

# SERIES OF ECOLOGICAL ASSESSMENTS OF ARTERIAL DRAINAGE MAINTENANCE - NO. 1

Screening of Natura 2000 Sites for Impacts of  
Arterial Drainage Maintenance Operations



Environment Section  
Engineering Services





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## EXECUTIVE SUMMARY

This report aims to assist the OPW in ensuring compliance of Arterial Drainage Maintenance operations with the European Communities (Natural Habitat) Regulations, 1997 by setting out a strategic approach to managing the requirement for environmental assessments in European Sites. The objective is to target resources on a more focussed list of environmental assessments through a coordinated nationwide approach. This report selects the conservation aspects that have a realistic potential of being significantly impacted upon by drainage maintenance works. It identifies conservation aspects that warrant further consideration and it is envisaged that the resultant assessments will be carried out in the form of a multi annual programme of studies. In addition, this report will act as a step in advancing the process of environmental consultations by acting as a knowledge platform for stakeholders to understand drainage maintenance operations and attain an appreciation of the environmental impacts on European Sites consisting of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

At present, 61 SACs overlap with drainage operations encapsulating 66 conservation aspects. Tables of the SACs, overlapping Drainage Schemes and conservation aspects are presented in Tables 1 and 2. 22 SPAs overlap with drainage operations with 22 Annex 1 and 35 Migratory bird species occurring in these sites. Tables of SPAs, overlapping Drainage Schemes and occurring bird species are presented in Tables 3 and 4.

Conservation aspects are sub-divided into three categories:

- 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.

Categorisation of SAC and SPA conservation aspects are summarised as follows:

	SAC	SPA
Category I;	11No. Species & 9No. Habitats.	1No. species
Category II;	2No. Species & 20No. Habitats.	32No. species
Category III;	6No. Species & 18No. Habitats.	24No. species

A series of Ecological Impact Assessments are recommended for SACs as follows:

- a. Salmon
- b. Brook, River & Sea Lamprey
- c. White-Clawed Crayfish
- d. Freshwater Pearl Mussel and Pearl Mussel
- e. Otter
- f. Alkaline Fens, Cladium Fens, Transition Mires and Whorl Snails *Vertigo angustior*, *Vertigo geyeri* and *Vertigo moulinsiana*
- g. Bog woodland, Depressions on peat substrates of *Rhynchosporion*, Raised bog and Degraded raised bog still capable of regeneration
- h. Turloughs
- i. Floating river vegetation

Further analysis is required for Category II aspects i.e.:

- j. 2 species and 20 habitats as listed in Table 5.

A series of Ecological Impact Assessments are recommended for SPAs as follows:

- k. Kingfisher
- l. Over-wintering birds frequenting inland areas with particular focus on disturbance.
- m. Birds dependent on riparian habitats with particular focus on direct impacts.

Studies denoted l. & m. above will entail the further analysis required for Category II birds.

Emanating from other policy and legislation, there are further studies and appraisals that will be running in parallel to the series of ECIAs. These include tasks such as compiling an OPW Biodiversity Action Plan and further research on the effects of drainage maintenance on Good Ecological Status as part of the Water Framework Directive (WFD) characterisation.

## **1. LEGAL CONTEXT**

This report is to assist the OPW in ensuring compliance of Arterial Drainage Maintenance operations with the European Communities (Natural Habitat) Regulations, 1997 by setting out a strategic approach to managing the requirement for environmental assessments in European Sites. In accordance with Section 31 of these Regulations, where an operation or activity is carried out by the State that is likely to have a significant effect on a European Site, an appropriate assessment should be carried out on the implications for that site in view of its conservation objectives. The operation or activity shall only be undertaken when it is ascertained that it will not adversely affect the integrity of the site and then, having regard to conclusions from the assessment.

## **2. OBJECTIVE AND SCOPE**

Statutory drainage maintenance operations are an ongoing activity across the state and overlap with many European Sites to varying degrees, resulting in a possible requirement for multiple individual environmental assessments. This report attempts to set out a strategic approach to managing this requirement for environmental assessments and offers a reasonable practical approach that can be followed by the OPW in fulfilling its statutory requirements. The objective is to target resources on a more focussed list of environmental assessments through a coordinated nationwide approach.

Decisions presented in this report are based on the current understanding of the various ecological concerns but the focus of future research may be subject to change as more refined knowledge becomes available. The recommendations from this report are not intended to be the finite approach towards European Sites but offer a pragmatic starting point for the OPW to address environmental assessments in these sites. It is foreseen that consultations with both statutory and voluntary environmental stakeholders will be an ever-increasing practice in drainage activities and this report will act as a step in advancing that process by acting as a knowledge platform for stakeholders to understand drainage maintenance operations and attain an understanding of environmental impacts.

To improve stakeholders understanding of Arterial Drainage Maintenance, this report explains the context and workings of typical drainage operations complimented by further details on environmental work practises described in Section 5. This report then reviews the scale of overlap between these operations and Natura 2000 sites nationwide and attempts to screen out the conservation aspects that have a realistic potential of being significantly impacted upon by drainage maintenance works. It will identify conservation aspects that warrant further consideration in terms of drainage maintenance impacts and it is envisaged that these resultant assessments will be carried out in the form of a multi-annual programme of studies and consultations.

## **3. ARTERIAL DRAINAGE SCHEMES**

### **• BACKGROUND**

The Office of Public Works is the body through which Central Government exercises its statutory responsibilities in respect of river drainage and flood relief. It derives its statutory authority from the Arterial Drainage Act, 1945 and the Arterial Drainage Amendment Act, 1995. The Report of the Flood Policy Review Group, which was adopted by Government in 2004, sets out the new national policy on flood risk management. The OPW are identified as the lead agency, supported by a number of other public bodies and implementation of this new policy has recently been commenced.

Ireland by its nature is liable to flooding and drainage problems principally due to the fact that the country has a relatively low-lying interior surrounded by coastal highlands. Many major rivers are sluggish in character and this coupled with our relatively high rainfall inevitably leads to chronic drainage problems. Accordingly, drainage works have a long history in Ireland stretching back to the mid 19th century. Improvement schemes were carried out under the 1842 Arterial Drainage Act on localised areas of river

catchments. Several hundred of these minor schemes were carried out, with Local Authorities having statutory maintenance responsibility for them. Some of these schemes have since been subsumed into Arterial Drainage Schemes carried out under the 1945 Arterial Drainage Act but circa 172 of these schemes remain standalone and are known as Drainage Districts (DDs). Maintenance responsibility for DDs resides with the Local Authorities with the OPW having a policing role with duties to inspect the condition of the Drainage Districts and obligations for Local Authorities to return annual reports on them. While the OPW have no statutory duty to maintain these DDs, state assistance is sometimes given to Local Authorities in dealing with emergency flooding issues in the form of OPW joint funding for investigations or in some cases, OPW assistance on maintenance or in constructing flood relief measures.

The 1945 Act Arterial Drainage Schemes differed from the historical schemes in that they dealt with the total river catchment rather than on a localised piecemeal basis. The 1945 Act was then amended in 1995 in response to serious urban and localised flooding problems. Since the 1995 Amendment Act, the OPW has embarked on a programme of Flood Relief Schemes. While these are not catchment based, regard is had of the downstream effect. Typically these schemes address urban flooding but also address some localised rural areas where dwellings or infrastructure is subjected to flood damage. Note that the new Flood Policy requires the development of Catchment Flood Risk Management Plans (CFRMP) which will take an overview of the catchment's flood risk pressures and management options. When these CFRMPs are completed, future Drainage Schemes will be carried out within this framework.

#### • EXTENT OF SCHEMES

Between 1948 and 1995 the OPW completed Arterial Drainage Schemes on thirty-four river catchments:

- o Fourteen were on major catchments i.e. >40,000Ha,
- o Five were on minor catchments i.e. 10 - 40,000Ha
- o Fifteen were on small catchments i.e. <10,000Ha.

In total, 253,000Ha of lands benefited from these schemes. In the same period, five Estuarine Embankment Drainage Schemes were carried out with four in the Shannon estuary region and one in the Swilly region Co. Donegal. Some 10,000Ha of land benefited from these embankment schemes.

To date under the 1995 Amendment Act, thirteen Flood Relief Schemes have been completed with a number currently at design stage.

#### • SCHEME DESIGN OBJECTIVE

Schemes carried out under the 1945 Act were generally designed to allow protection for a minimum of the three-year flood event in addition to creating an outfall for drainage of the adjoining lands. Where the creation of an outfall dictated the design bed levels, greater protection than the three-year flood event would have been achieved as a consequence.

In the case of modern urban flood relief schemes, flood protection for a 100 to 200 year flood event would be the design objective.

## 4. ARTERIAL DRAINAGE MAINTENANCE

#### • BACKGROUND

Maintenance works are carried out in fulfilment of the statutory requirement under the Arterial Drainage Act, 1945. This requires :

1. Scheme channels, embankments and associated structures to be maintained in "proper repair and effective condition".
2. Provision of flood alleviation and an outfall for drainage from agricultural lands, urban areas, bog developments, forestry and amenities in accordance with the scheme design standards.
3. Maintenance of urban flood defences in accordance with scheme design standards.

Failure to comply with these obligations would be contrary to the Drainage Acts and could lead to compensatory claims for damage to the benefiting lands. All of the completed Arterial Drainage and Estuarine Embankment Schemes are now maintained under the statutory obligation.

## • EXTENT OF OPERATIONS

Headquarters for the OPW is 51 Stephens Green, Dublin 2 with three Drainage Maintenance Regions managing the maintenance programme:

East Region, Trim, Co. Meath  
West Region, Headford, Co. Galway  
South West Region, Mungret, Co. Limerick

*Note that a fourth region i.e. South East, is to be formed in the near future.*

Map No.1 shows the geographical extent of drained catchments. The OPW are 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. Note that a significant portion of the 18,500 bridges are road bridges where the Local Authorities are responsible for the structural integrity and the OPW are responsible for flood conveyance. Annually, about 2000km of channels are maintained with circa 200 structures repaired. The annual maintenance budget is circa €15 Million. The OPW maintain their own transport and excavator fleet and other specialised equipment such as weed cutting boats. The operations are carried out by a trained direct labour work force numbering circa 300. The employment of seasonal staff can raise the peak numbers to circa 360.

OPW direct labour staff uses a fleet of approximately seventy hydraulic excavators nationwide to execute the maintenance programme. 17% of the excavator fleet consist of long reach machines which normally work on channels in excess of a four metre base width or have high banks. Works on the majority of channels are carried out using 15ton hydraulic excavators. Plant are designed for the appropriate site conditions, hence low ground pressure excavators are employed on soft ground with standard ground pressure excavators are utilised on more firm lands. In addition, for works on very weak ground, a system of timber mats is used.

## • DIFFERENCE BETWEEN SCHEMES AND MAINTENANCE

### *Scheme Works*

Construction of the original Arterial Drainage Schemes required major hard engineering. Typically it involved widening and deepening the existing channel with some localised straightening and, in a few cases, the opening of a new channel reach. Using Draglines, works entailed excavation of all soil types such as peat, clays and gravel while rock was normally blasted. The channel cross section was excavated to a trapezoidal form, channel width was standardised, longitudinal gradients were made more uniform and cross sectional bed levels were made even. All instream and riparian vegetation and soils were removed and access for construction plant was made along the channel banks. In schemes prior to circa 1973, excavated material was stockpiled in spoil heaps setback parallel to the channel. Post 1973, the spoil was levelled out on riparian lands which were then topsoiled and reseeded.

### *Scheme Hydrological Change*

Typically the riparian water table would have been dropped by circa one metre although this value would vary widely depending on a number of characteristics such as soils, geology, topography, catchment hydrology and critical design factors. Arterial drained channels differ from more natural channels in that the waterway has significantly more uniform flow velocities, more constant depth/width ratios, a reduction in connectivity to floodplains but with more instream storage.



### ***Maintenance Works***

In contrast, maintenance works entail a much more moderate approach in construction activities and are executed with the environmental work practices as described in Section 5, ecological disturbance is minimised and habitat enhancement is common. The purpose of Arterial Drainage Maintenance is simply to retain the scheme channel's design capacity to convey water in an effective manner. Following the scheme works, the channel capacity will gradually reduce over time as both silt and vegetation levels increase and other obstructions develop, necessitating maintenance to return the channel capacity to its design condition. This is achieved by removal of the silt and vegetation, repairing bank damage or slippage and removal of obstructions such as trees encroaching at low levels on the banks. No excavations of virgin ground are necessitated and generally the majority of the riparian vegetation is left intact. The environment has re-established and stabilised around these scheme works and maintenance operations having no need for "hard digging", in effect maintains the hydraulic conditions for this post scheme environment.

### ***Maintenance Hydrological Change***

These maintenance works will continuously re-establish the hydrological regime of the channel as that generated at scheme works stage. As a rule, medium to high gradient channels have limited build up of silt, and maintenance works consists of removing obstructions, repairing bank damage and removal of dense instream vegetation. Typically the water level in the channel at low-flows would not have appreciably increased above the original design datum hence maintenance operations would not cause any significant drop in the low-flow water levels. Maintenance works would reinstate the flood capacity of the channel hence if the level of flood-flows in the channel has risen due to obstructions etc. this peak level will be dropped back to the original design datum for flood-flows.

Low gradient channels requiring maintenance would normally have a low-flow water level of 50 to 300mm above the scheme design level which has built up over the intervening years primarily due to siltation and instream vegetation. Maintenance operations will drop the datum of this low-flow back to the original scheme design datum. Similarly, the water levels for flood-flows may also have risen by a similar magnitude. Maintenance will reinstate the channel's flood capacity and again, this peak level will be dropped back to the original design datum for flood-flows.

Accordingly, the hydrological regime surrounding medium to high gradient channels would have a stable low-flow datum with some increase in the flood-flow datum building up over a few years. For low gradient channels, both the low-flow and flood-flow water levels would tend to rise by 50 to 300mm over a few years and is then returned to the original design datum. This is an ongoing process and ensures that the level of drainage provided to the riparian lands and the flood protection originally provided is retained.

### **• PARTICULARS OF CHANNEL WORKS**

Channel maintenance operations normally involves removing the build up of foreign or natural material that impedes the free flow of water. Predominately this consists of the removal of water-entrained silt and associated vegetation from the bed of the channel by suitably rigged hydraulic excavators. Restrictions in channels due to bank slippage or damage would be regraded to the original profile. Channel breaches due to bank erosion would be resolved by reprofiling the bank in-situ or in some cases by importing protection material such as rock armour or log poles. In addition, other larger vegetation such as trees, which impinge on channel capacity are either removed in whole or impingement is reduced by selective removal of lower branches. The material removed in the maintenance operations is normally spread along the bank or on top of existing spoil heaps where present. In most cases, no alterations to the bank are required and in some cases the channel is not disturbed at all if no build up of material is present.

Some channels are steep and fast flowing, which are subject to flash floods, bank erosion and rapid movement of bed gravel. However, 60 – 70% of scheme channels are of gentle longitudinal gradient and subject to relatively rapid deposition of silt, especially those that are subject to prolific growth of instream vegetation. The steeper sections of channel normally require relatively little maintenance works. The majority of maintenance works are on smaller lower lying channels with 90% of works in channels with a base width of less than three metres. The average channel requires maintenance every four to six years. Channels with prolific weed growth may require maintenance annually particularly where downstream urban bridges are at risk of being blocked due to a flow of decaying vegetation in Autumn. Conversely, some channels may only require maintenance every twenty years due to the self cleaning characteristics of the channel.

#### • **PARTICULARS OF OTHER WORKS**

A number of channels have an annual prolific growth of aquatic plants but are too wide or the bank conditions are too unstable to allow maintenance by way of excavators. Weed cutting boats are engaged in these cases or where a particular channel requires to be cleared of vegetation but it is not deemed necessary to remove silt or other heavy material. In all, approximately ninety km of channel are cleaned annually by four weed cutting boats, operating on a seasonal basis, with the majority of the works concentrated in the West of Ireland.

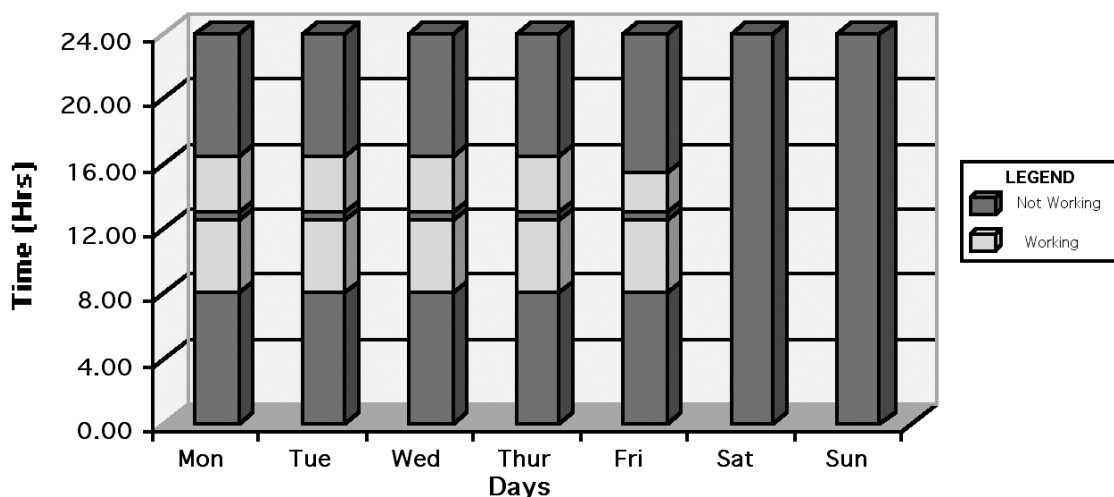
Most embankment schemes are tidal in nature hence they tend to be located at estuaries. The foremost inland embankment scheme is the Annagh Embankments on the Inny Drainage Scheme. The frequency of maintenance for embankments tends to be more variable than that for channels. Embankments are scheduled for works when it is deemed that the structure is in need of repair to maintain an effective condition. Repair works normally takes the form of topping up clay embankments to design height and structural strengthening by importing rock/soil material or utilising in-situ material that had been eroded from the original embankment.

Included within the bridges on maintainable arterial drainage schemes are structures ranging from concrete pipe culverts, timber bog access ramparts through to concrete or masonry structures. Repair/replacement works are carried out on approximately 170 bridges per annum and are restricted to the most critical structures. Repair works are normally carried out with a similar material as that of the structure in question with the exception of the wooden structures that tend to be substantially deteriorated and are replaced by concrete structures.

Ancillary structures such as sluice gates, tidal barrages and pumping stations are repaired or replaced as necessary to maintain their respective operating function.

#### • **WORKING HOURS**

Standard working hours for machines are generally in line with those of their operatives. Operatives work a thirty-nine hour week i.e. from 8:00am to 4:30pm including a 30min lunch break and one 15min tea break. Work ceases at 3:30pm on Friday. Figure 1 shows the time in graphical format:



**Figure 1:** Standard drainage maintenance machine working hours

In some instances, overtime of up to a few hours per week may be required in channel maintenance operations, albeit this tends to be localised and infrequent. Longer working hours can occur on the more capital project type jobs such as embankment strengthening works. Typically these embankments may not be maintained for twenty years and when funding is attained, strengthening operations may be carried out with the assistance of privately contracted plant hire. Working hours in these projects may increase up to 10 hour days although typically remain at 5 days per week.

## 5. CURRENT ENVIRONMENTAL PRACTICES

### • LIAISON WITH STATUTORY BODIES

In light of the fact that Drainage Works are predominately within inland waters, the Regional Fisheries Boards (RFBs), the Central Fisheries Board (CFB) and the National Parks & Wildlife Service (NPWS) are seen as the primary statutory body stakeholders. In 2004 a framework for communicating with these stakeholders was agreed and consists of the following:

- As soon as practical at the start of the year, Drainage Regions forward the relevant sections of the Annual Maintenance Programme with a copy of appropriate scheme maps, to the NPWS Regional Managers and the Regional Fisheries CEO.
- As a follow up, the Drainage Regions offer the opportunity for a meeting with the stakeholders to discuss the programme of works.
- Works that fall within SACs, SPAs or NHAs are highlighted on the programme and at least three weeks notice is given to the NPWS local staff prior to entry onto channels in those sites.
- Forward a copy of the entire Annual Works Programme to the CFB who review it for the identification of appropriate EDM research sites (see below), and they revert to the respective Regional Engineers Office.

Over past years, working relationships have been established with the Central Fisheries Board (CFB) and the Regional Fisheries Boards (RFBs) throughout the country at all staff levels. Many OPW operational staff have developed an understanding of fishery requirements and engage in open informal on-site communications. In more sensitive catchments such as the Moy, Corrib and Boyne, regular meetings are held with Fishery Officers, normally on a bi-monthly basis.

In more recent times the OPW are building up consultations with staff of the NPWS. Regional management now have the opportunity to review the annual works programme and over the next few years, it is envisaged that Drainage operational staff will develop open on-site communications with many of the Rangers and District Conservation Officers, which will integrate 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 intended to continuously develop improved consultation protocols at all staff levels with both the Fisheries and NPWS.

#### • ENVIRONMENTAL RESEARCH

The Drainage Maintenance Service in partnership with the CFB have established a research programme called the Environmental Drainage Maintenance (EDM) programme. This programme is funded by the OPW through the CFB who coordinate with the Regional Fisheries Boards. The Programme has been developed over the 1990's and there is ongoing research on a number of topics varying from assessing the impacts of maintenance operations on various fish species through to the effects of densely matted instream vegetation on the waterway's biology. A primary objective of the programme is to identify methods of operation which are both environmentally sensitive and effective from an arterial drainage maintenance viewpoint. To date, the programme has proved very successful in this regard. The current phase of the programme also includes formal training of OPW operational staff in environmentally sensitive maintenance techniques, combined with follow up site visits to coach staff and audit performance levels.

The EDM Programme continues to draw on the expertise and advice of the CFB and Regional Fishery Boards. The programme continues to be funded by the OPW. The next phase of this programme is to continue auditing and promoting the implementation of the various environmentally sensitive drainage maintenance work practises. Assessments of impacts on various aquatic species through studies with the Central and Regional Fisheries Boards will be an ongoing process. In addition, it is intended to instigate consultations with the NPWS with a view to formulating a second phase of environmentally sensitive maintenance work practices. The necessary training, publication of guidance notes, on-site coaching and site audits will flow from this.

#### • ENVIRONMENTAL TRAINING

Emanating from the EDM programme, an environmentally friendly approach to maintenance has been formulated which embraces ten alterations to work practices. As a first stage of implementing this change, all frontline machine operational staff received formal training from the CFB. This consisted of a half-day lecture series in two parts i.e.

**Part I:** Lecture to raise awareness of the waterway as a wildlife habitat.

**Part II:** Lecture on implementation of the ten environmentally friendly work practices.

This training was completed for the majority of operational staff in 2003 with some outstanding staff been trained in 2004. As an ongoing process, the CFB audit the standard of implementation and carry out site visits to assist with on-site coaching and training of frontline staff where practical examples of implementing the work practices can be discussed and demonstrated.

In addition, the CFB carry out pre-maintenance walk over surveys on selected channel segments where habitat enhancement opportunities are identified and the elements for an environmentally sensitive approach are detailed and recorded. Typically this type of survey includes a representative from the CFB, the relevant Regional Fisheries Board, OPW technical staff or foreman, occasionally accompanied by a Conservation Ranger. This type of on-site forum also offers the opportunity to train staff on the implementation of the various environmental practices.

In tandem, OPW environmental staff conduct site visits to frontline staff nationwide to again assist with on-site coaching and auditing the standard of implementation. To date, all machine operational staff have been visited at least twice by OPW environment staff while the CFB have carried out site visits to all machine operational gangs. In general, it is clear that operational staff have adopted the environmental friendly approach as standard practice and the level of implementation is high.



## • ENVIRONMENTAL WORK PRACTICES

Four alterations to traditional work practises are deemed to have a significant mitigating effect on possible environmental impacts of maintenance works:

- a) Environmental Drainage Maintenance practices
- b) Annual Works Programme to accommodate spawning
- c) Fishery habitat enhancement
- d) Upgraded mechanical fleet

### ***a) Environmental Drainage Maintenance practices***

As described in the paragraph Environmental Training, ten alterations to work practices have been developed under the EDM research programme. These methods have been condensed onto a singular double-sided laminated sheet to form Guidance Notes for staff. These guidance notes are held by all maintenance machine operation gangs and are used as an on-site reference guide. A copy of the guidance notes is in Appendix 3.

The ten environmentally friendly work practices range from leaving banks untouched where practicable, managing trees and vegetation, managing berms, tossing of spawning gravel (outside spawning season to remove entrapped silts) and enhancement works such as digging pools and placing of random boulders at the request of the Fishery Boards as appropriate. Staff have been trained in the new practices and this approach is now being incorporated into routine maintenance operations.

### ***b) Annual Works Programme to accommodate spawning***

Drainage Regions and relevant Fisheries Boards discuss and revise the annual works programme to accommodate the timing of works in spawning channels. Over the last few years, the typical annual work programme has changed substantially to reflect this requirement. In some salmonid fisheries, up to 60% of channels or part of channels are maintained within particular time frames to minimise impacts.

It is acknowledged that further appraisals are required between the Fisheries and the Drainage Maintenance Service to achieve a nationwide consistency in dovetailing the work programme to benefit fish stocks. However, given the current climate of extensive interaction between operational staff of both organisations, the standard of environmental protection is set to rise further over the next few years.

### ***c) Fishery habitat enhancement***

Fisheries Boards liaise with operational staff to coordinate operations on the ground to the benefit of fish stocks. This could involve the timely construction of in-channel fishery improvements to coincide with maintenance operations when extra resources would be on site or in some cases, the removal of existing stocks by electro-fishing where works could impact on them. In addition, the OPW have in partnership with the Fishery Boards constructed Tourism Angling Measures (TAM) projects since the conception of these measures in 1997. These types of projects have a direct positive impact on the habitat and further habitat enhancements are being implemented in partnership between the Drainage Maintenance Service, Regional Fisheries Board and local Angling Clubs. Typically, the latter groups tend to secure funding for these projects, the Fisheries design them and the Drainage Maintenance Service implement the works in conjunction with the channel maintenance programme. This partnership maximises efficiency of resources and makes the projects high value for money. It is foreseen that these habitat enhancement projects will continue into the future.

#### ***d) Upgraded mechanical fleet***

Traditional maintenance primarily utilised Dragline excavators which had a number of environmentally related disadvantages as follows:

- High ground pressure which caused damage to surrounding ground and banks.
- Unwieldy to manoeuvre around bank side vegetation with consequent risk of damage .
- Cumbersome for drivers to control the excavation bucket hence difficult to execute selective removal of channel material or control the depths of excavation.
- Slow progress that forced relatively long intervals between successive maintenance operations on the same channel.

Through the 1990's, draglines were replaced by hydraulic excavators and by 1999 the full fleet consisted of hydraulic excavators with the exception of one dragline that was retained for specific uses. This dragline plant can still be employed in instances where extra reach and ability to handle large volumes of material is required. In replacing the draglines, the hydraulic excavators have reversed many of the above disadvantages. Furthermore, there is now a seven-year replacement programme in place for the excavator fleet. All excavators use long life engine oil and biodegradable hydraulic oil. In addition, due to the good mechanical condition, there is effectively no loss of fluids such as hydraulic oil and few on site breakdowns with resultant reductions in bank side mechanical maintenance. The excavators are appropriate for the ground conditions and offer a high level of control to the drivers, hence a more selective approach to material removal can be implemented including the ability to alter the channel profile if desirable.

The OPW keep abreast with developments in mechanical equipment internationally and are now sourcing machinery that enhances the ability of excavators to carry out environmentally sensitive maintenance. A new form of weed cutting excavator bucket has recently being introduced into maintenance operations. This equipment allows the excavator to remove instream vegetation without disturbance to the channel bed and is proving very useful where spawning salmonid channels suffer from prolific weed growth. Similarly, a recent introduction of hydraulic shears offers excavators greater flexibility in selective and clean removal of woody vegetation. In situations were deemed suitable, excavators can reach over trees located along the top of the bank and remove the trees or limbs at lower level which impinge on channel capacity.

#### **• ENVIRONMENTAL MANAGEMENT**

A dedicated Environment Section was established within the Drainage Maintenance Service in 2003. The development of this section reflects the level of commitment of the Drainage Maintenance Service towards the environment and it will ensure the long-term integration of environmental protection and drainage maintenance. The environment section will provide assistance to the Drainage Maintenance Service in managing the many environmental issues that will arise in this sector over the coming years.

GIS systems are foreseen as a significant tool to manage both the existing and future environmental information and to this effect, the Drainage Maintenance Service has recently digitised the original drainage scheme maps. This will be of benefit to all stakeholders and will aid the rapid and accurate transfer of geographical environmental data. Ultimately it is hoped to contain all maintenance work programmes, fishery information such as spawning reaches, environmentally designated areas e.g. SACs, other sensitive sites such as habitats of protected species and general habitat information in this format.

## **6. NATURA 2000**

European Sites, otherwise called Natura 2000 sites, consist of two designations i.e. Special Area of Conservations (SACs) and Special Protection Areas (SPAs). SACs are to be managed in a method to maintain a favourable ecological status for the relevant Annex I Habitats and Annex II Species of the Habitats Directive (92/43/EEC). Similarly, SPAs are to maintain the favourable conservation status of habitats for Birds of Annex I in the Birds Directive (79/409/EEC) or areas that are important to migratory birds. Important migratory sites can be of either international or national importance. The principal criteria

for designation of a site as internationally important is that it regularly supports 20,000 waterfowl, or regularly sustains 1% of the all-Ireland bird population for an Annex 1 species, or regularly sustains 1% of the biogeographical (European) bird population for a non Annex 1 Migratory species. A site is defined as being of national importance if it regularly holds 1% of the estimated national population for non Annex 1 Migratory species.

## 7. ASSESSMENT BY CONSERVATION ASPECT

All European Sites (Natura 2000 network) have a prescribed list of specific conservation aspects and are normally designated for a multiple of these conservation aspects. However, with drainage maintenance operations being spread across the country, there are a relatively large number of conservation aspects that will be exposed to drainage maintenance works. Impacts assessments on the Natura network could be dealt with on a site by site basis through considering all the conservation aspects for an individual site in one appraisal. However, due to the fact that multiple conservation aspects overlap with drainage operations nationwide, the assessment of impacts by appraising individual conservation aspects is deemed to be more effective. This approach offers a number of advantages as follows:

- o Lessons learned can be applied to similar conservation aspects that overlap with maintenance works but lie outside the Natura network.
- o Mitigating measures identified will be equally useful for other drainage authorities such as Local Authorities if their operations overlap the same conservation aspect.
- o Nationwide studies offer the best opportunities for added benefit to a project in that other parties can justify combining or extending resources to maximise the output for the gain of conservation knowledge in the state.
- o Outputs from a nationwide study approach will be relevant to all operational staff and can be integrated into developing further standard OPW environmentally friendly work practises.
- o Effective management of nationwide drainage operations requires a consistency of approach whereas outputs from individual site assessments could in the longterm lead to the development an inconsistent and disjointed methodology when encountering broadly similar situations.

## 8. SCREENING METHODOLOGY

The extent of ecological assessments that may be required for OPW drainage maintenance operations into the future is determined by completing the following:

- o Identify all SAC & SPA sites nationwide that contain statutory drainage channels.
- o Identify all the conservation aspects that are relevant to these sites.
- o Develop a matrix of conservation aspects and Natura sites that impinge on drainage channels and assess scale of overlap.
- o Briefly assess each conservation aspect to determine if a possible impact could be significant and categorise the results.
- o 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.
- o Record the reasoning used to assign conservation aspects into Category III i.e. why it is that a significant impact is highly unlikely.

## 9. OVERLAP WITH NATURA 2000 SITES

The designation process of 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 designations are of conservation aspects in a post drainage scheme environment.

### • SPECIAL AREAS OF CONSERVATION (SACS)

#### *a) Ireland's Conservation aspects*

Emanating from the Habitats Directive, DAHGI (c.2003) prescribes the list of Annex Habitats and Species for which SACs have been selected in Ireland as follows:

- o 59No. Annex I Habitats (16No. Priority & 43No. Non-Priority)
- o 24No. Annex II Species (19No. Fauna & 5No. Flora)

A database is maintained by the DEHLG, that denotes which Annex Habitats and Species are designated as the qualifying interests for each SAC. These qualifying interests are the conservation aspects as referred to in the Natural Habitats Regulations, 1997.

#### *b) Distribution*

Map No.2 shows the nationwide distribution of SACs with drainage channels and embankments. There are 420 SACs within the state and 61 sites overlap with drainage operations. There are a total of 83No. conservation aspects protected by the SAC network and 66No. of these are encapsulated within the 61 relevant SACs. Table 1 denotes these SACs with the corresponding Drainage Scheme and the numbers of channels that overlap with the SAC.

#### *c) Relevant Conservation aspects*

Of the 83No. conservation aspects relevant to Irish SACs, 17No. have no overlap with drainage areas and are not considered further. They are as follows:

Species - Common seal (*Phoca vitulina*), Grey Seal (*Halichoerus grypus*), Harbour porpoise (*Phocoena phocoena*), Kerry slug (*Geomalacus maculosus*) and Marsh saxifrage (*Saxifraga hirculus*).

Habitats - Alpine and sub alpine heath, Calaminarian grassland, Calcareous rocky, Caves not open to the public, Decalcified empetrum dunes, Dystrophic lakes, Eutric scree, Marine caves, Rivers with *Chenopodium rubri* and *Bidenton* veg, Siliceous rocky, Siliceous scree and Species-rich *Nardus* upland grassland.

Table 2 displays a matrix of the 61 relevant SACs with their associated conservation aspects. The total column represents the number of times that a particular conservation aspect is a qualifying interest for a relevant SAC. For instance, the Bottle-nosed Dolphin is a qualifying interest for only one relevant site i.e. site no.2165, Lower River Shannon SAC while Raised Bogs are designated for 20 of the 61 SACs.

### • SPECIAL PROTECTION AREAS (SPAS)

#### *a) Ireland's Conservation aspects*

The Birds Directive requires the creation of SPAs for species from the following bird groups, which occur in member states, subject to various population criteria:

- o 181No. Annex I Birds
- o Non Annex I, regularly occurring Migratory birds. The Birds Directive does not prescribe a definitive list as the number of species for any member state can fluctuate with changes in bird populations and migration patterns.

All SPAs have prescribed qualifying interests, which are the conservation aspects as referred to in the Natural Habitats Regulations, 1997. However, the DEHLG are currently reviewing these qualifying interests and it is envisaged that there will be revisions to the same in due course. It is likely that if this report only considers the current qualifying interests, this screening exercise may be out of date in the relatively short-term. Accordingly, rather than focusing on the current conservation aspects, this screening exercise for SPAs will embrace all Annex I and Migratory species that occur on Irish SPAs.



### ***a) Distribution***

Map No.3 shows the nationwide distribution of SPAs with drainage channels and embankments. There are 135 SPA sites within the state and 22 sites overlap with drainage channels. Table 3 denotes these SPAs with the corresponding Drainage Scheme and the numbers of channels that overlap with the SPA.

### ***b) Relevant Conservation aspects***

Dúchas (2002) lists all noteworthy bird species that occur on each SPA. This publication was reviewed and both Annex I species and other species that could be considered Migratory birds were identified. Table 4 displays a matrix of the SPAs relevant to drainage with their associated occurring bird species. The numbers of species in this table which are denoted as occurring in each SPA will be substantially greater than the actual number of species that make up the site's conservation aspects. For example, Table 4 shows SPA site no. 4020 Ballyteigue Burrow, as having 8No. Annex I and 12No. Migratory species occurring on the site, but the conservation aspects for this SPA are only 2No. Annex I species i.e. Bar-tailed Godwit and Golden Plover with 1No. Migratory species i.e. Light-bellied Brent Goose.

Overall, 22No. Annex I and 35No. Migratory species are occurring within the 22 relevant SPAs. Table 4 displays a matrix of the 22 relevant SPAs with their associated occurring bird species i.e. 22No. Annex I and 35No. Migratory species.

## **10. Drainage Impacts**

### **• SACS**

SAC conservations aspects include a variety of species and habitats, hence there are a wide range of impacts that would need to be considered. However, from current knowledge it is considered that the main pathway for impacts due to drainage maintenance operations are in one way or another primarily due to habitat damage. The mechanisms for this impact can be subdivided into two broad groups:

### **1. Habitat damage**

#### ***a. Direct impacts***

Any species that inhabits the waterway could be impacted upon directly with the removal of instream material. Non-mobile species such as juvenile Lamprey could be excavated by de-silting works while all species could be impacted by the removal of suitable habitat e.g. spawning gravels used by Salmon or boulders and cobbles exploited by Crayfish. Similarly, any species dependent on instream or riparian vegetation could be affected directly by its removal. The extraction of trees used as Otter holts or the removal of the instream conservation aspect Floating River Vegetation are examples of potential impacts. In addition, a species may experience disturbance due to close proximity of human activities and a habitat adjoining a waterway that is sensitive to compaction effects could be impacted by the same due to access by machinery along the top of the bank.

The magnitude of these direct impacts is complex and would be dependent on several factors such as the sensitivity of the habitat or species to the impact, the importance of the habitat to a species, the availability of similar habitat, the season in which the works are carried out and the scale of the area in which the impact occurred in comparison to the size of the habitat or species range.

Notwithstanding the fact that studies recommended in Section 13 will further consider these impacts, there are a variety of applicable mitigation measures currently used in maintenance operations as described in Section 5. For example, the Environmental Drainage Maintenance Guidance Notes ensures a minimalist approach is taken towards the removal of riparian vegetation and trees and promotes habitat diversification by stipulating the reinstatement of boulders and managing berms to form a two stage channel. In addition, these Guidance Notes combined with work practises such as fishery habitat enhancement and works programmes to accommodate spawning ensure negative impacts to salmonids are minimal with positive benefit in many cases.

### ***b. Hydrological impacts***

Many habitats and their associated species have some form of dependence on hydrology and changes in hydrology can impact upon these habitats by reducing their extent or altering the type of habitat. The hydrological impacts of typical maintenance works are described in Section 4 where it is explained that maintenance will continuously re-establish the hydrological regime of the channel as that generated at scheme works stage. Section 9 explains that the majority of Natura designations are of conservation aspects in a post drainage scheme environment. Accordingly, it would appear likely that maintenance operations should be in effect maintaining the habitat's hydrology.

However, it is known that some habitats can have quite a complex relationship with the local hydrological regime and there could be scenarios where maintenance operations impacts hydrologically on adjoining habitats. Further knowledge is required on this subject and the concept of hydrological interdependency will be considered as part of many studies been recommended in Section 13. In addition, a further source of information that should be able to contribute to this understanding is the Water Framework Directive (WFD). Technical working groups under the auspice of the WFD both in Ireland and the UK are working on subjects such as hydromorphology and groundwater dependent terrestrial ecosystems. Outputs from these studies should be available within the next year or two and are expected to give expert opinion on these subjects.

While the primary objective of European Sites is to maintain ecological conditions for that site, improvements to ecological values would be desirable. Drainage schemes would have reduced the ecological potential of adjoining wetland habitats and the concept of restoration is to restore the hydrology towards pre-scheme conditions. This is a possibility where the restoration measures will not compromise the needs and rights of man. As part of ever increasing consultations with the DEHLG and the studies being recommended in Section 13, opportunities may be identified whereby some form of restoration can be incorporated into maintenance operations. For example, in the future where the State succeeds in purchasing a bogland for conservation and where there are no upstream third parties reliant on the drainage regime, it may be feasible to block the relevant drains to restore in part the pre-scheme hydrology of the bogland. In the future, SAC sites that are shown as having potential for restoration will be reviewed on a case by case basis.

### **• SPAS**

Similar to the SACs, it is believed that drainage maintenance operations could negatively impact on SPAs by habitat damage but in addition, the disturbance of species has the potential to also be an important factor:

### ***2. Disturbance impacts***

The presence of working machines could force birds to move to other areas. This disturbance would typically be of a temporary nature although it has the potential in an extreme case to cause a permanent displacement of significant numbers of birds. The scale of the impact would be dependent on a number of factors such as the availability of suitable alternative sites, the proximity of machine operations, the duration of machine operations, the season that the species is present, how negative to the species is a loss of time due to temporary disruptions and how sensitive is the species to disturbance by human presence. It is suspected that some species which Winter in Ireland such as Geese can be less tolerant of human activity than other birds although even this sensitivity is further complicated by the fact that some species can become less sensitive during the season as the species gets accustomed to human presence.

### 3. Habitat damage

From current understanding, habitat damage can occur due to two principal factors:

#### *a. Direct impact*

Any species that have a degree of dependency on the vegetation within or immediately adjoining a maintained waterway could be impacted upon directly by machinery. Maintenance operations frequently involve the removal of instream vegetation and to a much lesser extent, riparian vegetation. Spoil is deposited either on the top of the bank, on top of existing spoil heaps or on the bank slope. Vegetation on these zones can be submerged in spoil. However, as described in Section 4, typical channel maintenance is now carried out every four to six years. The actual volumes of spoil being excavated in most cases are not excessive for this frequency of intervention hence most spoil can be deposited within a thin layer of material on the adjoining areas. Current experience is that the vegetation appears to quickly re-establish itself through this spoil. Another possible impact is the compaction of soil or vegetation by machinery along the access routes.

Similar to all these direct type of impacts, the scale of impact would be dependent on multiple aspects such as the value of the habitat to a species, the availability of suitable alternative areas, the season that the species is present and the extent over which operations are carried out relative to the suitable length of waterway habitat.

#### *b. Hydrological impacts*

Many SPAs consist of some form of water dependent habitat, typically either a lake, a freshwater wetland or an estuary. The current understanding of hydrological impacts due to maintenance is described in this section under SACs. Also, the findings of studies to be carried out on the various SAC habitats combined with the expected output from the WFD working groups, will both be applicable to increasing the understanding of impacts on SPA habitats. In light of the fact that a significant volume of information on hydrological impacts will be forthcoming under other frameworks, it is deemed prudent to await this information. At that stage, any SPA habitats where it is deemed that there is still a lack of understanding on hydrological impacts can be studied separately.

Similar to the concept of restoration as discussed in this section under SACs, any SPA sites where an opportunity for restoration is identified can be incorporated into maintenance operations. For example, issues regarding hydrological impacts have arisen at Glen Lough SPA and restoration works have been carried out in consultation with the DEHLG. This site comprises of a seasonal lake with a drainage channel adjacent to it. This permitted restoration measures to accommodate an increase in lake levels without affecting the drainage of the upstream lands reliant on the maintained channel. As an ongoing process, any further SPA sites that are identified as having characteristics suitable for restoration will be reviewed on a case by case basis.

## 11. Conservation Aspects categorised

### • SAC CATEGORISATION

The screening methodology as explained in Section 8 sub-divides 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.
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- 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 shows the categorisation of SAC conservation aspects summarised as follows:

,Category I;      20No. aspects included i.e. 11No. Species & 9No. Habitats.

,Category II;      22No. aspects included i.e. 2No. Species & 20No. Habitats.

,Category III;      24No. aspects included i.e. 6No. Species & 18No. Habitats.

Table 5 offers a summary description of the reasoning behind the categorisation decision further expanded as follows:

,Category I primarily consists of two broad groups i.e.

- o Species and Habitats that are largely dependent on the instream of a maintained waterway.
- o 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 they are 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:

- o Some species and habitats are designated only within the River Barrow & River Nore SAC and the Lower River Suir SAC. Whilst urban flood relief schemes were carried out in both Kilkenny and Carrick On Suir, these schemes were primarily achieved through structural engineering. Typically these schemes have effectively no ongoing instream maintenance.
- o 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.
- o 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.



## • SPA CATEGORISATION

As noted above, the methodology in Section 8 sub-divides 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 6 shows the categorisation of SPA conservation aspects summarised as follows:

- ,      Category I;      1No. species i.e. Kingfisher
- ,      Category II;     32No. species
- ,      Category III;    24No. species

Table 6 offers 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 judgement 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:

- o 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.
- o 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.
- o 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.
- o 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.

## 12. Scope of Assessments

In accordance with the Natural Habitat Regulations, 1997, an Environmental Impact Assessment (EIA) is recognised as an appropriate assessment. The scope of this type of study encompasses a detailed evaluation across a broad range of environmental aspects from heritage through to air emissions. However, the Natural Habitats Regulations state that the objective of an assessment is to assess impacts on the site's conservation aspects, hence it is understood that a reasonably practicable approach would be to utilise a more focused type of assessment. This approach will have a narrower scope than the typical broad EIA approach and will study the specific relevant conservation aspects only.

Ecological Impact Assessment (EclA) is the term used to describe this type of study. The objective of each study will be to assess the impact of Arterial Drainage Maintenance operations on that particular aspect, to identify mitigating measures if applicable and ascertain practical enhancement opportunities if relevant. In the event where assessments for different conservation aspects have recommended conflicting mitigating measures for the same Natura site, expert opinion may be necessary to resolve them.

## 13. Recommended Ecological Assessments

Recommended EclAs are listed below but are not listed in any order of priority. Each study is assigned a letter for identification and future reference purposes.

### SACs

Category I conservation aspects i.e. 11 species and 9 habitats as listed in Table 5, require an EclA. Where aspects have similar or interdependent characteristics, one study would be the most efficient methodology and conservation aspects have been grouped accordingly. The following is the list of EclAs that are currently required:

- a. Salmon
- b. Brook, River & Sea Lamprey

- c. White-Clawed Crayfish
- d. Freshwater Pearl Mussel and Pearl Mussel
- e. Otter
- f. Alkaline Fens, Cladium Fens, Transition Mires and Whorl Snails *Vertigo angustior*, *Vertigo geyeri* and *Vertigo moulinsiana*
- g. Bog woodland, Depressions on peat substrates of *Rhynchosporion*, Raised bog, Degraded raised bog still capable of regeneration
- h. Turlough
- i. Floating river vegetation

Further information is required for Category II aspects which would entail the following research:

- o Desktop review of the geographical locations for each conservation aspect within the boundaries of each relevant SAC.
- o Assess its proximity to maintenance operations.
- o Judgement on its sensitivity to impact for that proximity.

The objective of this further research is to decide if the aspect is to be graded as Category I or III. Aspects deemed as Category I will require an EclA, while Category III will not require further study. It is considered that the most efficient methodology is to group all Category II conservation aspects into one review:

- j. Further analysis on 2No. species and 20No. habitats as listed in Category II, Table 5.

While the primary output from this further analysis will be to decide on Category I or III designations, for some conservation aspects, this study may be able to conclude specific mitigation measures where an impact is quite particular. For example, on further analysis, it may evolve that the Lesser Horseshoe Bat has a roosting site close to a maintained waterway and the only feasible impact would be the removal of riparian vegetation which is used as a flight corridor. The demarcation and protection of this riparian vegetation would be the only mitigation measure required. It would not be warranted to carry out an EclA on the Lesser Horseshoe Bat if the only potential mitigation measure was readily identified.

### **SPAs**

Category I of occurring bird species as listed in Table 6 require an EclA. There is one species identified:

- k. Kingfisher

Over 50% of the occurring bird species are deemed as Category II. Further to Section 10, the predominant impacts are either due to disturbance, direct impacts or a combination thereof. In the case of SACs, the proposal is to carry out studies furthering analysis on each of the Category II conservation aspects. However, in the case of SPAs it is deemed that a more productive approach would be to complete studies on the types of impacts rather than focusing on each bird species individually. Emanating from this concept, there is a need for EclAs focusing on two types of impact as denoted below:

- l. Over-wintering birds frequenting inland areas with particular focus on disturbance.
- m. Birds dependent on riparian habitats with particular focus on direct impacts.

These more non-species specific type of impact assessments would consider all Category II species as listed in Table 6 and entail the following research:

- o After the DEHLG have substantially completed the revision of SPA qualifying interests, carry out a desktop review to identify which occurring species are actual conservation aspects.

- o Delineate where plausible, the species locations within the boundaries of each relevant SPA with primary focus on the conservation aspects.
- o Assess conservation aspects seasonal proximity to maintenance operations.
- o Assess species sensitivity to the impact under study.
- o Identify mitigating measures where appropriate for Category II species with primary focus on the species designated as site conservation aspects.

In the event that these studies identify any bird species that could be significantly impacted upon by another aspect of maintenance operations, then further EclAs can be carried out to address these. Category III bird species will not require further study unless contrary knowledge arises in the future.

## 14. Framework for Consultations

Assessing the environmental impacts of drainage maintenance operations will be an evolving process and the OPW are committed to continual improvement in environmental performance. The Environment Section, OPW in consultation with the NPWS has compiled this initial screening of conservation aspects but it is recognised that categorisation and research priorities may alter in the future if new information dictates this need. Ongoing interactions with NPWS and Fisheries as part of standard maintenance operational procedures will continue to feed into the understanding required. Consultations with NGOs and the general public through the formulation of a Biodiversity Action Plan will also offer opportunities for identifying and minimising maintenance impacts. In addition, further expertise and assistance will also be contracted into the organisation through engaging the services of specialists such as ecologists or other professions as required.

It is acknowledged that the designation of European Sites is subject to change whether it is in their geographical extents, the number of qualifying conservation aspects or in the sites management objectives. The OPW have procedures in place with the NPWS to ensure that they are notified of changes in site boundaries and this spatial data is used to update digital drainage maps. Also, it is expected that with the role out of a multi-annual series of EclAs, there will be widespread consultations between the NPWS and the OPW into the future. Any changes to either a site's management objectives or qualifying conservation aspects will be addressed as part of these discussions.

In addition to the consultative framework as outlined above, the OPW can be contacted at any stage by environmental stakeholders or other interested parties. Consultations in respect of this report or any other relevant environmental issues are welcomed. Contact details are as follows:

Environment Section	Tel.	(093) 35456
Engineering Services	Tel.	01 6476000
Office Public Works	Fax.	01 6610747
51 St.Stephen's Green	Website	www.opw.ie
Dublin 2	Email	info@opw.ie

Depending on the scale of revisions in European Sites in the future and on the degree of change in the understanding of maintenance impacts, the need may arise to update this Screening Report. A sensible time scale after which it will be necessary to consider updating this report would be five years time. By then, the series of recommended EclAs will be near completion and greater understanding should have been gained from other parallel studies.



## 15. Parallel Studies

It is foreseen that a range of other environmental studies and appraisals will also be carried out by the OPW in parallel to the proposed series of EclAs. These arise from a number of legislative and national policies as follows:

- National Biodiversity Plan (NBP)
- National Heritage Plan (NHP)
- Water Framework Directive (WFD)

The OPW is a member of the Interdepartmental Steering Group for Implementation of the NBP and will be fulfilling its obligations under the NBP, which calls for the compilation of a Biodiversity Action Plan and the production of Wildlife & Drainage Guidance Notes. In addition, the NBP and NHP call for an assessment of implications from drainage works on Biodiversity and Heritage, respectively. It is foreseen that the Drainage Maintenance Service will be commencing to compile relevant information for these appraisals through outputs from the ongoing research studies conducted in partnership with the Central Fisheries Board, findings from the proposed series of EclAs and expertise introduced through continuously expanding consultation with NPWS and NGOs.

The OPW is continuing to aid in the implementation of the EU Water Framework Directive through participation with the various River Basin District Management Groups. Over the coming years, as the WFD requirements are rolled out, the Drainage Maintenance Service will be delivering on its role in aiding to achieve “good status” for relevant inland and estuarine waters. The national Article 5 Characterisation Report published in March 2005 has identified that further research is required within Ireland to more fully understand the effects of drainage maintenance on Good Ecological Status. This appraisal is being project managed by the EPA and DEHLG and is to be executed within the current Research and Monitoring phase of the WFD timetable i.e. before end 2007.

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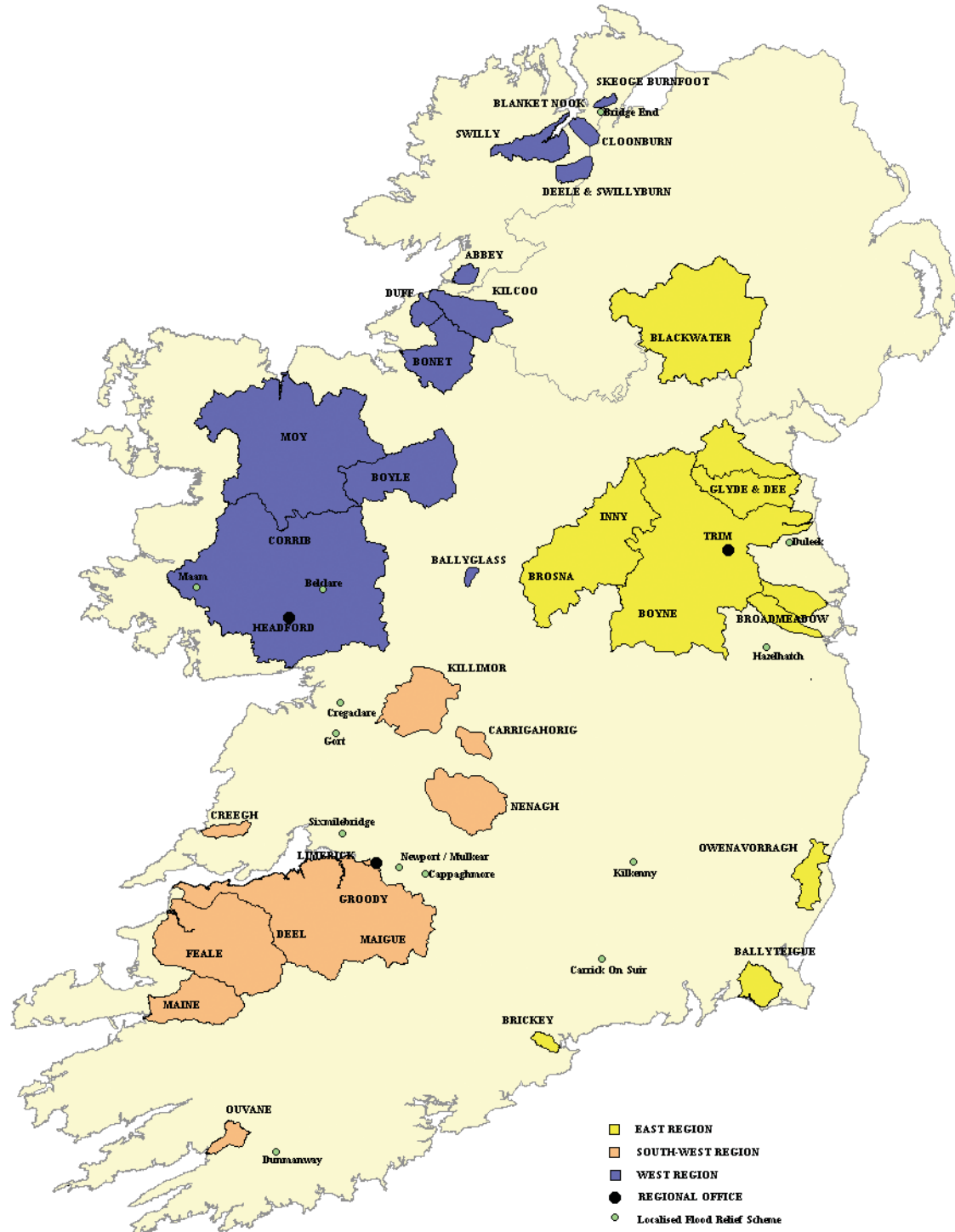
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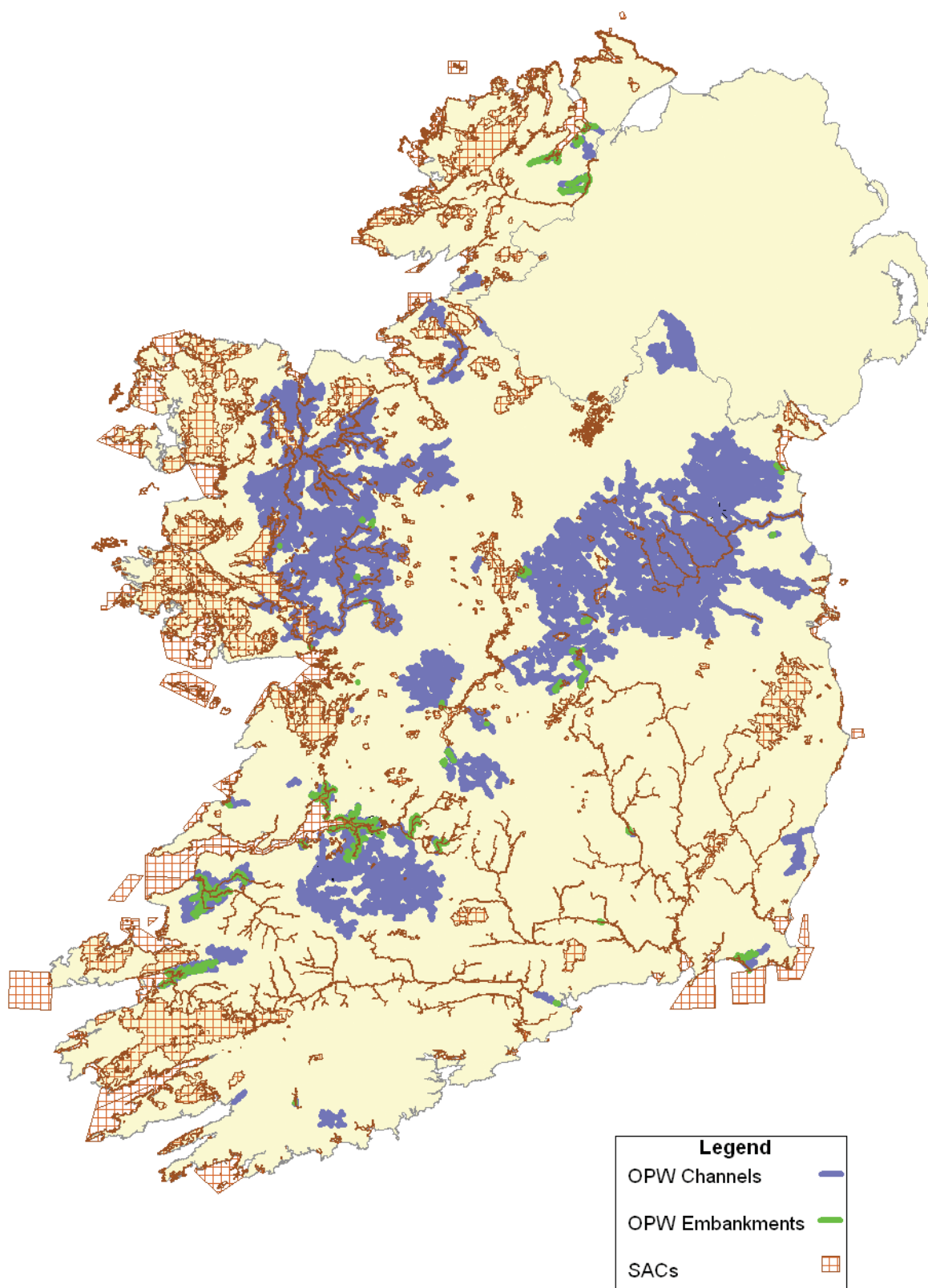
# *Catchments Maintained by OPW*



*Map No. 1*

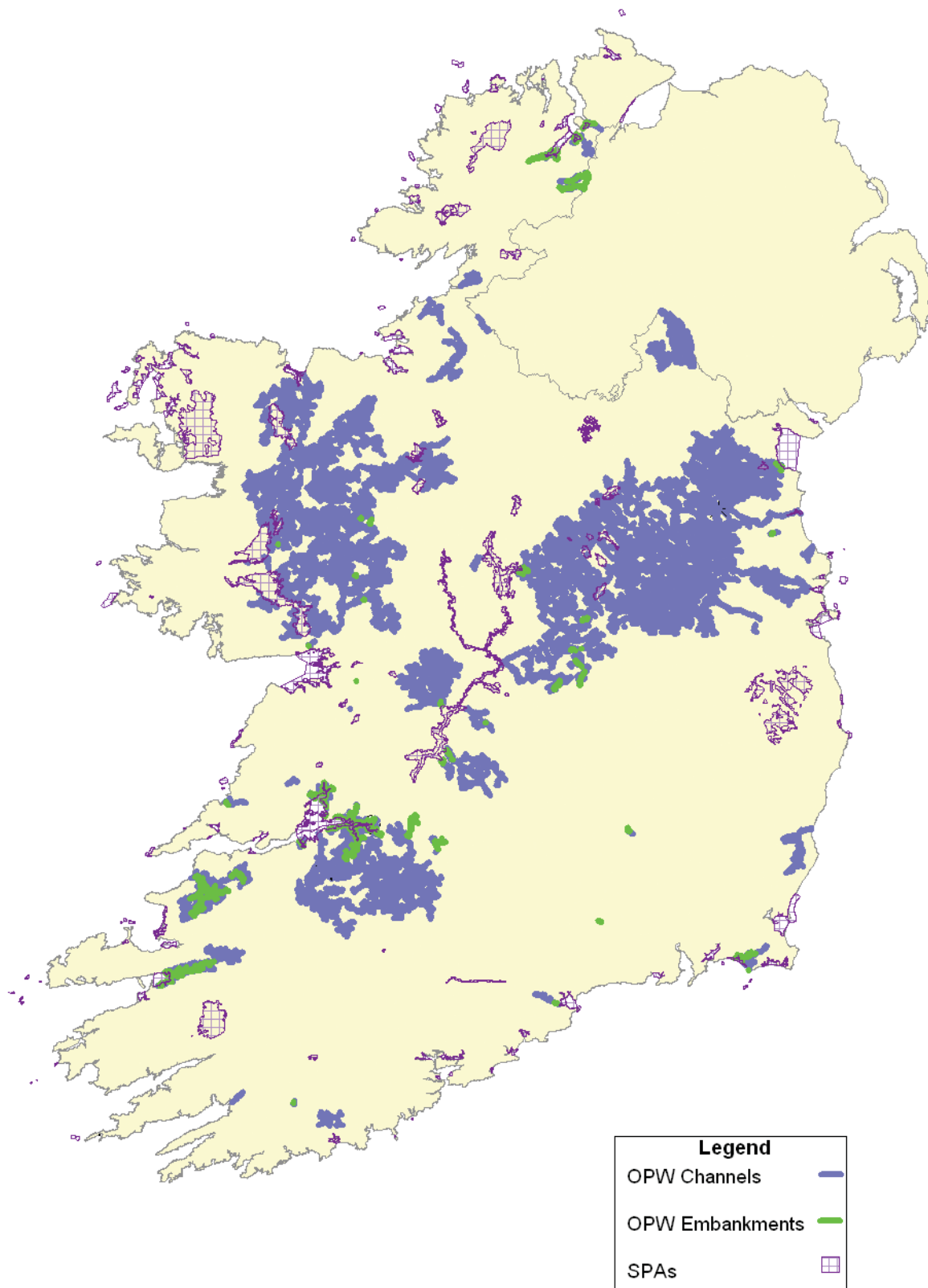


**SACs Nationwide &  
OPW Channels / Embankments**



**Map No.2**

**SPAs Nationwide &  
OPW Channels / Embankments**



**Map No.3**

Table 1 - SACs overlapping Arterial Drainage Schemes

Site Code	Site Name	Arterial Drainage Scheme	No. of Channels in SAC
0006	Killyconny Bog	Boyne	3
0174	Curraghchase Woods	Maigue	2
0205	Malahide Estuary	Broadmeadow & Ward	1
0216	River Shannon Callows	Brosna	1
0231	Barroughter Bog	Killimore Carrigahorig	3
0295	Levally Lough	Corrib Clare	1
0296	Lisnageeragh Bog & Ballinastack Turlough	Corrib Clare	1
0297	Lough Corrib	Corrib Clare, Corrib Headford	209
0301	Lough Lurgen Bog/ Glenamaddy Turlough	Corrib Clare	6
0343	Castlemaine Harbour	Maine	23
0428	Lough Melvin	Kilcoo	1
0439	Tory Hill	Maigue	4
0440	Lough Ree	Inny	12
0455	Dundalk Bay	Glyde & Dee	1
0458	Killala Bay/ Moy Estuary	Moy	3
0475	Carrowkeel Turlough	Corrib Mask	1
0479	Cloughmoyne	Corrib Headford	1
0525	Shrule Turlough	Corrib Headford	5
0571	Charleville Wood	Brosna	6
0572	Clara Bog	Brosna	1
0582	Raheenmore Bog	Boyne	2
0595	Callow Bog	Boyle	7
0604	Derrinea Bog	Boyle	1
0614	Cloonshanville Bog	Boyle	3
0625	Bunduff Lough & Machnair/ Trawalua & Mullaghmore	Duff	1
0647	Kilcarren- Firville Bog	Carrigahorig	2
0679	Garriskil Bog	Inny	5
0685	Lough Ennell	Brosna	11
0688	Lough Owel	Brosna	1
0696	Ballyteigue Burrow	Ballyteigue-Kilmore	7
0859	Clonaslee Eskers & Derry Bog	Brosna	5
1312	Ross Lake & Woods	Corrib Clare	1
1398	Ryewater Valley	Ryewater	1
1430	Glen Bog	Maigue	2
1571	Urlaur Lakes	Boyle	1
1774	Lough Carra/ Mask Complex	Corrib Mask	38
1810	White Lough, Ben Loughs & Lough Doo	Boyne	1
1831	Split Hills & Long Hill Eske	Brosna	2
1957	Boyne Coast & Estuary	Boyne	1
1976	Lough Gill	Bonet	24
2120	Lough Bane & Lough Glass	Boyne	1
2121	Lough Lene	Boyne	3
2137	Lower River Suir	Carrick-on-Suir Flood Relief	1
2162	River Barrow & River Nore	Killkenny Flood Relief	1

Table 1 cont'd

Site Code	Site Name	Arterial Drainage Scheme	No. of Channels in SAC
2164	Lough Golagh & Breesy Hill	Abbey	1
2165	Lower River Shannon	Ballynacclough, Bunratty-Rineanna, Bushy Island- Ballymartin, Coonagh Embankment, Deel, Feale, Fergus, Foynes, Groody, Maigue Outfall, Mullkear-Ballymackeough, Newtown-Tervoe, Owenagarney, Ringmoylan Mellon	203
2171	Bandon River	Dunmanway	6
2179	Towerhill House	Corrib Mask	3
2241	Lough Derg, North East Shore	Killimore Carrigahorig, Killimor Cappagh	6
2250	Carrowmore Dunes	Creegh	1
2279	Askeaton Fen Complex	Maigue	2
2287	Lough Swilly	Blanket Nook, Skeoge Burnfoot, Swilly Embankments	22
2298	River Moy	Moy	200
2299	Rivers Boyne & Blackwater	Boyne	174
2301	River Finn	Deele & Swillyburn	4
2313	Ballymore Fen	Inny	1
2340	Moneybeg & Clareisland Bogs	Inny	5
2342	Mount Hevey Bog	Boyne	8
2351	Moanveanlagh Bog	Feale	1
2352	Monivea Bog	Corrib Clare	1
2354	Tullaghanrock Bog	Boyle	3



Table 2 - Relevant SACs with associated Conservation Aspects (Total = No. of occurrence)

[illegible]

685	688	696	859	1312	1398	1430	1571	1774	1810	1831	1957	1976	2120	2121	2137	2162	2164	2165	2171	2179	2241	2250	2279	2287	2298	2299	2301	2313	2340	2342	2351	2352	2354	Total		
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Table 3 - SPAs overlapping Arterial Drainage Schemes

Site Code	Site Name	Arterial Drainage Scheme	No. of Channels in SPA
4020	Ballyteigue Burrow	Ballyteigue-Kilmore	3
4026	Dundalk Bay	Glyde & Dee	1
4036	Killala Bay/Moy Estuary	Moy	1
4042	Lough Corrib	Corrib Clare, Corrib Headford	33
4043	Lough Derravaragh	Inny	4
4044	Lough Ennell	Brosna	8
4045	Glen Lough	Inny	1
4046	Lough Iron	inny	7
4048	Lough Gara	Boyle	15
4051	Lough Carra	Corrib Mask	4
4053	Lough Conn	Moy	7
4054	Lough Cullin	Moy	2
4058	Lough Derg	Clareen, Killimore-Carrigahorig, Nenagh, Killimor-Cappagh	5
4062	Lough Mask	Corrib Mask	4
4064	Lough Ree	Inny	4
4075	Lough Swilly	Blanket Nook, Swilly Embankments	19
4077	River Shannon & River Fergus Estuaries	Ballynacclough, Bunratty-Rineanna, Coonagh Embankment, Deel, Fergus, Foynes, Maigne Outfall, Newtown-Tervoe, Owengarney	29
4080	Boyne Estuary	Boyne	1
4091	Stabannan-Braganstown	Glyde & Dee	7
4096	Middle Shannon Callows	Brosna	1
4102	Garriskill Bog	Inny	5
4140	Inch Lough	Skeoge-Burnfoot	4

Table 4 - Relevant SPAs with associated Occurring Species (Total = No. of occurrence)

Species	Site No.	4020	4026	4036	4042	4043	4044	4045	4046	4048	4051	4053	4054	4058	4062	4064	4075	4077	4080	4091	4096	4102	4140	Total
<b>Annex 1</b>																								
Arctic Tern																								2
Barnacle Goose																								3
Bar-tailed Godwit																								7
Berwick's Swan																								11
Black-throated Diver																								1
Chough																								1
Common Tern																								10
Corncrake																								1
Golden Plover																								20
Great Northern Diver																								5
Greenland White-Fronted Goose																								19
Hen Harrier																								6
Kingfisher																								8
Little Egret																								2
Little Tern																								2
Merlin																								4
Peregrine																								6
Red-throated Diver																								4
Ruff																								9
Sandwich Tern																								4
Slavonian Grebe																								2
Whooper Swan																								19
<b>Migratory</b>																								
Black-headed Gull																								5
Black-tailed Godwit																								7
Common Gull																								3
Common Scoter																								6
Coot																								12
Cormorant																								6
Curlew																								10
Dunlin																								7
Gadwall																								3
Goldeneye																								9
Great-crested Grebe																								7
Greenshank																								3
Grey Plover																								6
Greylag Goose																								5
Knot																								4
Lapwing																								12
Lesser Black-backed Gull																								2
Light-bellied Brent Goose																								6
Little Grebe																								6
Mallard																								12
Oystercatcher																								5
Pintail																								8
Pochard																								6
Red-breasted Merganser																								7
Redshank																								11
Ringed Plover																								4
Sanderling																								2
Scaup																								2
Shelduck																								5
Shoveler																								9
Snipe																								3
Teal																								11
Tufted Duck																								13
Turnstone																								5
Wigeon																								12



Table 5 - Categorisation of SAC Conservation Aspects

Conservation Aspect	Fauna or Flora (Species) Priority & Code (Habitat)	No. relevant SACs	Comment (Sensitivity to drainage maintenance)
<b>Category I (Possible significant effect)</b>			
Brook lamprey ( <i>Lampetra planeri</i> )	Fauna	7No. SACs	Instream species. Possibly susceptible to maintenance works.
River lamprey ( <i>Lampetra fluviatilis</i> )	Fauna	6No. SACs	
Sea lamprey ( <i>Petromyzon marinus</i> )	Fauna	7No. SACs	
Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> )	Fauna	5No. SACs	Instream species. Possibly susceptible to maintenance works. Pearl Mussel in Carrick On Suir Flood Relief Scheme only where minimal drainage maintenance envisaged.
Pearl mussel ( <i>Margaritifera durrovenensis</i> )	Fauna	1No. SAC	
Salmon ( <i>Salmo salar</i> )	Fauna	10No. SACs	Instream species. Possibly susceptible to drainage maintenance.
White-clawed crayfish ( <i>Austropotamobius pallipes</i> )	Fauna	8No. SACs	
Otter ( <i>Lutra lutra</i> )	Fauna	16No. SACs	River corridor species with holt and cover loss possibly susceptible to maintenance works. Composed of instream species. Possibly susceptible to maintenance works.
Floating river vegetation	Non Priority (3260)	5No. SACs	
Whorl Snail ( <i>Vertigo angustior</i> )	Fauna	3No. SACs	Combine with assessment on Fen habitats. Utilise as an indicator species for Fen condition.
Whorl Snail ( <i>Vertigo geyeri</i> )	Fauna	1No. SAC	
Whorl Snail ( <i>Vertigo moulinsiana</i> )	Fauna	3No. SACs	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Alkaline Fens	Non Priority (7230)	14No. SACs	
Cladium Fens	Priority (7210)	5No. SACs	
Transition mires	Non Priority (7140)	3No. SACs	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Bog woodland	Priority (91D0)	4No. SACs	
Degraded raised bogs still capable of regeneration	Non Priority (7120)	20No. SACs	
Depressions on peat substrates of Rhynchosporion	Non Priority (7150)	17No. SACs	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
Raised bog (active)	Priority (7110)	18No. SACs	
Turlough	Priority (3180)	5No. SACs	Possible sensitivity to maintenance works. Also consider hydrological interdependence.
<b>Category II (Further information required to assess if Category I or III)</b>			
Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )	Fauna	5No. SACs	Review proximity of roost sites adjacent to channels and riparian vegetated flight corridors. Only very localised site specific mitigating measures may be necessary. Lough Cara/Mask Complex SAC only. Review extent of site's maintenance and proximity of this species.
Shining sickle moss ( <i>Drepanocladus vermicosus</i> )	Flora	1No. SAC	
Alluvial forests	Priority (91E0)	15No. SACs	Floodplain dependent habitats. Review extent of site's maintenance and proximity of this habitat.
Molinia meadows	Non Priority (6410)	4No. SACs	
Blanket bog (active)	Priority (7130)	2No. SACs	Typically located in higher ground remote from drainage operations. Review extent of site's maintenance and proximity of this habitat.
Lowland hay meadows	Non Priority (6510)	1No. SAC	River Shannon Callows SAC only. Review extent of site's maintenance and proximity of this habitat.
Dry heath	Non Priority (4030)	2No. SACs	Typically located in higher ground remote from drainage operations. Review extent of site's maintenance and proximity of this habitat.
Wet heath	Non Priority (4010)	1No. SAC	
Hard water lakes	Non Priority (3140)	9No. SACs	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 longterm trends.
Lowland oligotrophic lakes	Non Priority (3110)	3No. SACs	
Natural eutrophic lakes	Non Priority (3150)	2No. SACs	
Upland Oligotrophic lakes	Non Priority (3130)	1No. SAC	

Table 5 - Continued

Atlantic salt meadows	Non Priority (1330)	10No. SACs	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.
Dune slack	Non Priority (2190)	2No. SACs	
Estuaries	Non Priority (1130)	8No. SACs	
Lagoons	Priority (1150)	3No. SACs	
Large shallow inlets and bays	Non Priority (1160)	2No. SACs	
Mediterranean salt meadows	Non Priority (1410)	8No. SACs	
Salicornia mud	Non Priority (1310)	8No. SACs	
Tidal mudflats	Non Priority (1140)	10No. SACs	
Limestone pavement	Priority (8240)	6No. SACs	
Petrifying springs	Priority (7220)	3No. SACs	
<b>Category III (Highly unlikely significant effect)</b>			
Bottle-nosed dolphin ( <i>Tursiops truncatus</i> )	Fauna	1No. SAC	Lower River Shannon SAC only. Primarily embankment maintenance works. No works in open estuary waters.
Killarney fern ( <i>Trichomanes speciosum</i> )	Flora	1No. SAC	Species typically occurs at water spray zones e.g. waterfalls. Only Kilkenny Flood Relief Scheme applicable which is an urban area with no suitable habitat.
Marsh fritillary Butterfly ( <i>Euphydryas aurinia</i> )	Fauna	2No. SACs	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> )	Flora	2No. SACs	Coastal dunes and machair based plant. Limited proximity to maintenance works.
Twaité shad ( <i>Alosa fallax</i> ) (incl. Killarney Shad)	Fauna	2No. SACs	Only Kilkenny and Carrick On Suir Flood Relief Schemes applicable, both in urban areas. None or minimal drainage maintenance envisaged.
Slender naiad ( <i>Najas flexilis</i> )	Flora	1No. SAC	Lough Corrib SAC only. Only occurs in the NorthWestern part of Lough Corrib and is not in close proximity to maintenance operations.
Decalcified dune heath	Priority (2150)	1No. SAC	None or limited maintenance required in proximity to dune systems.
Dunes with creeping willow	Non Priority (2170)	1No. SAC	
Embryonic shifting dunes	Non Priority (2110)	5No. SACs	None or limited maintenance required in proximity to dune systems.
Fixed dunes (Grey dunes)	Priority (2130)	7No. SACs	
Machair	Priority (21A0)	1No. SAC	
Marram dunes (White dunes)	Non Priority (2120)	7No. SACs	
Hydrophilous tall herb fringe communities	Non Priority (6430)	2No. SACs	Only Kilkenny and Carrick On Suir Flood Relief Schemes applicable, both in urban areas. None or minimal drainage maintenance envisaged.
Orchid-rich calcareous grasslands	Priority (6210)	9No. SACs	Channel adjacent grasslands would have a disturbed riparian corridor created by the original drainage scheme works. Maintenance holds this corridor at status quo.
Halophilous scrub	Non Priority (1420)	1No. SAC	None or limited maintenance required in these tidal areas.
Spartinion	Non Priority (1320)	6No. SACs	
Perennial vegetation of stony banks	Non Priority (1220)	4No. SACs	
Drift lines	Non Priority (1210)	3No. SACs	
Sand banks	Non Priority (1110)	1No. SAC	
Reefs	Non Priority (1170)	2No. SACs	No maintenance operations on Reef or Cliff formations.
Sea cliffs	Non Priority (1230)	1No. SAC	
Juniper scrub	Non Priority (5130)	1No. SAC	Channel adjacent scrub or woodland would have a disturbed riparian corridor created by the original drainage scheme works. Maintenance holds this corridor at status quo.
Old oak woodlands	Non Priority (91A0)	8No. SACs	
Yew woodland	Priority (91J0)	3No. SACs	

Table 6 - Categorisation of Species occurring in SPAs

Conservation Aspect	Annex I or Migratory	No. relevant SPAs	Comment (Season of residence & Sensitivity to drainage maintenance)
<b>Category I (Possible significant effect)</b>			
Kingfisher ( <i>Alcedo atthis</i> )	Annex I	8No. SPAs	Present all year. Typically inhabits river corridors. Possibly sensitivity to drainage maintenance.
<b>Category II (Further information required to assess if Category I or III)</b>			
Arctic Tern ( <i>Sterna paradisaea</i> )	Annex I	2No. SPAs	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Barnacle Goose ( <i>Branta leucopsis</i> )+A26	Annex I	3No. SPAs	Winter only. Typically inhabits coastal grass & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Berwick's Swan ( <i>Cygnus bewickii</i> )	Annex I	11No. SPAs	Winter only. Typically inhabits lakes & ponds. May have some sensitivity to maintenance works particularly disturbance.
Black-headed Gull ( <i>Larus ridibundus</i> )	Migratory	5No. SPAs	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> )	Migratory	7No. SPAs	Winter only. Typically inhabits estuaries & mudflats. Not normally in close proximity to maintenance operations.
Common Gull ( <i>Larus canus</i> )	Migratory	3No. SPAs	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> )	Annex I	10No. SPAs	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Coot ( <i>Fulica atra</i> )	Migratory	12No. SPAs	Present all year with influx in Winter. Typically inhabits lakes and marshes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Comorant ( <i>Phalacrocorax carbo</i> )	Migratory	6No. SPAs	Present all year moving inland in Winter. Typically inhabits coastal waters & summer lakes and rivers. May have some sensitivity to maintenance works particularly disturbance.
Comcrake ( <i>Crex crex</i> )	Annex I	1No. SPA	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> )	Migratory	7No. SPAs	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> )	Annex I	19No. SPAs	Winter only. Typically inhabits freshwater marshes & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Curlw ( <i>Numenius arquata</i> )	Migratory	10No. SPAs	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> )	Migratory	3No. SPAs	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> )	Migratory	9No. SPAs	Winter only. Typically inhabits coastal waters and large lakes. May have some sensitivity to maintenance works particularly disturbance.
Golden Plover ( <i>Pluvialis apricaria</i> )	Annex I	20No. SPAs	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> )	Migratory	5No. SPAs	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> )	Migratory	12No. SPAs	Present all year with influx in Winter. Typically inhabits undisturbed farmland, marshes and shoreline. May have some sensitivity to maintenance works particularly disturbance.
Little Egret ( <i>Egretta garzetta</i> )	Annex I	2No. SPAs	Regular visitor. Typically inhabits shallow open waters & marshes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Little Grebe ( <i>Tachybaptus ruficollis</i> )	Migratory	6No. SPAs	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> )	Annex I	2No. SPAs	Summer only. Typically inhabits coastal areas. May have some sensitivity to maintenance works particularly disturbance.

Table 6 - Continued

Mallard ( <i>Anas platyrhynchos</i> )	Migratory	12No. SPAs	Present all year with influx in Winter. Typically inhabits rivers and lakes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Pochar (Aythya ferina)	Migratory	6No. SPAs	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> )	Migratory	7No. SPAs	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> )+A38	Migratory	11No. SPAs	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> )	Annex 1	4No. SPAs	Summer only. Typically inhabits coastal areas & adjoining lakes. May have some sensitivity to maintenance works particularly disturbance.
Shoveler ( <i>Anas clypeata</i> )	Migratory	9No. SPAs	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.
Snipe ( <i>Gallinago gallinago</i> )	Migratory	3No. SPAs	Present all year. Typically inhabits moorland and marshes. May have some sensitivity to maintenance works particularly habitat impacts and disturbance.
Teal ( <i>Anas crecca</i> )	Migratory	11No. SPAs	Present all year with influx in Winter. Typically inhabits marshes, lakes and estuaries. May have some sensitivity to maintenance works particularly disturbance.
Tufted Duck ( <i>Aythya fuligula</i> )	Migratory	13No. SPAs	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> )	Annex 1	19No. SPAs	Winter only. Typically inhabits lakes & pastureland. May have some sensitivity to maintenance works particularly disturbance.
Wigeon ( <i>Anas penelope</i> )	Migratory	12No. SPAs	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.
<b>Category III (Highly unlikely significant effect)</b>			
Bar-tailed Godwit ( <i>Limosa lapponica</i> )	Annex 1	7No. SPAs	Winter only. Typically inhabits estuaries, mudflats and flood meadows. Not normally in close proximity to maintenance operations.
Black-throated Diver ( <i>Gavia arctica</i> )	Annex 1	1No. SPA	Rivers Shannon & Fergus Estuaries SPA only. Rare winter visitor. Typically inhabits shallow waters on estuaries & sometimes inland. Not normally in close proximity to maintenance operations.
Chough ( <i>Pyrrhocorax pyrrhocorax</i> )	Annex 1	1No. SPA	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> )	Migratory	6No. SPAs	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> )	Migratory	7No. SPAs	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> )	Annex 1	5No. SPAs	Winter only. Typically inhabits coastal waters & estuaries. Not normally in close proximity to maintenance operations.
Greenshank ( <i>Tringa nebularia</i> )	Migratory	3No. SPAs	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> )	Migratory	6No. SPAs	Winter only. Typically inhabits estuaries and mudflats. Not normally in close proximity to maintenance operations.
Hen Harrier ( <i>Circus cyaneus</i> )	Annex 1	6No. SPAs	Present all year. Typically inhabits moorland & young forest. Not normally in close proximity to maintenance operations.
Knot ( <i>Calidris canutus</i> )	Migratory	4No. SPAs	Winter only. Typically inhabits estuaries and mudflats. Not normally in close proximity to maintenance operations.
Lesser Black-backed Gull ( <i>Larus fuscus</i> )	Migratory	2No. SPAs	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> )	Migratory	6No. SPAs	Winter only. Typically inhabits coastal waters and estuaries. Not normally in close proximity to maintenance operations.
Merlin ( <i>Falco columbarius</i> )	Annex 1	4No. SPAs	Present all year. Typically inhabits moorland. Not normally in close proximity to maintenance operations.
Oystercatcher ( <i>Haematopus ostralegus</i> )	Migratory	5No. SPAs	Present all year. Typically inhabits beaches and estuaries. Not normally in close proximity to maintenance operations.

Table 6 - Continued

Peregrine ( <i>Falco peregrinus</i> )	Annex 1	6No. SPAs	Present all year. Typically inhabits cliffs areas. Hunts by patrolling. Not normally in close proximity to maintenance operations.
Pintail ( <i>Anas acuta</i> )	Migratory	8No. SPAs	Winter only. Typically inhabits estuaries and lakes. Not normally in close proximity to maintenance operations.
Red-throated Diver ( <i>Gavia stellata</i> )	Annex 1	4No. SPAs	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> )	Migratory	4No. SPAs	Present all year. Typically inhabits sandy and shingle beaches. Not normally in close proximity to maintenance operations.
Ruff ( <i>Philomachus pugnax</i> )	Annex 1	9No. SPAs	Passage migrant. Typically inhabits shallow waters inland & coastal. Not normally in close proximity to maintenance operations.
Sanderling ( <i>Calidris alba</i> )	Migratory	2No. SPAs	Winter only. Typically inhabits sandy beaches. Not normally in close proximity to maintenance operations.
Scaup ( <i>Aythya marila</i> )	Migratory	2No. SPAs	Winter only. Typically inhabits coastal waters. Not normally in close proximity to maintenance operations.
Shelduck ( <i>Tadorna tadorna</i> )	Migratory	5No. SPAs	Present all year with influx in Winter. Typically inhabits estuaries & mudflats. Not normally in close proximity to maintenance operations.
Slavonian Grebe ( <i>Podiceps auritus</i> )	Annex 1	2No. SPAs	Winter visitor. Typically inhabits coastal waters. Not normally in close proximity to maintenance operations.
Turnstone ( <i>Arenaria interpres</i> )	Migratory	5No. SPAs	Winter only. Typically inhabits coastal areas. Not normally in close proximity to maintenance operations.



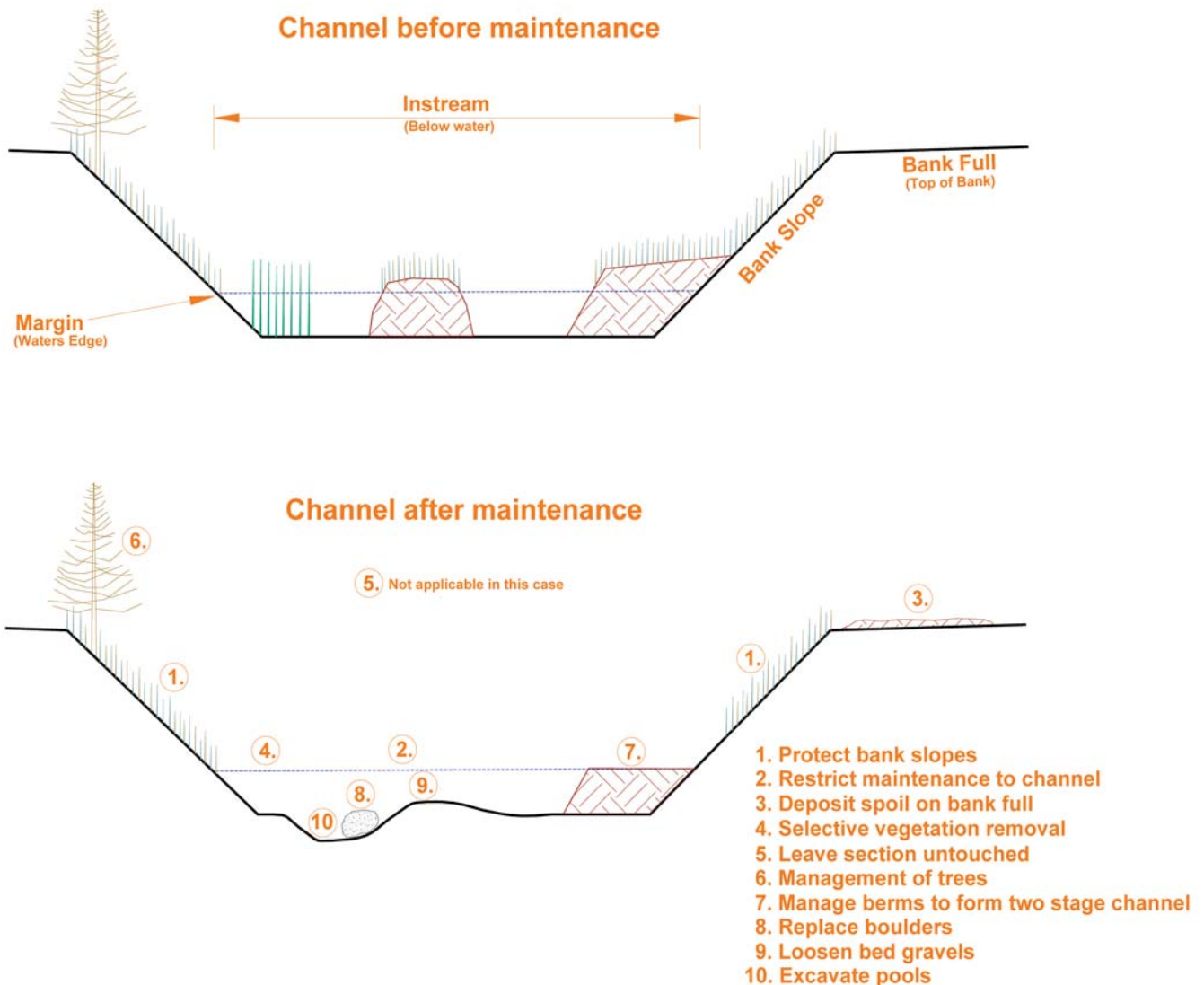


# Environmental Drainage Maintenance

## Guidance Notes

### 10 Steps to Environmentally Friendly Maintenance

Sketch with examples of EDM practices



## Steps to be carried out as standard procedure

### Protect bank slopes

- Retain vegetation on non-working bank
- Minimise scraping of bank slope on working bank

### Restrict maintenance to channel

- Remove instream material only
- Retain marginal vegetation

### Deposit spoil on bank full

- Maximise spoil deposition on bank full or spoil heaps
- Minimise spoil deposition on bank slopes

### Selective vegetation removal

- Retain Canary and other marginal grasses
- Remove Bulrush, Bur-reed and Water celery type vegetation

## Steps to be carried out in consultation with Foreman/Technician

### Leave sections untouched

- If channel capacity is not effected, then leave intact
- Only maintain if environmental works required

### Management of trees

- Leave intact if no reduction in channel capacity caused
- Remove overhanging branches to flood level
- Use saw or secateurs for removal, not excavator

### Manage berms to form two stage channel

- Remove top of berms to low flow levels
- Remove vegetation and soil from gravel berms
- Replace sod to the berm where feasible

### Replace boulders

- Reinstall boulders and gravels as removed by maintenance operations
- Reinstall boulders into channel from spoil heaps
- Boulders placed below low flow level and staggered

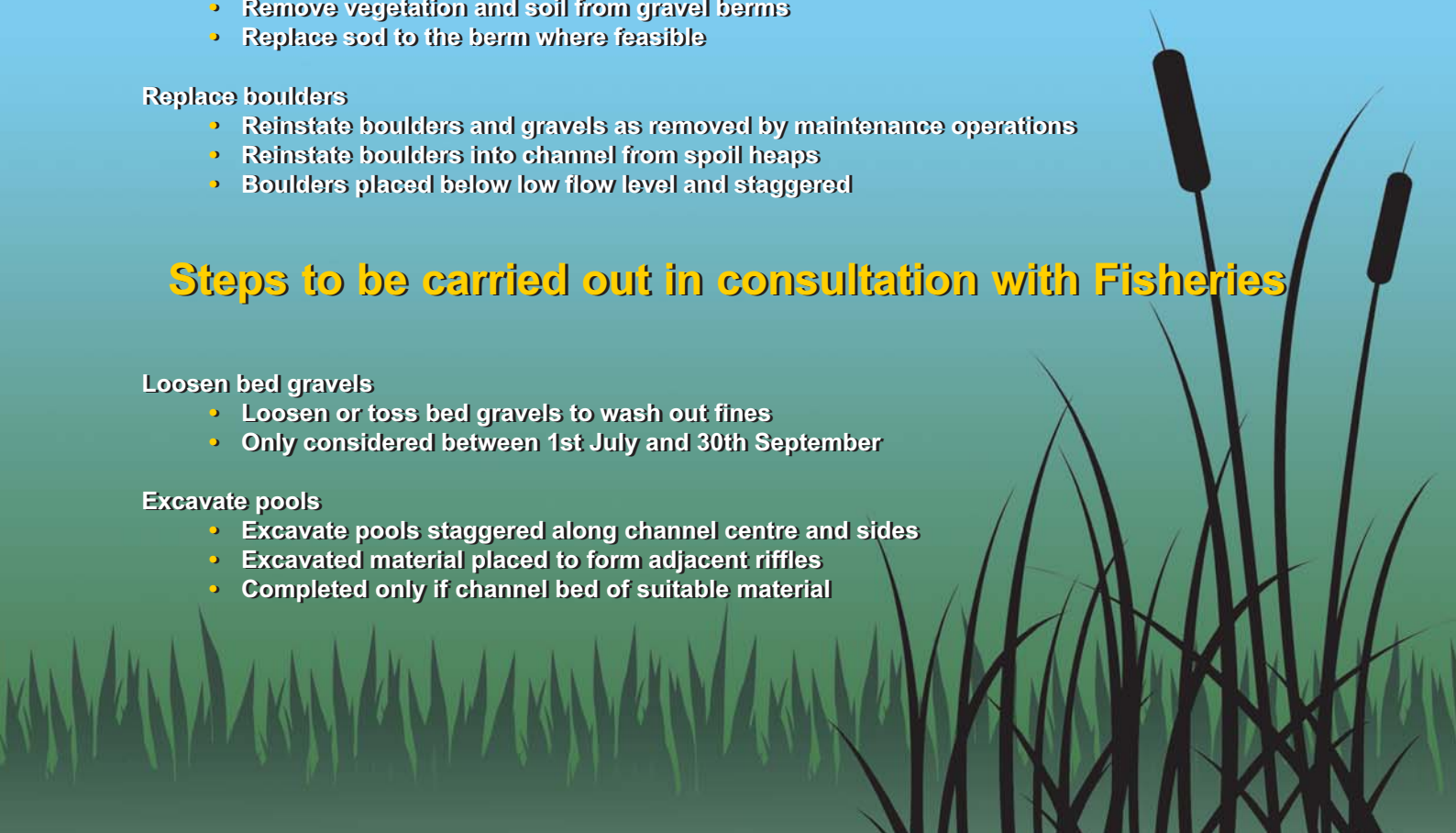
## Steps to be carried out in consultation with Fisheries

### Loosen bed gravels

- Loosen or toss bed gravels to wash out fines
- Only considered between 1st July and 30th September

### Excavate pools

- Excavate pools staggered along channel centre and sides
- Excavated material placed to form adjacent riffles
- Completed only if channel bed of suitable material





## APPENDIX 2 - Photographs of typical drainage maintenance. (Works either in progress or recently completed)



Channel maintenance. Bonet C1/3/4/3



Channel maintenance. Boyne C1/32/33



Channel maintenance. Corrib Mask CM2/2



Channel maintenance. Boyne C1/64





Channel maintenance (boulders inserted). Corrib Mask C3/47



Secateurs on Long Reach cutting out fallen tree. Moy C1/49



Channel maintenance. Corrib Clare C3/9



Weedcutting bucket. Corrib Headford CH2





Channel maintenance. Corrib Mask CM4/4/1



Channel maintenance. Inny C35/1



Channel maintenance. Inny C62/2/2



Channel maintenance. Boyle Scheme





Channel maintenance. Corrib Clare C3/51/1



Bank protection works with rock overlaid with soil. Bonet C1

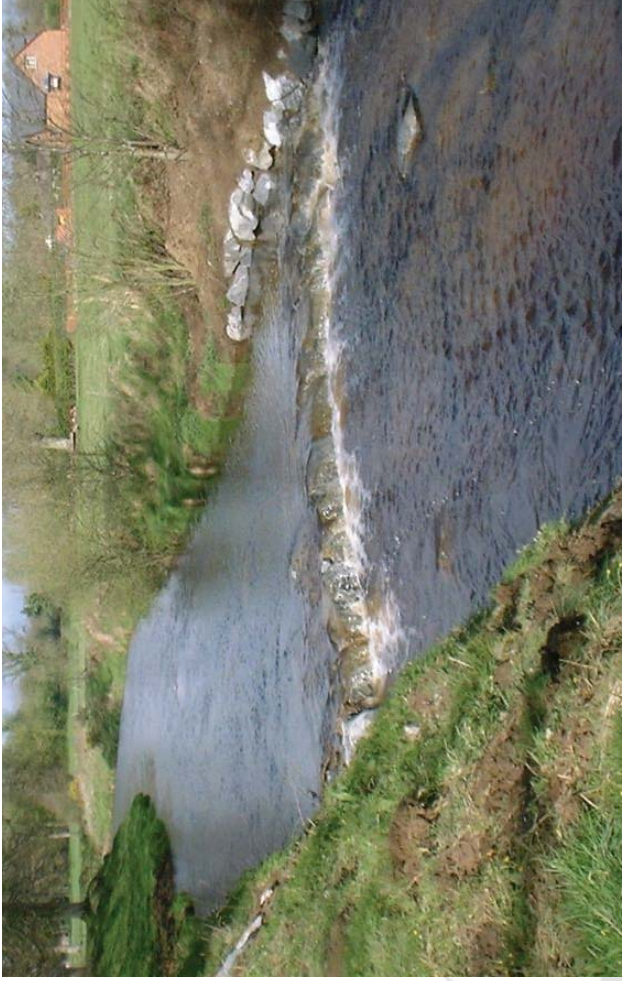


Channel maintenance. Maigue C1/31/1



Embankment strengthening works. Shannon Estuary.





Channel maintenance (stone weir inserted). Blackwater C1/1/5



Channel maintenance (gravel beds inserted). Corrib Mask CM5/15



Channel maintenance (stone weirs inserted). Corrib Headford CH 7



Research by Electrofishing. Moy C1/16

