as explained in the following sections.

5.2.1 SAC Categorisation

The screening methodology sub-divided conservation aspects into three categories. The following describes the reasoning used for categorising the species and habitats of SACs and is judged to be a relatively straightforward but appropriate logic:

- | | |
|--------------|---|
| Category I | Conservation aspects that are located in the waterway corridor or on lands adjoining the waterway. They are in close proximity to maintenance operations and have some form of sensitivity to these works. It is deemed that there is a realistic possibility that a significant effect could occur and that some form of an ecological assessment is warranted. |
| Category II | Conservation aspects that could have some sensitivities to maintenance operations but this is largely dependent on their proximity to waterways where maintenance is carried out. Further analysis is required to delineate their proximity to maintenance works. Insufficient information at present to decide if they are to be deemed as Category I or Category III. |
| Category III | Conservation aspects that have less sensitivity to maintenance operations and are not in close proximity to these works. It is expected that a significant impact is highly unlikely and further study would not be warranted unless contrary knowledge arises in the future. |

Table 5.1 shows the categorisation of SAC qualifying interests with a summary description of the reasoning behind the categorisation decision further expanded as follows:

Category I primarily consists of two broad groups i.e. species and habitats that are largely dependent on the instream of a maintained waterway. Species and habitats, which while not directly in the channel, are to some degree hydrologically dependent on the maintained channel or embankment.

Category II typifies species and habitats that could be sensitive to drainage works but the impact to a large degree will be proportional to its proximity to drainage operations e.g. molinia meadows will have a hydrological dependence on adjoining watercourses but this habitat only constitutes a portion of the relevant SACs. The exact location of the molinia meadows will have to be identified and if found to be in close proximity to maintained channels, a Category I designation may be appropriate. In the event that they are not in close proximity to maintained channels, a Category III designation may be deemed appropriate.

Category III contains a few species and a range of habitats. These are divided into three broad groups:

Some species and habitats are designated only within Natura 2000 sites which overlap with Flood Relief Schemes. The River Barrow & River Nore SAC and the Lower River Suir SAC overlap with the Kilkenny and Carrick On Suir urban Flood Relief Schemes respectively. These type of urban Flood Relief Schemes were primarily achieved through structural engineering and typically these Schemes have effectively no ongoing instream maintenance.

Species such as dolphins and many of the habitats like dunes are of a coastal nature. In general, while river channels traverse coastal habitats at their estuaries, there are relatively very limited maintenance operations in these regions as water levels are often governed tidally.

Habitats such as woodlands and scrub can have linear paths more typical of disturbed vegetation established along channels due to machine access. Initial access was gained during the Arterial Drainage Scheme works phase with large dragline plant and SAC designation was post this period. Maintenance access would hold the disturbed vegetation along the machinery access corridors at status quo.

Table 5.1 Categorisation of SAC Qualifying Interests

Qualifying Interest	Fauna / Flora (Species) Priority / Non Priority (Habitat)	Comment (Sensitivity to Drainage Maintenance)
Category I (Possible significant effect)		
Brook lamprey (<i>Lampetra planeri</i>) [1096]	Fauna	Instream species. Possibly susceptible to maintenance works.
River lamprey (<i>Lampetra fluviatilis</i>) [1099]	Fauna	
Sea lamprey (<i>Petromyzon marinus</i>) [1095]	Fauna	
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029]	Fauna	Instream species. Possibly susceptible to maintenance works.
Atlantic Salmon (<i>Salmo salar</i>) [1106]	Fauna	Instream species. Possibly susceptible to drainage maintenance.
White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092]	Fauna	Instream species. Possibly susceptible to maintenance works.
Otter (<i>Lutra lutra</i>) [1355]	Fauna	River corridor species with holt and cover loss possibly susceptible to maintenance works.
Narrow-mouthed Whorl Snail (<i>Vertigo angustior</i>) [1014]	Fauna	Combine with assessment on fen habitats. Utilise as an indicator species for fen condition.
Geyer's Whorl Snail (<i>Vertigo geyeri</i>) [1013]	Fauna	
Desmoulins Whorl Snail (<i>Vertigo moulinsiana</i>) [1016]	Fauna	
Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260]	Non Priority	Composed of instream species. Possibly susceptible to maintenance works.
Alkaline Fens [7230]	Non Priority	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Calcareous fens with Cladium mariscus and species of Caricion davallianae [7210]	Priority	
Transition mires and quaking bogs [7140]	Non Priority	
Bog woodland [91D0]	Priority	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Degraded raised bogs still capable of natural regeneration [7120]	Non Priority	
Depressions on peat substrates of Rhynchosporion [7150]	Non Priority	
Active raised bogs [7110]	Priority	

Turloughs [3180]	Priority	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Category II (Further information required to assess if Category I or III)		
Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303]	Fauna	Review proximity of roost sites adjacent to channels and riparian vegetated flight corridors. Only very localised site specific mitigating measures may be necessary.
Shining sickle moss (<i>Drepanocladus vernicosus</i>) [1393]	Flora	Lough Cara/Mask Complex SAC only. Review extent of site's maintenance and proximity of this species.
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incana</i> , <i>Salicion albae</i>) [91E0]	Priority	Floodplain dependent habitats. Review extent of site's maintenance and proximity of this habitat.
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]	Non Priority	
Blanket bog (*active only) [7130]	Priority	Typically located in higher ground remote from drainage operations. Review extent of site's maintenance and proximity of this habitat.
Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) [6510]	Non Priority	River Shannon Callows SAC only. Review extent of site's maintenance and proximity of this habitat.
European dry heaths [4030]	Non Priority	Typically located in higher ground remote from drainage operations. Review extent of site's maintenance and proximity of this habitat.
Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]	Non Priority	
Hard oligo-mesotrophic water with benthic vegetation of <i>Chara</i> spp. [3140]	Non Priority	Lake defined habitats with multiple attributes considered such as geology, plant communities and water chemistry. No direct pH or nutrient impact from maintenance works but review more long-term trends.
Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]	Non Priority	
Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation [3150]	Non Priority	
Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or the <i>Isoeto-Nanojuncetea</i> [3130]	Non Priority	
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	Non Priority	Wholly or partly tidal dependent habitats. Generally boundaries of altered waters defined by original Drainage Scheme embankments and channels, which are maintained at status quo. Normally none or limited maintenance required in tidal areas. Review extent of site's maintenance, proximity and extents of these habitats.
Humid dune slacks [2190]	Non Priority	
Estuaries [1130]	Non Priority	
Coastal lagoons [1150]	Priority	
Large shallow inlets and bays [1160]	Non Priority	

Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	Non Priority	
<i>Salicornia</i> and other annuals colonizing mud and sand [1310]	Non Priority	
Mudflats and sandflats not covered by seawater at low tide [1140]	Non Priority	
Limestone pavements [8240]	Priority	Consider impact of spoil deposition. Review extent of site's maintenance and proximity of this habitat.
Petrifying springs with tufa formation (Cratoneurion) [7220]	Priority	Instream water flow with crustation formation possibly susceptible to maintenance works. Review extent of site's maintenance and proximity of this habitat.
Category III (Highly unlikely significant effect)		
Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349]	Fauna	Lower River Shannon SAC only. Primarily embankment maintenance works. No works in open estuary waters.
Marsh fritillary Butterfly (<i>Euphydryas aurinia</i>) [1065]	Fauna	Clara Bog SAC only with one channel intersecting the same. Species has a transient nature with limited proximity to maintenance works.
Petalwort (<i>Petalophyllum ralfsii</i>) [1395]	Flora	Coastal dunes and machair based plant. Limited proximity to maintenance works.
Slender naiad (<i>Najas flexilis</i>) [1833]	Flora	Lough Corrib SAC only. Only occurs in the Northwestern part of Lough Corrib and is not in close proximity to maintenance operations.
Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150]	Priority	None or limited maintenance required in proximity to dune systems.
Dunes with <i>Salix repens ssp. argentea</i> (<i>Salix arenariae</i>) [2170]	Non Priority	
Embryonic shifting dunes [2110]	Non Priority	None or limited maintenance required in proximity to dune systems.
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Priority	
Machairs (* in Ireland) [21A0]	Priority	
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	Non Priority	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210]	Priority	Channel adjacent grasslands would have a disturbed riparian corridor created by the original Drainage Scheme works. Maintenance holds this corridor at status quo.

Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) [1420]	Non Priority	None or limited maintenance required in these tidal areas.
<i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320]	Non Priority	
Perennial vegetation of stony banks [1220]	Non Priority	
Annual vegetation of drift lines [1210]	Non Priority	
Sandbanks which are slightly covered by sea water all the time [1110]	Non Priority	
Reefs [1170]	Non Priority	No maintenance operations on Reef or Cliff formations.
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Non Priority	
<i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]	Non Priority	Channel adjacent to scrub or woodland, would have a disturbed riparian corridor created by the original Drainage Scheme works. Maintenance holds this corridor at status quo.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0]	Non Priority	
<i>Taxus baccata</i> woods of the British Isles [91J0]	Priority	

5.2.2 SPA Categorisation

Similar to the SAC categorisation, the methodology sub-divided conservation aspects into three categories. The following describes the reasoning used for categorising the bird species of SPAs and is judged to be a relatively straightforward but appropriate logic:

- Category I Birds that inhabit, for the whole of the year, either a waterway corridor or an adjoining wetland, hence they are consistently in close proximity to maintenance works and could have sensitivities to habitat impacts or disturbance. It is deemed that there is a realistic possibility that a significant effect could occur and some form of ecological assessment is warranted.
- Category II Birds that inhabit, for part of the year, either a waterway corridor or an adjoining wetland. They may be in close proximity to maintenance operations for a portion of their life and their sensitivity is partly determined by what activity they carry in the area e.g. breeding, feeding or resting. Further analysis is required to delineate their proximity to maintenance works and judge their susceptibility to habitat impacts or disturbance. There is insufficient information at present to decide if they are to be deemed as Category I or Category III.
- Category III Birds that rarely inhabit either a waterway corridor or an area adjoining a waterway. They would normally not be in close proximity to maintenance operations; hence they would not be as sensitive to habitat impacts or disturbance by these works. It is expected that a significant impact is highly unlikely and further study would not be warranted.

Table 5.2 shows the categorisation of SPA special conservation interests with a summary description of the reasoning behind the categorisation decision further expanded as follows:

Category I consists of birds that inhabit a maintained waterway corridor for the predominant portion of their lifecycle, hence maintenance works could impact along a significant portion of the species habitat. The kingfisher is the one species identified.

Category II typifies birds that either inhabit a maintained waterway or adjoining areas for part of their lifecycle. Birds such as geese that reside for winter only, may be disturbed by maintenance operations on their feeding or resting grounds. Birds such as mallard are residents and in addition to disturbance, could have breeding impacted upon. Further analysis is required to delineate the relevant habitats of these species, identify their proximity to maintenance operations, consider the frequency and seasonality of these operations and make judgment as to what impacts could be significant. Impacts deemed to have a realistic possibility that a significant effect could occur will be assigned to Category I and an ecological assessment will be carried out. Species or aspects to species that are not deemed to be possibly significant will be assigned to Category III.

Category III consists of birds that rarely inhabit either a maintained waterway corridor or adjoining areas. It is expected that a significant impact is highly unlikely and further study would not be warranted unless contrary knowledge arises in the future. These are divided into four broad groups:

Birds of prey such as hen harrier and birds like the chough where they nest in highlands or forest and where maintenance operations would only be ongoing in a small portion of their hunting range at any one time.

Winter migrant species largely breed outside Ireland and spend the majority of their winter on coastal areas such as the grey plover and knot. Some species such as the pintail can interchange between coastal and inland waters. Coastal species are seldom in close proximity to maintenance

operations and species that interchange habitats cover large ranges and would have incurred minimal impact due to localised maintenance operations.

Present all year birds breed in Ireland and many species have their population boosted in winter with an influx of migrants. Some species such as the oystercatcher spend their full lifecycle on the coast and others like the red-throated diver can interchange between coastal and inland waters. These species would seldom be in close proximity to maintenance operations.

Passage migrants such as the ruff will spend only a small portion of their time in Ireland. It is foreseen that these species would not normally be in close proximity to maintenance operations.

Table 5.2 Categorisation of SPA Special Conservation Interests

Conservation Aspect	Annex 1 or Migratory	Comment (Season of residence & Sensitivity to Drainage Maintenance)
Category I (Possible significant effect)		
Kingfisher (<i>Alcedo atthis</i>) [A229]	Annex 1	Present all year. Typically inhabits river corridors. Possibly sensitivity to drainage maintenance.
Category II (Further information required to assess if Category I or III)		
Arctic Tern (<i>Sterna paradisaea</i>) [A194]	Annex 1	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Barnacle Goose (<i>Branta leucopsis</i>) [A396]	Annex 1	Winter only. Typically inhabits coastal grass & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Black-headed Gull (<i>Larus ridibundus</i>) [A179]	Migratory	Present all year with influx in winter. Typically inhabits coastal waters & lakes. Not normally in close proximity to maintenance operations.
Black-tailed Godwit (<i>Limosa limosa</i>) [A156]	Migratory	Winter only. Typically inhabits estuaries & mudflats. Not normally in close proximity to maintenance operations.
Common Gull (<i>Larus canus</i>) [A182]	Migratory	Present all year with influx in winter. Typically inhabits coastal waters & some inland lakes. Not normally in close proximity to maintenance operations.
Common Tern (<i>Sterna hirundo</i>) [A193]	Annex 1	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Coot (<i>Fulica atra</i>) [A125]	Migratory	Present all year with influx in winter. Typically inhabits lakes and marshes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Cormorant (<i>Phalacrocorax carbo</i>) [A017]	Migratory	Present all year moving inland in winter. Typically inhabits coastal waters & summer lakes and rivers. May have some sensitivity to maintenance works particularly disturbance.
Corncrake (<i>Crex crex</i>) [A122]	Annex 1	Summer only. Typically inhabits grassland. Only one maintained channel within this SPA i.e. Middle Shannon Callows, hence there is limited scope for the species to be in close proximity to maintenance works. However, this region is a stronghold for this species and warrants further investigation.
Great-crested Grebe (<i>Podiceps cristatus</i>) [A005]	Migratory	Present all year. Typically inhabits lakes and some estuaries. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Greenland White-Fronted Goose (<i>Anser albifrons</i>) [A395]	Annex 1	Winter only. Typically inhabits freshwater marshes & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Curlew (<i>Numenius arquata</i>) [A160]	Migratory	Present all year. Typically inhabits winter coastal areas and summer moorland and rough grassland. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Gadwall (<i>Anas strepera</i>) [A051]	Migratory	Few present all year, mainly winter only. Typically inhabits inland lakes. May have some

		sensitivity to maintenance works particularly disturbance.
Goldeneye (<i>Bucephala clangula</i>) [A067]	Migratory	Winter only. Typically inhabits coastal waters and large lakes. May have some sensitivity to maintenance works particularly disturbance.
Golden Plover (<i>Pluvialis apricaria</i>) [A140]	Annex 1	Present all year with influx in winter. Typically inhabits coastal areas & farmland in winter. May have some sensitivity to maintenance works particularly disturbance.
Greylag Goose (<i>Anser anser</i>) [A043]	Migratory	Few present all year, mainly winter only. Typically inhabits coastal grasslands and farmland. May have some sensitivity to maintenance works particularly disturbance.
Lapwing (<i>Vanellus vanellus</i>) [A142]	Migratory	Present all year with influx in winter. Typically inhabits undisturbed farmland, marshes and shoreline. May have some sensitivity to maintenance works particularly disturbance.
Little Grebe (<i>Tachybaptus ruficollis</i>) [A004]	Migratory	Present all year. Typically inhabits rivers and lake edges. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Little Tern (<i>Sterna albifrons</i>) [A195]	Annex 1	Summer only. Typically inhabits coastal areas. May have some sensitivity to maintenance works particularly disturbance.
Mallard (<i>Anas platyrhynchos</i>) [A053]	Migratory	Present all year with influx in winter. Typically inhabits rivers and lakes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Pochard (<i>Aythya ferina</i>) [A059]	Migratory	Few present all year, mainly winter only. Typically inhabits lakes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Red-breasted Merganser (<i>Mergus serrator</i>) [A069]	Migratory	Present all year. Typically inhabits rivers, lakes and winter coastal areas. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Redshank (<i>Tringa totanus</i>) [A162]	Migratory	Present all year with influx in winter. Typically inhabits winter coastal areas and summer marshes and moorlands. May have some sensitivity to maintenance works particularly disturbance.
Sandwich Tern (<i>Sterna sandvicensis</i>) [A191]	Annex 1	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Shoveler (<i>Anas clypeata</i>) [A056]	Migratory	Few present all year, mainly winter only. Typically inhabits marshes and lakes with shallow muddy shores. May have some sensitivity to maintenance works particularly disturbance.
Teal (<i>Anas crecca</i>) [A052]	Migratory	Present all year with influx in winter. Typically inhabits marshes, lakes and estuaries. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Tufted Duck (<i>Aythya fuligula</i>) [A061]	Migratory	Present all year with influx in winter. Typically inhabits lakes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Whooper Swan (<i>Cygnus cygnus</i>) [A038]	Annex 1	Winter only. Typically inhabits lakes & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Wigeon (<i>Anas penelope</i>) [A050]	Migratory	Few present all year, mainly winter only. Typically inhabits estuaries, mudflats and lakes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Category III (Highly unlikely significant effect)		
Bar-tailed Godwit (<i>Limosa lapponica</i>) [A156]	Annex 1	Winter only. Typically inhabits estuaries, mudflats and flood meadows. Not normally in close proximity to maintenance operations.

Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346]	Annex 1	Rivers Shannon & Fergus Estuaries SPA only. Present all year. Typically inhabits mountain & coastal cliff areas. Not normally in close proximity to maintenance operations.
Common Scoter (<i>Melanitta nigra</i>) [A065]	Migratory	Few present all year, mainly winter only. Typically inhabits coastal waters & some moorlands. Not normally in close proximity to maintenance operations.
Dunlin (<i>Calidris alpina</i>) [A149]	Migratory	Few present all year, mainly winter only. Typically inhabits estuaries, mudflats and moorlands. Not normally in close proximity to maintenance operations.
Great Northern Diver (<i>Gavia immer</i>) [A003]	Annex 1	Winter only. Typically inhabits coastal waters & estuaries. Not normally in close proximity to maintenance operations.
Greenshank (<i>Tringa nebularia</i>) [A164]	Migratory	Mainly Winter only but also passage migrant. Typically inhabits mudflats, shoreline & marshes. Not normally in close proximity to maintenance operations.
Grey Plover (<i>Pluvialis squatarola</i>) [A141]	Migratory	Winter only. Typically inhabits estuaries and mudflats. Not normally in close proximity to maintenance operations.
Hen Harrier (<i>Circus cyaneus</i>) [A082]	Annex 1	Present all year. Typically inhabits moorland & young forest. Not normally in close proximity to maintenance operations.
Knot (<i>Calidris canutus</i>) [A143]	Migratory	Winter only. Typically inhabits estuaries and mudflats. Not normally in close proximity to maintenance operations.
Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]	Migratory	Mainly Summer only with some for winter only. Typically inhabits coastal areas, lakes and moorlands. Not normally in close proximity to maintenance operations.
Light-bellied Brent Goose (<i>Branta bernicla</i>) [A046]	Migratory	Winter only. Typically inhabits coastal waters and estuaries. Not normally in close proximity to maintenance operations.
Merlin (<i>Falco columbarius</i>) [A098]	Annex 1	Present all year. Typically inhabits moorland. Not normally in close proximity to maintenance operations.
Oystercatcher (<i>Haematopus ostralegus</i>) [A130]	Migratory	Present all year. Typically inhabits beaches and estuaries. Not normally in close proximity to maintenance operations.
Pintail (<i>Anas acuta</i>) [A054]	Migratory	Winter only. Typically inhabits estuaries and lakes. Not normally in close proximity to maintenance operations.
Red-throated Diver (<i>Gavia stellata</i>) [A001]	Annex 1	Present all year with influx in winter. Typically inhabits coastal waters & some mountain lakes. Not normally in close proximity to maintenance operations.
Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	Migratory	Present all year. Typically inhabits sandy and shingle beaches. Not normally in close proximity to maintenance operations.
Sanderling (<i>Calidris alba</i>) [A144]	Migratory	Winter only. Typically inhabits sandy beaches. Not normally in close proximity to maintenance operations.
Scaup (<i>Aythya marila</i>) [A062]	Migratory	Winter only. Typically inhabits coastal waters. Not normally in close proximity to maintenance.
Shelduck (<i>Tadorna tadorna</i>) [A048]	Migratory	Present all year with influx in winter. Typically inhabits estuaries & mudflats. Not normally in close proximity to maintenance operations.
Turnstone (<i>Arenaria interpres</i>) [A169]	Migratory	Winter only. Typically inhabits coastal areas. Not normally in close proximity to maintenance.

5.3 Research Strategy Undertaken

The following were the numbers of conservation aspects for each category of potential impact in respect of arterial drainage maintenance nationally:

Category	SACs	SPAs
Category I	11No. Species & 9No. Habitats	1No. species
Category II	2No. Species & 20No. Habitats	32No. species
Category III	6No. Species & 18No. Habitats	24No. species

Category I aspects were prioritised for research which is now completed in the form of EclAs. Appropriate Assessments for arterial drainage maintenance are to have particular regard to Category I, consider Category II on a site specific basis and can expect that Category III aspects would have little potential impacts unless some unusual site-specific scenario was identified.

The 2007 Screening Report, along with all emanating EclAs are published in a series entitled “*Series of Ecological Assessments on Arterial Drainage Maintenance*”, under the International Standards Series Number ISSN 1649-9840. The completed series listed in Table 5.3 are available in all main Irish and UK university libraries, and can be downloaded through www.opw.ie/en/FloodRiskManagement/Publications/. The EclAs focused on a range of Annex I habitats and Annex II species and were through a mixture of independent ecological consultants, statutory authorities and NGOs. Twelve EclAs were identified and eleven were completed. The recommended EclA on “*Overwintering birds frequenting inland areas with particular focus on disturbance*” is not to proceed. In consultation with BirdWatch Ireland, it was decided that the potential disturbance to wintering birds is not of a sufficient scale to justify a full EclA. Alternatively, OPW and BirdWatch Ireland extended kingfisher research, which was ongoing at that time.

Table 5.3 *Series of Ecological Assessments on Arterial Drainage Maintenance*

Issue No.	Title
1	Screening of Natura 2000 Sites for Impacts of Arterial Drainage Maintenance Operations
2	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on Raised Bogs & Associated Habitats
3	EclA in Relation to Atlantic Salmon in Special Areas of Conservation & potential for Impact of OPW’s Channel Maintenance Work
4	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on the Otter (<i>Lutra lutra</i>)
5	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on Water Courses of Plain to Montane Levels with Aquatic Vegetation (Floating River Vegetation)
6	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on birds Dependent on Riparian Habitats
7	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on freshwater pearl mussels
8	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on the Turloughs
9	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on three Lamprey Species (<i>Lampetra planeri</i> Bloch, <i>Lampetra fluviatilis</i> L., and <i>Petromyzon marinus</i> L.)
10	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on White-clawed Crayfish (<i>Austropotamobius pallipes</i>)
11	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on Fens, Mires & Whorl Snails
12	EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (<i>Alcedo atthis</i>) and other Riparian Birds II.

5.4 Species / Habitat Specific Impacts

5.4.1 Impacts to Special Conservation Interests

There is potential for indirect temporary slight to moderate negative impacts on special conservation interests from noise and visual disturbance from the use of plant and machinery depending on the timing of the activities. Overwintering species present could be disturbed during grazing and roosting during maintenance activities in the winter months. Spring and summer nesting species could be disturbed during nest building on tendering young, from maintenance activities in the summer months. Silt removal may result in a reduction of water quality due to the release of suspended solids or the accidental release or spillage of hydrocarbons from excavators which may impact on downstream habitats supporting special conservation interest species. A chronic or large scale pollution event has the potential to result in a more severe impact. Such indirect negative impacts, if severe, could result in a reduction in the numbers / abundances of bird species of the SPA due to reductions in habitat quality, water quality and associated feeding opportunities. Due to the scale of works during typical maintenance, tree cutting and woody vegetation cutting are unlikely to cause a significant impact on special conservation interests. Special conservation interests could also be affected by non-native invasive species. There is potential for the spread of invasive species throughout the Natura 2000 sites, through the movement of plant and machinery in the absence of avoidance and mitigation measures.

5.4.2 Impacts to Annex I Bird Species

The main threats/pressures to kingfisher populations are disturbance (humans, pathways, road traffic etc.), water pollution, lowered fisheries production (due to pollution or in-stream vegetation removal) and removal of overhanging vegetation/scrub (Cummins et al., 2010). Kingfishers are visual foragers; they may therefore be affected if drainage maintenance activities alter water quality and/or clarity. Studies have also shown that kingfishers will often not return to nest in an area if there is ongoing disturbance nearby (Boag 1982).

5.4.3 Impacts to Annex I Habitats

There is the potential for permanent direct and indirect hydraulic impacts on Annex I wetland habitat such as bogs, fens, turloughs and alluvial forests. There is also potential for indirect negative impacts on these water dependent Annex I habitats as a result of maintenance activities, in the event of a chronic or large scale pollution event. Direct impacts to the Annex I habitat floating river vegetation – Watercourses of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation [3260] are possible as a result of instream silt and vegetation removal where this species is present. Direct impacts on estuarine Annex I habitats as a result of maintenance activities are not anticipated as the invertebrates and fish species present in these Annex I habitat types exist within a dynamic environment, which is regularly disturbed by tidal inundation and wave action. It is not envisaged that there would be a significant negative impact on these habitats as it is anticipated that species numbers and diversity would be rapidly restored through natural recolonisation subsequent to completion of maintenance activities. Annex I habitat could also be affected by non-native invasive species. There is potential for the spread of invasive species throughout the Natura 2000 sites, through the movement of plant and machinery in the absence of avoidance and mitigation measures.

5.4.4 Impacts to Annex II Species

Potential impacts to Annex II species are as above for special conservation interest species. In addition to those impacts, there is potential for a temporary loss of aquatic habitat in the vicinity of the drainage maintenance work due to localised in-stream works. The release of silts could also impact directly on water dependant Annex II species by blocking the respiratory organs (i.e. gills) of

fish and the breathing apparatus of filter feeders such as mussels. The removal of overhanging vegetation could influence water temperatures and exposure to direct sunlight which could have direct or indirect impacts on Annex II species and or on feeding opportunities provided by in-stream macro-invertebrate, algae and plant species community in terms of the abundance and/or diversity of species which form a food resource. Experience from environmental assessments over the years shows that a number of Annex II species are particularly sensitive to drainage maintenance operations and are their potential impacts are expanded upon below.

Freshwater pearl mussel

Deterioration in river bed and river water quality has resulted in the majority of mussel populations failing to recruit young mussels over the last 30 year period, and widespread extinction of mussel populations is predicted. One of the most essential requirements for pearl mussel conservation is the removal of the risk of any sediment reaching the river, as any one single incident has such long term ramifications. Fine sediment, once introduced to a pearl mussel river, can continue to cause very serious effects on a long term basis and direct ingestion of silt by adult mussels can lead to rapid death. Turbidity, particularly from fine peat entering the water, causes adult mussels to clam up (they close their shells tightly and do not filter water through their siphons), a response that provides a protection against ingesting damaging fine particles. If the river water remains strongly turbid for a number of days, mussels can die from oxygen starvation, either from remaining clammed, or from ingesting contaminated water while stressed. During a time of year when water temperatures are high, oxygen depletion in the body occurs more rapidly, and mussels die more quickly. The evolutionarily primitive Margaritifera gills and the annual brooding of young in all four of the gills demand a continuous, high supply of oxygen.

Once a silt load enters a river that holds a pearl mussel population, it can continue to cause harm. Silt causes river changes, which in turn change the dynamics of the river into the future (Curran & Wilcock 2005, Colosimo & Wilcock 2005, Dietrich et al. 1989). Increases in fine material in the bed and suspended in the water column, and consequent changes in channel form, may affect mussels in many ways and at various stages in their life cycle. The direct kill to adults is only the first stage in the damage that silt causes to the population. Sediment that infiltrates the substrate decreases oxygen supply in the juvenile habitat, which prevents recruitment of the next generation. The sediment subsequently provides a medium for macrophyte growth, a negative indicator in pearl mussel habitats. Macrophytes then smother the juvenile habitat even further, and the macrophytes trap more sediment, exacerbating the problem in the long term.

Atlantic Salmon

In relation to Atlantic salmon there is also potential for a reduction in water quality which could result in a temporary to short-term indirect slight to significant negative impact on the salmonid populations. For example, in situations of low flow, where adult salmon would be dependent on finding deep pool areas to rest up while waiting for flood conditions to draw them further upstream, deposition of silt in pool or low-velocity reaches could cause stress to fish and may displace adult salmon down river (King, 2007). In general, OPW drainage maintenance works provide clear-water windows post-completion of works each day and at weekends. These breaks provide clear-water windows for adult salmon to pass through areas of maintenance work. A chronic or large scale pollution event has the potential to result in a more severe impact. In relation to juvenile salmon, drainage maintenance activities in the smaller spawning and nursery channels with resident juvenile salmon can adversely impact on these life stages. This may be particularly the case in low flow situations that pertain in summer – early autumn resulting in a direct significant negative impacts on juveniles salmon as a result of stress (King, 2007). The disturbance and/or siltation of spawning and nursery salmonid habitat (i.e. 'clean gravels') due to drainage maintenance activities may result in an indirect temporary moderate to significant negative impact on the salmonid populations.

Sea, River and Brook Lamprey

In addition to the impacts described above for Atlantic salmon, the following also applies to sea/river/brook lamprey. Loss of in-stream silts/fines and vegetation may result in an indirect temporary moderate negative localised impact on the habitat of lamprey. Removal of individuals within the excavator bucket during siltation/vegetation removal operations may result in a short-term to long-term direct significant negative localised impact on lamprey populations depending on recruitment rates and frequency of maintenance works. Spawning lamprey may be disturbed resulting in the loss of year classes.

White-clawed Crayfish

Impacts to white-clawed crayfish during drainage maintenance activities are likely to reflect those of Atlantic salmon. In addition, potential impacts may arise from the removal of in-stream and marginal vegetation which may result in an indirect temporary significant localised impact due to loss of habitat and shade, food resources and exposure of white-clawed crayfish to predators. Individuals may emigrate from a section of channel due to loss of habitat. Breeding white-clawed crayfish or females carrying eggs may also be disturbed (King et al., 2008). A long-term significant negative impact may occur depending on frequency of drainage maintenance activities. In addition to the above impacts, the cutting of riparian trees (with in-stream roots) may also disturb white-clawed crayfish resulting in an indirect temporary moderate negative localised impact as white-clawed crayfish often seek refuge within tree roots. Individuals may also be displaced as a result of the bough-wave created by the excavator bucket or it may induce an escape reaction resulting in a direct temporary slight negative localised impact on population size. Removal of individuals within the excavator bucket during in-stream and marginal vegetation removal operations, and the disposal of resultant spoil on riverbank, may result in a direct short-term to long-term significant negative localised impact on the population size of white-clawed crayfish depending on frequency of maintenance and recruitment rates (King et al., 2008).

Otter

Direct disturbance and loss of an otter holt would result in a significant negative impact, in the case of a breeding holt. Otters are generally crepuscular animals and given that maintenance activities are undertaken during full daylight hours, this would suggest that disturbance of foraging would not be a factor during these hours. Otters are likely to avoid the works by leaving resting in holts and lay-ups during the day due to noise and visual disturbance. This would result in a temporary indirect slight negative impact. The significance would potentially be higher, however, while females are rearing cubs as it would be more difficult for a female to move cubs than say a male to move resting locations. Furthermore, the food resources of otter are unlikely to be impacted by a reduction in water quality due to the release of suspended solids or the accidental release or spillage of hydrocarbons from excavators. However, a chronic or large scale pollution event could result in a reduced food supply i.e. where reductions in water quality affect macro-invertebrate diversity and abundance and fisheries production. Loss of habitat / vegetation cover (scrub clearance) could result in reduced habitat quality and cover for otter.

5.4.5 Annex IV Species

Bats, especially species such as Daubenton's Bat, are very dependent on good water quality and sufficient riparian vegetation (Aughney & Roche, 2006). The removal of woody vegetation cover could result in reduced habitat quality and feeding areas and the fragmentation of commuting/foraging route for Bats. The removal of overhanging branches could result in impacts on bat roosts in the absence of a careful and considered approach to limb removal. The removal of in-stream vegetation may also locally reduce the prey base (of aerial aquatic insects) such as simuliid black flies that occur in high densities on aquatic vegetation.

5.5 Cumulative Impacts with other Plans / Programmes

Appropriate Assessment requires consideration of the Programme in combination with other plans or projects, which may give rise to cumulative impacts affecting Natura 2000 Sites. Chapter 6 of the SEA Environmental Report addresses the relationship between the Programme and the objectives of relevant plans, policies and programmes at international, national, regional and local level. At a national level, this includes the National Spatial Strategy 2002-2020, National Development Plan 2007-2013, Wildlife Act 1976 and Amendment Act 2000, National Biodiversity Plan (2011) and the Birds and Natural Habitats Regulations which were revised in 2011. Plans and programmes at a regional level considered were the Regional Planning Guidelines, River Basin Management Plans and the future Flood Risk Management Plans with a number of plans at local level considered including County and City Development Plans, County and City Heritage Plans, County and City Biodiversity Action Plans and Local Area Plans. There are no known plans/projects on-going or proposed which may give rise to any cumulative impact with this Programme.

5.6 Impact Assessment Programme Part 2 – High Risk Channel Designation

High risk channel designation is at strategic development stage and specific projects are not identifiable for this stage. In the future, as individual projects are identified, the project level AA process will consider the potential for impacts, which will be similar in nature to the impacts described in this Section for Part 1 of the Programme. Impacts identified as part of the AA process, will have mitigation applied similar to as described in Section 6 for Part 1 of the Programme. In addition, cumulative impacts with other plans / programmes will be considered once the individual projects are identified.

6. Mitigation

6.1 Introduction

The SEA Environmental Report has assessed the potential positive and negative environmental impacts from the implementation of the Arterial Drainage Maintenance and High Risk Channel Designation Programme across a wide range of sectors including human beings, flora and fauna, geology and soils, water, air and climate, landscape, cultural heritage, material assets and cumulative impacts. These are described in detail in Chapter 9 of the SEA Environmental Report with mitigation measures and monitoring set out in Chapter 10.

These mitigations measures apply equally to the entire Programme, hence an equivalent level of environmental practice and enhancement is given both inside and outside of Natura 2000 sites for national arterial drainage maintenance operations. The Programme of drainage maintenance works and high risk channel designation, entails the OPW's Environmental Management Protocols which are standard procedure and an inherent component of statutory drainage maintenance operations. Any arterial drainage maintenance operations carried out in the State automatically include OPW's Environmental Management Protocols. In accordance with the SEA process, these Protocols are part of the Programme and under strict definition are not a separate mitigation measure. However, in the interest of simplicity in presenting the information, these Protocols and the associated framework of environmental practices are set out within this Chapter 6 as mitigating measures.

6.2 Mitigation Measures relevant to Programme Part 1 – Arterial Drainage Maintenance

6.2.1 Environmental Management Protocols

An environmental management framework was developed in 2009, based largely on the Ecological Impact Assessments (EclAs) carried out under OPW's environmental research strategy detailed in Chapter 5 of this report. A set of Environmental Management Protocols were formally introduced nationally in May 2009 which sets out how regional management staff manage a range of aspects, from environmental stakeholder consultations, forward planning for Appropriate Assessments, national recording of relevant conservation data, the approach to a range of protected species such as white-clawed crayfish, lamprey, otter etc, through to the approach to invasive species. A copy of the OPW's Environmental Management Protocols are presented in Appendix II and are also available to download via the OPW website www.opw.ie from the publications page.

A number of Standard Operating Procedures (SOPs) have been used in operations for some years, but in May 2009, a full suite of SOPs (7 No.) were introduced nationally in a folder format to be used by all operational staff on-site. SOPs set out actions designed to eliminate, or substantially reduce impacts to identified protected species and their associated habitats. The complete set of OPW's Environmental Management Protocols and Standard Operating Procedures are shown in Appendix 2. The 7 SOP's currently in place are as follows:

- Environmental Drainage Maintenance Guidance Notes
- Crayfish SOP
- Lamprey SOP
- Mussels SOP
- Otter SOP
- Invasive Species SOP
- Zebra Mussel SOP

6.2.2 Liaison with Statutory Bodies

In light of the fact that drainage works are predominately within inland waters, Inland Fisheries Ireland (IFI) and the National Parks & Wildlife Service (NPWS) are seen as the primary statutory body stakeholders. Over the years, working relationships have been established with these

stakeholders. Their regional management now have the opportunity to review the annual works programme and operational staff have developed open, on-site communications with many of the fishery officers, conservation rangers and district conservation officers, which integrates a deeper understanding of practical environmental protection within maintenance works.

Observations or comments on practical measures to either mitigate possible environmental impacts or exploit enhancement opportunities are integrated into the maintenance works. While the current communication framework offers adequate positive interaction, it is a requirement to continuously develop consultations at all staff levels with both Inland Fisheries Ireland and National Parks and Wildlife Service.

6.2.3 Environmental Drainage Maintenance

IFI research has been ongoing with OPW since the early 1990's. This research work known as the Environmental Drainage Maintenance (EDM) Programme developed environmentally friendly maintenance guidance, which is applicable both inside and outside Natura 2000 Sites. The most recent version of these guidance is as published in the SOP Environmental Drainage Maintenance Guidance Notes (10 Steps to Environmentally Friendly maintenance). This guidance has 'softened' drainage maintenance works and has proven to be effective in reducing potential environmental impacts for all associated habitats and species, either directly or indirectly. The EDM programme was followed by the Environmental River Enhancement Programme (EREP) which is explained below.

6.2.4 Environmental River Enhancement Programme

This OPW funded programme aims to enhance the river corridor, to support the achievement of 'good ecological status' under the WFD and increasing biodiversity in support of the National Biodiversity Plan. Drainage channels due to their man-made nature, have less diversity with more extensive lengths of uniform depths, widths and gradients. Enhancement involves the increase of structural diversity of the river corridor to create a more natural physical form. This is achieved through a range of enhancement techniques, such as construction of various instream stone structures, excavating pools and building riffles, fencing of river banks to allow vegetation regeneration etc. Reintroduction of more natural structural diversity within the river corridor increases the species richness in the river and has a positive effect on the whole food web surrounding the river corridor, which supports all the associated habitats and animals. Enhancement works also includes remediation of fish barriers which have positive effects on the access for spawning fish and other aquatic species for large distances upstream.

The Arterial Drainage Maintenance Service of Engineering Services, OPW carried out this five year Environmental River Enhancement Programme (2008 - 2012) in conjunction with IFI, and is now progressing with a new agreement, EREP 2013-2017. The enhancement works consist of both capital enhancement and enhanced maintenance. These works focus on river corridor improvements to salmonid channels with specific actions on 100 kilometres of scheme channel per annum, with biodiversity and hydromorphological monitoring. The enhancement works are being carried out using OPW staff and machinery with the IFI staff working alongside OPW supervisory staff. All materials required for the construction of in-stream structures, gravel and fencing is supplied by OPW. A public brochure with further information on the EREP is available on the OPW website www.opw.ie on the publications page.

6.2.5 Environmental Training

Environmental training of all staff is an ongoing process. Technical and operational staff have completed formal training in environmental river maintenance in 2004 and again in 2010, which contained the more recent environmental practices. This training was developed and delivered by IFI and OPW as part of the EREP. The training programme delivered included presentations in river corridor ecology, maintenance strategies involving both enhanced maintenance and capital

enhancement, and OPW's Environmental Management Protocols and SOPs.

The formal approach to EREP training is complimented with on-site training. Regular site visits from IFI and OPW's Environment Section provide further guidance and advice to operational staff. Auditing of operational staff on the implementation of the Environmental Drainage Maintenance Guidance Notes (Ten Steps to Environmentally Friendly Maintenance) is also carried out as described in Section 6.2.6.

In addition, other environmental training takes place as deemed beneficial, e.g. in 2008, the majority of operational staff were trained in otter awareness. This course, provided by the Department of Zoology, Trinity College Dublin, included presentations on otter ecology, and on-site training in the identification of otter signs and suitable habitat.

6.2.6 Environmental Auditing

External auditing of operational staff, on the implementation of the EDM Guidance Notes (Ten Steps to Environmentally Friendly Maintenance), is carried out by Inland Fisheries Ireland, as part of the EREP covering approximately one-third of OPW drainage machine crews annually.

Internal auditing is carried out by OPW's Environment Section. A number of joint OPW and IFI audits are carried out in tandem annually for standardisation purposes. A standard audit form is used by both IFI and OPW's Environment Section as presented in the Protocols in Appendix 2.

Auditing (both internal and external) informs the OPW of the level of compliance with the EDM approach but also allows for discussion with operational staff on any difficulties encountered and experimental works that could be applied. The OPW foreman is present throughout the audit along with the machine gang, typically two operatives. A section of recently maintained channel is examined along with the next section to be maintained. This gives a good idea of pre-maintenance conditions and enables recommendations to be made about how maintenance should proceed, should changes be required.

A rating system was developed as in Table 6.1, and ratings are monitored by both IFI and OPW to identify any issues with particular machine crews, or any difficulties with particular aspects of environmental maintenance. Audit results are reported in accordance with the Protocols including a copy forwarded to the relevant drainage engineer, issued to OPW's systems co-ordinator for recording within OPW's integrated management system and an annual overview presented in IFI's annual EREP report. Presentations are delivered on the auditing and recommended improvements at an annual meeting had with IFI's EREP team and OPW's engineers, technicians and foremen.

Table 6.1 *Audit Ratings*

Rating %	Category
0-49	Unacceptable
50-59	Poor
60-70	Acceptable
71-84	Good
85-100	Very Good

6.2.7 Scientific Monitoring

The EDM carried out a series of scientific monitoring over years and now the EREP continues a scientific monitoring programme, assesses a range of impacts of routine maintenance and river enhancement projects on the river corridor biodiversity. Vegetation, fish, flora, birds, macro-invertebrates, lamprey and white-clawed crayfish are monitored across a selection of sites. The physical changes in the channels are also monitored. The results of this 5-year monitoring programme will be compiled and reviewed in early 2013 and a further monitoring will then be

developed for the EREP 2013-2017, with a view to identifying areas where further information is deemed necessary.

Three vegetation types are surveyed under the floral monitoring programme including, aquatic (in-channel) vegetation, marginal vegetation and riparian vegetation. A walkover survey of selected sites is used to compile a species inventory of riparian and in-stream species. Quantitative assessments are also carried out within the sites and tree surveys which includes information on composition and abundance of tree cover.

The macro-invertebrate communities of a river respond quickly to change and are a good reflection of conditions in the short term. Their assemblages reflect changes in habitat as well as changes in water quality, as most species have a preference for either fast or slow flowing water, sheltered or exposes areas and silt or cobbles. Sampling is carried out at both experimental and control sites, and a species inventory list compiled.

While the primary focus for the EREP fish stock survey is on salmon and brown trout, data from all species encountered during surveys are recorded. Data collected provides information on population, distribution, age-structure for any species encountered.

Bird surveys are carried out on a selection of sites, using standard survey methods used by BirdWatch Ireland. This monitoring records the abundance, species richness and distribution of bird species in the selected channels, with a view to longterm data to track gains due to river enhancement works.

In terms of the river corridor biodiversity gains due to enhancement works, monitoring to date has shown that the enhancement of the physical regime can greatly improve channel diversity, through the creation of riffle/glide/pool sequences, addition of spawning gravels and certain bank protection. Physical changes to the channel often result in changes in the floral communities, as a more diverse bed material is available. Species such as *Ranunculus* and *Scirpus* tend to favour gravely bed material will softer sediment attracts species like *Sparganium*. These changes to the aquatic, marginal and riparian vegetation can often result in changes to the invertebrate communities. Increased vegetation cover and diversity typically correspond with increased invertebrate diversity and abundance.

Physical monitoring includes pre and post works monitoring of a number of variables such as , bank-full width, wetted width, channel length, depth velocity and canopy cover. The River Hydromorphology Assessment Technique (RHAT) is used to monitor the hydromorphological condition of a selection of channels under EREP, and the data collected will inform the WFD competent authorities and contribute to the overall national assessments on channel morphology.

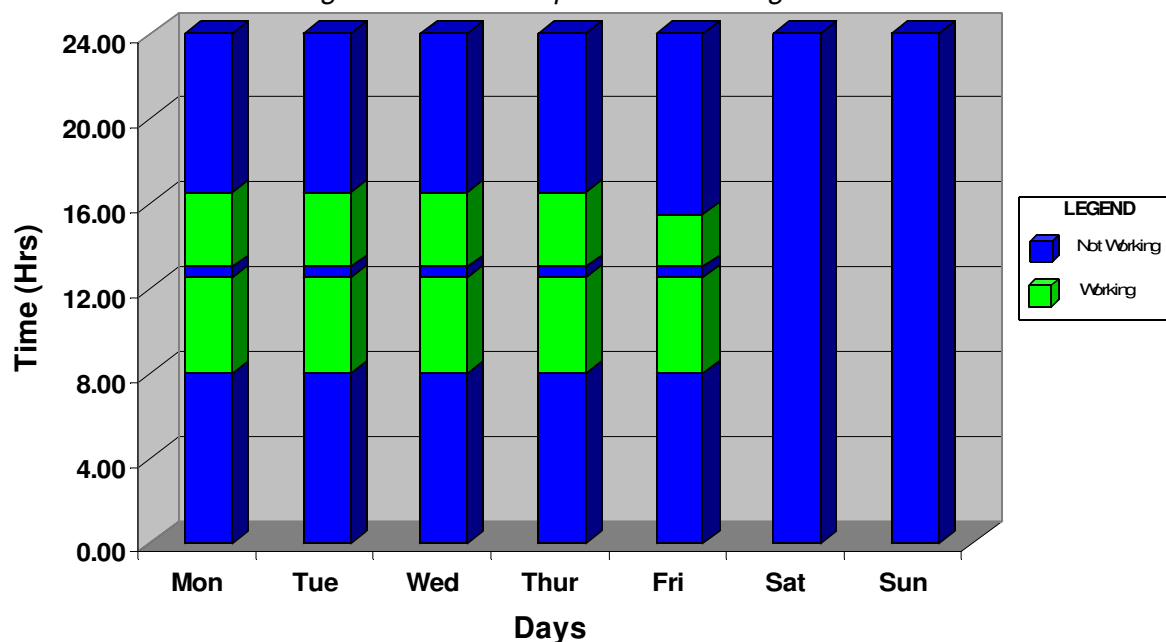
6.2.8 Working Hours

Standard working hours for operational staff are a thirty-nine hour week i.e. from 8:00am to 16:30pm including a 30min lunch break and one 15min tea break, displayed in Figure 6.1 in graphical format. Work ceases at 15:30pm on Friday, with some catchments working until 16.30 on a Friday but reduce the annual working days to balance the working hours. Actual running time for the excavators carrying out works are slightly less than these hours as down-time is necessary to carry out activities such as refuelling, security lock-up measures, health and safety and environmental procedures, facilitating audits, plotting out river enhancement designs, liaison with landowners etc. All channel maintenance operations follow these standard hours except for some infrequent scenarios where overtime of up to a few hours per week may be required. Slightly longer working hours can occur on the more capital project type jobs such as embankment strengthening works. Working hours in these projects may increase up to 10hour days although typically remain at 5 days per week.

The nature of these working hours means that operations are only active for a relatively small

portion within a week. This allows significant periods for clear water flow and means that for the major portion of the time, there is no noise or movement of machinery or operatives, minimising any form of disturbance.

Figure 6.1: *Standard drainage maintenance operations working hours*



6.2.9 Geographical Information Systems

Geographical Information Systems (GIS) are now a significant tool to manage both the existing and future environmental information and to this effect, the Arterial Drainage Maintenance Service has digitised the original Drainage Scheme maps. GIS systems allow the rapid and accurate transfer of geographical environmental data and ultimately, it is intended to contain all maintenance work programmes, fishery information such as spawning reaches, locations of Annex II species, river corridor habitat information, environmentally designated areas, other environmental sensitivities, river enhancement reaches, location of bat kingfisher and dipper boxes and any other relevant environmental information in this format.

There is a continuous flow of environmental data being captured onto OPW GIS systems which includes data being derived from OPW's environmental practices and collating other scattered datasets. It is recognised that this is becoming a valuable source of national conservation information and initial discussions have commenced with the National Biological Records Centre with a view to setting up systems to transfer this information for national conservation purposes.

6.2.10 Appropriate Assessments

All relevant arterial drainage maintenance activities conduct Appropriate Assessment as required. Section 7 explains the extent of Natura 2000 site related assessments between 2009 to 2012 and sets out the numbers of AAs envisaged until 2015.

6.2.11 Environmental Impact Assessments

In accordance with the Environmental Impact Assessment Regulations 1989 to 2006 and the more recent Planning and Development Amendment Regulations 2011, the most applicable class of development relevant to drainage maintenance is in respect of canalisation, with project size thresholds set for canalisation and flood relief works. Arterial drainage maintenance works are sub-Environmental Impact Assessment threshold as the operations are maintaining the river corridor and not canalising any new lengths or altering the existing post drainage catchment

hydraulics. Accordingly, in respect of arterial drainage maintenance, mitigation under this AA integrates with the SEA Environmental Report but does not integrate with an Environmental Impact Statement conducted under an EIA process.

6.2.12 Ecological Assessments

While annually there are a series of AAs carried out for arterial drainage maintenance together with other research and scientific monitoring as described in this section, there also a number of other ecological assessments carried out on an ongoing basis. These typically include targeted ecological surveys or assessments on some protected species or habitat that have been requested for further information through stakeholder consultations. In many cases these ecological surveys and assessments involve an Annex II species within a Natura 2000 site, but where the species is not a designated qualifying interest for that particular Natura 2000 site and there is a lack of information about its conservation within the Natura 2000 site. Types of ecological assessments recently completed includes freshwater pearl mussel stage 1 survey on a portion of the Moy and surveys for the plants triangular club rush and opposite leaved pondweed in the lower Shannon area.

While these ecological assessments do not form part an AA process, they are a further mechanism to increase national conservation information for the benefit of identifying potential impacts on Natura 2000 sites. The surveyed absence of freshwater pearl mussel on a portion of the Moy adds to the national picture of freshwater pearl mussel distribution and while the current national freshwater pearl mussel records database cannot facilitate absence results, this type of information will be held by OPW, as it is conservation information that will be valuable to all water sector stakeholders in the longterm. In terms of assessments for the plants triangular club rush and opposite leaved pondweed, localised surveys have been ongoing by OPW on a recurring basis in the lower Shannon area. In 2012 OPW conducted a review of all the readily available information sources for these plants and produced a distribution map in GIS of these species. This species distribution map with all the associated referenced data sources integrated into GIS, is a valuable piece of national conservation information and it is envisaged that by making this widely available, other stakeholders will build on this information and over time, the State will have a comprehensive GIS map of these species for conservation purposes.

6.2.13 Invasive Species

In terms of potential impacts for non-native invasive species, the Environmental Management Protocols entail procedures for the washing of machinery to prevent transfer between sites. All known locations of zebra mussels nationally which overlap with arterial drainage channels are listed on its SOP and any works in these areas involve consultation with the regional NPWS and IFI to ensure zebra mussels are not spread from the site.

While OPW do not have a statutory function in the control of invasive species established on a Natura 2000 site, on a number of Natura 2000 sites, OPW assist other authorities in these activities as part of a broader assistance in conservation. These works are typically carried out in partnership with statutory environmental authorities such as IFI and NPWS or other Local Authorities. In recent years, there has been much good work completed on management of invasive plant species as part of the Mulkear LIFE project, and with OPW actively involved in the national CAISIE (Control of Aquatic Invasive Species and Restoration of Natural Communities in Ireland) project, OPW have put significant resources in to the research and management of Lagarosiphon major on Lough Corrib. It is envisaged that OPW will continue to be involved in these type of multi-authority partnership projects which are judged to be the most effective mechanism for the State to manage the invasive species impacts.

6.2.14 Water Pollution

One potential source of water pollution from maintenance operations is a diesel or oil leak from

machinery. There are a number of good practices in place which minimise this potential impact. All excavators use biodegradable hydraulic oil which is less harmful if there was a spill but in addition, with the policy to keep the excavator fleet of less than seven years old, combined with a strict mechanical maintenance regime, means that there are little or no risks with leaking machinery or faulty hydraulic pipes etc. In terms of machine refuelling, a strict system of using only self-filling jeep mounted fuel bowzers directly into the machine, removes all risks associated with handling of fuel drums or temporary fuel storage tanks in site. In addition, a small fuel spillage containment kit is available with all excavators with a reserve of containment absorptive booms available in all depots, which can be quickly transported to site in the event of a spillage. While there is an inherent risk with any operations in close proximity to water, there has not been any oil spillage incident of a noteworthy scale in the recent history of drainage operations nationally.

While maintenance activities could have a temporary localised impacts on macroinvertebrates by direct removal or turbidity increases due to suspended solids, expert opinion from the EPA for WFD implementation has concluded that the State has many Q5 quality sites on arterial drainage channels and that arterial drainage channels have good water quality, where there are no other pressures. Accordingly, the State is targeting 'good ecological status' for all of Ireland's arterial drainage channels and is not proceeding with a Heavily Modified Water Body classification.

6.2.15 Species / Habitat Specific Avoidance and Mitigation Measures

The OPW Environmental Management Protocols and SOPs are standard practice for OPW drainage maintenance activities. These SOPs include standard avoidance and mitigation measures to reduce potential impacts on protected species (and habitats of protected species) inhabiting channels which are the subject of drainage maintenance activities.

6.2.15.1 Special Conservation Interests

Timing of maintenance activities can minimise noise and visual disturbance such as, where overwintering species are present, works should preferably be carried out between May to October to avoid potential impacts to the overwintering special conservation interests. Similarly, works should avoid disturbing summer breeding species in trees during the breeding season i.e. April to October. Table 6.2 shows the preferred seasons for maintenance activities in relation to birds. In accordance with the research strategy of EclAs as published in 2007, research was scheduled in the form of an EclA entitled 'Over-wintering Birds Frequenting Inland Areas with Particular Focus on Disturbance'. However, following a number of years of research work with BirdWatch Ireland around the impacts of drainage maintenance on birds, it was concluded that disturbance is not a significant issue in terms of drainage maintenance impacts and does not warrant further study through an individual EclA. This conclusion was issued to all statutory stakeholders. Notwithstanding this conclusion, over a number of years of interactions with environmental stakeholders, on a localised basis, there are certain timings of works adopted by OPW where disturbance was identified as a potential impact e.g. Lough Garra SPA in the Boyle Drainage Scheme, where operations in close proximity to Lough Garra are carried out in the summer periods to minimise any potential disturbance to overwintering geese.

Removal of riparian vegetation cover or marginal reed and tall sedge swamp vegetation in the lower reaches of channels entering SPA habitats should be retained where possible for breeding waterbirds. Recent years with significant changes to Drainage Maintenance practices, there is expected to be an incremental increase in the level of vegetation retained in statutory drainage channels, which is a positive impact for many bird species directly and indirectly. Research, bird surveys and observations by BirdWatch Ireland as part of the work for the EclA on the impacts of riparian birds, concluded that while managed rivers have been shown to impact on bird communities through loss of feeding and/ or nesting habitats, and through disturbance, there was little evidence which suggested that drainage maintenance activities impact on birds. Species abundance and diversity varied widely, even between stretches covered within the same river system. It seems more likely that bird species distribution and abundance is more influenced by

other factors, such as water flow and quality and the complexity of the adjacent bank habitats. The present arterial drainage maintenance regime is less aggressive and less damaging to waterways habitats than the engineering of the original schemes. A number of environmentally friendly measures are already implemented, and are beneficial to birds. This information is published in the *EclA No. 6 Effects of Statutory Arterial Drainage Maintenance Activities on birds Dependent on Riparian Habitats*, as listed in Section 5.3.

Table 6.2 Preferred seasons for maintenance activities for birds (in green)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding Waterbirds												
Overwintering Waterbirds												
General Bird nesting period												

6.2.15.2 Annex I bird species

Avoidance and mitigation measures are as above for special conservation interest species, with the exception of specific requirements for the Annex I species kingfisher such as perching sites. As a component of the *EclA* on kingfisher, there was a series of research and observations carried out by BirdWatch Ireland with this information published in the *EclA No. 12 Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (Alcedo atthis) and other Riparian Birds II*, as listed in Section 5.3.

This study completed quite extensive surveys and compared the kingfisher populations between a historically drained and undrained catchment i.e. the Boyne and the Munster Blackwater. A total of 20 - 22 kingfisher territories were estimated on the Boyne (density of 0.094 – 0.103 territories per kilometre) and 19 - 20 on the Munster Blackwater (0.067 – 0.071 territories/ kilometre) showing a slightly higher density of kingfisher on the drained and maintained catchment. It is recommended that particular attention should be paid to minimise impacts of drainage works on Natura 2000 sites, especially from bank realignment and vegetation removal during the key months of the breeding season i.e. Apr-Jun and to avoid the removal / bashing of bankside vegetation i.e. trees/hedgerow during the breeding season, unless the vegetation is restricting water flow. The research found that the impact of drainage maintenance activities on exclusively riverine-nesting bird species (such a kingfisher), is localised and usually short lived. Results in 2008 showed that Drainage Maintenance activities on the Boyne system do not appear to impact on waterways birds or their habitats at a wider scale. In 2009, there were minimal impacts of drainage maintenance work with respect to species richness along the river corridor. Most disturbances caused by the OPW works were short-lived.

6.2.15.3 Annex I habitats

A significant hydraulic impact and associated loss of wetland habitats would have occurred during the construction of the original Arterial Drainage Schemes. Increased channel capacity and dropped channel bed datum, resulted in a substantial drop in water levels, in the region of one meter for a typical Arterial Drainage Scheme. Research has been carried out on the key Annex I habitats i.e. bogs, fens and turloughs. *EclA No. 2 Effects of Statutory Arterial Drainage Maintenance Activities on Raised Bogs & Associated Habitats*, was published in 2007 with *EclA No. 11 Effects of Statutory Arterial Drainage Maintenance Activities on Fens, Mires & Whorl Snails*, published in 2009. Turloughs are discussed in the paragraph below. Emanating from these studies, potential impacts to the ecology of these wetland habitats can be divided into direct and indirect impacts. Direct impacts of drainage maintenance operations are confined to a narrow corridor along the channel where the machinery access and in most instances such impacts have little or no impact as arterial drainage channels are generally at the periphery or beyond the SAC

boundary where habitats are of less ecological value and due to the abundance of drains locally, of any disturbance or loss to an aquatic species will be short-term and not ecologically significant. However, an indirect impact such as altering the hydrology of the adjoining bog or fen, could have a significant impact on the ecological quality. Decline in habitats such as bogs is a complex issue with many pressures involved and similarly for fen habitats, land drainage and drying out has a detrimental impact on these wetland habitats. Arterial drainage channels in close proximity to these habitats which caused ongoing, long-term drying out of surface, could have potential impacts.

However, as part of OPW's AA process, over the last four years there has been a significant number of ecological walkover surveys on a range of bogs and fen habitats within SACs, including pre and post works ecological observations and some sites been repeated in intervening years. In 2012, more detailed habitat surveying and recording was conducted for some of these sites as part of the new five year AA process and having regard to all the information developed, it was concluded that drainage maintenance is unlikely to have an impact on the hydrology of these bog or fen habitats. Drainage maintenance deals only with existing channels. No deepening or widening takes place, with the hydrology maintained at that of the Arterial Drainage Scheme, which are the hydrological conditions that the Natura 2000 site was designated. These drainage maintenance activities have maintained the same hydrological conditions for decades and it is not anticipated that the maintenance of these channels would have a cumulative hydraulic impact on the Natura 2000 sites as there were no increases in depth or width of the original constructed channels during this extended time period. The concept of restoration i.e. to restore the hydrology of an adjoining wetland towards pre-drainage Scheme conditions, which can be achieved by raising water levels whether through drain blocking or permitting a rise in channel levels by withdrawing statutory drainage maintenance functions, is discussed in Section 6.3.2.

Nationally there are five SACs designated for turlough which overlap with drainage maintenance operations. The *EclA No. 8 Effects of Statutory Arterial Drainage Maintenance Activities on the Turloughs*, reviewed a series of turloughs including the five relevant Natura 2000 sites. From the associated ecological surveys, it is concluded that the current drainage maintenance regime poses no ecological threat to these turloughs. Previously documented plant species information for one of these turloughs, showed that ecologically the Turlough was found to be quite diverse and compared favourably with the historical plant records. In practice, some of these turloughs, while being a component of an Arterial Drainage Scheme were never excavated and in other cases, little or no channel maintenance takes place within the Turloughs except clearance of the associated swallow holes. However, any further arterial drainage works to be undertaken in the future for flood risk management works will need to be carefully assessed as there is potential for negative impacts on turlough habitat. This type of work which proposes to alter the existing hydraulic regime is outside the scope of drainage maintenance activities and would be assessed as part of a separate Flood Relief Scheme or 'designation' type project in the future.

Research on floating river vegetation through the *EclA No. 5 Effects of Statutory Arterial Drainage Maintenance Activities on Water Courses of Plain to Montane Levels with Aquatic Vegetation (Floating River Vegetation)*, shows that floating river vegetation is found in a large range of drainage channels, with some individual species restricted in their distribution while other species being ubiquitous. Floating river vegetation species were found within and beyond Natura 2000 site boundaries. River enhancement which increase channel diversity will be a positive impact for floating river vegetation and many of the EDM practices such as topping berms to form two stage channels will assist create habitat for these species within drainage channels. The removal of excessive tree over for flood or fisheries purposes will also assist by increasing the light into the channel and while high suspended solids could impact negatively on floating river vegetation, the four to six year cycle of maintenance operations will have very short periods of high turbidity and the removal of silt will impact positively on this habitat. Direct removal of floating river vegetation is minimised by standard practices such as retaining marginal vegetation and skipping channels sections where channel capacity is not effected. However, further nationwide information on habitat recognition or plant identification training is required to minimise potential impacts due to

direct removal.

Opposite leaved pondweed (*Groenlandia densa*) is present in large sections of the back drains to embankments in the Shannon region. These are shallow silt channels, maintained, as part of drainage maintenance operations which by the periodic removal of excessive silt deposits, prevents the encroachment of larger emergent vegetation and maintains the suitable conditions for opposite leaved pondweed. Continuation of drainage maintenance will favour the presence of opposite leaved pondweed.

For lake defined habitats standard measures to reduce impacts on water quality and to avoid the spread of non-native invasive species will minimise potential impacts. Where feasible, instream vegetation in channels entering these waters should be retained in the lower reaches during maintenance activities in order to provide a natural screen to silt escapement. Where possible, in stream silt and vegetation management should avoid the lower reaches of channels entering lakes where Annex I habitat 'Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.' is present. Lake defined habitats with multiple attributes considered such as geology, plant communities and water chemistry. There is no direct pH or nutrient outputs from maintenance works with little potential to impact the conditions required for the lake habitats such as 'Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.'.

Maintenance operations typically have limited work within the tidal zone, hence would not involve extensive instream silt and vegetation removal in the lower reaches of channels where the Annex I habitats 'Mudflats and sandflats not covered by water at low tide' and 'Salicornia and other annuals colonising mud and sand' are located. Experience from site surveys and environmental assessments to date indicates that there is very limited potential for impacts due to the proximity of operations and these habitats.

Areas containing Annex I habitats Embryonic shifting dunes, shifting dunes along shorelines with *Ammophila arenaria* ('white dunes'), Embryonic shifting dunes and the priority Annex I habitats, Fixed coastal dunes with herbaceous vegetation ('grey dunes')* and Atlantic decalcified dunes(*Calluno-Uliclea*)*, have a potential to for local destabilisation where machine damaged then marram vegetation binding the sands. However, these are very limited maintenance operations in close proximity to dune systems with little potential impact.

6.2.15.4 Annex II species

Avoidance and mitigation measures for Annex II species are as above for special conservation Interest species. However, in addition the OPW's Environmental Management Protocols and SOPs should be deployed to protect water dependant Annex II species.

Table 6.3 Preferred seasons for maintenance activities for Annex II species (in green)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salmon Spawning												
River & Brook Lamprey Spawning												
Lamprey larvae drift/settlement												
Sea Lamprey												
Crayfish carrying eggs												

Freshwater pearl mussel

The freshwater pearl mussel (FPM), *Margaritifera margaritifera*, is widespread in Ireland in rivers of low pH, but most populations have experienced a decline in recent years. This species inhabits faster flowing clean gravel rivers which limits the extent of overlap with drainage maintenance operations and all known locations of FPM which overlap with Drainage Maintenance channels are listed in the Protocols. Further to the *EcIA No.7 Effects of Statutory Arterial Drainage Maintenance Activities on Freshwater pearl mussels*, current procedures are that operations do not proceed in the vicinity of a FPM location without close consultations with NPWS, joint site visits are conducted and only essential works are to be considered. Furthermore, in accordance with the Mussels SOP, where evidence of a mussel population is found, operations cease until the situation is assessed. This occurred in 2010 for river enhancement works on the Moy, where just as works started, a FPM shell was found. Works ceased and a resultant survey carried out in conjunction with NPWS demonstrated that there was no FPM present and the works advanced in 2011.

Atlantic Salmon

As far as practicable, maintenance works on salmonid channels should avoid the salmonid spawning season and the times during the early life stages of salmonid fish. As described in the *EcIA No.3: Atlantic Salmon in Special Areas of Conservation, and potential for Impact of OPW's Channel Maintenance Work*, the EDM approach to drainage maintenance is the recommended approach to minimise impacts on fisheries. In addition, it supports the established practice of regional fisheries boards restricting drainage maintenance in salmonid (salmon and trout) channels between May to October. Where in-stream works are required during this period (see Table 6.3), consultation should take place with IFI and there is an extensive framework of meetings between regional IFI and OPW staff in many of the drainage regions. Some drainage catchments meet on a bimonthly basis and discuss the proposed programme for the following two months in detail. This high level of interaction ensures that works are carried out in the correct season, can allow for local variations in fish spawning times for specific rivers and allows staff from both OPW and IFI to identify enhancement opportunities. Maintenance work in the smaller spawning and nursery channels with resident juvenile salmon can adversely impact on these life stages and this may be particularly the case in low flow situations that pertain in summer and early autumn. Maintenance is frequently delayed to prevent adverse impact on spawning and intra-gravel life stages.

Maintenance in a downstream direction is likely to benefit Atlantic salmon. Working downstream has the potential to allow solids to settle out naturally in low velocity areas and/or be trapped by instream vegetation not yet removed in maintenance. This vegetation, if present in significant amounts, would form a natural screen and cause deposition of suspended solids. Where gravel beds are heavily compacted or concretised, the tossing of gravels can render the bed suitable for excavation by salmon. This work should be undertaken during the months 1st July to 30th September, but should also take into account the possible presence of white-clawed crayfish, juvenile river and brook lamprey and spawning sea lamprey.

White-clawed Crayfish

Research to date recommends a series of measures that can assist in reducing potential impacts and maintain suitable white-clawed crayfish habitat. Where white-clawed crayfish are confirmed present, instream works should preferably avoid the months of May and June (See table 6.3). The excavator weed-cutting bucket should also be deployed where possible, and when removing silt and instream vegetation, buckets should be held over the water for a sufficient period to allow white-clawed crayfish to escape. All spoil disposed of on the adjacent river bank should be checked for the presence of individual white-clawed crayfish in accordance with OPW's Crayfish SOP, and all stretches of channel identified as suitable habitat to be skipped or more narrow dig, in accordance with the SOP. Typical suitable habitat consists of stretches of rooted vegetation in fine sediment, associated with stands of branched bur-reed (*Sparganium erectum*), in low gradient channels, in foals watercress (*Apium nodiflorum*) dominated gravel or stony channels and in more high gradient riffle-glide habitats with boulders and marginal vegetation such a yellow flag (*Iris pseudacorus*) for refuges.

Crayfish have been shown to be widely distributed in maintained drainage channels, both inside and outside SACs with maintenance on many of the arterially drained channels ongoing since the early 1950s. Research generally indicates a decrease in crayfish numbers twelve months after maintenance. However both the literature and experience in Ireland, shows that crayfish populations fluctuate naturally, particularly due to disease such as crayfish plague. Crayfish populations have changed on some study sites where no maintenance took place while other sites have shown no change even post maintenance. OPW funded studies with IFI to examine the effects of drainage maintenance operations on white-clawed crayfish have been ongoing since 2006 with *EclA No.10 Effects of Statutory Arterial Drainage Maintenance Activities on White-clawed Crayfish (Austropotamobius pallipes)*, published in 2009. As recommended in this EclA, research is to be continued to gather more understanding of potential longterm impacts to Crayfish populations. Accordingly, crayfish research was ongoing as part of the EREP 2008-2012 and is being further continued as part of the new EREP 2013-2017.

As recommended in the EclA, a GIS layer of all known crayfish locations has been developed by OPW which is continuously expanded with information from operational staff in accordance with the Crayfish SOP. This GIS layer also captures all crayfish findings from other related OPW and IFI research and in due course expected to become the key information source for the locations of crayfish on drainage channels nationally.

Sea, River and Brook Lamprey

Research to date recommends a series of measures that can assist reduce potential impact and maintain suitable lamprey habitat. Where river and brook lamprey are known to be present or are encountered during the course of works, the timing of drainage maintenance activities at these locations should take account of the sensitivity of these species and should be managed in accordance with the relevant OPW Protocol and SOP. Where a lamprey record is found, the works should avoid the spawning season (see Table 6.3) where practically feasible. In-stream works on all lamprey-bearing channels with low potential for salmonids should proceed upstream in order to minimise impacts on lamprey, while taking in to consideration the presence of salmonids downstream. Instream vegetation should be retained in the lower reaches of the channels during maintenance activities as these vegetated stretches could form natural screens resulting in the deposition of suspended solids during drainage maintenance activities thus reducing the extent of suspended solids moving downstream into salmonid habitat. This instream vegetation could be removed once activities upstream on the channel have been completed and silt settlement has occurred.

The excavator weed-cutting bucket should also be deployed where possible, and when removing silt and instream vegetation, buckets should be held over the water for a sufficient period to allow lamprey to escape. All spoil disposed of on the adjacent river bank should be checked for the presence of individual lamprey in accordance with OPW's Lamprey SOP and all stretches of channel identified as suitable habitat to be skipped or more narrow dig, in accordance with the SOP. Typical suitable habitat for lamprey consists of low gradient stretches with instream vegetation and silt.

Sea lamprey spawns during the summer months. Where sea lamprey are known to be present or encountered during May to July, the works should avoid the spawning season (see Table 6.3) where practically feasible. In addition, Sea Lamprey construct large redds at spawning sites, of similar dimensions to Atlantic salmon; such structures would be evident in any channel and appropriate avoidance action could be undertaken during the course of drainage maintenance works. Consultation with IFI is required as regional differences in spawning patterns for specific catchments and channels are possible. There is however, no optimal period for instream works in relation to juvenile lamprey but juvenile lamprey transform into adults in August to September, therefore if works were to avoid this period there would be some opportunities for escapement for these individuals.

Similar to crayfish, lamprey have been shown to be widely distributed in maintained drainage channels, both inside and outside SACs with maintenance on many of the arterially drained channels ongoing since the early 1950s. Research shows that maintenance in silting areas, including those with *Sparganium erectum*, have the potential to remove large numbers of juvenile lamprey and their habitat from the channel but these studies have also shown that Lamprey can rapidly colonise newly-created areas of sediment deposition, with sizeable population densities recorded after three years. There is fluctuation in populations and some studies have shown no changes in lamprey post maintenance works. OPW funded studies with IFI to examine the effects of drainage maintenance operations on lamprey have been ongoing since 2006 with *EclA No.9 EclA of the Effects of Statutory Arterial Drainage Maintenance Activities on three Lamprey Species (Lampetra planeri Bloch, Lampetra fluviatilis L., and Petromyzon marinus L.)*, published in 2008. As recommended in this EclA, research needs to continue to gather more understanding of potential longterm impacts to lamprey populations. Accordingly, lamprey research was ongoing as part of the EREP 2008-2012 and is being further continued as part of the new EREP 2013-2017.

Similar to the crayfish, a GIS layer of all known lamprey locations has been developed by OPW which is continuously expanded with information from operational staff in accordance with the Lamprey SOP. This GIS layer also captures all lamprey findings from other related OPW and IFI research and in due course, is expected to become the key information source for the locations of lamprey on drainage channels nationally.

Otter

OPW's Environmental Management Protocols and the Otter SOP introduce site specific avoidance and mitigation measures such as retaining suitable otter habitat where feasible and not working within 50m of a suspected otter holt. Stemming from the *EclA No.4 Effects of Statutory Arterial Drainage Maintenance Activities on the Otter (Lutra lutra)*, otter awareness training was given to all relevant OPW operational staff in 2008. This consisted of talks on otter ecology and on-site training in the identification of otter signs and suitable habitat and was provided by the Department of Zoology, Trinity College Dublin (TCD). Observations to date from site surveys for the EclA and the multiple site visits by TCD for training purposes, indicate that otter are widespread on arterial drainage channels. In addition, the TCD research indicates that for a large drained SAC such as the Boyne, the main otter population in the catchment inhabits the smaller drainage channels outside the SAC boundary which while these are smaller channels, they have a much greater combined length than all the larger river reaches which are designated within the SAC proper.

River enhancement works such as the replacement of in-stream boulders and increasing substrate available for fish spawning/hiding places, will also assist otters. Other measures that will limit the impact of drainage maintenance activities on otter (or other mammal species and birds) is the limiting works to discrete sections of the channel at any one time and to undertake works incrementally, in order to avoid continuous impacts along the entire length of channels. This is current practice on the main long channels which are typically maintained in sections. The environmentally friendly approach to drainage maintenance combined with all the good fishery works appears to minimise any potential impacts and allows a strong population to be retained within a drained catchment.

6.2.15.5 Annex IV Species

Arterial Drainage Maintenance Guidelines Notes: Protection and Enhancement of Bats were developed in 2010 in conjunction with Bat Conservation Ireland. The research shows the presence of multiple bat species on drainage channels and makes recommendations to minimise potential impacts. Due to the historical excavation and maintenance of drainage channels, many of the riparian trees are relatively immature and are not suitable bat roosts with few large mature trees with extensive ivy cover and crevices which can provide bat roosts. To retain vegetation cover and foraging/commuting routes for bats, it is recommended to retain mature trees where feasible, retain the treeline and hedgerow adjacent to the channels, minimise scrub clearance and 'tidying up' dead wood and split limbs, confine management of vegetation to one bank only, and retain

overhanging vegetation located above high water level. Current EDM procedures in effect use this approach and ensures that vegetation management is only removed as necessary for drainage purposes. Where mature tree removal is required, a site specific bat assessment will be conducted, including consideration of planting replacement trees and the erection of bat boxes.

Bridges are important roosting sites, particularly stone masonry bridges. In relation to road bridges, where there are many stone masonry arches, Drainage Maintenance is principally responsible for the flood conveyance while the Local Authority is responsible for the structural integrity and associated works to the arch. The majority of bridge maintenance works includes low level work such as underpinning foundations with limited works to higher areas such as arches, combined with the fact that many OPW bridges are small field bridges which flood over in high water, there is limited potential for impacts to bat roosts from bridge maintenance works. However, where works are to areas above high water level and contain suitable crevices or habitats for bats, a bat survey will be conducted to assess if it's in use and devise site specific mitigating measures. Maintenance works are only undertaken during daylight hours which also minimises the impact from light pollution. As described in Section 6.3.3, a bat box pilot scheme was carried out in 2011 and 2012, for the erection of bat tubes on suitable bridges and this has recently become a standard practise within bridge maintenance activities.

Natterjack Toad (*Bufo calamita*) (although common in parts of its European range) is restricted to 12 coastal areas of Co. Kerry, where they were first recorded in Callinafersy in 1805 (Whilde 1993), and to one site in Wexford where they were translocated by NPWS in the early 1990s. Through consultations with stakeholders or emanating from other site surveys for environmental assessments, where Natterjack Toad presence is identified, avoidance and mitigation measures will be taken. Typical measures include timing of works to avoid the Natterjack Toad breeding season (April to July) and allowing sufficient time for tadpoles to metamorphose into toadlets. Maintenance operations use of low ground pressure machines will minimise ground damage and the use of a single access point and a defined machine access corridor, is recommended to avoid impacts on breeding pools.

6.3 Natura 2000 Site Enhancement / Restoration

6.3.1 Enhancement with IFI

As described in Section 6.2.4, OPW fund a large scale river enhancement programme which is implemented in partnership with IFI, called the Environmental River Enhancement Programme (EREP). There has been a long history of positive river enhancement works being completed between IFI and the OPW. This cooperative effort goes back to the 1980's cumulating in the EDM and EREP programmes between 2004 and 2012. Specialised skills and knowledge in the implementation of river enhancement works have been developed in both organisations. The first EREP was an initial five year programme 2008-2012, it is now being continued for 2013-2017 and river enhancement is becoming an integral component of statutory arterial drainage maintenance works in the State.

The main focus of the EREP is to achieve enhancement and environmental methods of work to maximise the environmental quality of the Irish drained river corridor while balancing the channel's drainage outfall and flood conveyance capacity. While these enhancement works have a primary objective of improving fisheries quality, they have a positive impact on the environmental quality of the whole river corridor including the biodiversity and the hydromorphology, both inside and outside Natura 2000 sites. It provides a tool for Ireland to comply with the WFD legislative obligations for hydromorphology and gives Ireland the information necessary to report to the European Commission on WFD hydromorphological compliance. In parallel, it helps Government to clearly demonstrate compliance with the National Biodiversity Plan (NBP) 2011-2016, 'Target 7: Optimised benefits for biodiversity in Flood Risk Management Planning', Indicator: 'Biodiversity gain from river enhancement works'. The EREP is a large multi-annual programme with up 100km of waterways

enhanced in the State annually. Further information in the form of a public brochure is available from the OPW website www.opw.ie on the publications page.

6.3.2 Enhancement with NPWS

The construction of the original Arterial Drainage Schemes would have significantly impacted the historical ecological quality of adjoining wetland habitats and the concept of restoration is to restore the hydrology towards the pre-Drainage Scheme water table datum within the SAC. This is a possibility where the restoration measures will not compromise the needs and rights of citizens such as, where the State succeeds in purchasing an SAC bog for conservation and where there are no upstream third parties reliant on the drainage regime. In this case it may be feasible raise water levels. This can be achieved through active blocking of the relevant drains or permitting a passive rise in channel levels by withdrawing statutory Drainage Maintenance functions. Many bog and fen habitats in Natura 2000 sites in the State are in less than favourable conservation status and there are requirements within the Habitats Directive to restore favourable conservation status. As part of ongoing consultations with environmental stakeholders, opportunities may be identified where some form of Natura 2000 site wetland restoration has potential and these scenarios will be reviewed on a case-by-case basis.

Similarly, through ongoing stakeholder consultations, opportunities for restoration of wetland SPAs, may be identified and will be reviewed on a case-by-case basis such as Glen Lough SPA where restoration has been carried out successfully. This SPA was a component of an ECJ case against Ireland on the Habitats Directive and in consultation with the Department of the Environment, Heritage and Local Government (DEHLG), OPW carried out restoration works. This site comprises a seasonal lake with a drainage channel adjacent to it, and this layout allowed an adjoining embankment to be constructed, isolating the lake from the channel. This permitted an increase in lake levels, in effect restoring the wetland close to the historical pre-drainage water levels without affecting the drainage of the upstream lands reliant on the maintained channel.

6.3.3 Other Enhancement works

Other forms of habitat enhancement works are carried out on an ongoing basis within drainage maintenance operations as feasible opportunities arise in consultation with stakeholders. As stated previously, OPW directly supports and are actively involved with the Lagarosiphon invasive species project which is controlling this invasive in Lough Corrib SAC. OPW are an active partner in the Mulkear LIFE Project and conduct various works to improve the Lower Shannon SAC.

Other works completed recently include the construction of a fish counter weir on the Mague river, which is an important piece of new infrastructure for salmon conservation in the Lower Shannon SAC. Stemming from work with Bat Conservation Ireland a bat box pilot scheme was carried out in 2011 and 2012, for the erection of bat tubes on suitable bridges as part of the statutory bridge maintenance activities. This is now a standard practise and a number of bat tubes are erected annually on arterial drainage scheme bridges as part of their maintenance where the bridge is suitable for bat tube placement. Similarly, stemming from work with BirdWatch Ireland, the use of nest boxes for kingfisher and dippers is to be trialled. The first artificial kingfisher nest chamber has recently been inserted on the River Dodder in Dublin, as part of flood relief works and it's envisaged that more nest chambers will be trialled through drainage maintenance works in the future. In consultation with BirdWatch Ireland a number of dipper boxes are to be trialled in 2013 and depending on the success and applicability, may become a standard drainage maintenance practice for bridges, similar to the bat tubes. Artificial otter holts are also been trialled with the first constructed in embankments on the Feale arterial drainage scheme and the second recently constructed in embankments on the Inny Arterial Drainage Scheme. The scale of success of these artificial otter holts and the artificial holts constructed on the Mulkear LIFE project, will be assessed and will dictate how widespread this practise becomes in the future. Modern drainage maintenance operations entail a wide range of environmental enhancement activities, which have

positive impacts for both Natura 2000 sites and the broader environment. This is now the standard business model as part of ongoing improvements in environmental performance and working with stakeholders in an integrated approach.

6.4 Mitigation Measures relevant to Programme Part 2 – High Risk Channel Designation

As stated in Section 5.6, the impacts of high risk channel designation projects will be similar in nature to the Programme Part 1- Arterial Drainage Maintenance. 'Designation' is at strategic development stage and specific projects are not identifiable for this stage. As 'Designation' is implemented and specific projects are identified, the approach used in the identification of impacts and mitigation as detailed for Part 1 within this NIS, will be applied to any project developed under Part 2 of the Programme – High Risk Channel Designation. Any impacts identified during that process will have an equivalent scale of mitigation to minimise potential impacts and maximise enhancement opportunities. The following mitigation measures will be applied along with any site specific measures identified at project level.

6.4.1 Environmental Management Protocols

The OPW's Environmental Management Protocols and Standard Operating Procedures detailed in Appendix 2 will be applied to all 'High Risk Channel Designation' projects.

6.4.2 Liaison with Statutory Bodies

The primary statutory environmental stakeholders identified in Section 6 will be consulted with from the design stage of all 'High Risk Channel Designation' projects. Observations or comments on practical measures to either mitigate possible environmental impacts or exploit enhancement opportunities will be integrated into the design of 'High Risk Channel Designation' projects.

6.4.3 Appropriate Assessments

While there have been no high risk channel designations projects to date in the State, there are a number of localised flood alleviation projects completed or underway which would be of a similar scale as envisaged for 'designation' projects. Recent practice for any new localised flood alleviation project is to carry out Screening for Appropriate Assessment, and full AA if required. All High Risk Channel Designation Projects will be subject to AA Screening and a Natura Impact Statement carried out if required.

6.4.4 Environmental Impact Assessments

European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006 transposes the EIA requirements, with recent further changes to the EIA thresholds been introduced through the Planning and Development (Amendment) (No. 2) Regulations 2011. The most applicable class of development relevant to 'designation' projects is in respect of canalisation. The thresholds for canalisation and flood relief works, are where the immediate contributing sub-catchment would exceed 100 hectares or where more than 2 hectares of wetland would be affected or where the length of river channel on which works are proposed would be greater than 2 km. In addition, a project likely to have a significant environmental impact may also qualify for an EIA. For 'designation' projects, it is foreseen that the size and scale of the works will typically be sub-threshold EIA. However, proposed 'designation' projects will apply the EIA thresholds and evaluate if the project would be likely to have a significant environmental impact. Any project exceeding these criteria will be subject to an EIA. In the absence of an EIA, or an AA, an ecological assessment will be carried out, which will be to identify any environmental sensitivities and devise any mitigating or enhancement measures, in order to minimise any potential environmental impacts of the project, irrespective of it being inside or outside a Natura 2000 site.

7. Appropriate Assessment Conclusion Statement

7.1 AA evolving process

7.1.1 AA process 2009 - 2011

In 2009, 30 'Assessments Of Significance' encapsulating 38 Natura 2000 sites were produced for the 2009 annual maintenance programme. These assessments were carried out on a Natura 2000 site basis with an individual assessment for each Natura 2000 site. In accordance with the current grouping of Schemes as in Table 7.1, in effect these 30 assessments consisted of annual assessments on 14 of the Drainage Schemes. These 'Assessments Of Significance' involved a desktop study for all the 38 Natura 2000 sites involved, and site visits to approx 25% of all channels scheduled for works in 2009.

In 2010, 25 'Assessments Of Significance' encapsulating 37 Natura 2000 sites were produced for the 2010 annual maintenance programme. These assessments were carried out on a Natura 2000 site basis with an individual assessment for each Natura 2000 site. In accordance with the current grouping of Schemes as in Table 7.1, in effect these 25 assessments consisted of annual assessments on 14 of the Drainage Schemes. These 'Assessments Of Significance' involved a desktop study for all the 37 Natura 2000 sites involved, and site visits to approx 25% of all channels scheduled for works in 2010.

In 2011, 19 Appropriate Assessments encapsulating 43 Natura 2000 sites were produced for the 2011 annual maintenance programme. These AAs were carried out on a catchment basis. Further to AA Screening carried out as part of this AA, the grouping of Schemes was altered slightly in 2012, and as in seen in Table 7.1, in effect these 19 AAs consisted of annual AAs on 17 of the Drainage Schemes. These AAs involved a desktop study for all 17 Schemes for all 43 Natura 2000 sites involved, and site visits to approx 25% of all channels scheduled for works in 2011.

7.1.2 AA process 2012

In 2012, a total of 20 Drainage Scheme scale AAs encapsulating 60 Natura 2000 sites were produced. This included a twin approach as follows:

- 12 annual AAs for the 2012 maintenance programme. These AAs were carried out on a catchment basis using the most recent grouping of Schemes as setout in this AA. These AAs involved a desktop study for all the 12 Schemes and the 50 Natura 2000 sites involved, and site visits to 25% of all channels programmed for works in 2012, within these 50 Natura 2000 sites.
- 8 five year AAs were completed for a five year maintenance cycle, 2012-2016, for 8 Drainage Schemes. This involved a desktop study for all 8 Schemes and the 10 Natura 2000 sites involved, and walkover survey and habitat mapping for all channels which are either in or directly connected to a Natura 2000 site, irrespective of whether it was programmed for works in 2012.

These 8 five year AAs (2012 – 2016), were the first step in developing a new national set of 5year AAs for Arterial Drainage Maintenance. The Schemes selected for 2012 were all small catchments, to streamline the scale of the assessments during this learning period. These assessments took a more detailed approach to the recording of walkover survey information in the form of record sheets and GIS, thereby forming a baseline of ecological information for all channels, which were either within or directly connected to a Natura 2000 site. These five year AAs are an assessment of all relevant drainage channels, irrespective of whether works were programmed for works in 2012. As described in the SEA Environmental Report, drainage maintenance operations nationally have a typical cycle of four to six years, and within any five year period, it is reasonable to assume that nearly all arterial drainage channels will be maintained within the catchment.

Further to the 20 Drainage Scheme scale AAs carried out during 2012, this national scale AA was completed at the end of 2012. This AA includes the assessment of all arterial drainage maintenance activities nationally until 2015 inclusive, i.e. the 25 Drainage Schemes as screened in and listed in Table 3.1, until the end of 2015. Moreover, this national AA also takes regard of the evolving AA processes used to-date within arterial drainage maintenance and develops a new approach for AA implementation. This consists of a national set of five year AAs, on a Drainage Scheme basis, to be compiled by 2015, thereby superseding this AA by the end of 2015. This process of superseding this national AA commenced in 2012 with the successful completion of 8 five year AAs. Accordingly, this national AA in effect currently entails the assessment of the remaining 17 Drainage Schemes and this number will be reducing on an annual basis until 2015, when the full national set of five year AA will be established, and replacing this AA in full.

Table 7.1 Completed Natura 2000 site Assessments 2009 - 2012

Scheme Name	2009	2010	2011	2012	
Abbey	N/A	N/A	N/A	N/A	National AA
Ballyteige/Kilmore	1 year	1 year	1 year	1 year	National AA
Brickey	N/A	N/A	1 year	2012-2016	
Bonet	1 year	1 year	1 year	1 year	National AA
Boyle	1 year	1 year	1 year	1 year	National AA
Boyne	1 year	1 year	1 year	1 year	National AA
Broadmeadow & Ward	N/A	N/A	N/A	N/A	National AA
Brosna	1 year	1 year	1 year	1 year	National AA
Carrigahorig	N/A	N/A	1 year	2012-2016	
Clareen	N/A	N/A	N/A	2012-2016	
Corrib	1 year	1 year	1 year	1 year	National AA
Creegh	N/A	N/A	1 year	2012-2016	
Donegal	1 year	1 year	1 year	1 year	National AA
Duff	N/A	N/A	1 year	N/A	National AA
Dunmanway FRS	1 year	1 year	N/A	2012-2016	
Feale	N/A	1 year	1 year	1 year	National AA
Glyde & Dee	1 year	N/A	N/A	2012-2016	
Inny	1 year	1 year	1 year	1 year	National AA
Kilcoo	N/A	N/A	N/A	N/A	National AA
Killimor/Cappagh	1 year	1 year	1 year	N/A	National AA
Knockcroghery	N/A	N/A	N/A	2012-2016	
Lower Shannon	1 year	1 year	1 year	1 year	National AA
Maine	1 year	1 year	1 year	1 year	National AA
Moy	1 year	1 year	1 year	1 year	National AA
Nenagh	N/A	N/A	N/A	2012-2016	

N/A – No relevant maintenance works programmed for that year

7.1.3 AA process 2013 - 2015

Emanating from Section 4.2, there are a total of 1324 individual channels or channel segments identified, which due to their presence, either within a Natura 2000 site itself or are in very close proximity i.e. within 100m of any part of a Natura 2000 site boundary, are more likely to have a potential impact on a Natura 2000 site. While there is some ecological information available through various sources, the assessment for these channels would benefit from targeted ecological site surveys as part of the process. The 1324 channels incorporates 1646km of channel, and accordingly, this 1646km is scheduled for site survey.

The 8 five year AAs carried out in 2012 have completed site surveys with GIS recording for a small portion of the 1646km, with the majority of the distance to be completed as part of the 2013 – 2015 strategy. The 2012 AAs used a wider approach to selecting channels for site surveys and included all channels which were either flowing into or out of a Natura 2000 sites, irrespective of distance, from the Natura 2000 site. Experience from 2012 shows that this includes large lengths of channel which lie upstream and downstream of Natura 2000 sites, and while this information is useful as baseline information on areas outside Natura 2000 sites, it was of limited use for assessing site specific impacts for a Natura 2000 site. This AA has completed more detailed analysis to identify the channels in close proximity to Natura 2000 sites and where an assessment of impacts will benefit most from site specific surveys i.e. 1705km as described above. Ecological site surveys for 2013-2015 will target take this approach.

In 2013 it is proposed to carry out Appropriate Assessments for a 5 year maintenance cycle 2013 - 2017, for 7 Drainage Schemes. 100% of the 'screened-in' channel lengths within the 100m buffer zone for these 7 Schemes will have walkover surveys and habitat mapping completed i.e. 547km.

In 2014 it is proposed to carry out Appropriate Assessments for a 5 year maintenance cycle 2014 - 2018 for 6 Drainage Schemes. 100% of the 'screened-in' channel lengths within the 100m buffer zone for these 6 Schemes will have walkover surveys and habitat mapping completed i.e. 540km.

In 2015, the remaining 4 Drainage Schemes will have AA's completed for a 5 year programme 2015 - 2019. 100% of the 'screened-in' channel lengths within the 100m buffer zone for these 4 Schemes will have walkover surveys and habitat mapping completed i.e. 534km.

7.2 Ecological Walkover Surveys

The national set of five year AAs will include an ecological walkover survey for the 1646km of channel, as screened-in from Section 4.2. This information will be recorded on GIS and will start a baseline of ecological information within the relevant Natura 2000 sites, that can be used for national conservation purposes.

These objective of the ecological walkover surveys is to gather site specific information and record a baseline of ecological information for all 'screened in' arterial drainage channels. Of particular use is information that will flag site specific environmental sensitivities and especially where this information can be used to alter the standard approach of drainage maintenance operations to minimise potential impacts. The following scale of information will be gathered:

- Classification of habitat along the channel in accordance with Fossitt Guidelines. This will have particular regard to the lands within 5 to 10 meters of the top of bank where machines will access,
- A survey of the river corridor habitat forming a baseline of the overall aquatic, marginal and riparian vegetation structure, the presence or likely presence of notable species and any other features of interest.
- Surveys will have particular regard to Annex I habitats both designated and not designated as qualifying interests for that Natura 2000 site, presence of spoil heaps where they are contributing to habitat diversity, and any other notable ecologically valuable areas, which are not sufficient to warrant separate classification under Fossitt, such as parcels of vegetation with high diversity, small wetland areas suitable for amphibians, linear features with particularly high species richness etc.
- Surveys will have particular regard to the presence of Annex II and Annex IV species, Annex I bird species, species protected under the Wildlife Acts and Flora Protection Order, and any other notable flora or fauna species.
- Specific information on the presence and locations for specific species/habitats will be required as follows:
 - Location and observations on abundance of floating river vegetation.

- Location and observations on abundance of any invasive species.
- Location of a suspected otter holt.
- Location of suspected badger sett / large mammal borrow.
- Location of kingfisher nest, sand martins nests, or eroded bank section which is suitable for these nests.
- Location and observations on importance of any niche habitats or notable ecologically valuable areas.
- Location and observations on abundance of other protected flora and fauna or any other notable flora or fauna species.
- While the precise location of a suspected otter holt is required on GIS, other otter signs observed are to be recorded albeit not necessarily be GIS referenced, as these signs are more transient in nature.
- All mapping and location information will be supplied in GIS format. Habitat classification maps will be in accordance with the Heritage Council's Habitat Mapping Guidelines or other nationally recognised mapping format.
- A photographic record of the ecological baseline will be developed for longterm comparative purposes in tracking environmental change. A GPS referenced digital photograph will be taken for each one kilometer of channel with judgment made onsite as to the best location for this photograph as it is to be a representative sample of the typical channel corridor for that kilometer. The photo will encompass a reach of channel so overall changes to the river corridor and adjoining lands can be visually assessed in future versions. GPS referenced photos of other environmental sensitivities will be provided where they are deemed useful by the ecologist. Photos will be GPS referenced and be compatible for transfer to GIS in node format.

Some monitored elements are not required as part of the ecological surveys as the information is available through other sources. The inclusion of water quality sampling in this survey is deemed to be of little benefit and where this is required, information is available through the EPAs national monitoring programme. While rapid assessment forms of aquatic species survey is required as iterated above, widespread catchment scale surveys on the presence / absence of Lamprey and Crayfish are being progressed on a national basis by IFI. Accordingly, comprehensive presence / absence surveys of Lamprey and Crayfish are not required.

	No. of Channels in the Scheme	Overall Channel Length in the Scheme (km)	No. of Channels Screened-In @ 100m buffer	Channel length Screened-In @ 100 m buffer (km)	Length Screened-In for survey 2013 (km)	Length Screened-In for survey 2014 (km)	Length Screened-In for survey 2015 (km)	AA requirement
Clareen	32	27.48	3	0.43				2012 - 2016 (complete)
Brickey	29	26.67	3	3.31				2012 - 2016 (complete)
Nenagh	86	192.62	5	0.59				2012 - 2016 (complete)
Creagh	19	31.60	3	0.37				2012 - 2016 (complete)
Dunmanway	7	5.41	6	4.92				2012 - 2016 (complete)
Glyde & Dee	382	762.77	6	6.81				2012 - 2016 (complete)
Carrigahorig	16	39.17	6	8.12				2012 - 2016 (complete)
Knockrockery	9	12.33	1	0.82				2012 - 2016 (complete)
Abbey	27	33.49	1	0.63	0.63			Propose 2013-2017
Broadmeadow & Ward	60	169.46	1	0.51	0.51			Propose 2013-2017
Brosna	227	614.50	26	21.83	21.83			Propose 2013-2017
Boyle	164	336.84	27	23.45	23.45			Propose 2013-2017
Bonet	72	125.30	26	41.07	41.07			Propose 2013-2017
Donegal	244	257.44	60	66.003	66.00			Propose 2013-2017
Moy	667	1293.09	231	394.60	394.60			Propose 2013-2017
Duff	13	34.42	1	0.79		0.79		Propose 2014-2018
Kilcoo	5	13.53	1	2.18		2.18		Propose 2014-2018
Ballyteigue Kilmore	39	55.99	14	11.48		11.48		Propose 2014-2018
Killimor/Cappagh	209	400.89	12	14.12		14.12		Propose 2014-2018
Feale	197	337.34	93	96.39		96.39		Propose 2014-2018
Corrib	1157	1686.96	338	417.00		417.00		Propose 2014-2018
Maine	155	228.36	42	52.41			53.82	Propose 2015-2019
Inny	325	846.74	41	26.28			26.28	Propose 2015-2019

Boyne	1397	2160.26	191	265.90			265.90	Propose 2015-2019
Lower Shannon	977	1547.57	191	189.02			189.02	Propose 2015-2019

Total **1333** **1650** **548km** **542km** **535km**

2012 Channel walkover survey lengths	8 Schemes (completed)
2013 Channel walkover survey lengths	7 Schemes (548km)
2014 Channel walkover survey lengths	6 Schemes (542km)
2015 Channel walkover survey lengths	4 Schemes (535km)

Scheme Name	No. of Channels in the Scheme	Overall Channel Length in the Scheme (km)	No. of Channels Screened-In @ 100m buffer	Channel length Screened-In @ 100 m buffer (km)	Length Screened-In for survey 2013 (km)	Length Screened-In for survey 2014 (km)	Length Screened-In for survey 2015 (km)	AA requirement
Duleek FRS	3	4.40	0	0				Not required
Hazelhatch FRS	3	4.50	0	0				Not required
Matt	13	15.38	0	0				Not required
Monaghan Blackwater	178	287.95	0	0				Not required
Owenvorragh	21	68.90	0	0				Not required
Ouvane	3	8.85	0	0				Not required
Carrick on Suir FRS	2	15.2			Conduct AA Screening in future if Maintenance required.			
Kilkenny FRS	2	4.6			Conduct AA Screening in future if Maintenance required.			
Gort FRS	1	0.6			Conduct AA Screening in future if Maintenance required.			
Lacken (Ardrahan)	Embankment only				Conduct AA Screening in future if Maintenance required.			
Ryewater	5	32.4			Conduct AA Screening in future if Maintenance required.			

Table 7.2 Drainage Schemes and schedule for national set of five year AAs

7.3 Conclusion Statement

7.3.1 Programme Part 1 – Arterial Drainage Maintenance

Between 2009 and 2012, the Arterial Drainage Maintenance Service has produced 94 assessments. While more knowledge and understanding on the various qualifying interests will always be desirable, all 94 assessments have in effect concluded that the drainage maintenance operations are unlikely to have a significant impact on any Natura 2000 site. Many Natura 2000 sites have been assessed multiple times, forming a highly repetitive process with multiple conclusions of unlikely significant impact on the same Natura 2000 sites, from different assessments.

Potential impacts of the drainage maintenance activities have been set out in Chapter 5 in the context of the range of Natura 2000 Sites, their special conservation interests and qualifying interests. Chapter 6 sets out the mitigation having regard to a whole host of research completed to date, the understanding gained from previous assessments, the ongoing evolution of a suite of environmental management protocols, ongoing work with environmental stakeholders through to the national river enhancement programme. With the implementation of these avoidance and mitigation measures, it is concluded that the integrity of the Natura 2000 sites will not be adversely affected by arterial drainage maintenance activities.

Notwithstanding this conclusion, this national AA sets out a new process for AA implementation for the future. With statutory drainage maintenance operations being an ongoing activity of a cyclic nature, it has a national scale, carried out directly by the same public service employees, the AA process was further evolved in 2012, to make it more effective and efficient. As described in section 7.1.2, a national set of five year AAs, on a Drainage Scheme basis, is to be compiled by 2015, thereby superseding this AA by the end of 2015. By 2015, all drainage channels 'screened-in' will have had an ecological walkover survey conducted by a qualified ecologist and GIS habitat mapping drawn up for same. All Drainage Schemes will have completed a new 5year AA, replacing this AA in full. In the longterm, these AAs can be reviewed on a five yearly basis and will provide both a more effective process for implementing AA requirements and are expected to be a more efficient process for demonstrating compliance with Habitats Directive Article 6 requirements.

Table 7.3 *Integrity of Site Checklist (DEHLG, 2009)*

Conservation Objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the site?	No. Potential impacts as a result of the Programme will be effectively mitigated.
Interrupt progress towards achieving the conservation objectives of the site?	No.
Disrupt those factors that help to maintain the favourable conditions of the site?	No. Potential impacts on habitats within the works areas will be mitigated.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable conditions of the site?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Other objectives: does the project or plan have the potential to:	Y/N
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No.

Change the dynamics of the relationships (between, for example, soil and water of plants and animals) that define the structure and/or function of the site?	No.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No.
Reduce the area of key habitats?	No. Potential impacts on habitats within the works areas will be mitigated.
Reduce the population of key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Change the balance between key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Reduce diversity of the site?	No. Potential impacts as a result of the Programme will be effectively mitigated.
Result in disturbance that could affect population size or density or the balance between key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Result in fragmentation	No.
Result in loss or reduction of key features (e.g. Tree cover, tidal exposure, annual flooding etc.)?	No. Potential impacts as a result of the Programme will be effectively mitigated.

7.3.2 Programme Part 2 – High Risk Channel Designation

As stated in Section 6.4, 'Designation' is at strategic development stage and specific projects are not identifiable for this stage. As 'Designation' is implemented and specific projects are identified, the approach used in the identification of impacts and mitigation as detailed for Part 1 within this NIS, will be applied to any project developed under Part 2 of the Programme – High Risk Channel Designation. As stated in Section 5.6, the impacts of high risk channel designation projects will be similar in nature to the Programme Part 1 and accordingly, any impacts identified during that process will be have an equivalent scale of mitigation to minimise potential impacts and maximise enhancement opportunities.

In summary, the High Risk Channel Designation Programme 2011- 2015, incorporates all mitigation measures that have been proposed in Chapter 6 of this NIS, including the completion of project level AAs where screened in for individual projects. With the implementation of these avoidance and mitigation measures, it is concluded that the integrity of any Natura 2000 sites will not be adversely affected by the High Risk Channel Designation Programme.

Table 7.4 *Integrity of Site Checklist*

Conservation Objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the site?	No. Potential impacts as a result of the Programme will be effectively mitigated.

Interrupt progress towards achieving the conservation objectives of the site?	No.
Disrupt those factors that help to maintain the favourable conditions of the site?	No. Potential impacts on habitats within the works areas will be mitigated.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable conditions of the site?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Other objectives: does the project or plan have the potential to:	Y/N
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No.
Change the dynamics of the relationships (between, for example, soil and water of plants and animals) that define the structure and/or function of the site?	No.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No.
Reduce the area of key habitats?	No. Potential impacts on habitats within the works areas will be mitigated.
Reduce the population of key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Change the balance between key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Reduce diversity of the site?	No. Potential impacts as a result of the Programme will be effectively mitigated.
Result in disturbance that could affect population size or density or the balance between key species?	No. Potential impacts on protected species within the works area will be avoided and mitigated.
Result in fragmentation	No.
Result in loss or reduction of key features (e.g. Tree cover, tidal exposure, annual flooding etc.)?	No. Potential impacts as a result of the Programme will be effectively mitigated.

8. References

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Appendix 1

Natura 2000 Site Objectives and Channels selected for ecological site surveys

Table A1.1	Abbey
Table A1.2	Ballyteige/Kilmore
Table A1.3	Bonet
Table A1.4	Boyle
Table A1.5	Boyne
Table A1.6	Brickey
Table A1.7	Broadmeadow & Ward
Table A1.8	Brosna
Table A1.9	Carrigahorig
Table A1.10	Clareen
Table A1.11	Corrib
Table A1.12	Creegh
Table A1.13	Donegal Schemes
Table A1.14	Duff
Table A1.15	Dunmanway (Bandon River) FRS
Table A1.16	Feale
Table A1.17	Glyde & Dee
Table A1.18	Inny
Table A1.19	Kilcoo
Table A1.20	Killimor/Cappagh
Table A1.21	Knockcroghery
Table A1.22	Maine
Table A1.23	Moy
Table A1.24	Nenagh
Table A1.25	Lower Shannon

Table A1.1 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Abbey Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Golagh And Breesy Hill SAC (Site Code: 002164)	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.	<ul style="list-style-type: none"> Blanket bog (*active only) [7130] 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Yes 	C1

Table A1.2 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Ballyteigue/Kilmore Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Ballyteigue Burrow SAC (Site Code: 000696)	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.	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Coastal lagoons [1150] • Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • <i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] • Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) [1420] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Fixed coastal dunes 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C1/2/1, C1/2/1A, C2, C2/1, C2/12, C2/2, C2/2/1A, C2/3, C2/4, C2/5, D5

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		with herbaceous vegetation (grey dunes) [2130] <ul style="list-style-type: none"> • Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150] 				
Ballyteigue Burrow SPA (Site Code: 004020)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C1/2/1, C1/2/1A, C2, C2/1, C2/12, C2/2, C2/2/1A

Table A1.3 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Bonet Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Glenade Lough SAC (Site Code: 001919)	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.	<ul style="list-style-type: none"> Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150] 	<ul style="list-style-type: none"> White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] Slender naiad (<i>Najas flexilis</i>) [1833] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1
Lough Gill SAC (Site Code:001976)	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	<ul style="list-style-type: none"> Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] 	<ul style="list-style-type: none"> White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] Sea lamprey (<i>Petromyzon marinus</i>) [1095] Brook lamprey (<i>Lampetra planeri</i>) [1096] River lamprey (<i>Lampetra fluviatilis</i>) [1099] Atlantic salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1, C1/1, C1/1/1, C1/1/1/1, C1/1/1/2, C1/1/2, C1/10, C1/11, C1/12, C1/13, C1/13/1, C1/13/1/1, C1/13/2, C1/13/3, C1/14, C1/15, C1/2, C1/3, C1/3/1, C1/4, C1/5, C1/6, C1/7, C1/8, C1/9, C1/9/1

Table A1.4 Qualifying Features and Conservation Objectives of Natura 2000 Sites - – Boyle Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Urlaur Loughs SAC (Site Code: 001571)	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.	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/24
Tullaghanrock Bog SAC (Site Code: 002354)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/2, C1/3
Derrinea Bog SAC (Site Code: 000604)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/24, C1/24/1

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Cloonshanvi lle Bog SAC (Site Code: 000614)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] • Bog woodland [91D0] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C6, C6/5, C6/7/1/2/1, C6/7/1/2/1/1
Callow Bog SAC (Site Code: 000595)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • Marsh fritillary (<i>Euphydryas aurinia</i>) [1065] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C1/3/1, C2, C2/1, C2/2, C20, C3
Lough Gara SPA (Site Code: 004048)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] 	<ul style="list-style-type: none"> • No 	C0, C1, C10, C11, C12, C12/1, C19, C2, C20, C3, C4, C5, C6, C7, C8, C9

Table A1.5 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Boyne Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Lene SAC (Site Code: 002121)	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.	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] 	<ul style="list-style-type: none"> • White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/37/37, C1/37/37/2, C1/37/37/3, XC1/37/37
White Lough Ben Lough & Lough Doo (Site Code: 001810)	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	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] 	<ul style="list-style-type: none"> • White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/37
Lough Bane & Lough Glass SAC (Site Code: 002120)	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	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] 	<ul style="list-style-type: none"> • White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/37/38
Killconny Bog SAC (Site Code: 000006)	To maintain or restore the favourable conservation condition of the	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/8/18, C1/8/23/2, X2/C1/8/23/2

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	Annex I habitat(s) and/or the Annex II species for which the SAC has been selected					
Mount Hevey Bog SAC (Site Code: 002342)	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	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/37/2/2, C1/37/2/3, C1/37/7/3, C1/37/7/3/1, C1/44/10, C1/44/11, C1/44/11/1, XC1/44/11
Boyne Coast and Estuary SAC (Site Code: 001957)	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	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Fixed coastal dunes 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • No 	C1 (Tidal)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		with herbaceous vegetation (grey dunes) [2130]				
Boyne Estuary SPA (Site Code: 004080)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195] Wetlands & 	<ul style="list-style-type: none"> No 	C1 (Tidal)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				Waterbirds [A999]		
River Boyne & River Blackwater SPA (Site Code: 004232)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Kingfisher (<i>Alcedo atthis</i>) [A229] 	<ul style="list-style-type: none"> No 	C1, C1/1, C1/10, C1/11, C1/12, C1/13, C1/14, C1/15, C1/16, C1/17, C1/18, C1/19, C1/21, C1/21/1, C1/21/10, C1/21/11, C1/21/12, C1/21/13, C1/21/2, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/8, C1/21/9, C1/23, C1/24, C1/25, C1/26, C1/27, C1/29, C1/3, C1/30, C1/31, C1/32, C1/32/1, C1/32/10, C1/32/11, C1/32/12, C1/32/13, C1/32/16, C1/32/17, C1/32/18, C1/32/19, C1/32/2, C1/32/21, C1/32/22, C1/32/3, C1/32/4, C1/32/5, C1/32/7, C1/32/8, C1/32/9, C1/33, C1/35, C1/36, C1/37, C1/37/1, C1/37/10, C1/37/11, C1/37/12, C1/37/12/1, C1/37/13, C1/37/14, C1/37/15, C1/37/2, C1/37/3, C1/37/4, C1/37/5, C1/37/6, C1/37/7, C1/37/8, C1/37/9, C1/38, C1/39, C1/4, C1/40, C1/5, C1/6, C1/7, C1/8, C1/8/1, C1/8/10, C1/8/11, C1/8/12, C1/8/14, C1/8/15, C1/8/16, C1/8/17, C1/8/18, C1/8/19, C1/8/2, C1/8/20, C1/8/21, C1/8/22, C1/8/3, C1/8/4, C1/8/5, C1/8/6, C1/8/7, C1/8/8, C1/8/9, X1C1/37, X2/C1, X3/C1, X4/C1, X5/C1, X6/C1, XC1/32/15

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
River Boyne & River Blackwater SAC (Site Code: 002299)	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	<ul style="list-style-type: none"> Alkaline fens [7230] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] 	<ul style="list-style-type: none"> River lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1, C1/1, C1/10, C1/11, C1/12, C1/13, C1/14, C1/15, C1/16, C1/17, C1/18, C1/19, C1/2, C1/21, C1/21/1, C1/21/10, C1/21/11, C1/21/12, C1/21/13, C1/21/14, C1/21/15, C1/21/16, C1/21/17, C1/21/18, C1/21/2, C1/21/20, C1/21/21, C1/21/21/2/1, C1/21/22, C1/21/23, C1/21/24, C1/21/25, C1/21/26, C1/21/27, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/8, C1/21/9, C1/21/9/1, C1/23, C1/24, C1/25, C1/26, C1/27, C1/27/1, C1/27/2, C1/29, C1/3, C1/30, C1/31, C1/32, C1/32/1, C1/32/10, C1/32/11, C1/32/12, C1/32/13, C1/32/16, C1/32/17, C1/32/18, C1/32/19, C1/32/2, C1/32/21, C1/32/22, C1/32/23, C1/32/24, C1/32/25, C1/32/27, C1/32/28, C1/32/29, C1/32/29/1, C1/32/3, C1/32/30, C1/32/31, C1/32/32, C1/32/33, C1/32/33/2, C1/32/33/2/1, C1/32/33/2/2, C1/32/33/3, C1/32/34, C1/32/4, C1/32/5, C1/32/7, C1/32/8, C1/32/9, C1/33, C1/35, C1/36, C1/37, C1/37/1, C1/37/10, C1/37/11, C1/37/12, C1/37/12/1, C1/37/13, C1/37/14, C1/37/15, C1/37/15/1, C1/37/15/3, C1/37/15/4, C1/37/15/5, C1/37/17, C1/37/18, C1/37/19,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
						C1/37/2, C1/37/20, C1/37/20/1, C1/37/21, C1/37/22, C1/37/23, C1/37/24, C1/37/26, C1/37/27, C1/37/28, C1/37/29, C1/37/3, C1/37/30, C1/37/31, C1/37/32, C1/37/33, C1/37/34, C1/37/35, C1/37/35/1, C1/37/35/2, C1/37/36, C1/37/4, C1/37/5, C1/37/6, C1/37/7, C1/37/8, C1/37/9, C1/38, C1/39, C1/4, C1/40, C1/5, C1/6, C1/7, C1/8, C1/8/1, C1/8/10, C1/8/11, C1/8/12, C1/8/13, C1/8/13/1, C1/8/14, C1/8/15, C1/8/16, C1/8/17, C1/8/18, C1/8/19, C1/8/2, C1/8/20, C1/8/21, C1/8/22, C1/8/3, C1/8/4, C1/8/5, C1/8/6, C1/8/7, C1/8/8, C1/8/9, X1C1/37, X2/C1, X3/C1, X4/C1, X5/C1, X6/C1, XC1/32, XC1/32/15, XC1/37/15, XC1/37/16

Table A1.6 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Brickey Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Dungarvan Harbour SPA (Site Code: 004032)	To maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Red-breasted Merganser (<i>Mergus serrator</i>) [A069] • Oystercatcher (<i>Haematopus ostralegus</i>) [A130] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Turnstone (<i>Arenaria interpres</i>) [A169] • Wetlands & Waterbirds [A999] 		

Table A1.7 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Broadmeadow & Ward Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Malahide Estuary SAC (Site Code: 000205)	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	<ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • <i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] 	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1
Malahide Estuary SPA (Site Code: 004025)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] 	<ul style="list-style-type: none"> • No 	C1

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> • Pintail (<i>Anas acuta</i>) [A054] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Red-breasted Merganser (<i>Mergus serrator</i>) [A069] • Oystercatcher (<i>Haematopus ostralegus</i>) [A130] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Redshank (<i>Tringa totanus</i>) [A162] • Wetlands & Waterbirds [A999] 		

Table A1.8 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Brosna Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Clonaslee Eskers & Derry Bog SAC (Site Code: 000859)	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.	<ul style="list-style-type: none"> Alkaline fens [7230] 	<ul style="list-style-type: none"> Geyer's Whorl Snail (<i>Vertigo geyeri</i>) [1013] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C3(13), C3(13C), C3(13F), C3(14)
Clara Bog SAC (Site Code: 000572)	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.	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] *Bog woodland [91D0] 	<ul style="list-style-type: none"> Marsh fritillary (<i>Euphydryas aurinia</i>) [1065] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C9(4)
Split Hills and Longhill Esker SAC (Site Code: 001831)	To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] 	<ul style="list-style-type: none"> No 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1(1), C18(4), C18(4C)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	the SAC has been selected					
River Shannon Callows SAC (Site Code: 000216)	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	<ul style="list-style-type: none"> • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) [6410] • Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] • Limestone pavements [8240] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incana, Salicion albae) [91E0] 	<ul style="list-style-type: none"> • Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1(1)
Middle Shannon Callows SPA (Site Code: 004096)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Wigeon (<i>Anas penelope</i>) [A050] • Corncrake (<i>Crex crex</i>) [A122] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] 	<ul style="list-style-type: none"> • No 	C1(1)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> Black Headed Gull <i>Chroicocephalus ridibundus</i> [A179] Wetlands & Waterbirds [A999] 		
Lough Ennell SAC (Site Code: 000685)	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	<ul style="list-style-type: none"> Alkaline fens [7230] 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1(1), C35(1), C35(2), C36(1), C37(1), C38(1), C39(1), C40(1), C41(1), C42(1), C43(1), C44(1), C45(1)
Lough Ennell SPA (Site Code: 004044)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Pochard (<i>Aythya ferina</i>) [A059] Tufted Duck (<i>Aythya fuligula</i>) [A061] Coot (<i>Fulica atra</i>) [A125] Wetlands [A999] 	<ul style="list-style-type: none"> No 	C1(1), C35(2), C36(1), C37(1), C38(1), C39(1), C40(1), C41(1), C42(1), C43(1), C44(1), C45(1)
Charleville Wood SAC (Site Code: 000571)	To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II	<ul style="list-style-type: none"> Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] 	<ul style="list-style-type: none"> Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>) [1016] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C10(1), C8(1), C8(10), C8(7), C8(8), C8(9)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	species for which the SAC has been selected					

Table A1.9 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Carrigahorig Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Kilcarren-Firville Bog SAC (Site Code: 000647)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Yes 	C1/2/2, C1/2/2/1
Lough Derg North East Shore SAC (Site Code: 002241)	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	<ul style="list-style-type: none"> • <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> 	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C2, C2/1, C3

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		(Alno-Padion, Alnion incanae, Salicion albae) [91E0] • <i>Taxus baccata</i> woods of the British Isles [91J0]				
Lough Derg SPA (Site Code: 004058)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	• n/a	• n/a	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Common Tern (<i>Sterna hirundo</i>) [A193] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Wetlands & Waterbirds [A999] 	• No	C1, C2, C3

Table A1.10 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Clareen Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Derg SPA (Site Code: 004058)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Common Tern (<i>Sterna hirundo</i>) [A193] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Wetlands & Waterbirds [A999] 	<ul style="list-style-type: none"> • No 	C1, C2, C3

Table A1.11 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Corrib Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Lurleen Bog/Glenamaddy Turlough SAC (Site Code: 000301)	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.	<ul style="list-style-type: none"> • Turloughs [3180] • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	SG.18/4, SG.18/4/1, SG.18/4/1/1, SG.18/4/2, SG.18/4/2/1, SG.18/4/3 (Corrib Clare)
Lisnageerah Bog and Ballinastack Turlough SAC (Site Code: 000296)	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.	<ul style="list-style-type: none"> • Turloughs [3180] • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	SG. 18/2 (Corrib Clare)
Galway Bay Complex SAC (Site Code: 000268)	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.	<ul style="list-style-type: none"> • Mudflats and sandflats not covered by seawater at low tide [1140] • Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows 	<ul style="list-style-type: none"> • Otter (<i>Lutra lutra</i>) [1355] • Common seal (<i>Phoca vitulina</i>) [1365] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1 (Corrib Clare)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		(Glauco-Puccinellietalia maritimae) [1330] <ul style="list-style-type: none"> • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Turloughs [3180] • <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] • Alkaline fens [7230] 				
Monivea Bog SAC (Site Code: 002352)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C3/8, C3/8/14, C3/8/16, C3/8/17 (Corrib Clare)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Levally Lough SAC (Site Code: 000295)	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	<ul style="list-style-type: none"> • Turloughs [3180] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	SG. 30/3 (Corrib Clare)
Cloughmoyne SAC (Site Code: 000479)	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	<ul style="list-style-type: none"> • Limestone pavements [8240] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	CH5 (Corrib Headford)
Shrule Turlough SAC (Site Code: 000525)	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	<ul style="list-style-type: none"> • Turloughs [3180] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	CH4/10, CH4/10/1, F.316, F.321, SM122/1, SM122/2, SM122/2/1 (Corrib Headford)
Kilglassan/Cahervoostia Turlough (Site Code: 000504)	To maintain or restore the favourable conservation condition of the Annex I habitat(s)	<ul style="list-style-type: none"> • Turloughs [3180] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	CM 4/18 Proposed

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	Annex I habitat(s) and/or the Annex II species for which the SAC has been selected					
Carrowkeel Turlough SAC (Site Code: 000475)	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	<ul style="list-style-type: none"> Turloughs [3180] 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	SM 111/1 (Corrib Mask)
Towerhill House SAC (Site Code: 002179)	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	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	CM5/10, CM5/10/3, CM5/10/4 (Corrib Mask)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Connemara Bog Complex SAC (Site Code: 002034)	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	<ul style="list-style-type: none"> • Coastal lagoons [1150] • Reefs [1170] • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] • Natural dystrophic lakes and ponds [3160] • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] • Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] • European dry heaths [4030] • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] • Blanket bog (*active only) [7130] • Transition mires and quaking bogs [7140] • Depressions on peat substrates of the Rhynchosporion [7150] • Alkaline fens [7230] • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> 	<ul style="list-style-type: none"> • Marsh fritillary (<i>Euphydryas aurinia</i>) [1065] • Atlantic Salmon (<i>Salmo salar</i>) [1106] • Otter (<i>Lutra lutra</i>) [1355] • Slender naiad (<i>Najas flexilis</i>) [1833] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	CH11(Corrib Headford)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		in British Isles [91A0]				
Maumturk Mountains SAC(Site Code: 002008)	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	<ul style="list-style-type: none"> • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] • Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] • Alpine and Boreal heaths [4060] • Blanket bog (*active only) [7130] • Depressions on peat substrates of the Rhynchosporion [7150] • Siliceous rocky slopes with chasmophytic vegetation [8220] 	<ul style="list-style-type: none"> • Atlantic Salmon (<i>Salmo salar</i>) [1106] • Slender naiad (<i>Najas flexilis</i>) [1833] 	• n/a	• No	C1 (Maam Flood Relief)
Lough Carra SPA(Site Code: 004051)	To maintain or restore the favourable conservation condition of the bird species listed as Special	• n/a	• n/a	• Common Gull (<i>Larus canus</i>) [A182]	• No	CM5, CM5/10, CM5/11, CM5/13, CM5/14, CM5/15, CM5/16, CM5/2, CM5/3, CM5/4, CM5/5, CM5/6, CM5/7, CM5/8, CM5/9, CM5A (Corrib Mask)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	Conservation Interests for this SPA.					
Lough Mask SPA (Site Code: 004062)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Tufted Duck (<i>Aythya fuligula</i>) [A061] Black-headed Gull (<i>Chroicephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Common Tern (<i>Sterna hirundo</i>) [A193] Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] Wetlands [A999] 	<ul style="list-style-type: none"> No 	CM1, CM10, CM11, CM2, CM3, CM4, CM5, CM6, CM7, CM8, F287(A) (Corrib Mask)
Lough Carra/Mask Complex SAC (Site Code: 001774)	To maintain or restore the favourable conservation condition of the Annex I habitat(s)	<ul style="list-style-type: none"> Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] 	<ul style="list-style-type: none"> Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303] Otter (<i>Lutra lutra</i>) [1255] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	CM1, CM1/1, CM10, CM11, CM2, CM2/1, CM2/2, CM2/3, CM3, CM4, CM5, CM5/1, CM5/10, CM5/11, CM5/13, CM5/14, CM5/15, CM5/16, CM5/17, CM5/18, CM5/19, CM5/20, CM5/21, CM5/22, CM5/23, CM5/24, CM5/25, CM5/26, CM5/27, CM5/28, CM5/29, CM5/30, CM5/31, CM5/32, CM5/33, CM5/34, CM5/35, CM5/36, CM5/37, CM5/38, CM5/39, CM5/40, CM5/41, CM5/42, CM5/43, CM5/44, CM5/45, CM5/46, CM5/47, CM5/48, CM5/49, CM5/50, CM5/51, CM5/52, CM5/53, CM5/54, CM5/55, CM5/56, CM5/57, CM5/58, CM5/59, CM5/60, CM5/61, CM5/62, CM5/63, CM5/64, CM5/65, CM5/66, CM5/67, CM5/68, CM5/69, CM5/70, CM5/71, CM5/72, CM5/73, CM5/74, CM5/75, CM5/76, CM5/77, CM5/78, CM5/79, CM5/80, CM5/81, CM5/82, CM5/83, CM5/84, CM5/85, CM5/86, CM5/87, CM5/88, CM5/89, CM5/90, CM5/91, CM5/92, CM5/93, CM5/94, CM5/95, CM5/96, CM5/97, CM5/98, CM5/99, CM5/100

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
001774)	Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140] • European dry heaths [4030] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] 	<ul style="list-style-type: none"> [1355] • Shining sickle moss (<i>Drepanocladus vernicosus</i>) [1393] 			CM5/2, CM5/3, CM5/4, CM5/5, CM5/6, CM5/7, CM5/8, CM5/8/1, CM5/9, CM5A, CM6, CM7, CM8, CM8/1, CM8/2, CM8/3, CM8/4, CM9, CM9/1, F287(A) (Corrib Mask)
Ross Lake & Woods SAC (Site Code: 001312)	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	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140] 	<ul style="list-style-type: none"> • Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C32/10, C32/2A, C32/3, C32/4, C32/5, C32/6, C32/6/1, C32/7, C32/8, C32/9, EXT on C32, F.138 (Corrib Clare)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	selected					
Lough Corrib SPA (Site Code: 004042)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] Gadwall (<i>Anas strepera</i>) [A051] Shoveler (<i>Anas clypeata</i>) [A056] Pochard (<i>Aythya ferina</i>) [A059] Tufted Duck (<i>Aythya fuligula</i>) [A061] Common Scoter (<i>Melanitta nigra</i>) [A065] Hen Harrier (<i>Circus cyaneus</i>) [A082] Coot (<i>Fulica atra</i>) [A125] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] 	<ul style="list-style-type: none"> No 	C1, C10, C11, C12, C13, C15, C17, C18, C19, C20, C21, C23, C24, C25, C26, C27, C28, C29, C3, C3/1, C30, C31, C32, C33, C4, C5, C6, C8, C9, F.1215A, F.1215B, F.1215C, F.137, F.154 A2-B2, F.391, F.573, F.604, F.604/1, F.722, F.746, P196/1, P196/5, P196/6 L5-M5 F.154, P196/8 P5-Q5 (Corrib Clare), CH1, CH2, CH3, CH4, CH5, CH6, CH7, CH8 c16, Cornamona River, F.78 (Corrib Headford)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetlands [A999] 		
Lough Corrib SAC (Site Code: 000297)	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	<ul style="list-style-type: none"> Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) [6210] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] 	<ul style="list-style-type: none"> Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] Sea lamprey (<i>Petromyzon marinus</i>) [1095] Brook lamprey (<i>Lampetra planeri</i>) [1096] Atlantic Salmon (<i>Salmo salar</i>) [1106] Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303] Otter (<i>Lutra lutra</i>) [1355] Shining sickle moss (<i>Drepanocladus</i> 	<ul style="list-style-type: none"> n/a 	• No	C1, C10, C11, C12, C13, C14/1, C14/2, C14/3, C14/4, C15, C16/1, C17, C18, C19, C2, C20, C20/1, C21, C21/1, C23, C24, C25, C25/1, C25/2, C26, C27, C28, C29, C3, C3/1, C3/10, C3/11, C3/12, C3/13, C3/14, C3/15, C3/16, C3/17, C3/18, C3/19, C3/2, C3/20, C3/21, C3/22, C3/23, C3/24, C3/25, C3/26, C3/26/1, C3/26/1/1, C3/26/2, C3/26/3, C3/26/4, C3/26/5, C3/26/6, C3/26/7, C3/27, C3/28, C3/3, C3/30, C3/30/1, C3/31, C3/32, C3/32/1, C3/33, C3/34, C3/35, C3/35/1, C3/35/10, C3/35/11, C3/35/11/1, C3/35/11/2, C3/35/11/3, C3/35/12, C3/35/12/1, C3/35/13, C3/35/2, C3/35/3, C3/35/4, C3/35/5, C3/35/7, C3/35/8, C3/35/9, C3/36, C3/37, C3/38, C3/39, C3/4, C3/40, C3/41, C3/42, C3/43, C3/44, C3/45, C3/46, C3/47, C3/47/1, C3/47/2, C3/47/3, C3/47/4, C3/5, C3/6, C3/7, C3/8, C3/8/10, C3/8/11,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		<ul style="list-style-type: none"> Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] Petrifying springs with tufa formation (Cratoneurion) [7220] Alkaline fens [7230] Limestone pavements [8240] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] Bog woodland [91D0] 	<ul style="list-style-type: none"> <i>vernicosus</i>) [1393] Slender naiad (<i>Najas flexilis</i>) [1833] 			C3/8/11/1, C3/8/11/1/1, C3/8/11/2, C3/8/11/5, C3/8/12, C3/8/13, C3/8/14, C3/8/15, C3/8/16, C3/8/17, C3/8/18, C3/8/19, C3/8/2, C3/8/20, C3/8/22, C3/8/23, C3/8/23/1, C3/8/23/2, C3/8/23/3, C3/8/24, C3/8/3, C3/8/4, C3/8/6, C3/8/7, C3/8/8, C3/8/9, C3/9, C3/9/1, C3/9/10, C3/9/12, C3/9/12/1, C3/9/13, C3/9/14, C3/9/15, C3/9/16, C3/9/17, C3/9/18, C3/9/19, C3/9/2, C3/9/3, C3/9/4, C3/9/5, C3/9/6, C3/9/7, C3/9/8, C3/9/8/2, C3/9/8/3, C3/9/8/4, C3/9/8/5, C3/9/9, C30, C31, C32, C32/1, C32/2, C32/5, C33, C3, C34/1, C35, C4, C4/1, C4/2, C4/3, C4/4, C5, C6, C8, C9, ED @ Ballyglunin, ED @ Montiagh, F.1215A, F.1215B, F.1215C, F.129, F.1290, F.137, F.154 A2-B2, F.159, F.180, F.242, F.242/1, F.391, F.459, F.466, F.475, f.53, F.534, F.551, F.565, F.573, F.583, F.604, F.604/1, F.623A, F.623B, F.652A, F.652B, F.711, F.722, F.746, F.75, F.772/5, F.776, F.808, F.814, F.837, F.898, F.987/1, F.987/2, P196/1, P196/5, P196/6 L5-M5 F.154, P196/8 P5-Q5, S.G.68/5, S.G.68/6, S.G.68/7, S.G.68/7/1 (Corrib Clare) CH1, CH10,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
						CH10/1, CH10/2, CH10/3, CH10/4, CH10/5, CH10/5/1, CH11, CH2, CH3, CH4, CH4/1, CH4/2, CH4/3, CH4/4, CH4/4/1, CH4/4/2, CH4/5, CH4/5/1, CH4/6, CH4/6/1, CH4/6/2, CH4/6/3, CH4/7, CH4/8, CH4/9, CH4/9/1, CH5, CH6, CH7, CH8 c16, CH9, CH9/1, CH9/2, Cornamona River, F.102, F.129, F.145, F.193, F.205, F.23, F.28, F.78 (Corrib Headford)

Table A1.12 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Creegh Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Carrowmore Dunes SAC (Site Code: 002250)	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	<ul style="list-style-type: none"> • Reefs [1170] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] 	<ul style="list-style-type: none"> • Narrow-mouthed whorl snail <i>Vertigo angustior</i> [1014] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C2/1, C3
Mid Clare Coast SPA (Site Code: 004182)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Sanderling (<i>Calidris alba</i>) [A144] • Purple Sandpiper (<i>Calidris maritima</i>) [A148] • Dunlin (<i>Calidris alpina</i>) [A149] • Turnstone (<i>Arenaria interpres</i>) [A169] • Barnacle Goose (<i>Branta leucopsis</i>) [A396] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C1, C3

Table A1.13 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Donegal Arterial Drainage Schemes

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
River Finn SAC (Site Code: 002301)	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.	<ul style="list-style-type: none"> • Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] • Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] • Blanket bog (*active only) [7130] • Transition mires and quaking bogs [7140] 	<ul style="list-style-type: none"> • Salmon (<i>Salmo salar</i>) [1106] • Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1 (Cloonburn), C1, C2, C2/1, C3, D1, D14, D2, D22, D23, D3, D5, D6, Ext D2A, Ext on D2 (Deele & Swillyburn)
Lough Swilly SPA (Site Code: 004075)	To maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] • Grey Heron (<i>Ardea cinerea</i>) [A028] • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Greylag Goose (<i>Anser anser</i>) [A043] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Mallard (<i>Anas platyrhynchos</i>) [A053] 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C1/3, C2, C3, C3/1, C3/1/1, D 2, D1, D1/1, D1/1/1, D1/1/2, D1/2 (Blanket Nook), C1, C1/1, C1/2, D1 (Skeoge Burnfoot), C 1, C1/1, C1/2, C1/3, D 1, D 1 D 14, D 2 ,D 2 D 15, D 3, D 3, D 4, D 4, D 9, D.1, D2, D3, D4A, Isleburn (Swilly Embankments)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> • Shoveler (<i>Anas clypeata</i>) [A056] • Scaup (<i>Aythya marila</i>) [A062] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Red-breasted Merganser (<i>Mergus serrator</i>) [A069] • Coot (<i>Fulica atra</i>) [A125] • Oystercatcher (<i>Haematopus ostralegus</i>) [A130] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164] • Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] • Common Gull 		

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<p>(<i>Larus canus</i>) [A182]</p> <ul style="list-style-type: none"> Sandwich Tern (<i>Sterna sandvicensis</i>) [A191] Common Tern (<i>Sterna hirundo</i>) [A193] Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] Wetlands & Waterbirds [A999] 		
Lough Swilly SAC (Site Code: 002287)	To maintain the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **To restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been	<ul style="list-style-type: none"> Estuaries [1130] **Coastal lagoons [1150] **Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] **Old sessile oak woods with Ilex and Blechnum in British Isles [91A0] 	<ul style="list-style-type: none"> **Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1, C2, C3, D1, D1/1, D1/2, (Blanket Nook), C1, C1/1, C1/2, D1 (Skeoge Burnfoot), C 1, C1/1, C1/2, C1/3, C1/4, D 1, D 1 D 14, D 2, D 2 D 15, D 20, D 21, D 21/1, D 3, D 4, D 3, D 4, D 5, D 8, D 9, D.1, D19, D2, D3, D4A, Isleburn (Swilly Embankments)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	selected.					

Table A1.14 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Duff Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Bunduff Lough And Machair/Tra walua/Mulla ghmore SAC (Site Code: 000625)	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.	<ul style="list-style-type: none"> • Alkaline fens [7230] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Machairs [21A0] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] • Large shallow inlets and bays [1160] • Mudflats and sandflats not covered by seawater at low tide [1140] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Reefs [1170] • <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] 	<ul style="list-style-type: none"> • Petalwort (<i>Petalophyllum ralfsii</i>) [1395] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1

Table A1.15 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Dunmanway (Bandon River) Flood Relief Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Bandon River SAC (Site Code: 002171)	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.	<ul style="list-style-type: none"> • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] 	<ul style="list-style-type: none"> • Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] • Brook lamprey (<i>Lampetra planeri</i>) [1096] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C2, C2/1, C2/2, C3, C4

Table A1.16 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Feale Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Moanveanla gh Bog SAC (Site Code: 002351)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/18/17
Lower River Shannon SAC (Site Code: 002165)	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	<ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time [1110] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] • Mediterranean salt 	<ul style="list-style-type: none"> • Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] • Sea lamprey (<i>Petromyzon marinus</i>) [1095] • Brook lamprey (<i>Lampetra planeri</i>) [1096] • River lamprey (<i>Lampetra fluviatilis</i>) [1099] • Atlantic Salmon (<i>Salmo salar</i>) [1106] • Otter (<i>Lutra lutra</i>) [1355] • Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/10, C1/11, C1/12, C1/14, C1/14/1, C1/14/10, C1/14/11, C1/14/12, C1/14/13, C1/14/14, C1/14/15, C1/14/16, C1/14/16/1, C1/14/16/2, C1/14/16/3, C1/14/2, C1/14/3, C1/14/4, C1/14/5, C1/14/6, C1/14/7, C1/14/8, C1/15, C1/16, C1/17, C1/18, C1/18/1, C1/18/10, C1/18/11, C1/18/12, C1/18/13, C1/18/14, C1/18/15, C1/18/15/1, C1/18/15/1/1/1, C1/18/15/2, C1/18/16, C1/18/17, C1/18/18, C1/18/19, C1/18/2, C1/18/2/1, C1/18/20, C1/18/3, C1/18/4, C1/18/5, C1/18/6, C1/18/7, C1/18/8, C1/18/9, C1/19, C1/2, C1/20, C1/21, C1/22, C1/23, C1/24, C1/25, C1/26, C1/3, C1/3/1, C1/5, C1/6, C1/7, C1/8, C1/9, D1, D10, D11, D12, D13, D14, D19, D2, D20, D21, D23, D25, D26, D27, D28, D29, D3, D30, D31, D32, D4,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		meadows (<i>Juncetalia maritimi</i>) [1410] • Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]				D5, D6, D7, D9

Table A1.17 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Glyde & Dee Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Stabannan-Braganstown SPA (Site Code: 04091)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Greylag Goose (<i>Anser anser</i>) [A043] 	<ul style="list-style-type: none"> • No 	C10(1), C10(3), C10(4), C11(1), C9(1)
Dundalk Bay SAC (Site Code: 000455)	To maintain the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected **To restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Perennial vegetation of stony banks [1220] • **<i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] • Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1(1)
Dundalk Bay SPA (Site Code: 004026)	To maintain the favourable conservation condition of the bird species listed as Special	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] • Greylag Goose (<i>Anser anser</i>) [A043] 	<ul style="list-style-type: none"> • No 	C1(1)

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	Conservation Interests for this SPA.			<ul style="list-style-type: none"> • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Teal (<i>Anas crecca</i>) [A052] • Mallard (<i>Anas platyrhynchos</i>) [A053] • Pintail (<i>Anas acuta</i>) [A054] • Common Scoter (<i>Melanitta nigra</i>) [A065] • Red-breasted Merganser (<i>Mergus serrator</i>) [A069] • Oystercatcher (<i>Haematopus ostralegus</i>) [A130] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing 		

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<p>(<i>Vanellus vanellus</i>) [A142]</p> <ul style="list-style-type: none"> • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Black-headed Gull (<i>Larus ridibundus</i>) [A179] • Common Gull (<i>Larus canus</i>) [A182] • Herring Gull (<i>Larus argentatus</i>) [A184] • Wetlands & Waterbirds [A999] 		

Table A1.18 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Inny Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Owel SPA (Site Code: 004047)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Shoveler (<i>Anas clypeata</i>) [A056] • Coot (<i>Fulica atra</i>) [A125] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C45 (1)
Lough Owel cSAC (Site Code: 000688)	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.	<ul style="list-style-type: none"> • Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.[3140] • Transition mires and quaking bogs [7140] • Alkaline fens [7230] 	<ul style="list-style-type: none"> • White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C45 (1)
Glen Lough SPA (Site Code: 004045)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] 	<ul style="list-style-type: none"> • No 	C29
Garriskill Bog SPA (Site Code: 004102)	To maintain or restore the favourable conservation	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) 	<ul style="list-style-type: none"> • No 	C1, C33, C33/1, C33/1/1, C34

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	condition of the bird species listed as Special Conservation Interests for this SPA.			[A395]		
Garriskill Bog SAC (Site Code: 000679)	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	<ul style="list-style-type: none"> • *Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C33, C33/1, C33/1/1, C34
Lough Kinale & Derragh Lough SPA (Site Code: 004061)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Pochard (<i>Aythya ferina</i>) [A059] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C55, C56, C57, C1
Lough Sheelin SPA (Site Code: 004065)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] • Pochard (<i>Aythya ferina</i>) [A059] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Goldeneye 	<ul style="list-style-type: none"> • No 	C1, C59, C60, C61, C62, C63

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	SPA.			(<i>Bucephala clangula</i>) [A067] • Wetlands [A999]		
Lough Ree SPA (Site Code: 004064)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	• n/a	• n/a	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Mallard (<i>Anas platyrhynchos</i>) [A053] • Shoveler (<i>Anas clypeata</i>) [A056] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Common Scoter (<i>Melanitta nigra</i>) [A065] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] • Coot (<i>Fulica atra</i>) [A125] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Lapwing (<i>Vanellus vanellus</i>) [A142] 	• No	C1, C1/1, C2, C3, C3A, C4, C6 Outfall, C6/2

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<ul style="list-style-type: none"> • Common Tern (<i>Sterna hirundo</i>) [A193] • Wetlands [A999] 		
Ballymore Fen cSAC (Site Code: 002313)	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	<ul style="list-style-type: none"> • Transition mires and quaking bogs [7140] 	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C8/7/3
Lough Iron SPA (Site Code: 004046)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Shoveler (<i>Anas clypeata</i>) [A056] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Coot (<i>Fulica atra</i>) [A125] • Greenland White-fronted goose (<i>Anser albifrons flavirostris</i>) [A395] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C1, C29, C30, C31, C31A, C31A/1. C31A/2
Lough	To maintain or	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan 	<ul style="list-style-type: none"> • No 	C1, C37, C38, C39, C40, C41,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Derravarragh SPA (Site Code: 004043)	restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.			<i>(Cygnus cygnus)</i> [A038] • Pochard (<i>Aythya ferina</i>) [A059] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Coot (<i>Fulica atra</i>) [A125] • Wetlands [A999]		C42, C43
Moneybeg & Clareisland Bog (Site Code: 002340)	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.	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C59, C60, C60/1, XC60/1
Lough Ree SAC (Site Code: 000440)	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.	<ul style="list-style-type: none"> • Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) [6210] • Degraded raised bogs still capable of natural regeneration [7120] • Alkaline fens [7230] 	<ul style="list-style-type: none"> • Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C2, C3A/1, C5, C5A, C6 Outfall, C6, C6/2

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		<ul style="list-style-type: none"> • Limestone pavements [8240] • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] • Bog woodland [91D0] 				

Table A1.19 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Kilcoo Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Melvin SAC (Site Code: 000428)	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.	<ul style="list-style-type: none"> • Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea [3130] 	<ul style="list-style-type: none"> • Atlantic Salmon (<i>Salmo salar</i>) [1106] • Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1

Table A1.20 Qualifying Features and Conservation Objectives of Natura 2000 Sites – Killimor/Cappagh Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Derg SPA (Site Code: 004058)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Common Tern (<i>Sterna hirundo</i>) [A193] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C1
Slieve Aughty Mountains SPA (Site Code: 004168)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Merlin (<i>Falco columbarius</i>) [A098] • Hen Harrier (<i>Circus cyaneus</i>) [A082] 	<ul style="list-style-type: none"> • No 	C2/10, C2/10/1, C2/10/1/1, C2/14, C2/17/1, C2/2, C2/2/5
Barroughter Bog SAC (Site Code: 000231)	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	<ul style="list-style-type: none"> • Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/1/1, D1, D1/1

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Derg North East Shore SAC (Site Code: 002241)	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	<ul style="list-style-type: none"> • <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] • Alkaline fens [7230] • Limestone pavements [8240] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • <i>Taxus baccata</i> woods of the British Isles [91J0] 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, D1

Table A1.21 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Knockcroghery Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Ree SPA (Site Code: 004064)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Mallard (<i>Anas platyrhynchos</i>) [A053] • Shoveler (<i>Anas clypeata</i>) [A056] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Common Scoter (<i>Melanitta nigra</i>) [A065] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] • Coot (<i>Fulica atra</i>) [A125] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Common Tern (<i>Sterna hirundo</i>) 	<ul style="list-style-type: none"> • No 	C1 Ballyglass

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				[A193] • Wetlands [A999]		
Lough Ree SAC (Site Code: 000440)	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	<ul style="list-style-type: none"> • Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150] • Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] • Degraded raised bogs still capable of regeneration [7120] • Alkaline fens [7230] • Limestone pavements [8240] • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] • Bog woodland [91D0] 	<ul style="list-style-type: none"> • Otter (<i>Lutra lutra</i>) [1355] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1 Ballyglass

Table A1.22 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Maine Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Castlemaine Harbour SAC (Site Code: 000343)	To maintain the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **To restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • **Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Dunes with <i>Salix repens ssp. argentea</i> (<i>Salix arenariae</i>) [2170] • Humid dune slacks [2190] • **Alluvial forests with 	<ul style="list-style-type: none"> • Sea lamprey (<i>Petromyzon marinus</i>) [1095] • River lamprey (<i>Lampetra fluviatilis</i>) [1099] • Atlantic Salmon (<i>Salmo salar</i>) [1106] • **Otter (<i>Lutra lutra</i>) [1355] • Petalwort (<i>Petalophyllum ralfsii</i>) [1395] 	• N/a	• No	C1, C1/1, C1/2, C1/3, C1/3/1, C1/4, C1/5, C1/6, C10, C10A, C11, C2, C3, C4, C4/1, C5, C6, C7, C8, C9, D1, D14, D15, D16, D17, D2, D20, D3, D35, D36, D37, D38, D39, D41, D42, D43, D43A, D44, D45, D46, D47, D47A, D7, D8, D9, Outfall Creek

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		<i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]				
Castlemaine Harbour SPA (Site Code: 004029)	To maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Red-throated Diver (<i>Gavia stellata</i>) [A001] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Wigeon (<i>Anas penelope</i>) [A050] Mallard (<i>Anas platyrhynchos</i>) [A053] Pintail (<i>Anas acuta</i>) [A054] Scaup (<i>Aythya marila</i>) [A062] Common Scoter (<i>Melanitta nigra</i>) [A065] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Sanderling 	<ul style="list-style-type: none"> No 	C1, C1/1, C1/2, C1/3, C1/4, C10, C10A, C11, C2, C3, C4, C6, C7, C8, C9, D1, D14, D15, D16, D17, D35, D36, D37, D38, D39, D41, D42, D43, D43A, D44, D45, D46, D47, D7, D8, D9, Outfall Creek

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<p>(<i>Calidris alba</i>) [A144]</p> <ul style="list-style-type: none"> • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164] • Turnstone (<i>Arenaria interpres</i>) [A169] • Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346] • Wetlands & Waterbirds [A999] 		

Table A1.23 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Moy Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Killala Bay/Moy Estuary SAC (Site Code: 000458)	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.	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] • Humid dune slacks [2190] 	<ul style="list-style-type: none"> • Narrow-mouthed whorl snail (<i>Vertigo angustior</i>) [1014] • Sea Lamprey (<i>Petromyzon marinus</i>) [1095] • Common Seal (<i>Phoca vitulina</i>) [1365] 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1, C1/1, C1/2, C1/3, C1/4, C1/5, F/149, F/200
Killala Bay/Moy Estuary SPA (Site Code: 0004036)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) 	<ul style="list-style-type: none"> • No 	C1/2, C1/3, C1/4, F/149, F/200

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	SPA.			[A141] • Sanderling (<i>Calidris alba</i>) [A144] • Dunlin (<i>Calidris alpina</i>) [A149] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Wetlands [A999]		
Lough Conn & Lough Cullin SPA (Site Code: 004228)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395] Tufted Duck (<i>Aythya fuligula</i>) [A061] Common Gull (<i>Larus canus</i>) [A182] Common Scoter (<i>Melanitta nigra</i>) [A065] Wetland [A999] 	<ul style="list-style-type: none"> No 	C1/21, C1/21/1, C1/21/10, C1/21/11, C1/21/12, C1/21/13, C1/21/14, C1/21/2, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/8, C1/21/9, C1/21A, F/1155
River Moy SAC (Site Code: 002298)	To maintain or restore the favourable conservation condition of the	<ul style="list-style-type: none"> Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] 	<ul style="list-style-type: none"> White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] Sea lamprey 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1, C1/10, C1/11, C1/12, C1/13, C1/14, C1/15, C1/16, C1/17, C1/17/1, C1/18, C1/19, C1/20, C1/21, C1/21/1, C1/21/1/1, C1/21/1/10, C1/21/1/2,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
	Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	<ul style="list-style-type: none"> Depressions on peat substrates of the Rhynchosporion [7150] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Alkaline Fens [7230] 	<p>(<i>Petromyzon marinus</i>) [1095]</p> <ul style="list-style-type: none"> Brook lamprey (<i>Lampetra planeri</i>) [1096] Atlantic Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355] 			C1/21/1/3, C1/21/1/4, C1/21/1/5, C1/21/1/5/1, C1/21/1/5/10, C1/21/1/5/11, C1/21/1/5/12, C1/21/1/5/13, C1/21/1/5/14, C1/21/1/5/15, C1/21/1/5/16, C1/21/1/5/17, C1/21/1/5/18, C1/21/1/5/18/1, C1/21/1/5/18/2, C1/21/1/5/18/3, C1/21/1/5/18/4, C1/21/1/5/18/5, C1/21/1/5/18/6, C1/21/1/5/2, C1/21/1/5/3, C1/21/1/5/4, C1/21/1/5/5, C1/21/1/5/6, C1/21/1/5/6/1, C1/21/1/5/7, C1/21/1/5/8, C1/21/1/5/9, C1/21/1/6, C1/21/1/7, C1/21/1/8, C1/21/1/9, C1/21/10, C1/21/10/1, C1/21/11, C1/21/12, C1/21/13, C1/21/13/1, C1/21/14, C1/21/14/1, C1/21/14/2, C1/21/14/2/1, C1/21/14/2/2, C1/21/14/3, C1/21/14/4, C1/21/14/5, C1/21/14/5/1, C1/21/14/5/2, C1/21/14/6, C1/21/2, C1/21/3, C1/21/4, C1/21/5, C1/21/6, C1/21/7, C1/21/7/1, C1/21/7/1/1, C1/21/8, C1/21/9, C1/21/9/1, C1/21A, C1/22, C1/23, C1/23/1, C1/23/2, C1/24, C1/25, C1/26, C1/27, C1/28, C1/29, C1/30, C1/30/1, C1/30/10, C1/30/11, C1/30/12, C1/30/13, C1/30/2, C1/30/2/1, C1/30/3, C1/30/4, C1/30/5, C1/30/5/1, C1/30/5/10, C1/30/5/2, C1/30/5/3, C1/30/5/4, C1/30/5/4/1, C1/30/5/5,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
						C1/30/5/6, C1/30/5/7, C1/30/5/8, C1/30/6, C1/30/7, C1/30/7/1, C1/30/7/11, C1/30/7/12, C1/30/7/12/1, C1/30/7/13, C1/30/7/14, C1/30/7/15, C1/30/7/16, C1/30/7/16/1, C1/30/7/2, C1/30/7/3, C1/30/7/4, C1/30/7/5, C1/30/7/6, C1/30/7/7, C1/30/7/8, C1/30/7/9, C1/30/7/9A, C1/30/8, C1/30/9, C1/31, C1/31/1, C1/31/2, C1/32, C1/33, C1/34, C1/35, C1/35/1, C1/35/2, C1/36, C1/37, C1/38, C1/39, C1/40, C1/41, C1/42, C1/43, C1/44, C1/45, C1/45/1, C1/45/2, C1/45/2/1, C1/45/2/1/1, C1/45/2/2, C1/45/3, C1/45/4, C1/46, C1/47, C1/47/1, C1/48, C1/48/1, C1/48/2, C1/48/3, C1/48/4, C1/48/5, C1/48/6, C1/48/6/1, C1/48/7, C1/48/7/1, C1/48/8, C1/49, C1/49/1, C1/49/2, C1/49/3, C1/49/4, C1/49/5, C1/49/6, C1/5, C1/5/1, C1/5/2, C1/5/3, C1/5/4, C1/5/4/1, C1/5/5, C1/5/5/1, C1/5/6, C1/5/6/1, C1/5/7, C1/50, C1/50/1, C1/51, C1/52, C1/53, C1/54, C1/54/1, C1/55, C1/56, C1/57, C1/57/1, C1/57/2, C1/57/3, C1/57/4, C1/58, C1/7, C1/8, C1/9, F/1070, F/1070B, F/1155, F/1181, F/1314, F/1390, F/1465, F/1536, F/1597, F/1599, F/210A, F/242, F/290, F/312,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
						F/673, F/909, F/961

Table A1.24 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Nenagh Arterial Drainage Scheme

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Lough Derg (Shannon) SPA (Site Code: 004058)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Common Tern (<i>Sterna hirundo</i>) [A193] • Tufted Duck (<i>Aythya fuligula</i>) [A061] • Goldeneye (<i>Bucephala clangula</i>) [A067] • Wetlands [A999] 	<ul style="list-style-type: none"> • No 	C1, C3, C4, D1, D2

Table A1.25 Qualifying Features and Conservation Objectives of Natura 2000 Sites - Lower Shannon Arterial Drainage Schemes

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Glen Bog (Site Code: 001430)	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.	<ul style="list-style-type: none"> Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1/25/22/1, C1/25/22/1A
Tory Hill SAC (Site Code: 000439)	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	<ul style="list-style-type: none"> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210] Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] Alkaline fens [7230] 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1/23, C1/23/2, C1/23/3, C1/23/4
Curraghcha se Woods SAC (Site Code: 000174)	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	<ul style="list-style-type: none"> Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] <i>Taxus baccata</i> woods of the British Isles [91J0] 	<ul style="list-style-type: none"> Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303] 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> No 	C1/17/4

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Askeaton Fen Complex SAC (Site Code: 002279)	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	<ul style="list-style-type: none"> • Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] • Alkaline fens [7230] • 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • No 	C1/17/4/7, C1/17/4
River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • n/a 	<ul style="list-style-type: none"> • Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Pintail (<i>Anas acuta</i>) [A054] • Shoveler (<i>Anas clypeata</i>) [A056] • Scaup (<i>Aythya marila</i>) [A062] • Ringed Plover (<i>Charadrius</i> 	<ul style="list-style-type: none"> • No 	C1, C1/1, D1, D2, D4 (Ballynacclough), C1, C1/1, C2, D1, D2, D3, D4 (Bunratty Rineanna), C1, C10, C10/2, C10/3, C11, C12, C13, C2, C3, C5, C6, C7, C7/1, C7/2, C7/3, C7/4, C7/5, C8, C9, C9/1, D1, D12, D13, D2, D22, D24, D25 (Coonagh Embankment), C1 (Deel), C10, C13, C14, C15, C16, C16/1/1, C17, C18, C19, C2, C20, C21, C22, C22A, C3, C4/1, C4/1/1, C6, C7, C8, C9, D1, D11, D12, D13, D14, D15, D16, D17, D18, D19, D2, D20, D27, D3, D4, D6, D7, (Fergus), C1 Mague Outfall, C1/10, C1/2, C1/3, C1/4, C1/5, C1/6, C1/7, C1/8, D10, D2, D20, D21, D22, D23, D3, D4, D7 (Mague Outfall), C1, D1, D2 (Newtown Tervoe), C2, C2/1, C2/1A, C3, C4, D1, D2, D3, D4, D5, D6, Owenagarney River (Owenagarney), D1 (Polefield),

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
				<i>hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164] • Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] • Wetlands [A999]		C1, C2, C3, C4, D1, D2, D3 (Ringmoylan Mellon), C1, C1/A, C2, D1, D2, D3 (Ringmoylan-Foynes (Ballymartin section)), C1 (Ringmoylan-Foynes (Ballysteen section)), C1, C2, C3, D1, D2, D3, D4, D5 (Ringmoylan-Foynes (Foynes Section))
Lower River Shannon SAC (Site	To maintain or restore the favourable	• Sandbanks which are slightly covered by sea water all the time [1110]	• Freshwater pearl mussel (<i>Margaritifera</i>	• n/a	• No	C1, C1/1, D1, D2, D4 (Ballynacclough), C1, C1/1, C2, D1, D2, D3, D4 (Bunratty

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
Code: 002165)	conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected	<ul style="list-style-type: none"> • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • <i>Salicornia</i> and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] • Alluvial forests with 	<ul style="list-style-type: none"> • <i>margaritifera</i> [1029] • Sea lamprey (<i>Petromyzon marinus</i>) [1095] • Brook lamprey (<i>Lampetra planeri</i>) [1096] • River lamprey (<i>Lampetra fluviatilis</i>) [1099] • Atlantic Salmon (<i>Salmo salar</i>) [1106] • Otter (<i>Lutra lutra</i>) [1355] • Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349] 			Rineanna), C1, C10, C10/2, C10/3, C11, C12, C13, C2, C3, C5, C6, C7, C7/1, C7/2, C7/3, C7/4, C7/5, C8, C9, C9/1, D1, D12, D13, D2, D22, D24, D25 (Coonagh Embankment), C1, C1/1, C1/10, C1/11, C1/12, C1/14, C1/14/1, C1/14/10, C1/14/11, C1/14/12, C1/14/13, C1/14/14, C1/14/15, C1/14/16, C1/14/16/1, C1/14/16/2, C1/14/16/3, C1/14/2, C1/14/3, C1/14/4, C1/14/5, C1/14/6, C1/14/7, C1/14/8, C1/15, C1/16, C1/17, C1/18, C1/18/1, C1/18/10, C1/18/11, C1/18/12, C1/18/13, C1/18/14, C1/18/15, C1/18/15/1, C1/18/15/1/1/1, C1/18/15/2, C1/18/16, C1/18/17, C1/18/18, C1/18/19, C1/18/2, C1/18/2/1, C1/18/20, C1/18/3, C1/18/4, C1/18/5, C1/18/6, C1/18/7, C1/18/8, C1/18/9, C1/19, C1/2, C1/20, C1/21, C1/22, C1/23, C1/24, C1/25, C1/26, C1/3, C1/3/1, C1/5, C1/6, C1/7, C1/8, C1/9, D1, D10, D11, D12, D13, D14, D19, D2, D20, D21, D23, D25, D26, D27, D28, D29, D3, D30, D31, D32, D4, D5, D6, D7, D9 (Feale), C10, C12, C13, C14, C15, C16, C16/1/1, C17, C18, C19, C2, C20, C21, C22, C22A, C3, C4/1, C4/1/1, C6, C7, C8,

Natura 2000 sites with potential effect from works	Conservation Objectives	Qualifying Interests – Annex I habitats	Qualifying Interests – Annex II species	Qualifying Interests – Special Conservation Interests	Site Conservation Plan available	Channels selected for ecological site survey
		<i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]				C9, D1, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D2, D20, D27, D3, D4, D6, D7, D8, D9 (Fergus), C1 (Groody), C1, C1/13, C1/15, Drain (Maigne), C1 Maigne Outfall, C1/10, C1/11, C1/12, C1/14, C1/14/2, C1/15A, C1/17, C1/2, C1/3, C1/4, C1/4/1, C1/5, C1/6, C1/7, C1/8, C18, D10, D11, D12, D14, D15, D16, D17, D18, D19, D2, D20, D21, D22, D23, D24, D3, D4, D41, D42, D43, D7 (Maigne Outfall), C1, C1/1, C1/1/0, C1/1/1, C1/1/2, C1/1/3 (Mulkear Ballymackeogh), C1, C1/1, C1/2, C1/3, C1/4, C1/5 (Mulkear Cappamore), C1, D1, D2 (Newtown Tervoe), C1, C2, C2/1, C2/1A, C3, C4, C5, D1, D15, D18, D2, D3, D4, D5, D6, D7, D8, D9, Owenagarney River (Owenagarney), D1 (Polefield), C1, C1/1, C2, C3, C4, D1, D2, D3 (Ringmoylan Mellon), C1, C1/A, C2, D1, D2, D3 (Ringmoylan-Foynes (Ballymartin section)), C1 (Ringmoylan-Foynes (Ballysteen Section)) C1, C2, C3, D1, D2, D3, D4, D5 (Ringmoylan-Foynes (Foynes Section))

Appendix 2

OPW's Environmental Management Protocols & Standard Operating Procedures



The Office of Public Works
Arterial Drainage Maintenance Service
Environmental Management Protocols
&
Standard Operating Procedures

The Office of Public Works
Environment Section
West Region Drainage Maintenance
Headford
Co. Galway
Telephone: +353 (0)93 35 456
Fax: +353 (0)93 35 631



**The Office of Public Works
Arterial Drainage Maintenance
Environmental Management Protocols &
Standard Operating Procedures**

Contents:	Current Version
Environmental Management Protocols	April 2011
Environmental Drainage Maintenance Guidance Notes (10 Steps to Environmentally Friendly Maintenance)	April 2011
Lamprey Standard Operating Procedure	V2 April 2009
Crayfish Standard Operating Procedure	V2 April 2009
Otter Standard Operating Procedure	V2 April 2009
Mussels Standard Operating Procedure	V2 April 2009
Invasive Species Standard Operating Procedure	V2 March 2009
Zebra Mussel Standard Operating Procedure	V2 May 2009
Blank OPW/ EREP Audit Form	April 2011
NPWS Local Contact Details	May 2009
Fisheries Contact Details	April 2011
OPW Bridges on National Primary Roads	March 2009

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ENVIRONMENTAL MANAGEMENT PROTOCOLS
ARTERIAL DRAINAGE MAINTENANCE SERVICE
(APPLICABLE TO ENGINEERS, TECHNICIANS AND FOREMEN)



PART I – OPERATIONS MANAGEMENT

COMMUNICATIONS - STATUTORY STAKEHOLDERS

- By the end of September of each year, each Drainage Region to forward a **draft** copy of its Annual Works Programme for the coming year to OPW's Environment Section, and to the Inland Fisheries Ireland (IFI) EREP Project Manager who will review it for appropriate sites and study locations for the Environmental River Enhancement Programme 2008 -2012.
- By end of November of each year, each Drainage Region to forward the relevant sections of the Finalised Annual Maintenance Programme for the coming year with a copy of appropriate scheme maps, to the National Parks & Wildlife Services (NPWS) Regional Managers and the IFI Directors.
- When compiling the programme the type of works proposed should be indicated for each channel under the headings A-F to facilitate the Screening for Appropriate Assessment (AA).
 - A – Silt & Vegetation Management
 - B – Aquatic Vegetation Cutting
 - C – Bank Protection
 - D – Bush Cutting/Branch Trimming
 - E – Tree Cutting
 - F – Bridge/ Structure Repairs
- Ideally, approximate timing (season/month) and approximate duration of works should be included for each channel.
- Works that fall within SACs, SPAs or NHAs are to be highlighted on the programme.
- As a follow up, the Drainage Regions offer the opportunity for a meeting with the stakeholders to discuss the programme and where a meeting is requested, preferable for this to take place as early as possible in the year.
- Prior to entry onto a channel contained wholly or partly within an SAC, SPA or NHA, three weeks notice in advance of entry, and for SAC & SPA an AA Screening Statement/Conclusion Statement must be completed and forwarded through the NPWS District Conservation Officer.

INTERIM STAKEHOLDERS MEETINGS

- In addition to the start of the year stakeholder meeting to overview the Annual Works Programme, Regional Offices will offer and facilitate a schedule of more frequent and catchment focused meetings.
- The need and the frequency of these meetings will be determined on a regional basis in partnership with the relevant stakeholders.
- Typically a frequency of every 2-3 months to discuss the following 2-3 months work on the catchment, identifying any further environmental sensitivities, appropriate mitigating measures, follow up joint site visits where deemed beneficial and flagging any opportunities for added benefit in proposed River Enhancement works.
- Typical attendance includes a range of OPW Management Staff, i.e. Engineer, Technician and/or Foreman, NPWS Rangers and/or DCO and IFI Officers.
- OPW Engineer will compile minutes of the meeting to record attendance and a brief account of main decisions and follow up actions.
- Any channel specific information resulting from these meetings, such as timing requests should be entered into the Records Database in accordance with the National Recording Process.
- Fruitful consultations with statutory stakeholders such as NPWS and IFI are of critical importance to continuously improving environmental performance. However, in the interest of maximising the efficiency of stakeholders input, Management Staff are as far as practical,

to plan their consultative requirements and address a range of aspects in any one discussion forum. Interim Stakeholder Meetings or similar forums offer good opportunities to maximise consultation efficiencies.

CORRESPONDENCE

- All Environment related correspondence/complaints should be logged on the Engineering Services Correspondence Database as per normal protocol. Complaints received should be forwarded to the Environment Section should assistance be required.

WALKOVER SURVEYS

- As a component to the EREP Project, on a number of channels, EREP team will request for Walkover Surveys as an opportunity to discuss in detail on site the environmental options for a particular channel with a range of relevant stakeholders.
- Typical attendance will be an IFI EREP representative, a range of OPW Management Staff and relevant Operational Crew if deemed beneficial, local IFI Officer and/or NPWS Ranger or DCO.
- OPW Management Staff to liaise with EREP team and coordinate the site visit with local IFI and NPWS to facilitate their participation if these stakeholders wish to attend.
- Environmental procedures as agreed on-site will be recorded by IFI EREP team and issued to the OPW Engineer as part of the design guidance for the particular Enhanced Maintenance works.
- Regional Management Staff to ensure that Operational Staff carry out the works in accordance with the agreed procedures.

NATURA 2000 SITE ASSESSMENTS

- All scheduled maintenance operations in the vicinity of a Natura 2000 Site i.e. an SAC or SPA, will require Screening for Appropriate Assessment and Stage II Appropriate Assessment where required.
- By the end of September of each year, each Drainage Region to forward a ***draft*** copy of its Annual Works Programme for the coming year to OPW's Environment Section to facilitate this process.
- Environment Section will procure the Ecological Consultant, collate all the channel lists and issue completed AA Screening Statements/Conclusion Statements to the respective OPW engineers as completed.
- The Ecological Consultant will consult with OPW management to define the precise extents of proposed works in each Natura 2000 Site.
- In addition, the Ecological Consultant will be carrying out walkover surveys for pre and post maintenance works for a representative number of the sites and OPW Management will be required to facilitate the same.
- OPW Management Staff will issue the relevant completed Assessments directly to the NPWS District Conservation Officer. In addition, Environment Section will issue all of the Assessments to the Development Applications Unit, DEHLG, Dun Sceine, Harcourt Lane, Dublin 2.
- Preferably for the Assessments to be forwarded to the DCO as soon as it is completed, but in any case with a minimum of three weeks notice before commencement of the works.
- Management Staff to implement all prescribed mitigating measures and ensure that Operational Staff are made aware of all relevant site specific mitigating measures.

Current version of Designated Sites GIS Layers available on Socialtext

Environmental River Enhancement Programme (EREP)

- After reviewing the draft Annual Works Programme, IFI EREP team will revert to the respective Regional Engineers Office and request follow up meetings as required to discuss aspects of the programme in relation to the EREP.
- Enhancement sites require ground truthing to ensure they are technically feasible as envisaged. This is to be coordinated by the IFI EREP team with local IFI and OPW personnel as required.

- Sites shortlisted by IFI EREP team for Capital Enhancement works are emanating from a screening process of technical feasibility in terms of gradient and water quality. In the future, sites selected will increasingly be resulting from other requirements such as the Water Framework Directive Programme Of Measures under Morphology.
- IFI EREP team in consultation with the local IFI and OPW, will prioritise sites on a basis of best return for investment. IFI EREP team will liaise with the Regional Offices to assist in identifying channels deemed suitable for capital enhancement which should be integrated with the following years work programme. In some cases, a situation may arise where the site selected is not overlapping with the current Annual Works Programme but where feasible and subject to any third party agreement, OPW will accommodate these works.
- Similarly for enhanced maintenance works, IFI EREP team in consultation with the local IFI and OPW, will select sites again that are technically feasible and offer best return for investment. These sites will normally be from channels on the current Annual Works Programme.
- IFI EREP team will coordinate all the scientific monitoring works, provide the enhancement design details and guidance to OPW Management Staff and maintain a reasonable level of site supervision, proportional to the complexity of the works and the experience of the OPW Staff involved.
- Consultations with local IFI through the Interim Stakeholder meetings are encouraged to identify sites suitable for Enhancement works and in some cases the local IFI may also be in a position to produce an enhancement design. All enhancement designs and works are to be coordinated through the IFI EREP team to facilitate formal recording into the national EREP project and allow for biodiversity and/or hydromorphology monitoring if required. Local IFI may coordinate with IFI EREP team or alternatively OPW Regional Staff coordinate directly with the EREP team.
- A small portion of channels have more infrequent maintenance cycles and these cases can offer particularly good opportunities for enhanced maintenance type works. Channels programmed where maintenance works have not being carried out for in excess of 10 years, to be flagged to IFI EREP team for possible Walkover Surveys and guidance on appropriate EDM procedures.
- Management Staff to ensure that as far as practical, all Operational crews have an opportunity to get experience on these projects.
- Each Regional Engineer is to make provision in the Annual Works Programme for Plant & Labour resources in addition to provisions in the Annual Budget for materials subject to expenditure constraints. Typical resources are as follows:

Capital Enhancement

Region	Target (Km)	Capital Costs	Machine Weeks	ManWeeks
East Region	20	€200,000	30	60
South West Region	14	€140,000	21	42
West Region	16	€160,000	24	48
	50	€500,000	75	150

Enhanced Maintenance *(in conjunction with routine maintenance)*

Region	Target (Km)	Capital Costs	Machine Weeks	ManWeeks
East Region	20		15	0
South West Region	14		11	0
West Region	16		12	0
	50		38	0

- Progress targets for EREP to be shown on monthly production reports.
- OPW are the primary contact point for liaison with landowners including the organising of

access and egress for machinery and materials. Brochures on EREP are available in all Regional Offices. Additional copies can be obtained through OPW Environment Section.

- Management Staff are encouraged to maximise the use of all available on-site materials such as stone from historical spoil heaps as opposed to importing materials at a higher cost.
- In addition, Management Staff are encouraged to maximise synergies with other funding sources such as Fisheries Development grants attained by local Angling Clubs which could combine with OPW plant and labour to supply materials.
- In all cases, Inland Fisheries Ireland are the statutory authority to give design guidance to OPW. Angling Clubs or other sectoral funding sources to liaise with the Fisheries authorities in respect of all design and environmental monitoring requirements.
- As-Built plans are to be completed by the IFI EREP team for all enhancement works. This will entail a site visit by IFI and relevant OPW Staff where requested. These will be retained by IFI as well as any relevant design information.
- IFI EREP team will forward a copy of the As-Built plans to Environment Section who will upload the same to Socialtext for access to the information by all Staff.
- At the end of the year, IFI EREP team will forward Environment Section a GIS layer of that year's works for uploading to OPW's GIS records.

Current version of Enhancement GIS Layer available on Socialtext

NATIONAL RECORDING PROCESS

- Weekly Record Cards can contain information on Lamprey, white-clawed crayfish, kingfisher, Mussels, Otter and other site specific environmental information as arises.
- Environmental information on Cards will be recorded onto the Records Database by each Drainage office. The latest Records Database has been revised to integrate environmental records.
- On an interim basis, a copy of all Cards with environmental information to be copied and forwarded to Environment Section by each Drainage Office. This is to allow Environment Section to review the detail of information being recorded, feedback to the Operational crews through the Management Staff and attain a national consistency in the style of information being recorded.
- All relevant information to be uploaded to GIS by Environment Section.
- All other relevant environmental information sourced by Management Staff whether from direct observations or through stakeholder consultations, should be entered into the Records Database.
- Relevant environmental information sourced through the EREP project and related research will be forwarded by IFI EREP team to Environment Section directly for centralised GIS uploading.
- On an annual basis, Environment Section will compile an update of Weekly Records Cards species records and make available to all Staff via Socialtext to assist in tracking progress.
- On an ongoing basis, Environment Section will make available the various OPW compiled species records to other authorities to assist in contributing to any appropriate national conservation knowledge.
- As described above, each drainage office will upload onto the Records Database all environmental information from the Weekly Record Cards and all other broader environmental information attained by Management Staff. Within a few years, it's envisaged that multiple regional Staff will be able to use the new Records Database, and then environmental information from all sources will be uploaded directly by a whole host of Staff. Typically this will include any mitigating agreements for particular channels agreed with stakeholders or any other individuals observation such as protected species presence noted during a separate site visit.

SALMONIDS

- As far as practicable, the maintenance works are to be scheduled to accommodate salmonid (Salmon & Trout) spawning areas, as is in place across all regions for many years. This is a widespread measure on many catchments and is most applicable to medium gradient channels with gravel substrate.
- Prior to works commencing, consult with local IFI. Ideally, consultations to be conducted through Interim Stakeholder Meetings or alternatively, direct contact in respect of the specific site.
- Maintenance operations on salmonid spawning beds typically carried out between July and September but timing subject to adjustment due to local knowledge of IFI.
- Raking of spawning gravels to improve spawning capacity also typically carried out between July and September.
- River enhancement works to enhance both the fisheries and the broader ecology of the drainage channel are covered under the EREP project.
- In the future, as the extent of completed enhancement works increases, there is a risk of damage to structures due to future maintenance. All channels scheduled for maintenance to be checked against GIS records for presence of previous enhancement works. Where a presence is indicated, carry out a site visit as appropriate and in consultation with IFI, devise on-site procedures to protect or enhance existing instream structures.

Current version of Enhancements & Spawning GIS Layers available on Socialtext.

LAMPREY (BROOK, RIVER & SEA) & CRAYFISH

- All channels scheduled for maintenance to be checked against GIS records for presence of Lamprey or white-clawed crayfish.
- In accordance with the SOPs, Operational Staff will closely observe the spoil three times daily and report to the Foreman any Lamprey or white-clawed crayfish located.
- Mitigating procedures to apply when:
 - GIS records indicate species presence, or
 - Operational Staff locate Lamprey or white-clawed crayfish during operations, or
 - Where particularly suitable habitat is identified by an environmental stakeholder.
- If significant populations are encountered, notify IFI EREP team and facilitate scientific studies if site deemed suitable by IFI.
- If significant populations are encountered, notify NPWS Ranger and local IFI Officer and conduct site visit as necessary.
- Combination of Mitigating Measures to be selected as applicable to the site while balancing the Flood Risk Management requirements and a sustainable approach to the conservation of Lamprey and/or white-clawed crayfish.
- Identify extent of channel applicable and the mitigating measures to apply.
- Inform Operational Staff of mitigating requirements.

Suite of relevant Mitigating Measures as follows:

On site measures

- Skip sections to retain intact habitat either in one long reach or multiple short reaches.
- Maintenance in an upstream direction to avoid secondary disturbance of a species moving downstream. Balance with the advantage of maintenance in a downstream direction where instream vegetation minimises siltation.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective. This is effective for Lamprey juveniles as they are in the silt. For white-clawed crayfish, cutting of “Flaggers” type vegetation is effective but cutting of “water celery” mat type vegetation is less effective as it can result in white-clawed crayfish being removed within the weed mass.

Forward planning measures

- Annual maintenance of the channel in shorter segments sequentially completing the same over a number of years. Balance with maintaining reasonably operational efficiency in terms of machinery moving, transport, access and egress.
- Longer time periods between maintenance cycles e.g. move from 4-6 years to 7 to 8 years. Balance with overall river ecology as longer maintenance cycles will lead to more heavy-scale works.
- Timing of maintenance to accommodate Lamprey spawning. Stakeholder consultations between OPW and local IFI for salmonid mitigating purposes, to include consideration of Lamprey spawning. This is to be applied to channels where Lamprey spawning habitat is known as informed by IFI or other stakeholder. For River & Brook Lamprey, no works on relevant spawning channel from end March to start of June subject to adjustment due to local knowledge of IFI. For Sea Lamprey, as they spawn during the summer months, restrictions from late April to early July are required. To be applied to channels where Sea Lamprey spawning is known as informed by IFI or other stakeholder and timing subject to adjustment due to local knowledge of IFI. Note that Sea Lamprey are much less widespread so envisaged that the scale of this mitigation will be very limited.
- Loosening spawning bed gravels. Stakeholder consultations between OPW and IFI for salmonid gravel loosening purposes, now to include consideration of Lamprey spawning as above.
- Enhance channel profile such as skewed cross section and promote deposition of silt along margins. Integrate with IFI discussions on planning the EREP to avail of enhancement opportunities particularly for channels where Lamprey or white-clawed crayfish presence is recorded.
- Modification of OPW structures which impede upstream migration. Identification of weirs as barriers to be as informed by IFI or other stakeholder. Where modification designs required, liaison with IFI EREP team to integrate the improvement works into the EREP project. Identification of a bridge apron step attained through ongoing site inspections by OPW Management Staff or other stakeholder. In consultation with IFI, steps at bridges to be modified by a rock armour type ramp or similar. Envisaged that these measures will be of a limited scale on drained channels.

GIS Records:

- Where Lamprey or white-clawed crayfish are discovered, Operational Staff will have recorded the same on the Weekly Record Cards. Cards with species location information will be uploaded to the Records Database as stated in the National Recording Process.
- All new Lamprey spawning location information attained through stakeholder consultation to be recorded on the Records Database in accordance with the National Recording Process.
- All database records of species location will be uploaded to GIS by Environment Section.
- IFI EREP team conducting ongoing research on Lamprey & white-clawed crayfish as a component of the EREP works. Scientific data calculating species density for some sites will be developed and to be supplied by IFI to OPW and uploaded to GIS by Environment Section.

Current version of relevant SOPs: V2 April 2009

Current version of relevant GIS Layers available on Socialtext.

OTTER

- Research to date indicates that Otters are widespread across all sizes of drainage channels nationally, hence it is prudent to assume that Otter use any particular site.
- In accordance with the Otter SOP, Operational Staff will walkover the works area one week in advance in conjunction with the Health & Safety assessment noting dense cover with access directly to the water that is to be avoided where feasible.
- In addition, any recognisable signs of Otter presence observed such as Spraints, Footprints or suspected Holts, will be recorded on the Weekly Record Cards. These signs were identified in Otter Awareness Training carried out across all regions in 2008.
- While holts are usually well concealed, where Operational Staff observe a suspected holt

such as a burrow opening, in consultation with Management Staff, subject to flood risk management functions, no works to within a 50m buffer each side.

Bridge mammal crossing enhancement

- As a component of ongoing consultations with NPWS and other stakeholders, evidence may arise from time to time as to a particular spot for Otter road kill. Typically this can arise where the Otter always traverses the roadway as opposed to going through the bridge. While this scenario is not known to be a widespread issue in Ireland, the highest risk locations are on the National Primary Roads which have the heaviest traffic volumes.
- There are 170 National Primary Road bridges on OPW channels as listed in the table referenced below and Management Staff are to have particular regard to these locations if evidence arises on a possible road kill “hot spot”.
- Enhancement works will typically take the form of a bolt-on wildlife ledge or similar. Design and configuration is to be carried out in consultation with NPWS and relevant Local Authority.
- On an annual basis, Environment Section will review the national website www.biology.ie which records Otter road kill reports from the public. Any road kill location which overlaps with an OPW channel will be flagged by Environment Section to the relevant Management Staff.
- Current understanding is that Otter road kill is not a significant issue in Ireland. It's envisaged that while the justification for bridge mammal crossing works may arise for some scenarios, these measures will be of a limited scale on drained channels.

Current version of Otter SOP:

V2 April 2009

Current version of National Primary Roads & OPW Bridges: March 2009

FRESHWATER PEARL MUSSEL

- GIS records from NPWS show the locations of the 91 known FWPM populations in Ireland.
- The following OPW channels have been identified as containing FWPM:

Channel	Scheme	Location	Most Recent Record
CH9	Corrib Headford	Oughterard	2009
C1/21/3	Moy	Approx 500yds from outfall to into L. Cullin	2004
C1 Sect M&N	Moy	Ballygallagart	2004
C1/21/14	Moy	Crossmolina	2008
C1	Dunmanway FR	d/s of the Long Bridge	2003
C1	Owvane	Approx 1400 yds from outfall	2002
C1	Feale	d/s Listowel near Scartleigh cemetery	2006
**Owenaher	Moy	u/s of C1/54	1996
**Brown Flesk Riv	Maine	Trib of C1 Maine near Farranfore	1987
** Galey River	Feale	Approx 1400yds u/s of C1/18 near Ahavoher	1950
**River Liffey	Ryewater	(Lucan) Approx 3.5km d/s C1 Ryewater outfall	1894

** Although not on OPW channels - these channels may or may not contain populations of FWPM. Works in the vicinity which could impact on a possible population need to be considered in close consultation with local NPWS knowledge.

- While highly unlikely to have instream works in a FWPM habitat, if a new population located by Operational Staff during operations, works to cease.
- Notify NPWS and in consultation with NPWS, area to be skipped or non in-stream works carried out as agreed for the specific site.
- For operations in the vicinity of known populations, mitigating procedures to apply:
- Consult with NPWS and local IFI and conduct site visit as necessary.

- Typically only selective non in-stream works adjoining the population.
- Works such as removal of a fallen tree is to be completed by lifting clear of the channel to minimise any channel bed disturbance due to the branches being dragged.
- Assess need for silt management procedures for works upstream of the population and implement in consultation with NPWS.

Current version of relevant SOPs: V2 April 2009
Current version of FWPM GIS Layer available on Socialtext.

SWAN & DUCK MUSSELS

- Swan and Duck Mussels are not strictly a protected species, however they are of conservation interest.
- Both species are similar in appearance and habitat requirements and distinguishing between them is not necessary unless local environmental stakeholders can identify the exact species.
- As the Mussel SOP, if Operational Staff locate the same, Management Staff will be notified.
- Where significant populations are encountered notify NPWS Ranger and local IFI Officer, and where they are interested in visiting the site, facilitate a site visit as necessary.
- Identify extent of channel applicable and the mitigating measures to apply.
- Typical Mitigating Measures include:
 - Operational Staff to observe spoil and return any Mussels to the channel whom are expected to recolonise the channel bed.
 - Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.
 - Skip sections to retain intact habitat either in one long reach or multiple short reaches.
 - Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Record species presence on the Weekly Record Cards which will be recorded on the Records Database.

Current version of relevant SOPs: V2 April 2009

KINGFISHER

- Avoid disturbing nesting sites in banks.
- Visual sightings of Kingfisher by Operational Staff to be recorded on the Weekly Record Cards.
- Sightings by Management Staff to be recorded on the Weekly Record Cards where works in progress or on other occasions, record by separate map or channel reference format.
- All sightings to be recorded on the Records Database in accordance with the National Recording Process.
- All database records of species location will be uploaded to GIS by Environment Section.
- On an annual basis, Environment Section will issue the records to BirdWatch Ireland whom will add to the national Kingfisher database.

Current version of Kingfisher GIS Layer available on Socialtext.

BIRDS

- Removal of any abnormally dense layer of vegetation is to be executed between September and February (inclusive) to minimise impacts on nesting birds unless there are other overriding requirements such as Health & Safety.
- For SPAs containing important over-wintering bird populations, in consultation with the NPWS, regard to be given to timing or phasing of the works to minimise potential disturbance.

BATS

- While the removal of large mature trees is not typically a requirement of maintenance works, where the case arises, in consultation with NPWS, regard to be given to the likelihood of bat roosting habitat.

- Typical mitigating measure would be to leave tree in fallen position for 24hrs to allow any bats vacate.
- Masonry bridges offer niches and crevices suitable for bat roosts and where masonry bridges are scheduled for maintenance works, regard to be given to the likelihood of bat roosting habitat. Typical maintenance works at low level such as wing wall repair or underpinning foundations have limited potential to impact on bat roosts. Where the case arises that repair works are to be above the high water level such as the upper arch, in consultation with NPWS, assess the potential for the works impacting on bat roosts.
- Typical mitigating measure would be to contract a bat specialist to survey for bat presence before works commence, to avoid entombment of any bats.

WETLANDS - BOGS, FENS & TURLOUGHES

- All channels scheduled for maintenance which overlap SAC designations to be checked against the list of channels that impinge on Raised Bog, Fen habitat or Turloughs and have regard to any NPWS agreements noted *.
- OPW Management Staff to consult with NPWS for expert opinion as to any evidence of ongoing ecological decline of the Bog, Fen or Turlough and judgement on, if the drainage datum set by the Drainage Scheme and its maintenance is an ongoing contributing factor by affecting the hydrological regime of the same.
- Where a likely impact is identified, conduct site visit as necessary and in consultation with NPWS, mitigating measures to be selected such as:
- Skipping the channel in question while taking cognisance of the flood risk management requirements.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.
- Inspection by OPW line management to assess the possibility of over digging the channel below the original design datum. Presence of an existing water level control such as a bridge floor to be established and alternative reference datum to be installed if deemed warranted.

** Environment Section currently developing a list of channels which overlap with Raised Bog, Fen habitat and Turloughs within SACs. Channels that are subject to a previous NPWS agreement /understanding of the extent of maintenance will be recorded.*

Current version of Wetlands channels list available on Socialtext.

INVASIVE SPECIES – PLANTS

- Multiple invasive plant species are widespread nationally as described in the SOP and prudent to assume that one or more of these plants can be present on any works site.
- At present the OPW does not have any direct responsibility for the management of Invasive species. However to ensure OPW operations are not a vector for these invasives, measures are required to reduce the risk of spread.
- Ensure machine washing equipment transported to site for all appropriate machinery movements as described in the Invasive Species SOP.
- Ongoing EDM site audits by Environment Section will include confirmation that machine washing was executed in accordance with the SOP for the last applicable machine transfer.
- In some cases, OPW will assist other authorities in the control of invasive species. In these projects, the works are typically carried out in partnership between a number of authorities such as IFI, NPWS and relevant Local Authority. As scenarios arise where OPW are requested to assist in an invasive species control project, Management Staff are encouraged to support the multi-authority partnership model which will maximise resource efficiencies for all parties while still achieving a broader environmental good.

Current version of relevant SOP:

V2 March 2009

INVASIVE SPECIES – ZEBRA MUSSEL

- Zebra Mussels are present in the River Shannon, Grand Canal and are in many lakes such as L Derg, L Ree, L Garra, L Key, L Derragh, Derravaragh, L Sheelin and L Corrib. This species is spreading and it is prudent to assume that works in any large sluggish river or near a lake has potential to contain Zebra Mussel.
- For any proposed works in the vicinity of potential Zebra Mussel waters, flag for Operational Staff and ensure particular attention to cleaning procedures for all equipment prior to removal from site.
- Any new location of Zebra Mussel uncovered during operations, notify NPWS and IFI for their information.
- Record on Weekly Record Sheet which will be uploaded on the Records Database in accordance with the National Recording Process.
- On an annual basis, Environment Section will collate the records nationally and issue to any relevant authorities to assist in tracking the species spread.

Current version of relevant SOP:

V2 May 2009

TREE MANAGEMENT

- A small portion of channels have more infrequent maintenance cycles typically where self cleaning gradients are present. These sites can entail abnormally dense tree cover which may be required to be managed for conveyance or fisheries purposes. Removal of any abnormally dense layer of vegetation is to be executed between September and February (inclusive) to minimise impacts on nesting birds unless there are other overriding requirements.
- IFI requests to reduce “tunnelling” on drainage channels to be accommodated where feasible. OPW Management Staff to facilitate a site visit with the IFI Officer as required and devise a selective approach to the tree removal so as to retain a dappling of shade along the channel length.
- Excess woody vegetation to be collected and utilised by the following in order of preference:
 - Reused by adjoining landowner for domestic firewood.
 - Subject to landowners agreement, stockpile excess to form natural cover and niche habitat, preferably with some connection of cover to the channel e.g. along a hedge leading to the water.
 - Shred and spread along the adjoining top of bank allowing the material to degrade rapidly and recolonisation of the underlying vegetation.

ENVIRONMENTAL DRAINAGE MAINTENANCE (EDM) GUIDELINES

- A portion of operational crews will be audited annually for implementation of the EDM Guidelines and other standard environmental procedures as adopted.
- Auditing will be carried out separately by both IFI and OPW Environment Section on a rotational basis to ensure all operational crews are audited at least once every three years.
- Audit results will be recorded on a standard format with the following feedback:
 - All audit results will be forwarded to the relevant Engineer for that Drainage Scheme within two working weeks.
 - In the event of an audit showing elements of unreasonable non-compliance with procedures, the relevant Engineer will be notified within one working day.
 - Audit results will be forwarded to OPW Systems Co-ordinator for inclusion in monthly regional benchmarking reports.
 - IFI EREP team will compile an overall summary of their findings in their end of year report under the EREP project.
- Design for Enhanced Maintenance works under EREP will include a design element for full scale implementation of the EDM Guidelines such as Boulder Replacement and Excavating Pools.
- Management Staff to ensure that as far as practical, all Operational crews have an opportunity to get experience on these projects.

PART II – DEPOT MANAGEMENT

DEPOT WASTE MANAGEMENT

- 12 Waste Management Plans are available on Socialtext covering the 12 Drainage Offices.
- Environment Section will review 2 plans per annum and audit implementation.
- Updated Plans together with an overview of findings will be forwarded to the relevant Coordinator and uploaded to Socialtext.

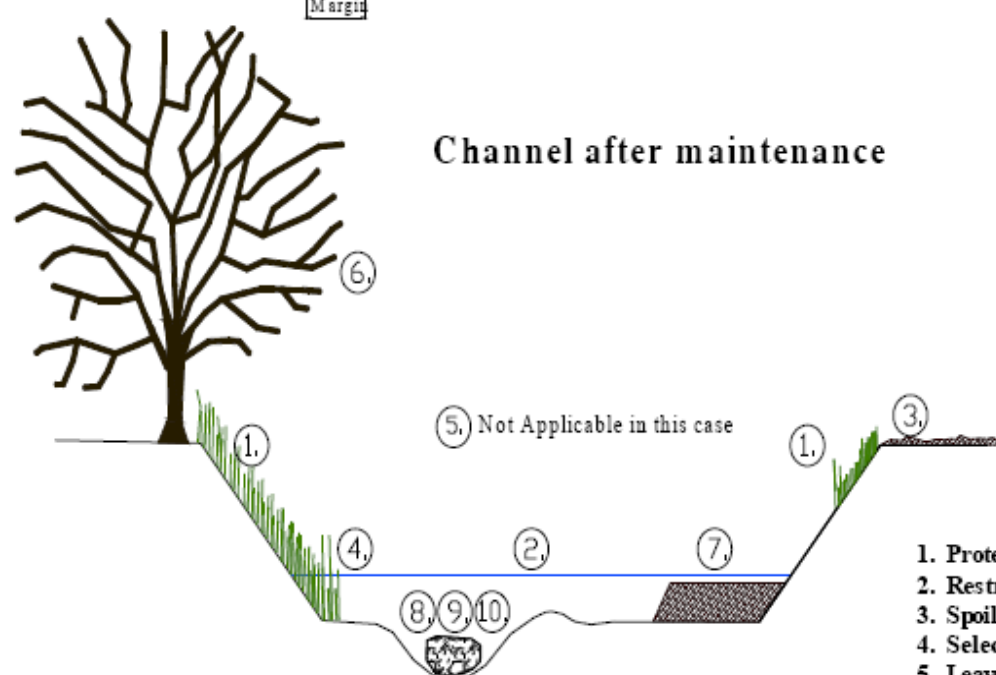
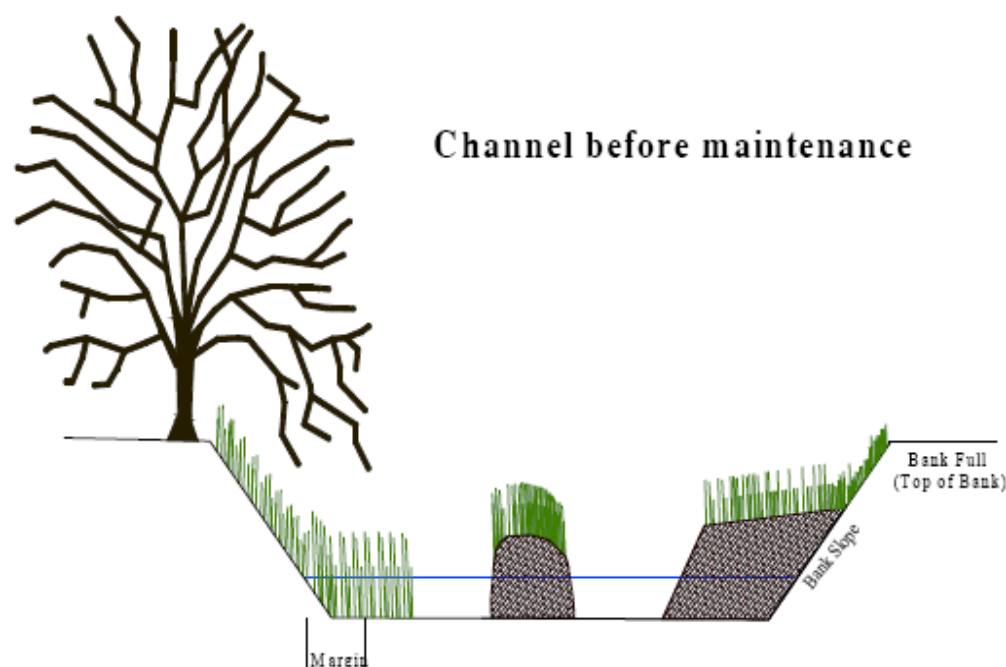
FUTURE REVISIONS

- Envisaged that this set of Protocols will be a fluid document and will be periodically updated as procedures are revised or new procedures introduced. In addition, to be used as a framework document for quality control purposes to reference the latest versions of all supporting information.

Environmental Drainage Maintenance Guidance Notes



10 Steps to Environmentally Friendly Maintenance



1. Protect bank slopes
2. Restrict maintenance to channel
3. Spoil management
4. Selective vegetation removal
5. Leave section untouched
6. Management of trees
7. Manage berm to form two stage channel
8. Replace stones and boulders
9. Loosen gravel beds
10. Re-profile channel bed

Environmental Strategies for Channel Maintenance



1. Protect bank slopes

- 1.1 Do not disturb the non-working bank slope
- 1.2 Minimise any effect on working bank
- 1.3 Leave margin of vegetation at foot of each bank slope



2. Restrict maintenance to channel

- 2.1 Remove only necessary silt – **no new diggings**
- 2.2 Remove instream material only
- 2.3 Retain marginal vegetation
- 2.4 Check spoil regularly. *See Lamprey & Crayfish SOPs*

3. Spoil Management

- 3.1 Maximise spoil placement on bank full line or spoil heaps **and**
- 3.2 Minimise spoil placement on bank slopes
- 3.3 Spread spoil as thinly as possible
- 3.4 Allow water to drain out of bucket over the water – lets small fish, lamprey and crayfish escape



Environmental Strategies for Channel Maintenance



4. Selective Vegetation Removal

- 4.1 Retain a band of vegetation on both sides at water's edge
- 4.2 Selectively manage instream vegetation
- 4.3 Maximise use of weed-cutting bucket
- 4.4 Avoid maintenance in coarse fish channels from 1st April to 1st July



- 4.5 Retain 1/3 to 1/2 of instream floating type vegetation, such as *Ranunculus* (water crowfoot) – see photo to right



5. Leave sections untouched

- 5.1 If channel capacity is not affected, leave section alone



Environmental Strategies for Channel Maintenance



6. Management of Trees

- 6.1 Remove trees that are blocking the flow
- 6.2 Tree-cutting window 1st September to 28th February



- 6.3 Remove overhanging branches to known flood level
- 6.4 Use saw secateurs for removal, not excavator bucket

- 6.5 Manage Trees to reduce very heavy shading
- 6.6 Manage briars and scrub.
See Otter SOP



7. Manage berms to form two-stage channels

- 7.1 Retain berm where channel capacity is not affected
- 7.2 Remove top of berms to low flow levels
- 7.2 Remove vegetation and soil from gravel berms
- 7.3 Replace sod to the berm where feasible
- 7.4 Only narrow berms if 'excessively' wide for the channel (i.e. greater than a third of the channel width)



8. Replace stone and boulders

- 8.1 Reinststate boulders and gravels as removed by maintenance operations
- 8.2 Reinststate suitably sized boulders into channel from spoil heaps where feasible
- 8.3 Boulders should be placed at or below low flow level and spaced out

9. Work in gravel bed channels

- 9.1 Loosen or toss bed gravels to wash out fines
- 9.2 Only considered between 1st July and 30th September
- 9.3 No work in gravel bed / spawning channels in fisheries 'closed season'
Note: This varies locally check with local IFI



Environmental Strategies for Channel Maintenance



10.1 Excavate bed to form deeper pool areas and shallow riffles



10.2 Overdeepen the channel along one side and place spoil on opposite side –particularly on curves and bends

10.3 Use existing boulders to form simple low-level structures



10.4 Record where such works are carried out

BROOK, RIVER & SEA LAMPREY STANDARD OPERATING PROCEDURE - ARTERIAL DRAINAGE MAINTENANCE

Actions during Maintenance Operations

- Machine gangs to closely observe the spoil three times daily for Lamprey (and Crayfish).
- Where Lamprey encountered:
 - Contact area Foreman immediately.
 - Foreman to contact Engineering Staff in line with the Environmental Management Protocols.
 - Record the location and abundance of Lamprey on the time card.

Measures as directed by Foreman to minimise impact may include:

- Skip a defined stretch of channel.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.



Lamprey in the spoil

RIVER, BROOK & SEA LAMPREY IDENTIFICATION CARD



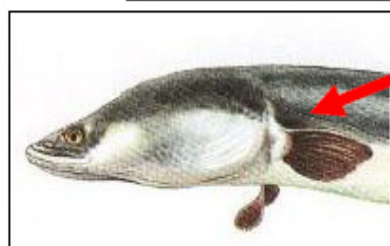
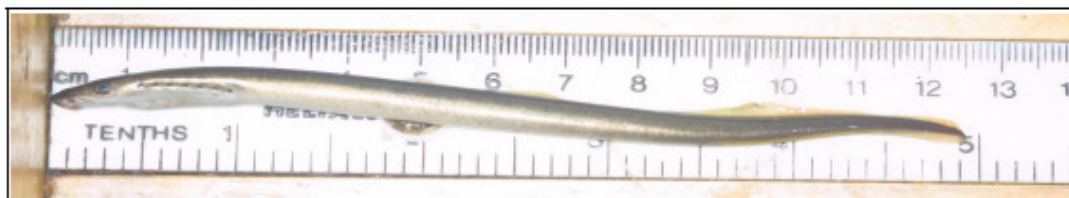
Gill Pores



Lamprey and young eels can look very similar. These key identifying features can be used to distinguish the two species

Lamprey:

- Gill Pores (Holes)
- No Fins
- No Jaw
- Average length 8 to 15cm (3 to 6 inches)



No Gill pores

Eels: No Gill Pores

Paired Fins

Jawed Mouth

Average length 65cm (26 inches)

Juvenile Lamprey:

- Juvenile Lampreys live in the sediment.
- It is in this juvenile phase that they can be removed from the sediment during maintenance.



Adult Lamprey:

- Largest is the Sea Lamprey species.
- Also are River and Brook Lamprey
- Length from 30 to 60cm (12 to 24 inches).



WHITE-CLAWED CRAYFISH

STANDARD OPERATING PROCEDURE - ARTERIAL DRAINAGE MAINTENANCE

Actions during Maintenance Operations

- Machine gangs to closely observe the spoil three times daily for Crayfish (and Lamprey).
- Where Crayfish encountered:
 - Contact area Foreman immediately.
 - Foreman to contact Engineering Staff in line with the Environmental Management Protocols.
 - Record the location and abundance of Crayfish on the time card.

Measures as directed by Foreman to minimise impact may include:

- Skip a defined stretch of channel.
- Confine maintenance to 2/3 of channel width leaving marginal vegetation and silt intact.
- Maximise use of weed cutting bucket particularly where aquatic vegetation removal is the primary objective.



Crayfish in the spoil

WHITE-CLAWED CRAYFISH



Identification

- Resemble small lobsters.
- Colour varies from light to dark green-brown, with large front claws.
- Adults typically 7cm - 10cm (3" - 4") long.
- Juveniles can be as small as 2cm (1") long.
- Prefer channels with
 - dense weed cover (flaggers / watercelery) or
 - with a mixture of rocks / gravels that provide crevices for cover.



OTTER

STANDARD OPERATING PROCEDURE - ARTERIAL DRAINAGE MAINTENANCE

Week before Maintenance Operations begin:

- Operational staff will walkover works area one week in advance in conjunction with the PRA noting areas of dense cover with access directly to the water. (As identified during Otter Awareness Training)
- These areas of suitable cover should be avoided where feasible during maintenance.
- Suspected presence of an Otter holt to be reported immediately to area Foreman, who will contact Engineering Staff in line with the Environmental Management Protocols.
- Signs of Otter presence observed such as Spraints, Footprints or suspected Holts, to be recorded on the Weekly Record Cards.

Measures to minimise disturbance may include:

- Retain suitable cover where possible.
- Areas of dense scrub to be avoided by large plant.
- Skip stretch of channel in proximity of suspected holt.



Otters

- Widespread presence on OPW channels.
- Shy animals and not normally seen.
- Adults 1 metre long and weigh 10kg.
- Streamlined profile.

OTTER

Holts

- Usually well concealed.
- Typically burrows, or spaces under banks, tree roots or dense cover.



Spraints

- Found on rocks, paths, channel junctions.
- Dark, oily, sweet smelling.

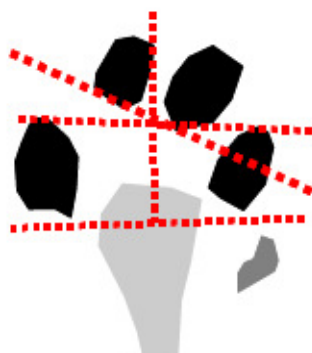


Suitable areas of cover

Dense bankside vegetation, particularly where there is direct covered access to the water.
Any isolated clumps of dense vegetation giving cover along an open length of channel.

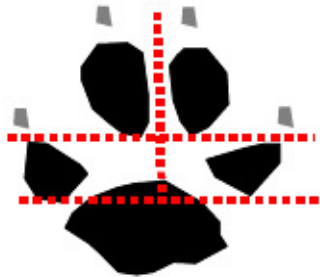


Foot-prints



Otter

(Non-symmetrical toes)



Dog

(Symmetrical toes)



Fox



Badger



Mink

MUSSELS

STANDARD OPERATING PROCEDURE - ARTERIAL DRAINAGE MAINTENANCE

FRESH WATER PEARL MUSSELS

Before Maintenance Operations begin:

- Maintenance must not commence where a known population of Fresh Water Pearl Mussel exists (as listed in the Environmental Management Protocols).
- In the unlikely event of new population of Fresh Water Pearl Mussel being encountered during maintenance,
 - **All works must cease immediately.**
 - Contact area Foreman.
 - Record the location of Mussels on the time card.

Measures to minimise disturbance may include:

- Placing of straw bales to prevent movement of silt.
- Any exceptional / emergency works to be carried out in close consultation with the NPWS.
- For exceptional / emergency works e.g. fallen tree obstruction – these to be lifted clear of the channel to prevent disturbing the channel bed.

MUSSELS



Fresh Water Pearl Mussels (*Margaritifera margaritifera*)

- Shells very thick & heavy – shaped like a kidney.
- Shell colour is dark-brown – black, to blue & black.
- Adults range in length from approx. 6 cm – 12 cm (2.5 – 5 inches) and can live for over 100 years.
- Suitable rivers are reasonably fast flowing, with very clean, good quality water, gravel bed, preferably with large cobbles.



Not to be confused with Duck & Swan Mussel

- Egg-shaped shells 12 -16cm (5-6 inches) long.
- Thin shiny shells, usually brownish yellow with traces of green.
- Found in slow moving water.
- If encountered, contact area Foreman and return Mussels to channel.
- Record location of Mussels on time card



INVASIVE SPECIES STANDARD OPERATING PROCEDURE – ARTERIAL DRAINAGE MAINTENANCE

Measures to reduce the risk of spread of invasive species

All excavators, weed cutting boats, tractors, dumpers & other machinery employed on maintenance must be thoroughly cleaned down using a power washer unit prior to being;

- (a) transported by Low- Loader**
- (b) moving to another catchment within the Region**
- (c) moving to another Region.**

Notify your supervisor immediately if you see any of the invasive species listed.

*Full details of all species are available in the CFB's
Field guide to the Identification of Aquatic Invasive Species*



Giant Hogweed

Found on the banks of many rivers throughout Ireland.

Can grow to a height of 4 metres.

Seeds are carried by water and spread very quickly.

!!!Avoid contact with the sap of this plant as it can cause extensive lesions or blistering of the skin.



Japanese Knotweed

Grows up to 2-3m in height along roadsides and river corridors throughout the country.

Even a tiny piece of this plant can produce a new plant.

Leaves are heart-shaped with a pale stripe down the centre.

In Summer cream flowers arise from the tips of the red-flecked stems.



Himalayan Balsam

Grows in dense strands up to 3m high, and is found widespread across Ireland along banks of rivers.

Seed pods explode scattering seeds.

Dies back in Autumn exposing bare banksides to erosion.

White or pink flowers, smooth hollow stem, oval shaped pointed leaves with jagged edges.



Curly waterweed – *Lagarosiphon major*

Found in lakes and slow flowing waterways up to 6m deep.

Spread by fragmentation from one watercourse to another on boat hulls, trailers, outboard motors or angling equipment.

Significant weed stands located in Lough Corrib.



Zebra Mussels

Distinctive stripy shell, very small (1-3cm).

Attach in clusters to hard surfaces – boats, pipes, buoys.

Refer to the [Zebra Mussel Standard Operating Procedure](#).

All photographs courtesy of Central Fisheries Board

Actions for Maintenance Operations

1) Zebra Mussels detected on site

- Where Zebra Mussels are found, remark on the extent of Mussels on the Weekly Report Card and notify the Foreman/Technician.
- Technicians/Engineers to notify Environment Section of location and grid reference.
- Environment Section to update the National Database.

2) Maintenance close to R. Shannon or infested lakes

- Where a machine is working close to the R. Shannon or an infested lake, ensure that prior to the machine transferring to a new site, buckets and tracks are thoroughly cleaned of any material such as silt or vegetation.
- Ganger / Driver to visually inspect the bucket, tracks and any equipment that was in the water to ensure no Mussels are present.

3) Maintenance close to outlets/inlets of any lakes

- Where a machine is working close to any lake, ensure that prior to machine transferring to a new site, buckets are clean of any material such as silt or vegetation.
- Ganger / Driver to visually inspect the bucket and other equipment that was in the water to ensure no Mussels are present.

4) Boats and other equipment

- Boats or other water based equipment that is to be transferred between river catchments should be thoroughly cleaned on the outside, drained of any bilge water and inspected for the presence of Mussels.
- If it's suspected that the equipment was in contact with Zebra Mussel waters, steam clean the hull and trailer and leave the boat or equipment out of water for four weeks prior to moving.

OPW Role

Although it is a relatively low risk, OPW could spread Zebra Mussels if aquatic vegetation or excavated material containing Mussels is inadvertently transported to another non-infested channel. Adult Mussels can survive for up to four weeks out of water hence its critical not to transport the same. Larvae are tiny and barely visible but will not survive on a machine bucket if there is no silt, stones or vegetation to shelter it.



Environmental Threat

Zebra Mussels are thumbnail-sized black & orange striped shellfish. They grow into dense clusters and attach to any underwater hard surface. They are an invasive species that damage the natural ecology of the infested waters. They expand into catchments through been transported by man's activities e.g. transferring fishing boats. Once in a particular lake or river, if conditions are favourable, they will multiply and spread with the currents. It is envisaged that they will keep expanding their territory unless man makes a concerted effort to prevent transport of the Mussels into non-infested waters.

OPW Site Audit Form

Region: _____ **CDS:** _____
Channel (name & code): _____ **Section (chg – chg):** _____
Foreman: _____ **Driver(s):** _____
Auditor: _____ **Date:** _____
 Site surveyed from- working bank: ☐ non-working bank: ☐
GPS Reference: _____ **Photographs:** Yes ☐ No ☐
Weather Conditions: _____ **Water levels:** _____
 Wetted/Base width: 0-3m ☐ 3-6m ☐ 6-10m ☐ 10-15m ☐ >15m ☐
 Velocity Rating: Slow ☐ Moderate ☐ Fast ☐ Torrential ☐
Bed Type: _____ **Machine Number:** _____

OPW SOP AWARENESS / COMPLIANCE

Invasive Species SOP: Poor / Fair / Good / Excellent
 Protected Species SOP's: Poor / Fair / Good / Excellent
 Spill Kit Present: YES / NO

Environmental Drainage Maintenance Constraints

Maintenance Constraints		Working Bank	Non Working Bank
Ownership:	Woodland		
Ownership:	Tillage		
Ownership:	Position of Fencing		
Availability of suitable stone			
Placement of spoil			
Time of year:	Tree cutting		
Time of year:	Wildlife		
Time of year:	Fisheries		
Potential Habitat for Annex II Species	Lamprey		
	Crayfish		
	Otter		
	Pearl mussel		
	Salmon		

Comments on Audit Findings

Maintenance Strategies Achieved - (based on section recently maintained)							
Maintenance Options		Working Bank		Non-working Bank		Instream Channel	
		Suitability	Compliance*	Suitability	Compliance*	Suitability	Compliance*
1	Protect Bank Slopes						
	Non-working bank left intact						
	Protect working bank slope						
2	Restrict Maintenance to Channel						
	Restrict maintenance to open channel						
	Use of SOPs for lamprey and crayfish						
3	Spoil Management						
	Best practice placement of spoil						
	Spread spoil thinly						
	Let water drain from bucket over channel						
4	Selective Vegetation Removal						
	Manage instream vegetation (Attn SOPs)						
	Retain marginal vegetation both sides						
	Potential for weed cutting bucket						
	Outside coarse fish spawning (April 1 st to July 1 st)						
5	Leave Sections Intact						
	Sections skipped						
6	Management of Trees						
	Remove trees blocking flow						
	Observe tree cutting window						
	Remove low hanging branches to known flood level						
	Use chainsaw/secuturs for tree removal or thinning						
	Tree thinning management						
	Manage scrub - Otter & Birds SOP						
7	Manage Berms to form 2 Stage Channels						
	Retain berms (no maintenance)						
	Top berm to just over summer water flow						
	Re-sod berms where suitable						
	Only narrow berms if OVER-WIDE						
8	Replace Stone & Boulders						
	Replace stone and gravel coming out in digging bucket (No New Diggings)						
	Replace large stones/boulders into channel from old spoil						
9	Working in Gravel Bed Channels						
	Loosen/toss gravels (between July 1 st & Sept. 30 th)						
	No instream works outside of Fisheries Window (between July 1 st & Sept. 30 th)						
	Use of silt barriers in winter/spring						
10	Re-profile Channel Bed						
	Dig pool - riffle sequences						
	Reprofile cross-section						
	Use existing stone to create 'simple' instream structures						

*based on rating system: 0-10, with 0=no compliance and 10=full compliance

Total Compliance (%)

OVERALL COMPLIANCE (%)

Department of the Environment, Heritage and Local Government / An Roinn Comhshaoil, Oidhreacht agus Rialtais Áitiúil

National Parks & Wildlife Service (NPWS) / An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra, 7 Ely Place, Dublin 2.
Regional Information/Eolas Réigiúnach (01) 888 2000
Locall/Glaoch Áitiúil: 1890 20 20 21
Fax/Faics: (01) 888 3272
Internet/Idirlíon: www.npws.ie & www.environ.ie
E-mail/Ríomhphost: natureconservation@envron.ie

Eastern Division / Rannán an Oirthir

Divisional Manager: (01) 8883243
Divisional Ecologist: (01) 6678256

South Eastern Region/Réigiún an Oirdheiscirt

(Carlow, Kilkenny, Wexford & Wicklow (incl. Wicklow Mountains National Park))

Regional Office: (0404) 45800
Regional Manager: (0404) 45802
Deputy Regional Manager: (0404) 45801
Education Centre: (0404) 45656
Information Office (Wicklow Mtns Nt Park): (0404) 45425
District Conservation Officer:
(North Wexford & Wicklow) (0404) 45807
District Conservation Officer:
(Carlow, Kilkenny & Wexford) (056) 7722135

North Eastern Region/Réigiún an Oirthuaiscirt

(Dublin, Kildare, Laois, Louth, Meath & Offaly)

Regional Manager: (045) 520 622
Deputy Regional Manager: (045) 520 644
District Conservation Officer:
(Kildare, Laois & Offaly) (045) 521 713
District Conservation Officer:
(Dublin, Louth & Meath) (046) 909 3506

Western Division/Rannán an Iarthair

Divisional Manager: (091) 704 206
Divisional Ecologist: (091) 704 208

Western Region/Réigiún an Iarthair

(Mayo, Galway West)

Regional Manager: (095) 41054
Deputy Regional Manager: (098) 49996

District Conservation Officer: (Galway West) (095) 41054
District Conservation Officer: (Mayo) (098) 49996

Mid Western Region/Réigiún an Lár-Iarthair

(Clare, Galway (except Galway West above))

Regional Office: (091) 704200
Regional Manager: (091) 704 201
Deputy Regional Manager: (091) 870341
District Conservation Officer:(Clare) (065) 682 2711
District Conservation Officer:
Galway (except Galway West above) (091) 739654

Southern Division/Rannán an Deiscirt

Divisional Manager: (021) 4619901
Divisional Ecologist: (021) 4619903

Mid Southern Region/Réigiún an Lár-Deiscirt

(East Cork, Limerick, Tipperary NR, Tipperary SR & Waterford)

Regional Manager: (067) 44287
Deputy Regional Manager: (021) 4619904
District Conservation Officer:
(East Cork, Tipperary SR & Waterford) (021) 4619905
District Conservation Officer:
(Limerick & Tipperary NR) (067) 44135

South Western Region/Réigiún an Iardheiscirt

(West Cork & Kerry)

Regional Office: (064) 31440
Regional Manager: (064) 70145
Deputy Regional Manager: (064) 70143
District Conservation Officer:
(North Cork & Kerry) (064) 33567
District Conservation Officer:
(South & West Cork and South & West Kerry) ... (028) 37347

Northern Division/Rannán an Tuaiscirt

Divisional Manager: (071) 966 6020
Divisional Ecologist: (071) 966 6928

Northern Region/Réigiún an Tuaiscirt

(Donegal, Leitrim West & Sligo)

Regional Office: (074) 913 7090
Regional Manager: (074) 972 1837
Deputy Regional Manager: (074) 913 7090
District Conservation Officer:
(Donegal Nth & Glenveagh National Park) ... (074) 913 7440
District Conservation Officer:
(Donegal, Leitrim West & Sligo) (071) 966 6178

North Midlands Region/An Réigiún Lár Tíre Thuaidh

(Cavan, Leitrim East, Longford, Monaghan, Roscommon & Westmeath)

Regional Office: (071) 9666178
Regional Manager: (071) 966 6934
Deputy Regional Manager: (044) 934 2661
District Conservation Officer:
(Cavan, Leitrim, Longford & Monaghan) (049) 433 5750
District Conservation Officer:
(Roscommon & Westmeath) (044) 933 7007

National Parks & Nature Reserves/Páirceanna Náisiúnta

Ballycroy National Park County Mayo, Lagduff More, Ballycroy, Westport, Co. Mayo (098) 49996
Burren National Park, NEPS Building, St. Francis Street, Ennis, Co. Clare (065) 6822662
Connemara National Park, Letterfrack, Co. Galway (095) 41054
Coole Park Nature Reserve, Gort, Co. Galway (091) 631 804
Glenveagh National Park, Church Hill, Letterkenny, Co. Donegal (074) 9137090
Killarney National Park, Muckross House, Killarney, Co. Kerry (064) 31440
Wexford Wildfowl Reserve, North Slob, Wexford (053) 9123129
Wicklow Mountains National Park, Kilafin, Laragh, Co. Wicklow (0404) 45800

Inland Fisheries Ireland March 2011

IFI Region	Director	Address	Telephone	Region/Scheme
IFI Blackrock	William Walsh	15a Main Street Blackrock Co. Dublin	01 2787022	East: Glyde & Dee, Boyne, Blackwater, Bally-Teigue
IFI Ballina	John Connelly	Ardnaree House Abbey Street Ballina Co. Mayo	096 22788	West: Moy, Bonet
IFI Ballyshannon	Dr. Milton Matthews,	Station Road Ballyshannon Co. Donegal	071 9851435	West: Donegal schemes, Kilcoo, Duff
IFI Limerick	Sean Ryan	Ashbourne Business Park Dock Road Limerick	061 300238	East: Inny, Brosna West: Boyle, Ballyglass South: Killimor, Carrighahorig, Nenagh, Groody, Maigne, Deel, Feale
IFI Macroom	Dr. Patrick Buck	Sunnyside House, Macroom Co. Cork	026 41221	South: Maine, Owvane
IFI Clonmel	Suzanne Champion	Anglesea Street Clonmel Co. Tipperary	052 80055	East: Brickey
IFI Galway	Amanda Mooney	The Weir Lodge Earl's Island Galway	091 563118	West: Corrib Headford, Mask,
IFI	Dr. Ciaran Byrne	Unit 4 Swords Business Campus Balheary Rd Swords Co. Dublin	01 8842600	All
EREP Project Manager	Dr. Karen Delanty	Unit 4 Swords Business Campus Balheary Rd Swords Co. Dublin	01 8842624	All

(Note: Completed flood relief schemes are not listed but proposed works should be discussed with the relevant local IFI)

OPW Bridges (numbering 170) intersecting National Primary Roads.

Scheme	Channel ID	Bridge No.	National Route type	Bridge Name
Glyde and Dee	C2 (7C)	B80	N01	
Glyde and Dee	C2 (7E1)	B839	N01	
Glyde and Dee	C2 (7E1)	B840	N01	
Broadmeadow and Ward	C2/1	B230	N02	
Broadmeadow and Ward	C2/1	B239	N02	
Broadmeadow and Ward	C2	B204	N02	Coolatrath br.
Broadmeadow and Ward	C2/3	B243	N02	
Broadmeadow and Ward	C1/6/1	B86	N02	
Broadmeadow and Ward	C1/6/1/1	B96	N02	
Broadmeadow and Ward	C1/6	B68	N02	
Broadmeadow and Ward	C1	B16	N02	
Boyne	C1	B4	N02	Slane br.
Glyde and Dee	C2 (7H)	B101A	N02	
Glyde and Dee	C2 (17)	B179	N02	
Glyde and Dee	C2 (14B)	B118	N02	
Glyde and Dee	C2 (14)	B867	N02	
Glyde and Dee	C2 (1)	B30	N02	
Glyde and Dee	C2 (13)	B111	N02	
Glyde and Dee	C2 (16B4)		N02	
Glyde and Dee	C1 (1)	B15	N02	Aclint Br
Glyde and Dee	C29 (2)	B441	N02	
Glyde and Dee	C29 (3)	B443	N02	
Glyde and Dee	C25 (8)	B341	N02	
Glyde and Dee	C25 (7D1)	B672	N02	
Monaghan Blackwater	C1/1/5	B7	N02	
Monaghan Blackwater	C1/1/5/6/1	B1	N02	
Monaghan Blackwater	C1/3/5/2	B8	N02	
Monaghan Blackwater	C1/3/6/3	B1	N02	Hoaf Br
Boyne	C1/8/24	BX1	N03	
Boyne	C1/8/23	B733	N03	
Boyne	C1/8/21	B723	N03	
Boyne	C1/8/16	B644	N03	
Boyne	C1/8	B126	N03	Clavens Br
Boyne	C1/8/8	B294	N03	
Boyne	C1/12/1	B875	N03	Dillon's Br
Boyne	C1/12/7	B915	N03	
Owenmore	Behy Bridge	BX1	N04	
Boyle	C6/7/5	B2	N05	Ballanagare Br
Boyle	C6/7/1/4	B2	N05	
Boyle	C6/7/1	B3	N05	Cloonshanville Br
Boyle	C1/3/2/1	B4	N05	
Boyle	C1/9/1	B1	N05	
Boyle	C1	B4	N05	Old Lung Bridge
Boyle	C1/8	B1	N05	New Lung Bridge
Boyle	C1/45	B8	N05	
Moy	C1/31/2	B3	N05	
Moy	C1/31	B4	N05	
Moy	Not on a channel	B2	N05	Trimoge
Moy	Not on a channel	B2	N05	
Moy	Not on a channel	B1	N05	
Moy	C1/30/3/1	B1	N05	
Moy	C1/28/2	B3	N05	
Moy	C1/28/1	B4	N05	
Moy	C1/25	B6	N05	
Moy	C1/23/3	B2	N05	
Moy	C1/23	B9	N05	

Moy	Not on a channel	B1	N05	
Moy	C1/21/1/5/2/2	B3	N05	
Moy	C1/21/1/5/2/11	B2	N05	
Moy	C1/21/1/5/1/15	B1	N05	
Moy	C1/21/1/5/2/18	B1	N05	
Moy	C1/21/1/5/2/19	B2	N05	
Moy	C1/21/2/5/2/20/4	B1	N05	
Boyle	C1/44/15	B2976	N06	
Boyle	C1/44/17	B2984	N06	
Boyle	C1/64/1/11/6	B3337	N06	
Boyle	C1/64/1/11	B3303	N06	Miltownpass Br.
Boyle	C1/64/1/11/4	B3319	N06	
Boyle	C1/64/1/11/4/2	B3331	N06	
Boyle	C1/64/1/13/2	B3330	N06	
Boyle	C1/64/1/13	B3372	N06	Rochfort Br.
Boyle	C1/64/1/13/4	B3384	N06	
Brosna	C27 (1)	B150	N06	
Brosna	C1 (1)	B11	N06	Kilbeggan Br.
Brosna	C17 (1)	B143	N06	
Brosna	C17 (SE)	B726	N06	
Brosna	C17 (5)	B138	N06	New Br
Brosna	C17 (4)	B135	N06	
Corrib Clare	C1	B3	N06	Quincentennial Br.
Nenagh	C1/9	B23	N07	Ollatrim Br
Nenagh	C1/9/24	B4	N07	
Monaghan Blackwater	C1/1/6/1	B11	N12	Tyholland Br
Blanket Nook	C1/3	B23	N13	
Swilly embankments	E9	B1	N14	
Swilly embankments	C1/5	B9	N14	
Deele and Swillyburn	C1	B6	N14	
Deele and Swillyburn	C1/11	B19	N14	
Deele and Swillyburn	C2	B20	N14	
Abbey	C1/4	B39	N15	
Abbey	C1/4	B31	N15	
Abbey	C1/3A	B30B	N15	
Abbey	C1/2	B21 - B23	N15	
Abbey	C1/1	B18	N15	
Duff	C1	B1	N15	
Bonet	C1/12/3	B1	N16	
Bonet	C1/12	B5	N16	
Bonet	C1/12	B4	N16	
Bonet	C1/12	B2	N16	
Bonet	C1	B5	N16	
Bonet	C1/13/2	B1	N16	
Bonet	C1/13	B1	N16	
Moy	C1/50/2	B3	N17	
Moy	C1/50	B4	N17	
Moy	C1/48/3	B2	N17	
Moy	C1/48	B3	N17	
Moy	C1/45/4	B2	N17	
Moy	C1/45	B13	N17	
Moy	C1/30/5/9	B3	N17	
Moy	C1/30/5/9	B15	N17	
Corrib Mask	CM4/43/4	B2	N17	
Corrib Mask	CM4/34	B10	N17	
Corrib Mask	CM4/34/2	B2	N17	
Corrib Clare	C3/30	B8	N17	
Corrib Clare	C3/30/4	B1	N17	
Corrib Clare	C3/26	B2	N17	
Corrib Clare	C3/26/9	B1	N17	

Corrib Clare	C3/26/1	B3	N17	
Corrib Clare	C3/12/2	B1	N17	
Corrib Clare	C3	B14	N17	
Corrib Clare	C3	B2	N17	Claregalway bridge
Fergus	D7	B3	N18	
Owenagarney	C2	B1	N18	
Owenagarney	C4	B3	N18	
Coonagh Embankments	C10	B9	N18	
Coonagh Embankments	D13	B113	N18	
Coonagh Embankments		B1	N18	
Maigue	C1/36	B1	N20	Helena's br.
Maigue	C1/37/1	B3	N20	
Maigue	C1/37	B1	N20	
Maigue	C1	B23	N20	Creggane br.
Maigue	C1/33	B1	N20	Cappanafaha br.
Maigue	C1/30	B2	N20	Ballynabanoge br
Maigue	C1/26	B1	N20	
Maigue	C1/15	B10	N20	
Maigue	C1/10/5	B3	N20	
Maine	C1/28	BX1	N21	
Maine	C1/34	B117	N21	
Maine	C1/35	BX2	N21	
Deel SR	C12/2/2	B125	N21	
Deel SR	C12/2/2/2	B127	N21	
Deel SR	C12/2/1	B123	N21	
Deel SR	C10	B95	N21	Ballyfraley br.
Deel SR	C8	B76	N21	Reens br.
Maigue	C1/17/10	B1	N21	
Maigue	C1/17/8	B2	N21	
Maigue	C1/17/5	B1	N21	
Maigue	C1	B1	N21	Adare br.
Maigue	C1/15	B5	N21	
Maine	C1	B3	N22	Maine br.
Maine	C1/32	B110	N23	Dysert br.
Maine	C1/33	B114	N23	Killfinnaun br.
Maine	C1	B9	N23	Herbert br.
Groody	C1/4	B29	N24	
Groody	C1	B4	N24	
Groody	C1/7	B53	N24	
Groody	C1/9	B56	N24	
Moy	C1/9/1	B1	N26	
Moy	C1/9	B2	N26	
Moy	F/282	B	N26	
Moy	C1/14	B1	N26	
Moy	RIVER	B3	N26	
Moy	C1/37	B1	N26	
Moy	C1/38	B1	N26	
Moy	RIVER	B2	N26	Cloongullaun br.
Moy	C1/39	B3	N26	
Moy	C1/39	B6	N26	
Moy	C1/39	B9	N26	
Moy	C1/39/3	B1	N26	

Otter Wildlife Passes and OPW Drainage Channels

- It has been brought to the attention of the OPW that there may be a need for small mammal passes on some of the maintained channels.
- The National roads constitute less than 6 percent of roads in this country, approx. 3 National Primary and 3 percent National Secondary. In spite of this they carry over 42 percent of the traffic.
- It is for this reason that the focus will be on the National Primary road crossings.

- The national road kill survey was analysed and the data from the web site “www.biology.ie” was cross-referenced against OPW channel locations and the results were inconclusive, as the web page is not widely used. It appears for now that OPW channel road crossings have no affect on the deaths of otters as per this information.

Next Steps:

1. Consult NPWS throughout all regions to review any evidence of otter road kills on National Primary roads or are they aware of any other such road deaths.
2. Where there appears to be mammal deaths on National Primary roads that intersect OPW channels it will be seriously considered to install in the bridge (where possible) a small mammal pass to allow ease of access for otters.

Otter Habitat Disruption

- Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act, 1976, as amended by the Wildlife (Amendment) Act, 2000. They are also included in Annex I and Annex IV of the Habitats Directive, which is transposed into Irish Law in the European Communities (Natural Habitats) Regulations (S.I. 94 of 1997), as amended.

Otter Pass Details

- Mammal Ledges and underpasses should be constructed parallel to the watercourse.
- Underpasses should be of a diameter of 600mm up to a length of 20m. Where lengths exceed this the pipe should be increased to 900mm diameter
- An underpass should be no more than 50m of the watercourse with channels or fencing guiding the animals to it.

Where there is sufficient space under the bridge for a ledge the following should be provided:

- Fencing: See “figure 1; Specification for Mammal Resistant Fencing” in the NRA, National Roads Authority, Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes, for more detail. Also, Design Manual for Roads and Bridges, DMRB Volume 10, Section 1, Part 5, Chapter 9.
- A bolt on ledge can be used under a bridge where there is no dry passage. The bolt on ledge should provide otters with a dry walkway of between 300mm and 450mm wide, constructed from 4.5mm Durbar patterned galvanised plate.
- At some sites, considerations of responsibility, cost, aesthetics or practicality might indicate the use of a solid ledge; this is most likely where an existing otter-ledge has proved to be sited too low to offer dry passage at spate conditions. A solid ledge can be created in 3 ways; concrete bagging, shuttering plus new concrete and concrete blocks.
- See (OPW, 2007), (DMRB, 2001) and (NRA 2006) for further Details



References

- NRA (2006) – National Roads Authority, Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes.
- NRA (2005) – National Roads Authority, Guidelines for the Crossing of Watercourses During the Construction Of National Road Schemes.

- OPW (2007) – Series of Ecological Assessments on Arterial Drainage Maintenance No. 4, Ecological Impact Assessment (EclA) of the Effects of Statutory Arterial Drainage Maintenance Activities on the Otter (*Lutra lutra*).
- OPW (2006) – Screening of Natura 2000 Sites for Impacts of Arterial Drainage Maintenance Operations. Environment Section, Engineering Services, Office of Public Works.
- DMRB (2001) - Design manual for roads and bridges (DMRB). Volume 10, Section 4 Environmental Design and Management Nature Conservation. Part 4 HA 81/99 Nature conservation advice in relation to otters. Section 1, Part 9 HA 81/99.