# Strategic Regulatory Impact Assessment of Water Framework Directive Draft River Basin Management Plans

# Final Report

## October 2009

### Notice



### Document History

| JOB NUMBER: 5087370 | | | DOCUMENT REF: 5087370/60/DG/52 | | | |
|---|---|---|---|---|---|---|
| 02 | Draft (with gaps) issued for internal review only | SW, JT | | | JT | 20/09/09 |
| 03 | Draft (with gaps) issued for client review only | SW, JT | | GJ | JT | 30/09/09 |
| 06 | Draft for internal review | SW, JT | | | JT | 5/10/09 |
| 07 | Revised draft for client review | SW, JT | JT | BP | JT | 6/10/09 |
| 08 | Final Report | SW, JT | JT | BP | BP | 8/10/09 |
| Revision | Purpose Description | Originated | Checked | Reviewed | Authorised | Date |

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## Section Page

# Acronyms

| | |
|---|---|
| AFBI | Agri-Food and Biosciences Institute |
| ALCS | Aggregates Levy Credit Scheme |
| BREA | Ballinderry River Enhancement Association |
| CEA | Cost-effectiveness Analysis |
| CEDA | Central Dredging Association |
| CFW | Constructed Farm Wetland |
| CL | Conservation limits |
| CMS | Countryside Management Scheme |
| CRP | Collaborative Research Programme |
| cSAC | candidate Special Area of Conservation |
| CSO | Combined sewer overflows |
| DARD | Department of Agriculture and Rural Development |
| DCAL | Department of Culture, Arts and Leisure |
| DETI | Department for Enterprise, Trade and Investment |
| DLCP | domestic laundry cleaning products |
| DRD | Department for Regional Development |
| DWPA | Diffuse water pollution from agriculture |
| ECOPACT | Environmental Code of Practice for Aquaculture, Companies and Traders |
| EFF | European Fisheries Fund |
| EPA | Environmental Protection Agency |
| FEPA | Food and Environmental Protection Act |
| FNMS | Farm Nutrient Management Scheme |
| FPM | Freshwater Pearl Mussel |
| FTE | full-time equivalent |
| GBR | General Binding Regulations |
| GDP | Gross Domestic Product |
| GEP | Good Ecological Potential |
| GES | Good Ecological Status |
| GIS | geographical information system |
| GWDD | Groundwater Daughter Directive |
| HSO | Higher Scientific Officer |
| IAS | Invasive (non-native) Alien Species |
| ICES | International Council for the Exploration of the Sea |
| ICW | Integrated Constructed Wetland |
| NAP | Nitrates Actions Programme |
| NASCO | North Atlantic Salmon Conservation Organisation |
| NGO | non-governmental organisation |
| NI | Northern Ireland |
| NIA | Northern Ireland Assembly |
| NICMS | Northern Ireland Countryside Management Scheme |
| NIEA | Northern Ireland Environment Agency |
| NIHF | Northern Ireland Hotels Federation |
| NIRDP | Northern Ireland Rural Development Programme |
| NIW | Northern Ireland Water |
| OSNI | Ordinance Survey Northern Ireland |
| pCEA | Preliminary Cost-Effectiveness Analysis |
| PPG | Pollution Prevention Guidelines |
| RBD | River Basin District |
| RBMP | River Basin Management Plan |
| RBP | River Basin Planning |

| | |
|---|---|
| REACH | Registration, Evaluation and Authorisation of Chemicals |
| RIA | Regulatory Impact Assessment |
| ROMP | Review of Old Mineral Permissions |
| SAC | Special Area of Conservation |
| SAP | Species Action Plan |
| SEA | Strategic Environmental Assessment |
| SEPA | Scottish Environment Protection Agency |
| SME | small and medium-sized enterprise |
| SNIFFER | Scotland and Northern Ireland Forum for Environmental Research |
| SO | Scientific Officer |
| sRIA | strategic Regulatory Impact Assessment |
| SSAFO | Silage, slurry, and agricultural fuel oil |
| SUDS | Sustainable drainage systems |
| UKTAG | UK Technical Advisory Group |
| WFD | Water Framework Directive |
| WTP | Willingness to pay |
| WWTW | Waste water treatment works |

# Executive Summary

## Introduction

This strategic Regulatory Impact Assessment (sRIA) concerns the additional measures identified as part of the Water Framework Directive (WFD) River Basin Management Plans (RBMPs) for Northern Ireland.

The primary focus of the WFD is to achieve 'good' status (i.e. good ecological status and chemical status for surface waters and good status for groundwaters) by 2015. To achieve this water quality management should be based on river basins, with management of these basins to be achieved through management plans, a plan being created for each River Basin District (RBD).

The draft plans set out objectives for improvements to the water environment for the next three river basin planning cycles to 2015, 2021 and 2027 with a programme of measures to deliver these objectives. The programme of measures is made up of existing measures and further additional (also referred to as 'supplementary' measures within the Directive). It is these additional measures and their application to Northern Ireland which are the subject of this sRIA.

## The costs and benefits of the proposed measures

Benefits from implementation of the WFD will fall to the whole of society within Northern Ireland. They include the obvious improvements to the quality of the water environment but also recreational opportunities, increased aesthetic value, biodiversity benefits, recreational and tourism benefits, and benefits related to human health. There may also be benefits associated with the ecosystem services provided by the water environment, such as reduced flood risk and mitigation for climate change.

Costs of implementation will fall to those regulating and implementing the measures through administrative costs, and to certain sectors of society by way of compliance with regulatory measures. All costs are estimates and are not currently funded (unless otherwise stated), and therefore will be subject to the normal Government budgetary processes.

Table i provides a summary of the forty measures, along with their estimated costs (administrative and compliance) and benefits identified as part this assessment. There are four types of additional measures, each with a different colour shading in Table i; enabling, voluntary, regulatory, and working with the charitable sector. The majority of the forty measures proposed are classified as 'enabling' measures, in that they are proposals for further research or investigations which will improve existing knowledge. In themselves, the measures will not impose constraints or costs on their sectors (e.g. agriculture, business, the water industry). The cost-effectiveness analysis (CEA), used as the basis of many of the costs and benefits identified within this report, notes that these types of measures are inherently cost-effective. However, they are likely to be followed by further, regulatory measures to improve the water environment which will have further compliance costs and wider benefits. Where possible, a likely indication of these further costs or benefits has been provided.

Based on existing knowledge of the measures, the assessment identifies:

Estimated **administrative costs** total £12.2 million.

Strategic **benefits and compliance costs** where they could be determined and monetarised include:

Measure to ban phosphates in laundry detergents will provide £14.1 million benefits plus £6.9 million to Northern Ireland Water in treatment cost savings.

Benefit from all other measures to reduce eutrophication of £2-4 million.

£100,000 possible benefits through works completed by Rivers Trusts (assuming further trusts are established within Northern Ireland and complete similar works to those already in existence).

Provision of wastewater sewerage from currently unsewered properties at £2 million to complete (one-off).

Development of an Alien Species Strategy could lead to works costing 3-5 million.

In addition, the assessment indicates where significant costs and benefits may fall, depending upon the outcome and subsequent actions of other measures. These are likely to fall to the:

Agricultural sector – significant costs and benefits possible through off-farm waste measures

Fisheries sector – significant benefits to the Northern Ireland economy and at a local, river basin district level

Protected areas – significant benefits depending upon actions determined and carried out within the Species Action Plan for fresh water pearl mussels

Tourism/Recreation – significant benefits are likely to follow the planned improvements in the quality of the water environment

Numerous sectors (including households, agriculture, business and water industry) – the promotion of efficient water use could provide significant benefits through reduced abstraction and reduced costs to households, and businesses if these benefits are passed on.

Table i: Summary of costs and benefits of proposed additional measures

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (unfunded) (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| Water supply, hydropower and flood control | Abstraction and flow regulation | 1 | Monitor actual abstraction and compensation flows | enabling | 50 | | |
| | | 2 | Develop biological tools to assess the ecological impacts of changes in hydrology | enabling | 211.2 | | |
| | | 3 | Further develop Northern Ireland's Monitoring Programme to cover four biological elements and fish to directly monitor impacts and to incorporate the newly developed biological monitoring tools (Measure 2) | enabling | 638.4 | | |
| | | 4 | Research to further develop our understanding of the relationship between groundwater and surface waters | enabling | 58 | | |
| | | 5 | More detailed assessment of water resource availability and management priorities | enabling | 162 | | |
| | | 6 | Developing a tool to assess the extent to which barriers impede migration of a wide range of fish species | enabling | 100 | | |

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| Agriculture | Point and Diffuse pollution | 7 | To promote best management practices including using feedstuffs designed to minimise phosphorus in excreta without compromising animal health (advisory resource to promote best practice in farm yard management and nutrient management. With research funding into poultry diets.) | voluntary | 2,120 | None | Potentially significant at the RBD level |
| | | 8 | Work with the intensive pig and poultry farming sectors for an off-farm solution to dealing with manures and thereby reduce phosphorus surplus (technical and policy work relating to development of alternative technologies) | enabling | 28 | Likely to be significant if subsequent measures can be identified | Likely to be significant if subsequent measures can be identified |
| | | 9 | Review the need to give statutory effect to phosphorous balances on individual farm holdings | enabling | No further funding required | | |
| | | **10** | Develop GIS-based tool to further identify and regulate diffuse pollution (from agriculture) (same measure as 26 and 21) | enabling | 321.2 (to also cover measures 21, and 26) | | |
| | | 11 | Develop catchment management plans to identify and target diffuse pollution from agriculture. | enabling | 726.60 | | Benefit from reduced eutrophication of £2,000 – 4,000 from all measures to address pressure. |

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| | | 40 | Effectiveness of wetlands in the reduction of nutrient loadings | enabling | - | | 1.1 |
| Collection and treatment of sewage | Point and Diffuse pollution | 12 | Review of wastewater consents | enabling | 197.70 | | |
| | | 13 | Provision of wastewater sewerage from currently unsewered properties | regulatory | - | 2,000 (one-off) | Potentially significant |
| | | 14 | Improved policy, guidance and development control for septic tanks | enabling | 25 | | |
| | | 15 | Research mapping and investigation of further controls for large unsewered populations. | enabling | - | | |
| | | 16 | Phosphate-free laundry detergents | regulatory | No further funding required | None | 14,100 plus 6,910.38 to NIW |
| | | 17 | Development control in relation to sewage treatment capacity and receiving water bodies | regulatory | 121.2 | - | - |
| | | 38 | Installation of reed beds and constructed wetlands for sewage treatment | voluntary | - | Per application and installation | Localised |
| | | 39 | Awareness programme on septic tank maintenance, installation and design | enabling | - | | |

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| Urban development | Point and Diffuse pollution | 18 | Draft Strategy to manage stormwater using SUDS | regulatory | - | - | - |
| | | 19 | Strategy for better management of misconnections | enabling | 202.80 | | |
| | | **20** | Development of an extended regulatory toolkit for diffuse pollution (same measure as 24) | enabling | Same work as Measure 24. Not yet assessed. | | |
| | | **21** | Update diffuse pollution screening and modelling tool (same measure as 26 and 10) | enabling | Under same budget as Measures No. 10 and 26. | | |
| | | 22 | Good practice for the storage and handling of hazardous chemicals | regulatory | - | - | - |
| Forestry | Point and Diffuse pollution | 23 | Reduce nutrient loading from forestry in sensitive areas | regulatory | 202.8 | Costs to agricultural and forestry sectors likely | Likely to be significant depending upon measures identified |
| Industry and other businesses | Point and Diffuse pollution | **24** | Development of an extended regulatory toolkit for diffuse pollution (same measure as 20) | enabling | Same as 20. Not yet assessed. | | |
| | | 25 | Review of consents for point discharge controls | enabling | - | | |

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| | | **26** | Update diffuse pollution screening and modelling tool (same measure as 21 and 10) | enabling | Under the same budget as Measures No. 10 and 21. | | |
| Historical engineering, Urban development, Public water supply, Hydropower, Agriculture and Forestry | Freshwater morphology | 27 | Review of controls on hydromorphology | enabling | met within existing resources | | |
| | | 28 | River restoration measures review | regulatory | 2,927.50 | | |
| | | 29 | Strategic appraisal of barriers to fish (Ongoing measure, already funded) | enabling | Funded within existing resources | Measure outside scope sRIA | Measure outside scope sRIA |
| Ports and Harbours, Aggregate & Fishing/Aquaculture industry (Marine) | Marine morphology | 30 | Development of a Protocol for Maintenance Dredging | regulatory | - | Insignificant | - |
| All sectors | Invasive alien species | 31 | Invasive Species Ireland Project | enabling | | | |

| Sector | Pressure | Measure number | Measure description | Type of Measure | Total estimated Administrative cost (£k) 2010-2013 | Compliance cost (PV) (15 years at 3.5%) (£k) | Benefits (PV) (15 years at 3.5%) (£k) |
|---|---|---|---|---|---|---|---|
| | | 32 | Development of Alien Species strategy | enabling | 595.50 | 3,000-15,000 | Significant avoidance of further costs possible |
| Fisheries | All pressures | 33 | Implementation of Eel Management Plans | regulatory | 1,750 (to 2015) | | Significant benefits for NI economy and at a local level |
| | | 34 | Mitigation to impacts of drainage maintenance works on habitat | regulatory | 1,050 | None | |
| Protected areas | All pressures | 35 | Development of action plans for designated freshwater pearl mussel SACs | regulatory | 392.4 (if Interreg funding not won) | Dependent upon results of action plan | Dependent upon results of action plan |
| Public participation | All pressures | 36 | Facilitate establishment of River Trusts across NI | Working with charitable sector | 180.0 | None | 100 |
| | | 37 | Promotion of efficient use of water | voluntary | 136.2 | | Depending on measures taken – could be significant |

Notes to table:

'-' denotes it is too early to confirm a value

Measures 10, 21 and 26 are the same measure; as are measures 20 and 24.

# 1. Structure of the document

1.1 Sections 1-11 provide a background and introduction to the assessment including methodology and scope.

1.2 Section 12 onwards provides an assessment of the measures according to the sector in which they fall. The pressure is described, followed by an indication of basic measures in place, the additional measures proposed, and their respective costs, risks, and benefits.

Section 12: Water Supply, Hydropower and Flood Control (Water Resources)

Section 13: Agriculture (Diffuse and Point Source Pollution)

Section 14: Collection and Treatment of Sewage (Diffuse and Point Source Pollution)

Section 15: Urban Development (Diffuse and Point Source Pollution)

Section 16: Forestry (Diffuse and Point Source Pollution)

Section 17: Industry and Other Business (Diffuse and Point Source Pollution)

Section 18: Historical Engineering, Urban Development, Public Water Supply, Hydropower, Agriculture and Forestry (Freshwater Morphology)

Section 19: Ports and harbours, Aggregate and Fishing/Aquaculture Industry (Marine Morphology)

Section 20: All sectors (Invasive Alien Species)

Section 21: Fisheries (All pressures)

Section 22: Protected Areas (All pressures)

Section 23: Public Participation (All pressures)

1.3 Section 24 is the Competition Test; and Section 25 is the Small Firms Impact Test

# 2. Background

2.1 The Water Framework Directive (WFD) requires Government to assess the water environment in a holistic manner and consider impacts that go beyond water pollution and look at the impacts of water abstraction and impoundment, physical modifications due to engineering activities, and invasive alien (non-native) species. It also requires that the existing measures and new measures being taken to deal with these impacts are both integrated and coordinated across river basins.

2.2 The primary focus of the Directive is to achieve 'good' status (i.e. good ecological status and chemical status for surface waters and good status for groundwaters) by 2015. To achieve this water quality management should be based on river basins, with management of these basins to be achieved through management plans, a plan being created for each River Basin District (RBD).

2.3 The river basin planning approach introduces a six yearly cycle of planning, action and review. Every six years a river basin management plan will be produced for each river basin district. In common with the rest of Europe the first plans are being developed for the period from 2009 to 2015.

2.4 WFD was established in law in Northern Ireland (NI) on 22 December 2003 through the Water Environment (WFD) Regulations (Northern Ireland) 2003 (SR 2003 No. 544). These regulations identified the Department of the Environment as the competent authority for each river basin district within Northern Ireland. The Department of the Environment is required to coordinate the implementation of the Directive. The Northern Ireland Environment Agency, an agency within the Department, is the lead body on the technical work required for implementation of the WFD.

Delivery of the WFD rests with the Department of the Environment, in partnership with the Department of Agriculture and Rural Development (DARD), the Department of Culture, Arts and Leisure (DCAL) and the Department for Regional Development (DRD).

# 3. River Basin Management Planning

3.1 Within Northern Ireland, draft River Basin Management Plans (RBMPs) and supporting documents were produced in December 2008 for the North Eastern River Basin District and the two International RBDs, the Neagh Bann and the North Western IRBDs[1]. A draft plan was also produced for the Shannon International River Basin District (IRBD). Only a small portion of this district lies within Northern Ireland, therefore the drafting of this plan was led by the authorities in Ireland. All four RBDs are shown in Figure 3.1.

3.2 Each finalised RBMP contains information relating to the pressures and impacts on the water environment ("Characterisation Reports"). These give some indication of whether such effects are likely to inhibit the accomplishment of good status. The plans set out a programme of measures to show improvements that can be made to meet those objectives. The “Programme of Measures” consists of policies and strategies, such as monitoring programmes, that are intended to reduce the risk to water bodies and allow them to attain good status. Existing measures (referred to as “Basic Measures” within the Directive), will achieve significant improvements to the water environment. However, additional measures (also referred to as “Supplementary Measures” within the Directive), will be needed to achieved further improvements by 2015.

3.3 It is these proposed additional or supplementary measures which are the subject of this assessment. By completing a strategic Regulatory Impact Assessment (sRIA) of the measures it will assist in identifying the potential costs, impacts and the benefits they might bring. To this end, the sRIA will help the Government of Northern Ireland effectively plan and manage their implementation within the first and future river basin management planning cycles.

[1] (http://www.ni-environment.gov.uk/water/wfd.htm)

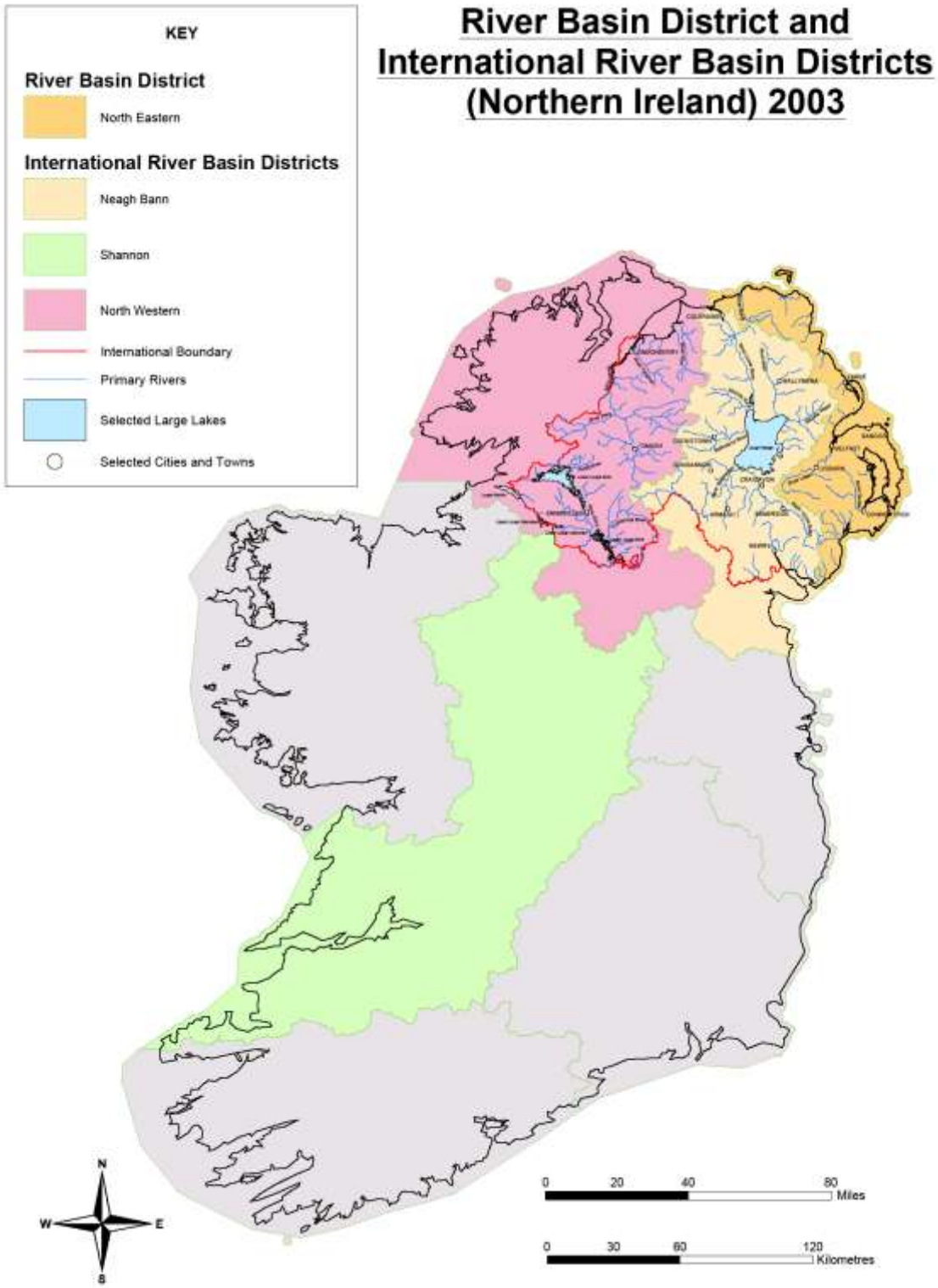


**Figure 3.1: National and International River Basin Districts for Northern Ireland**

Figure based on OSNI Mapping - Crown Copyright 2004 Permit No. 30376 based on river basin district datasets as prepared by the then Environment and Heritage Service (now NIEA) and the Environmental Protection Agency (EPA) prepared for the purposes of the Water Framework Directive.

# 4. What is the problem under consideration?

4.1 The initial 2005 WFD characterisation assessment indicated that overall around 90% of water bodies in Northern Ireland were at risk of not meeting the Directive's environmental objectives, including 538 rivers, 23 lakes, 7 transitional, 19 coastal and 15 groundwater bodies[2]. These figures were based on an assessment of risk. Further monitoring and assessment undertaken by NIEA indicates that currently 71% of all waterbodies are not meeting WFD objectives, as detailed in Table 5.1 (2009).

4.2 Without Government intervention, and the identification of additional measures, there is a significant risk that water environment improvements required by the WFD will not be realised.

4.3 The main pressures and issues for those waters in Northern Ireland not achieving good status or better are as listed below, and provide a structure for assessing the impact of the proposed measures:

- Abstraction and flow regulation;
- Diffuse pollution from rural and urban land, including nutrient enrichment;
- Point source pollution from sewage and industry;
- Changes to morphology (physical habitat); and
- Invasive alien (non-native) species.

# 5. Purpose of intended effect of Measures

5.1 Under the WFD, a programme of measures will be implemented following publication of the final RBMPs with the aim of achieving Good Ecological Status (GES) or Good Ecological Potential (GEP) by 2015. However, it will not be possible to achieve GES or GEP in all water bodies by 2015. In some cases the measures required to achieve that deadline would be technically infeasible or disproportionately expensive. In these cases the Directive allows the timetable to be extended by up to 12 years (two subsequent RBP cycles) by the setting of alternative objectives (extended deadlines). The deadline can be extended to 2027 if it is disproportionately expensive or technically infeasible to achieve Good Status by 2015. If it is still not possible to achieve Good Status by 2027 then it may be possible to set a Less Stringent Objective.

5.2 Table 5.1 shows the current situation and agreed approach for Northern Ireland to reach GES or GEP for all waterbodies through the next three cycles.

[2] Article 5 Report for Northern Ireland (2005) (different to above)

Table 5.1: Northern Ireland WFD compliance 2009

| | | | | | |
|---|---|---|---|---|---|
| | **Number or % of water bodies** | **2009** | **2015** | **2021** | **2027** |
| **Rivers** | **Good/GEP or better** | 116 | 325 | 535 | 563 |
| | **%** | **20.2%** | **56.5%** | **93.0%** | **97.9%** |
| | **Less than Good/GEP** | 459 | 250 | 40 | 12 |
| | **%** | **79.8%** | **43.5%** | **7.0%** | **2.1%** |
| **Lakes** | **Good/GEP or better** | 6 | 7 | 14 | 22 |
| | **%** | **27.3%** | **31.8%** | **63.6%** | **100.0%** |
| | **Less than Good/GEP** | 16 | 15 | 8 | 0 |
| | **%** | **72.7%** | **68.2%** | **36.4%** | **0.0%** |
| **Coastal** | **Good/GEP or better** | 8 | 12 | 20 | 20 |
| | **%** | **40.0%** | **60.0%** | **100.0%** | **100.0%** |
| | **Less than Good/GEP** | 12 | 8 | 0 | 0 |
| | **%** | **60.0%** | **40.0%** | **0.0%** | **0.0%** |
| **Transitional** | **Good/GEP or better** | 0 | 1 | 4 | 7 |
| | **%** | **0.0%** | **14.3%** | **57.1%** | **100.0%** |
| | **Less than Good/GEP** | 7 | 6 | 3 | 0 |
| | **%** | **100.0%** | **85.7%** | **42.9%** | **0.0%** |
| **Groundwater** | **Good or better** | 65 | 65 | 66 | 67 |
| | **%** | **97.0%** | **97.0%** | **98.5%** | **100.0%** |
| | **Less than Good** | 2 | 2 | 1 | 0 |
| | **%** | **3.0%** | **3.0%** | **1.5%** | **0.0%** |
| **All Water bodies** | **Good/GEP or better** | 195 | 440 | 635 | 679 |
| | **%** | **28.2%** | **63.7%** | **91.9%** | **98.3%** |
| | **Less than Good/GEP** | 496 | 251 | 56 | 12 |
| | **%** | **71.8%** | **36.3%** | **8.1%** | **1.7%** |

# 6. Strategic RIA

6.1 It should be noted that clear guidance is not available on the completion of a 'Strategic' RIA (sRIA). Accordingly, we have interpreted the requirements as such:

- Costs and benefits are assessed at a high level, that is, across the country of Northern Ireland as a whole;
- Impacts are considered as they apply to Northern Ireland: its regulatory framework, natural environment, citizens and economy;
- Information from all three RBMPs and accompanying Strategic Environmental Assessments (SEAs) is considered as a whole. However, this does not preclude the inclusion of more specific, localised information where it is judged relevant to the achievement of WFD objectives by 2015; and
- As many of the additional measures are still at an early stage of development, it may not be possible to determine precise detail on the costs and benefits attributable to them at this stage. A strategic RIA will therefore assist the policy process in determining likely costs, benefits and risks (where information is available) to guide further development of policy options.

6.2 The decision to complete a Strategic RIA fits with much of the assessment of the RBMPs to date, completed at the NI scale, and the expectation of further detail on the forty measures being available during the implementation phase.

# 7. Options

## Baseline (do nothing)

7.1 The first option is to 'do nothing'. This refers to the current water quality situation (2009) as outlined in Table 5.1 Continued use of relevant existing standards and basic measures that make up the programme of measures are assumed to be in place. In reality, this is not a realistic option as it will lead to failure to achieve WFD objectives by 2027 and may well put the Northern Ireland government at risk of infraction proceedings by the EU, with the further risk of a fine or the requirement to introduce measures which are less cost-effective than it would otherwise adopt.

## Additional Measures

7.2 This option is to begin implementation of all remaining[3] additional measures, as determined by the NIEA, from 2009. The measures are those identified within the draft RBMPs for Northern Ireland, with further measures suggested from consultee responses. It has been recognised that these measures (also referred to as "Supplementary Measures" within the Directive), will be needed to achieve improvements to the water environment by 2015, in addition to "Basic measures".

7.3 Table 7.1 lists 40 measures along with their respective sectors and pressures.

[3] Measure 29 has already been agreed, funded, and work started to complete the measure.

Table 7.1: Table of measures reviewed by sector and pressure and type of measure

| Sector | Pressure | Measure type | Number | Measure description |
|---|---|---|---|---|
| Water supply, hydropower and flood control | Abstraction and flow regulation | enabling | 1 | Monitor actual abstraction and compensation flows. |
| | | enabling | 2 | Develop biological tools to assess the ecological impacts of changes in hydrology. |
| | | enabling | 3 | Further develop Northern Ireland's Monitoring Programme to cover four biological elements and fish to directly monitor impacts and to incorporate the newly developed biological monitoring tools (Measure 2) |
| | | enabling | 4 | Research to further develop our understanding of the relationship between groundwater and surface waters |
| | | enabling | 5 | More detailed assessment of water resource availability and management priorities |
| | | enabling | 6 | Developing a tool to assess the extent to which barriers impede migration of a wide range of fish species |
| Agriculture | Point and Diffuse pollution | voluntary | 7 | Proposed voluntary measures to reduce the level of phosphorus in feed stuffs |
| | | enabling | 8 | Work with the intensive pig and poultry farming sectors for an off-farm solution to dealing with manures and thereby reduce phosphorus surplus |
| | | enabling | 9 | Review the need to give statutory effect to phosphorous balances on individual farm holdings |
| | | enabling | 10 | Develop GIS-based tool to further identify and regulate diffuse pollution (same as 21 and 26) |
| | | enabling | 11 | Develop catchment management plans to identify and target diffuse pollution from agriculture. |
| | | enabling | 40 | Effectiveness of wetlands in the reduction of nutrient loadings |
| Collection and treatment of sewage | Point and Diffuse Pollution | enabling | 12 | Review of wastewater consents |
| | | regulatory | 13 | Provision of wastewater sewerage from currently unsewered properties |
| | | regulatory | 14 | Improved policy, guidance and development control for septic tanks |

| | | | | |
|---|---|---|---|---|
| | | enabling | 15 | Research mapping and investigation of further controls for large unsewered populations. |
| | | regulatory | 16 | Phosphate-free laundry detergents |
| | | regulatory | 17 | Development control in relation to sewage treatment capacity and receiving water bodies |
| | | voluntary | 38 | Installation of reed beds and constructed wetlands for sewage treatment |
| | | enabling | 39 | Awareness programme on septic tank maintenance, installation and design |
| Urban development | Point and Diffuse pollution | regulatory | 18 | Draft Strategy to manage stormwater using SUDS |
| | | enabling | 19 | Strategy for better management of misconnections |
| | | enabling | **20** | Development of an extended regulatory toolkit for diffuse pollution (same as 24) |
| | | enabling | **21** | Update diffuse pollution screening and modelling tool (same as 26 and 10) |
| | | regulatory | 22 | Good practice for the storage and handling of hazardous chemicals |
| Forestry | Point and Diffuse pollution | regulatory | 23 | Reduce nutrient loading from forestry in sensitive areas |
| Industry and other businesses | Point and Diffuse pollution | regulatory | **24** | Development of an extended regulatory toolkit for diffuse pollution (same as 20) |
| | | enabling | 25 | Review of consents for point discharge controls |
| | | enabling | **26** | Update diffuse pollution screening and modelling tool (same as 21 and 10) |
| Historical engineering, Urban development, Public water supply, Hydropower, Agriculture and Forestry | Freshwater morphology | enabling | 27 | Review of controls on hydromorphology |
| | | regulatory | 28 | River restoration measures |
| | | enabling | 29 | Strategic appraisal of barriers to fish[4] |
| Ports and Harbours, Aggregate & Fishing/Aquaculture industry (Marine) | Marine morphology | regulatory | 30 | Development of a Protocol for Maintenance Dredging |
| All sectors | Invasive alien species | enabling | 31 | Invasive Species Ireland Project |
| | | enabling | 32 | Development of Alien Species strategy |

[4] Measure is currently being taken forward within existing resources

| | | | | |
|---|---|---|---|---|
| Fisheries | All pressures | regulatory | 33 | Implementation of Eel Management Plans |
| | | regulatory | 34 | Mitigation to impacts of drainage maintenance works on habitat |
| Protected areas | All pressures | regulatory | 35 | Development of action plans for designated freshwater pearl mussel SACs |
| Public participation | All pressures | Working with charitable sector | 36 | Facilitate the establishment of River Trusts across NI |
| | | voluntary | 37 | Promotion of efficient use of water |

Measures 10, 21 and 26 are the same measure, but are to be developed for use within three different sectors (Industry and other businesses, agriculture, and urban development); and Measures 20 and 24 are also the same measure.

Table 7.1 also categorises each measure type, according to whether it is:

- **enabling** – measure to improve regulator's understanding and knowledge of a pressure e.g. development of a GIS tool.
- **regulatory** – measure designed to impose a form of regulation on a sector.
- **working with charitable sector** – measure to facilitate and fund work being undertaken by the charities for improvements to the water environment.
- **voluntary** – working with an industry to identify further measures to improve water status.

7.4 The type of measure (as identified in table 7.1) is important in terms of assessing its impact.

7.5 Enabling measures, which make up the majority of the proposed measures, will not in themselves impose any costs on the sectors, or easily quantifiable benefits. They have been proposed to improve the level of understanding within NIEA or other Government organisations, and will in all likelihood be followed by further regulatory measures.

## Other potential options

7.6 Consideration would have been given to other options, such as alternative additional measures to achieve WFD objectives, or phased approaches to delivery of measures. However, this has not been possible given the limited time to complete this assessment (September 2009). Notably, work within the implementation phase will include identification of the use of alternative additional measures where appropriate which may also include taking forward measures in a subsequent planning cycle.

# 8. When will the policy be reviewed to establish the actual cost and benefits and the achievement of the desired effects?

8.1 Further details of the measures and their associated impacts, costs and benefits will become known as the WFD implementation process progresses. Most especially, once the RBP process identifies measures at a RBD level; and following the completion of the enabling (research/tool

development) measures identified within the assessment which will in turn suggest where further action is needed and how improvements may be achieved in the most cost-effective manner.

# 9. Methodology

## Approach to assessment

9.1 The assessment of costs, risks and benefits is based on data collection and expert judgement, with input and review from NIEA, DCAL, DARD and external stakeholders. Interviews have been completed with members of NIEA, DCAL and DARD to establish the nature of the proposed measures, those impacted and their likely administrative costs. External stakeholders, drawn principally from the WFD National Stakeholder Group, were also consulted in brief on the likely impacts[5].

9.2 Costs and benefits have taken account (as far as possible) of the range of economic, social and environmental factors. Impacts have been monetised as far as possible and the potential significance of non-monetised costs and benefits are highlighted where significant. Information on noted risks is also provided e.g. risk of measure not being implemented.

9.3 Information has principally been drawn from:

- The UK's Collaborative Research Programme reports and databases;
- Other relevant data and research; including RIAs, government reports, and academic research; and
- Expert views gained from consultation with NIEA, DARD and DCAL officials and members of the WFD National Stakeholder Forum (where time permitted).

9.4 Where possible, ranges have been presented within the data. Where these are not available the costs and benefits should be taken as indicative.

9.5 The assessment should be viewed as best current knowledge as of end September 2009.

9.6 More detailed information will be available during the implementation phase where specific RBD programmes of measures are provided.

## Cost Assessment

### Identifying economic costs

9.7 Economic costs are divided into the following three categories:

- **Compliance costs** for those sectors directly impacted by the proposed measures;
- **Wider economic impacts** following on from the compliance costs such as competition, competitiveness, and economic development; and
- **Administrative costs** of implementing the measures or mechanisms, which principally fall to the Northern Ireland Executive.

[5] Noting only a very short consultation period was allowed for external consultees due to time limitations.

## Compliance costs

9.8 Compliance costs are made up of capital and recurring costs and can include costs related to design, new equipment/machinery/land/buildings; installations; staff training costs; changes in processing, inputs or overheads.

9.9 Where possible compliance costs are calculated at present economic value and are discounted at 3.5% over 15 years.

## Wider economic impacts

9.10 Additional cost burdens on certain sectors or industries could affect the level of competition within the sector or industry. It could also affect the industry's international competitiveness. These wider economic impacts are also considered.

9.11 The competition assessment provided as Section 24 is based on the guidelines published by the Office of Fair Trading. The core of this guidance is to consider four questions about whether the policy option, here the additional measures, will affect competition by reducing the number of suppliers or by reducing the ability or interest in competing. In general, we would not expect that there would be many cases of competition effects as a result of implementation of the RBMPs.

9.12 The application of the Small Firms Impact test is provided in Section 25. The main element to consider is whether the measures impact on small/micro business and whether they affect them disproportionately in comparison to large firms.

## Administrative Costs

The administrative costs are those related to the work required to implement the additional measures. Administrative costs were discussed with NIEA, DCAL, and DARD officials according to their understanding of the likely costs to their departments of the measures. Costs are categorised under three headings:

- Policy development costs
- Set-up costs. This may require development or acquisition of capital assets denoted separately as Capital costs.
- Recurring running costs also denoted separately as Resource (Other)

These costs have generally been estimated for the next three years, starting in 2010.

9.13 Notably, these are estimated costs and are not funded at this time (unless otherwise stated). Costs are only considered for the next three financial years, although it is very likely that where, for example, further members of staff are required, these will continue in the same role after 2013, through the course of the first WFD cycle.

9.14 No savings have been identified by the department members, however, it is likely that savings will be realised once action to achieve the measures commences.

## Identifying environmental and social costs

9.15 Environmental and social impacts are identified and valued (where possible) as follows:

- **Environmental impacts including b**iodiversity, landscape, built and earth heritage, air quality, climate change, and waste.
- **Social impacts including** health, recreation, and any particularly vulnerable groups

# Cost-Effectiveness Analysis

9.16 The WFD requires Member States to "make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures" [Annex II (b)]. Where there are a number of potential measures that could be implemented to achieve a WFD objective, the most cost-effective combination of measures is that which delivers the objective for the least overall cost.

9.17 Accordingly, the Collaborative Research Programme (CRP) on River Basin Management Planning Economics was set up to develop the methodologies needed to undertake the WFD economic analysis and to provide the guidance on these methodologies for use in the UK as well as a cost calculation tool, a cost database and the completion of a National Water Environment Benefits survey to provide information about the overall scale of benefits from WFD implementation. The CRP involved 14 parties and was chaired by Defra[6].

9.18 The preliminary cost-effectiveness analysis (pCEA) makes a significant contribution to our understanding of the measures that are needed to meet WFD objectives and their associated costs. However, there is still uncertainty about several aspects of the cost estimations. In particular, there is uncertainty about the relationship between some water quality and quantity parameters, and the ecological status of water bodies; and the related question of how far measures will need to be rolled out in order to achieve the desired objective.

9.19 The pCEA information was used to develop the preferred WFD implementation option which is described in the updated Impact Assessment (reference 2). This shows clearly that costs need to be phased significantly in order to achieve a proportionate implementation of the WFD, given the likely level of benefits.

9.20 The pCEA also shows that, given the uncertainty associated with classification, source apportionment and the effectiveness of measures, and the current state of knowledge, a longer term adaptive approach to river basin planning will ultimately be more effective and cost-effective than an unphased approach.

9.21 A common theme emerging from the pCEA is the need for measures to improve information and reduce uncertainty. These measures may take a number of forms, such as research on the extent and apportionment of pressures which have not previously been monitored by the NIEA; the relationship between particular pressures and ecology, particularly for hydrology and morphological pressures; investigations of pressures in specific sites; research on the effectiveness of measures, including the implementation of pilot projects.

9.22 A second recurring theme within this work is that of site-specificity. Given the wide range of conditions affecting water bodies in Northern Ireland, it is clear that the most cost effective package of measures will vary from location to location, both between and within RBDs. The remit of the pCEA was to consider costs and effectiveness at the national level. As a result, authors made assumptions about the number of sites where implementation would be necessary and the average cost that would be incurred.

9.23 The pCEA also identifies a number of cross-cutting measures which may address several pressures at the same time. There are particular challenges in assessing the cost effectiveness of these measures because of their cross-cutting and innovative nature.

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[6] Parties to the CRP were: Department of Environment, Food and Rural Affairs (Defra), Scottish Executive, the Environment Agency, Scottish and Northern Ireland Forum for Environmental Research (SNIFFER), Scottish Environment Protection Agency (SEPA), English Nature, Department of Trade and Industry (DTI), UK Water Industry Research (UKWIR), Royal Society for the Protection of Birds (RSPB), Welsh Assembly Government (WAG), Department of Environment Northern Ireland (DOENI), British Ports/UK Major Ports Group (UKMPG), Countryside Landowners and Business Association (CLBA), National Farmers Union (NFU), and Joint Environment Programme (JEP).

## Uncertainties

9.24 Whilst it is clear what objectives need to be achieved and the proposed deadlines for achieving them (Table 5.1), it remains unclear as to how much of an improvement to the water environment will be achieved by additional measures, or a combination of basic and additional measures.

9.25 Moreover, many of the measures assessed are research or the development of tools to further the knowledge and understanding, for example Measure 4: 'Research to further develop understanding of the relationship between groundwater and surface waters'. As such, they are 'enabling measures'. The decision to implement these measures is cost-effective, as supported by results of the pCEA. However, it may mean that further measures are then needed, based on the findings of these investigations to reach GES or GEP.

# 10. Benefits Assessment

## Approach to benefit assessment

10.1 Our approach to the assessment of the benefits of the additional measures to achieve WFD objectives by 2015 is as follows:

## Assessment of benefits for the water environment

10.2 The benefits for the water environment that follow from the implementation of the additional measures can be reported in a number of ways:

- Qualitative descriptions of the types of improvements that will follow from the measures;
- Number of water bodies that will see improvements and comply with "good status" by 2015; and
- Monetary valuation of water quality and morphological improvements.

10.3 A qualitative description can be based on the expected improvements in the water quality and other characteristics of the water environment. This would be linked to the benefits identified in the SEA for the RBMPs.

10.4 Monetary valuations of benefits are often more difficult and qualitative data has more often been used.

## Non-market benefits

10.5 Non-market benefits include a wide range of benefits from aesthetic value, inheritance value, to recreation, and amenity. As their title suggest they rarely have a value within the market and therefore are difficult to place any or a satisfactory monetary value on. Most studies for the water environment look mainly at the recreational values of improved water quality and the non-use values of the same water environmental improvements. A possible quantification of recreation benefits could be done through the following steps:

- Number of additional recreational visits and activities; and
- Estimation of the value of each visit or activity.

10.6 Existing studies and literature has been reviewed in order to draw conclusions and consider their applicability within Northern Ireland.

10.7 For non-use values (i.e. where a benefit does not have a recognised monetary value) only a qualitative description has been provided.

## Market benefits

10.8 Market benefits from the forty additional measures are likely to be quite small, but where savings can be found, for example, their benefit for Northern Ireland as a whole might be considerable.

## Social Benefits

10.9 The assessment notes that the measures will not disproportionately impact upon any social groups or genders.

## Description and scale of key monetised benefits by main affected groups or sectors

10.10 Benefit improvements have been estimated and valued based on potential improvements in the quality of water bodies. Data supplied by the NIEA shows compliance based on numbers of water bodies therefore potential improvements are estimated based on % improvement to those numbers.

10.11 There is limited information on the benefits of WFD improvements. Many investigations use a technique of benefits transfer but using largely unsuitable reference valuation studies. Improvements in the scientific understanding of good status will be required before benefits analysis can significantly improve. Until then members of the Collaborative Research Programme recommended a single total benefits valuation exercise. This was implemented through the National Water Environment Benefits survey[7] and uses stated preference valuation methods in order to assess the benefits brought by the achievement of improved water quality. These benefits include biodiversity (in terms of fish and other aquatic life), aesthetic quality (clarity, smell and insects) and recreation (suitability for contact activities).

10.12 A review of water resource benefit values (draft, Goodbody Economic Consultants, 2008) notes that there are only a small number of Irish studies that put monetary values on water resource benefits, and those which do exist put values on water-related recreational activities. The review concludes that benefit values suggested for the UK are the most appropriate for use within Northern Ireland, but that these are based on a small number of studies and are likely to be an under-estimation.

10.13 There are different ways to present costs and benefits. For example the methodology that has been used within the CRP has treated non-WFD benefits, such as other environmental benefits, as negative costs. If a measure, for example establishing a wetland, would have non-WFD benefits such as increased biodiversity, this is treated as something that is reducing the costs of the measure rather than as a benefit. The approach we propose is to present other environmental costs or benefits as costs or benefits i.e. not as given in the example above.

[7] National Water Environment Benefits Survey Report, Defra 2007

# 11. Economic Background

11.1 Northern Ireland has a population on 1.7 million and one of the fastest population growth rates in Europe with an estimated need for an additional 160, 000 dwellings by 2015 (WFD Characterisation report 2005). These properties are expected to be concentrated in the Belfast metropolitan area, around Londonderry, and to a lesser extent in the Antrim, Ards, Down, and Newry and Mourne areas[8]. Northern Ireland's population has been steadily increasing since the early 1970s. In 2001, the population was 5% greater than it had been 10 years previous and almost 10% greater than it was in 1971. The projected population indicates that this trend is estimated to continue over the next 20 - 25 years. By 2031, the population is projected to grow by another 18%, to just below 2 million[9].

11.2 By 2031, the number of households in Northern Ireland is projected to increase by 38% on 2001 figures[10].

11.3 These increases in population and number of households have and will continue to place pressure on the water environment through:

- more people and increased household water usage require bigger water supply schemes and produce larger volumes of wastewater to treat and dispose of;
- demand for more food and industrial goods leads to more intensive or expanded activities with higher water demand and pollution threats;
- additional homes mean the spread of urban areas and an increase in housing, with the associated threat of more water pollution. Building developments may necessitate more flood control works; and
- ports handling more exports and imports mean busy shipping routes and demand for port expansion.

11.4 These increased pressures are in addition to pressure from climate change which will place further pressures on planning and development services.

11.5 The economic importance of water use in Northern Ireland is noted in the Article 5 Economic Analysis Summary Report (2005). Several sectors of the economy, considered to be of strategic importance to Northern Ireland are closely associated with the water environment are noted in the RBMPs. These include:

- Agriculture;
- Manufacturing industry;
- Water services industry;
- Construction industry;
- Commercial businesses;
- Navigation; and
- Transport.

11.6 In addition, tourism/recreation and the commercial fishing sector will be impacted by the additional measures assessed within this report. Improvements in the water environment are likely to have a

[8] http://www.ni-environment.gov.uk/article5report.pdf Summary Characterisation Report for Northern Ireland, 2005
[9] Northern Ireland Environmental Statistics Report – January 2009
[10] Northern Ireland Environmental Statistics Report – January 2009

significant positive impact upon the tourism and recreation sector, which is an important component of the Northern Ireland economy (noting that benefits are likely to be gained from a combination of measures depending upon the implementation process). In total, income generated by tourism is worth some 3.5% of Gross Value Added, or £783 million to the Northern Ireland economy. With Direct Added Value from tourism estimated at £423 million, this places tourism almost on a par with agriculture as one of Northern Ireland's top industries (NIHF, 2007). Annual tourism sales are over £1.6bn and are worth £783 million Gross Value Added (GVA) or 3.5% to the Northern Ireland economy with the industry supporting some 37,000 jobs (NIHF, 2007[11]).

11.7 The Chartered Institute of Marketing Northern Ireland believes that Northern Ireland has the potential to generate around 8-10% of GDP from tourism within ten years, given the provision of the necessary capital infrastructure in terms of accommodation, transport and developed tourist products.

[11] see http://www.nihf.co.uk/

# 12. Sector: Water Supply, Hydropower and Flood Control

## Pressure: Water Resources

### Background

12.1 Abstraction refers to the process where water is removed from a surface water or groundwater body, either permanently or temporarily (for example, water can be temporarily diverted and then returned elsewhere within the same system). Abstraction of water can be by a number of means such as pumping, piping, diverting water into a reservoir, or by sinking a borehole or well.

12.2 In Northern Ireland water is abstracted for public drinking water supply in the domestic, industrial, service and public sectors, industrial use, use in the food and drink industry, hydro-power generation, agricultural and agri-industry use, recreational use (such as golf courses) and for use in fisheries.

12.3 Over abstraction or changes in flow regulation within a water body may lead to a reduction of water levels in rivers, lakes, wetlands and groundwater aquifers. This can lead to increased risk of pollution through reduced dilution and stress or mortality of fish and/or invertebrates. In extreme cases rivers beds may dry up, lake shores can become exposed and high levels of groundwater abstraction can lower groundwater levels to such an extent that polluted or saline water is drawn into aquifers compromising their long-term use.

12.4 Water impoundment structures associated with abstraction activities such as weirs and dams can cause environmental impacts by causing barriers to fish passage. A number of fish species, including trout, salmon, eels and lamprey migrate along rivers to and from the sea as part of their natural breeding ecology. These species have evolved to be able to travel over small obstacles in the water, such as rocks, but larger structures can block their passage. A poorly designed or managed impoundment can also prevent sediment movement down river systems and cause build up of sediment leading to changes to the river bed habitat.

12.5 Assessment of hydrological impacts is based upon the use of condition limits for rivers, lakes and estuaries developed by the UK Technical Advisory Group (UKTAG). In order to assess whether a condition limit has been exceeded, the Northern Ireland Environment Agency (NIEA) undertakes water balance calculations, this includes both known abstractions and discharges, to determine the degree of change from modelled natural river flows or lake levels.

12.6 In the case of groundwater, the surface water condition limits are also used for determining whether groundwater abstraction is sustainable where there is a connection between groundwater and surface waters. In addition, consideration is taken of the overall level of abstraction compared with how much water is available to replenish the groundwater body through recharge, the effect of abstraction on nearby dependent ecosystems and whether saline intrusion is occurring.

12.7 The classification data shows that 9% of surface waters are failing because of impacts upon hydrology associated with low flows, lowering of levels caused by abstractions or the regulation of flows down stream of reservoirs. For some surface water bodies, abstraction of groundwater within the catchment, which reduces baseflow to the surface water body, can be a contributory factor to the failure.

12.8 Hydroelectricity is limited in Northern Ireland. There are 30 small-scale hydroelectric power sites working in Northern Ireland, producing a total of 3.4MW = about 0.2% of Northern Ireland's peak (greatest) electricity demand[12].

12.9 The Rivers Agency is an Executive Agency of the Department of Agriculture and Rural Development. The Department is the statutory drainage and flood protection authority for Northern Ireland. The Agency maintains 6,800 km of rural and urban watercourses and controls water levels in Lough Neagh and Lough Erne. The Rivers Agency does not currently operate any formal flood warning system. The Rivers Agency provides information on the geography of the Country's rivers and the management functions relating to them; the hydrometry section provides water level and flow information to Government Departments and others.

# Programme of Measures

## Basic measures

12.10 Key legislation already in place in Northern Ireland to protect water resources:

12.11 The *Water Abstraction and Impoundment (Licensing) Regulations (NI) 2006* aim to provide a single and consistent environmental risk based approach to the assessment and authorisation of water abstraction and impoundment activities within Northern Ireland. Licensing is required for several activities:

- Small scale activities with abstraction volumes less than $10m^3$ per day are not required to notify NIEA, but must conform to Permitted Controlled Activities (PCA) conditions;
- Operators with abstraction volumes between $10m^3$ and $20m^3$ per day must notify NIEA of the location of the activity and show compliance to the PCA
- Abstraction volumes greater than $20m^3$ per day require a formal licence from NIEA which may stipulate conditions;
- All hydroelectric schemes require a licence to abstract water; and
- Impounding works/structures not associated with an abstraction, which do not control the water level upstream and do not create a height differential between the upstream and downstream water surfaces of more than 1 metre, are permitted as a Permitted Controlled Activity. In all other circumstances authorisation through formal licence may be required for impoundments of water.

12.12 The *Water Resources (Environmental Impact Assessment) Regulations (NI) 2005* require agricultural water management projects, such as spray irrigation, which involve the impoundment, abstraction and/or diversion of water from surface or underground sources of volumes greater than 200m3 per day, to submit an environmental statement to the DOE. Following a determination made under this legislation, an abstraction/impoundment licence may be required.

12.13 The *Fisheries Act (Northern Ireland) 1966* protects fisheries and their habitats by several measures:

- Part 4 of the Fisheries Act protects fisheries and their habitats making it an offence to obstruct the passage of fish or fail to protect fish where water is abstracted and requires the construction of a fish pass where a weir is built or an existing weir is reinstated or altered. Most weirs have fish passes under the Fisheries Act. However an issue has been periodic lack of flow through some fish passes which will be addressed through the abstraction licensing regulations.

[12] "Hydro", Action Renewables (http://www.actionrenewables.org/uploads_documents/Hydro.pdf )

- Section 54 of the Fisheries Act requires persons who wish to build dams and weirs or repair existing weirs in rivers to construct fish passes for the free passage of fish.
- Sections 58 and 59 of the Fisheries Act impose certain closure periods where water is being abstracted from a river or lake to facilitate the passage of fish and require grids and gratings to be placed at water abstractions and return points.
- The Fisheries Act also allows the DCAL to issue exemption certificates from these requirements. The exemptions are used to introduce modern fishery protection measures.

12.14 The WFD places requirements on Member States to introduce measures to promote efficient and sustainable water use and measures to safeguard the quality of drinking water supplies. There are a number of measures that Northern Ireland is currently taking or is in the process of developing to address these requirements:

- Water Supply (Water Fittings) Regulations (Northern Ireland) 2009;
- Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2009;
- Reduction in water supply leakage levels;
- Drinking Water Safety Plans;
- Northern Ireland Water Resource Strategy 2002 – 2030 to be superseded in 2010 by the Water Resource Management Plan that is being prepared at the moment; and
- Education and awareness.

12.15 The existing actions described above aim to deliver environmental benefits with flows being returned to rivers and fish migration extended. This will have biodiversity, amenity and fisheries benefits. The Water Abstraction and Impoundment (Licensing) Regulations will ensure that abstractions are sustainable and both abstractions and impoundments do not impact on the river's ecological status. Implementation of Fisheries Act legislation will continue to ensure that fish passes are provided in reinstated and new weirs. Implementation of the Abstraction and Impoundment Regulations will also ensure that adequate flow is provided at weirs etc. with existing fish passes resulting in improved access to habitats for fish to breed and grow. The River Basin Management Plans are also part of the process which will enhance the protection of drinking water sources from pollution helping to ensure that Northern Ireland Water can continue to provide high quality drinking water without recourse to advanced, expensive and potentially environmentally damaging treatment technologies. Northern Ireland Water's investment to reduce leakage and promote efficient water use by consumers will also deliver benefits for the water environment, although the absence of charging for domestic water suppliers makes the promotion of water efficiency more difficult.

## Additional Measures for water supply, hydropower, and flood control

| | | |
|---|---|---|
| WATER SUPPLY, HYDROPOWER AND FLOOD CONTROL | 1 | Monitor actual abstraction and compensation flows |
| | 2 | Develop biological tools to assess the ecological impacts of changes in hydrology. |
| | 3 | Further develop Northern Ireland's Monitoring Programme to cover four biological elements: invertebrates; macrophytes; phytobenthos; and, fish to directly monitor impacts and to incorporate the newly developed biological monitoring tools (Measure 2) |

| | | |
|---|---|---|
| | 4 | Research to further develop our understanding of the relationship between groundwater and surface waters |
| | 5 | More detailed assessment of water resource availability and management priorities |
| | 6 | Developing a tool to assess the extent to which barriers impede migration of a wide range of fish species |

## Administrative Costs

### Additional Measure No. 1

12.16 Three pilot studies are proposed to inform the development of the Measure. The pilot studies will require an FTE for two years at £20-25k per year.

12.17 Set-up costs beyond the pilot studies have not yet been assessed.

12.18 There are no anticipated recurring costs, apart form the normal costs of licensing.

### Additional Measure No. 2

12.19 NIEA cost estimates indicate that 1 no. HSO will be required. Costs are split between £40.4 of administration costs per year plus £30 k per year for "other" resources. Costs run for three years, totalling £211.2 k.

12.20 There could be more resources required to consider lakes as well.

### Additional Measure No. 3

12.21 NIEA cost estimates indicate that:

- Two Higher Scientific Officers (HSOs) for freshwater monitoring and assessment will be required. Costs are split between £80.8 of administration costs per year plus £30 k per year for "other" resources. Costs run for three years, totalling £332.4 k.
- In addition 4 x Scientific Officers (SOs) – for freshwater monitoring and assessment@ £102 k per year are required exclusively as administration costs. Costs run for three years, totalling £306 k.

### Additional Measure No. 4

12.22 Information about costs revealed during the interview revealed that the funding of a PhD student would be required. It is assumed that the PhD student funding to support Measure No. 5 would also cover Measure No. 4.

12.23 As part of the research, a budget of £8k has been allowed for the installation of data loggers and baseline monitoring. Two rounds of monitoring at Mt. Stewart will cost £15k. NIEA will contribute £20 K per year to a collaborative SNIFFER research programme.

### Additional Measure No. 5

12.24 The funding of two PhD students to conduct research to further understanding of the issues. Each of the PhD students has an associated cost of £25k per year, plus £2k per year for expenses for the first three years, totalling £162k. The students will spend a fourth year to write up their findings, but this will fall outside the 2010-2013 funding period.

12.25 Other set-up costs are minimal because various monitoring stations already exist and historical data can be used.

12.26 The costs for this measure are firm therefore no further work is required.

12.27 The research could make future licensing applications more streamlined as it may reduce the need to establish site-by-site measurements in light of a new model being developed.

**Additional Measure No. 6**

12.28 The research is a SNIFFER project, shared between Northern Ireland, Scotland, England and Wales. The SNIFFER websites states the cost of the overall project is between £50k and £100k. No further details of Northern Ireland's contribution were available at the time of interview with NIEA's internal contact.

12.29 To establish firmer costs the following items would need to be investigated.

- Establish costs for training materials;
- Costs to integrate the tool into established IT systems; and
- Further work on an implementation plan for removing barriers to fish.

12.30 The Measure will identify work that needs to be done as well as what does not need to be done to facilitate the optimal allocation of resources to priorities. No potential cost savings have been quantified to date.

## Compliance Costs

12.31 Measures 2 through to 6 are all NIEA internal research project and by themselves will not incur compliance costs on external stakeholders.

12.32 The application of the knowledge gained from Measures 1 through to 5 will be used to try to close the gap between what volumes of water are required and what volumes of water are abstracted.

12.33 Measure 1 will aim to close the gap between what volumes of water are required by abstractors and the licence conditions that are issued.

12.34 The external stakeholders impacted will be abstractors. These will principally be:

- Northern Ireland Water;
- Farmers / Horticulturalists;
- Wide range of industry including manufacturing, power stations; and
- Recreation and fishing interests.

12.35 In terms of reducing licence conditions external stakeholders could be impacted by:

- The need to develop alternative sources of water;
- Invest in alternative manufacturing techniques which use less water;
- Loss of value of property if associated abstraction rights are lost or reduced; and
- Reduced revenue associated with water-dependent production processes.

12.36 NIEA has not undertaken research to assess the costs to external stakeholders of changes in licensing conditions to date. Research conducted as part of these measures will inform the policy development process of likely economic impacts.

12.37 Defra research[13] stated that in Northern Ireland:

- *"With further analysis it would be possible to identify the business sectors, and the extent of their contribution to the failure of flow standards. There may be benefit in undertaking this work on water bodies where the flow standards are failed by significant margins to provide an*

[13] Draft partial regulatory impact assessment of environmental quality standards for implementation of the Water Framework Directive in the UK; Defra; 2007.

*indication of where the burden would lie. However, until the relationship between the level of flow standard failure and the degree of ecological impact has been improved, there is little benefit in undertaking extensive work."*

12.38 Measure No. 6 comprises the development of a tool that will identify and prioritise issues regarding fish migration only. The Measure, therefore, will not directly impose compliance costs.

12.39 However, knowledge gained from Measure No. 6 could be used to remove barriers to fish migration. The interview with the internal stakeholder regarding this revealed, in the absence of a formal assessment, that riparian owners would be affected by removing barriers to fish migration. This stakeholder group would include farmers and industry. Depending of the size of the barriers removed or re-engineered the changes could affect navigation. No quantitative assessment has been conducted to date.

12.40 The power generating company AES operates a dual coal/oil fired power station at Kilroot, Carrickfergus. The station abstracts river water and sea water. On commenting on Measures No. 1 through to No. 6 the company indicated that experience has shown where damming occurs silt may build up behind it. In their own case, realigning their the area from which their water was abstracted by setting it back at an angle of 30° gave less flood, debris and silting problems from the industrial perspective.

## Benefits

12.41 Strategic Environmental Assessment work to support the River Basin Management plans in Northern Ireland has identified broad benefits in relation to improving water resources.

12.42 Ensuring minimum flow and flow variability will have a direct positive impact on water and on aquatic biodiversity. Indirect positive impacts are likely for human health and soils.

12.43 Indirect positive impacts are also expected for population and for material assets including angling and tourism, which depend on flows for fish migration, navigation and water supply. In addition, material assets may also benefit as review of compensation flows can offer opportunities for some protection from the effects of climate change into the future. There is some potential for impacts on cultural heritage if flows are regulated. This impact may be positive where minimum flows keep submerged archaeology from exposure or it could be negative where compensation flows cause damage to riverine or bank side archaeology.

12.44 Lower overall requirement for water from abstraction has many positive knock-on effects for the environment. Lower consumption by domestic and industrial users will lead to reduced demand for public and private water supplies and therefore reduce the risk of incidences of over abstraction. This will have direct positive impacts for surface and groundwater and also aquatic biodiversity, which may be under stress from increased low flow periods and changes to the hydrological regime. Water availability is a key driver of development and economic growth; therefore, strategies to reduce consumption would result in less drinking water requiring treatment and consequently less wastewater requiring treatment. This would have indirect positive impacts on climate change as less energy will be required and consequently lower $CO_2$ outputs would be expected. With lower consumption there will be reduced need to improve and provide more water management infrastructure allowing funds to be redirected to other areas. This would have indirect positive impacts for population and the economy generally. In the longer term, reduced consumption will improve capacity overall and facilitate continued growth and development in line with government policies, for example, development strategies.

12.45 The total length of rivers in Northern Ireland at risk of not meeting good status as a result of abstraction and flow regulation pressures is 9% of the total river length.

12.46 RIA work published by Defra in 2007[14] stated that:

[14] Water Framework Directive Article 5 Economic Analysis of Water Use Defra, 2005

- "*Environmental benefits associated with meeting the water resource standards (rivers and lakes) are not included due to the current level of understanding of how ecological impacts are linked to the degree of failure of flow standards*".

12.47 The benefits have not been quantified by NIEA to date as the work is either yet to start or still in its early phases. The research being conducted through Measures No. 1 through to No. 6 will better inform the anticipated benefits.

12.48 The power generating company AES commented on Measures No. 1 through to No. 6. The company indicated that experience has shown where damming occurs silt may build up behind it. In their case, realigning their pumping area to compensate may give environmental benefits and assist flow, fish runs and biological diversity.

# 13. Key sector: Agriculture

## Pressure: Diffuse and Point Source Pollution

### Background

13.1 Farming covers around 70% of the total land area within Northern Ireland, with 26,000 farm businesses, of which only 25% are sufficiently large enough to provide full-time employment for one or more persons. Agriculture and food processing account for 3.5% of total added value in Northern Ireland's economy.

13.2 Eutrophication is considered to be the most widespread threat to water quality in Northern Ireland. It is caused by the enrichment of waterways (both freshwater and marine) with nutrients, primarily compounds of phosphorus and/or nitrogen. This leads to an accelerated growth of algae and higher forms of plant life, producing an undesirable disturbance to the balance of organisms present in the water and to water quality. Phosphorus is supplied to agricultural land through applying mineral fertilisers and organic fertilisers (mostly animal manure and, to a lesser extent, compost and sludge). Nutrients from agriculture can reach surface waters in a number of ways, including surface run-off, flow from land drains and erosion of soil particles. They can also leach from soils into groundwater.

13.3 Phosphorous is also discharged from point sources including wastewater treatment works, septic tanks and certain food manufacturing industries, although these direct sources are not relevant to this measure.

13.4 Phosphorus is the main cause of eutrophication and of water quality deterioration for closed water resources and in a lesser extent for running waters and coastal waters. Even a minimal phosphorus content (some tens of µg/l) can pose environmental and health problems because of eutrophication and micro-algae development, respectively. Freshwater eutrophication, caused primarily by high phosphorus inputs, is widespread across Northern Ireland. Both Lough Neagh and Lough Erne are highly eutrophic, as are many smaller lakes. Phosphorus concentrations in lakes and rivers have been rising since the 1960s and 1970s, despite reduced inputs of phosphorus from major sewage treatment works and detergents. Since the 1990s increased phosphorus inputs through diffuse inputs from agriculture are still being identified as the main cause of eutrophication in Northern Ireland. In addition, high nitrogen concentrations are the main driver for similar problems in the marine environment with problems evident for example in inner Belfast Lough and the northern end of Strangford Lough.

13.5 The review and investigation of the effectiveness of wetlands in the reduction of nutrients loadings follows the recent publication of a design manual on constructed farm wetlands (CFW) (NIEA and SEPA, 2008) and policy guidance issued by DARD in 2009. The manual provides information and guidance on the design, siting and construction of CFW used to treat lightly contaminated surface water runoff from farm steadings.

13.6 This measure does have the capacity to reduce point and diffuse source nutrient pollution, and it is for these reasons it has been proposed as an additional measure. However, recent research has identified and sought to clarify the role wetlands in flood risk management at a local and catchment scale.

13.7 Table 13.1 shows the number of rivers and lakes currently not reaching Good status due to phosphorus, invertebrates, diatoms and macrophytes (key diffuse pollution indicators related to these measures). Figures for Northern Ireland as a whole show 15% of water bodies failing for phosphorus, with a significantly higher value of 36% for the North Eastern RBD and only 2.8% in the North Western RBD. For invertebrates the figures are higher with over 47% of water bodies failing. Invertebrate levels are often associated with diffuse pollution from farming.

Table 13.1: NI WFD 2009 compliance for phosphorus, invertebrates, macrophytes and diatoms

| | | Number or % of water bodies | Phosphorus | Invertebrates | Macrophytes | Diatoms |
|---|---|---|---|---|---|---|
| Rivers & Lakes | **Total number of waterbodies in NE RBMP114** | **Less than Good status** | 41 | 75 | 21 | 14 |
| | | **%** | **36.0%** | **65.8%** | **18.4%** | **12.3%** |
| | **Total number of waterbodies in NW RBMP 218** | **Less than Good Status** | 6 | 66 | 37 | 34 |
| | | **%** | **2.8%** | **30.3%** | **17.0%** | **15.6%** |
| | **Total number of water bodies in NB RBMP 265** | **Less than Good status** | 48 | 143 | 92 | 40 |
| | | **%** | **18.1%** | **54.0%** | **34.7%** | **15.1%** |
| | **Total number of waterbodies in NI 597** | **Less than Good status** | 95 | 284 | 150 | 88 |
| | | **%** | **15.9%** | **47.6%** | **25.1%** | **14.7%** |

**Key to above table**: NI is Northern Ireland. NE is North Western. NE is North Eastern. NB is Neagh Bann.

## Basic measures

13.8 The RBMPs identify a number of regulatory and voluntary measures to control diffuse and point source pollution from agriculture within the programme of measures:

The Nitrates Action Programme (NAP) Regulations (NI) 2006

13.9 These regulations were introduced by DOE and DARD to implement the Nitrates Directive in Northern Ireland. The aim is to improve water quality from pollution caused by nitrates from agricultural sources. The action programme requires farmers to observe rules to reduce and prevent nitrate pollution, including controls on storing manure; closed periods for spreading manure and applying fertiliser; and nitrogen efficiency measures. These Regulations have applied to all farms in NI from 1 January 2007, except where some transitional arrangements are in place. Action programmes must be reviewed every four years and a review of the current NAP Regulations has recently been initiated by DOE and DARD for completion before the end of 2010. Compliance with this legislation is a Statutory Management Requirement under Cross Compliance.

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (SSAFO) Regulations (NI) 2003

13.10 The SSAFO Regulations cover the design, siting, construction and maintenance of silage, slurry and agricultural fuel oil stores. The regulations minimise the risk of pollution to water bodies by setting minimum standards for the construction and maintenance of these structures. Compliance with the SSAFO Regulations, with regard to livestock manure and silage effluent storage facilities, is now a requirement of the Nitrates Action Programme (NAP) Regulations (NI) 2006.

The Phosphorus (Use in Agriculture) Regulations (Northern Ireland) 2006 (Phosphorus Regulations)

13.11 The Phosphorus Regulations control the application of chemical phosphorus fertiliser. These Regulations were introduced by DOE on the 1 January 2007 (the same date as the NAP Regulations) in support of environmental obligations but not as part of the NI Nitrates Action Programme. These Regulations were introduced as it was recognised that phosphorus played a key role in freshwater eutrophication and to ensure in Northern Ireland that chemical phosphorus fertiliser was not applied in excess of crop requirement.

The Pollution Prevention and Control Regulations (Northern Ireland) 2003 (PPC Regulations)

13.12 The PPC Regulations implemented the Integrated Pollution Prevention and Control Directive (91/61/EC) and extended an environmental permitting system to a range of new sectors including intensive rearing of pigs and poultry above certain thresholds (40000 places for poultry, 2000 places for production pigs >30kg or 750 places for sows). IPPC farms which spread slurry/manure to land are required to demonstrate that they have sufficient land to take the quantity of manure generated on the installation. New or expanded farms are being asked to demonstrate that they have either sufficient land to spread slurry or manure in accordance with crop requirements or have an alternative means for utilizing the material before they are permitted. For existing farms, a staged approach is being taken whereby applicants will be allowed until 6 months after the issue of a permit to come up with firm proposals to resolve any shortfall in available spreading land or to identify possible alternative uses.

Waste Management Licensing Regulations (Northern Ireland) 2003 (WML Regulations)

13.13 The storage and application of certain organic wastes to agricultural land including the application of sewage sludge for use with industrial crops is controlled through the WML Regulations. The application can be exempt from waste management licensing if it results in either "benefit to agriculture" or "ecological improvement". Benefit to agriculture is assessed against specific criteria including that the addition of nitrogen, phosphorus and other plant nutrients in the waste should take account of the soil nutrient status and other sources of nutrient supply and be matched to the needs of the planned crop rotation. Furthermore application of any wastes must be done so in accordance with the NAP Regulations.

The Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990 (The Sewage Sludge Regulations)

13.14 The Sewage Sludge Regulations implement the Sewage Sludge Directive (86/278/EEC). This legislation applies only to the application of sewage sludge and septic tank sludge to commercial food crops, including for stock rearing purposes. These Regulations prohibit the use of sludge in agriculture as described above unless specified requirements are met including spreading controls and sludge/soil testing to avoid a build up of nutrients. Compliance with this legislation is a Statutory Management Requirement under Cross Compliance.

Farm Nutrient Management Scheme

13.15 The Farm Nutrient Management Scheme (FNMS) was launched by DARD in 2005 to assist farmers invest in new or improved slurry and manure storage facilities. Increased storage facilities enable farmers to spread manures when weather, soil conditions and crop uptake of nutrients are optimum, which reducing the risk of pollution and enables farmers to comply with the NAP Regulations. The FNMS closed on 31 December 2008 and over 3,900 farmers have availed of the scheme.

Agri-environment Schemes

13.16 DARD's agri-environment schemes support agricultural production methods which protect the water quality of rivers and lakes. Effective pollution control is a requirement of all agri-environment schemes and scheme participants are provided with farm nutrient and pollution control advice as part of their application process. By the close of the Northern Ireland Rural Development Programme (NIRDB) 2000-2006, 13,000 farmers were participants in the schemes, covering 45% of farmed area under agreement. Current expenditure in Northern Ireland on agri-environment schemes amounts to about £7.5 million.

13.17 The Northern Ireland Countryside Management scheme (NICMS) is an integral part of the NIRDP (2007-2013). Under the NIRDP, the NICMS further enhances the agri-environment programme's ability to reduce water pollution from agricultural sources and to improve water quality on farms. NICMS participants will continue to draw up obligatory farm waste management plans and in addition they will have the option of taking up new farm waterway and riparian zone management

measures which aim to enhance river and riverbank biodiversity and help local agriculture meet the requirements of the EU Water Framework Directive. There are around 11,000 beef and sheep farmers taking part in a farm quality assurance scheme.

Code of Good Agricultural Practice (CoGAP)

13.18 The CoGAP provides practical guidance for farmers and advisors in relation to pollution control.

Education and Awareness

13.19 A range of guidance and support tools for farmers including training and advisory programmes are also provided by DARD and NIEA to assist compliance within the agricultural sector.

13.20 Draft RBMPs suggest there will be a **20% reduction in the phosphorus** budget as a result of the programme of measures. Additional measures are targeted at further reducing phosphorus levels, and improved mechanisms to identify and target diffuse pollution in general from agricultural sources.

### Additional Measures for Agriculture

| | | |
|---|---|---|
| AGRICULTURE | 7 | Proposed voluntary measures to reduce the level of phosphorus in feed stuffs |
| | 8 | Work with the intensive pig and poultry farming sectors for an off-farm solution to dealing with manures and thereby reduce phosphorus surplus |
| | 9 | Review the need to give statutory effect to phosphorous balances on individual farm holdings |
| | 10 | Develop GIS-based tool to further identify and regulate diffuse pollution (for agriculture) |
| | 11 | Develop catchment management plans to identify and target diffuse pollution from agriculture. |
| | 40 | Review and investigation of the effectiveness of wetlands in the reduction of nutrient loadings |

## Administrative Costs

#### Additional Measure No. 7

13.21 Cost estimates suggest the requirement for additional DARD advisory resource to promote best practice in farm yard management and nutrient management of £2 million over the next three years.

13.22 In addition, an AFBI Research project into poultry diets will be required at a cost estimate of £120,000.

#### Additional Measure No. 8

13.23 Cost estimates are £25,000 for DARD and £3,000 for AFBI. Technical and policy work relating to development of alternative technologies to process manures from the intensive livestock sectors. Total estimated administrative cost for this measure is £28,000.

13.24 The Rose Energy project, as an alternative to land spreading for poultry litter, is currently awaiting Planning and Government funding decisions. Capital cost exceeds £100m. NI Authorities will incur significant costs if the Rose Energy project proceeds, notably to NIEA through costs associated with the IPPC/environmental licensing. However, these are not quantifiable at the present time.

### Additional Measure No. 9

13.25 AFBI Research commenced 2009 at a cost of £20k. The report on measures to control phosphorus inputs to be completed by end 2009. There are therefore no further funding requirements for this measure.

### Additional Measure No. 10

13.26 Works for a scoping study, a specification, model development and a Modelling Manager will cost £321.2k in total between 2010 and 2013.

### Additional Measure No. 11

13.27 Six Additional Catchment Officers at Higher Scientific Officer grade will be required within NIEA. Costs are split between £242.2k of administration costs per year totalling £726.60k.

### Additional Measure No. 40

13.28 Administrative input will involve input within the consenting process, to be completed using existing resources. There are no extra costs to NIEA anticipated in relation to this Measure. DARD are taking the research forward with PhD students but no costs have been estimated by DARD to date.

## Compliance Costs

13.29 Measure 7: Proposed voluntary measures to reduce the level of phosphorus in feed stuffs

13.30 The phosphorus content of concentrate feeds is currently around 0.6 % on a dry matter basis (DARD, 2009) and a phosphorus limit of 0.58% on compounded ruminant feedstuffs has been in place since 2007. Levels in Northern Ireland are in line with or slightly lower than those in the rest of Europe.

13.31 This additional measure addresses poultry feedstuffs. It is hoped that a voluntary agreement could be made with the Northern Ireland Grain Trade Association to reduce the level of phosphorus in poultry feed stuffs. DARD have had ongoing liaison with the feed industry and an additional substantial lowering of the phosphorus content of poultry feeds has been achieved recently through the use of high phytase diets. A phytase enzyme is added to increase the availability of phosphorus in the diet to poultry. These reductions have a significant effect on phosphorus excretion.

13.32 Further research has now been commissioned by DARD to establish the environmental benefits of lowering nutrient levels in poultry diets. It will quantify the effects of lowering dietary levels of phosphorus and nitrogen on poultry performance, including the use of phytase enzymes. The study will assess the phosphorus content of poultry litter and will also establish if there are any negative effects on chicken welfare using assessments of bone strength. Previous research on diet modification for dairy cows and pigs in Northern Ireland has been conducted by AFBI. Research findings from these studies have demonstrated the potential for significant reductions in phosphorus and nitrogen in both diet and excretion rates (AFBI, 2005). Magowan et al (2004) concluded that soluble phosphorus output from growing pigs can be reduced 50% without affecting performance, following changes in phosphorus management in pig diets. If new sources of low phosphate feed components could be found, more use could be made of low phytate cereal varieties, or of increased phytase to allow more efficient utilisation of phosphorus in rations (AFBI, 2005).

13.33 The key requirement will be to ensure that any further reductions in phosphorus levels in poultry feedstuffs do not risk lowering bone strength and increasing broken bones during processing, which has both an economic cost and impact on animal welfare (Gordon and Rowland, 1997).

13.34 For dairy industry, the assumption is that output will remain unchanged but that there will be an increase in costs due to the new diet. The total estimated increase in average feeding costs is £48.28 / year for each cow (Cuttle et al. 2007). For pigs, nitrate and phosphorus intake reduction

will involve a decrease in production of around 7.5%, and an additional cost estimated at roughly £1 /sow for the new feedings formulation. For broilers (poultry), the estimated reduction in production is 8.75%, connected with a 4% reduction in proteins with no significant changes in feeding costs.

13.35 The assumed revenue and cost changes associated with livestock dietary nitrogen intakes are reported in Table 13.2.

**Table 13.2 Revenue and cost changes associated with dietary nitrogen intakes (based on Cuttle et al. 2007 and developed by Batemen et al. 2008)**

| Livestock | Revenue changes (%) | Costs |
|---|---|---|
| Dairy | 0.00 | £48.28 per cow |
| Pigs | -7.50 | £1.00/pig |
| Poultry | -8.75 | 0.00 |

13.36 Measure 8: Work with the intensive pig and poultry farming sectors for an off-farm solution to dealing with manures and thereby reduce phosphorus surplus.

13.37 During the development of the NAP Regulations it became evident that off-farm solutions as an alternative to land spreading were needed, particularly for the intensive pig and poultry industries. An expert working group chaired by the then Chief Scientist of DARD identified practical solutions and made recommendations for their implementation (DARD, 2005). In respect of the poultry industry, the group reviewed and endorsed the technical approach being adopted by a consortium within the industry to develop a single poultry-litter fired generator to deal with the vast majority of chicken litter from broiler and turkey farms in NI. The proposed capital cost of this plant is over £100 million.

13.38 Further action has not been taken primarily because many of the solutions indentified do not appear to be cost-effective to farmers. Furthermore, DARD has stated that pig farms are generally exporting manure to lower intensity grassland farms and arable farms where it can be used, in accordance with the NAP Regulations, as an organic fertiliser and substitute for chemical fertiliser. DARD believe that as pig farms now have adequate storage facilities and the ready demand for pig manure, the pig industry in general is not pursuing off-farm solutions to utilise manure.

13.39 Approximately 20% of poultry litter is currently used for the production of mushroom compost and 3-8% is exported to Scotland for use in power generation depending on capacity being available at the power plant. A further 75% is currently spread on land as an organic fertiliser. This practice is not sustainable at such levels due to its high phosphorus content, the enriched phosphorus status of soils, and the resultant impact on water quality.

13.40 A small number of farms already use techniques to separate slurry, including weeping walls, rotary screen, and screw or belt-press separators. Slurry processing facilities to allow nutrients to be partitioned into usable and transportable products are already being employed on a small number of farms.

13.41 Measure 9: Review the need to give statutory effect to phosphorous balances on individual farm holdings.

13.42 Under the Nitrates Directive Action Programme (2007) a date of 31 December 2008 was set for a review of the need to give statutory effect to phosphorus balances on individual holdings. This should have allowed two years from the introduction of the action programme for commercial/technical proposals for alternative uses of manures that have the potential to bring about a significant reduction in the phosphorus surplus to be developed. A phosphorus balance at the farm level would require, for example on a dairy holding, fertiliser, concentrates and livestock to match levels of phosphorus outputs in milk and livestock, over the total area of a farm. This is with

a view to achieving an overall objective of the Nitrates Action Programme where all holdings are in a sustainable phosphorus balance by 2015.

13.43 The review by DARD will now be completed at the end of 2009. It is therefore not clear at this current time as to whether this objective will become a statutory requirement and the precise details of any proposed legislation.

13.44 If a statutory requirement is justified, a separate RIA will be required to assess the specific costs, benefits and impacts of such a measure. Notably, costs to farming sector are likely to be significant.

13.45 Many farms, particularly pig farms, do not have adequate spread-lands to comply with the 170kg N/ha limit set by the NAP regulations, let alone meet a phosphorus balance requirement. An initial review of phosphorus balances by DARD estimated that this measure could cost the pig and poultry sectors £52 million per year simply for locating new spread-lands (DARD, 2005). However, the availability of further land is very limited, and therefore the pressure to reduce phosphorus inputs is likely to be more practicable and cost-effective.

13.46 Measure 10: Develop GIS-based tool to further identify and regulate diffuse pollution (from agriculture), and
Measure 11: Develop catchment management plans to identify and target diffuse pollution from agriculture.

13.47 Both measures 10 and 11, through the development of a GIS-tool and prioritised catchment management plans, reflect the need to improve knowledge of diffuse pollution on a catchment or local scale. Targeting specific problem areas with awareness initiatives, for example, can be the most productive and cost-effective of measures for DWPA.

13.48 This measure is particularly important for protected areas. There is particular need for models that predict/model the ecological impacts in the receptor. e.g. the Draft Freshwater Pearl Mussel Regulation set targets for diatoms, macroalgae, macrophytes and macroinvertebrates, but models are needed that can determine what reductions in nutrient loads are required to achieve these targets. Models will need to be very detailed in order to take account of site-specific issues such as soil-type, water colour/light attenuation, and flows.

13.49 Measure 10 (GIS-based tool) as an ‘enabling’ measure which furthers understanding of diffuse pollution, it will not impose any compliance costs in itself.

13.50 As part of measure 11 (catchment management plans) NIEA are progressing the prioritisation of 26 local area management plans (LAMPs) for action within Northern Ireland. Advice would be targeted on priority river catchments with particular water quality issues. The focus of advice for farmers would be on farm yard management practice. Improved management can reduce nutrient losses to water and can often be implemented at low cost.

13.51 Measure 40(effectiveness of wetlands) is a research-based initiative and will not specifically have any cost impacts upon the Northern Ireland economy. Further information on the cost-effectiveness and application of the initiative will be known once the measure is complete.

13.52 However, the CFW Manual does provide some useful information to inform that review. It identifies a small number of case studies which show varying costs according to specific site requirements. A case-study of twelve Integrated Constructed Wetlands (ICWs) within the Annestown-Dunhill catchment, Waterford, Ireland achieved a reduction in phosphorus concentrations of over 90%. ICWs were constructed and planted at a cost of 17,000-21,000 euros per hectare (between 200 and 2005).

13.53 Preserving and restoring wetlands to improve the quality of water that flows through a watershed require a landscape approach, e.g. finding sites that can intercept a significant fraction of a watershed’s nutrient-rich runoff.

13.54 It is suggested that ICWs are being applied throughout Ireland for treatment of contaminated waters for agricultural, industrial and civic use. However, a key requirements associated with their uptake

is the large land area requirement. This may be the reason why applications in Northern Ireland are still very low (applications in single figures).

13.55 Little information is known on the need for maintenance requirements of CFW.

13.56 CFWs are noted to emit greenhouse gases including methane, nitrous oxide and ammonia. Whilst the precise levels are as yet unknown, they are likely to be low.

## Benefits

13.57 (Measure 40) A study undertaken to assess cost-effective management of soil water from agricultural systems in Ireland (Culleton, et al. 2005) looked at a number of systems for managing agricultural soiled water. The low-cost ICW systems were the cheapest method in wet soil areas and the second cheapest on dry soil areas.

13.58 At a farm level, the cost-benefit analysis of a CFW at Greenmount Campus, Northern Ireland suggested an annual saving of £4,365 compared to a conventional storage and land spreading system, based on a 180-cow dairy unit (NIEA and SEPA, 2008).

13.59 As noted, this measure is a research-based initiative to assess the effectiveness of wetlands in nutrient reduction; therefore the measure itself will not provide any direct benefits other than through increased knowledge. Further information on the effectiveness and application of the initiative within RBDs will be known once the measure is complete.

13.60 However, there are a number of wider benefits associated with the wetlands. Four functions performed by wetlands stand out as having significance and value as an 'ecosystem service': provision of habitat and biodiversity, water quality improvement, flood abatement, and carbon management. Water quality improvement – i.e. the ability to remove sediments, nutrients, and other contaminants from water, is the focus of this measure. However, the three other main functions would provide further benefits. The presence of water, high plant productivity, and other habitat qualities of wetlands attracts high numbers of animals and animal species

13.61 The wetlands that best abate flooding are those occurring upstream of places where flooding is a problem, namely urban areas and fields that have been planted with crops. Opinions differ on the advantages and disadvantages of wetlands in the upper reaches of a watershed, but floodplains are known to be critical in mitigating flood damage, as they store large quantities of water, effectively reducing the height of flood peaks and the risk of flooding downstream. This is the subject of current research, using field trials to establish their effectiveness in rural areas at a local and catchment level (see Environment Agency, Making Space for Water, 2008).

13.62 Understanding of the role of wetlands as climate regulators is growing, and their role in sequestering carbon in long-lived pools is becoming appreciated. Wetlands are known to store vast quantities of carbon, especially in their soils. Globally, wetlands are the largest component (up to 44% to 71%) of the terrestrial biological carbon pool, storing as much as 535 Gt (gigaton) of carbon. Although wetlands store vast quantities of carbon in vegetation and especially in their soils, they also contribute more than 10% of the annual global emissions of the greenhouse gas methane ($CH_4$) and can also be a significant source of $CO_2$ under some conditions. To what degree wetlands function as net sinks or sources of greenhouse gases appears to depend on interactions involving the local conditions including physical conditions in the soil, microbial processes, and vegetation characteristics.

13.63 The Defra 2007 WFD Impact Assessment calculated the present value (2006) benefits to Northern Ireland from phosphorus reduction (to rivers and using non-use value only) as £6 million. This would be from 2015 for 30 years and is based upon 3,281 km of rivers failing to meet UKTAG standards. This significantly underestimates the other direct and non-direct-use related benefits associated with reduced eutrophication. It also identifies a weakness with the methodology in that a smaller population within Northern Ireland (relative to England) produces a smaller relevant population with willingness to pay for these benefits.

13.64 Achieving reduced levels of eutrophication may well be the result of a number of measures, not simply those which affect the agricultural sector. Similarly, benefits from reduced eutrophication whilst they are likely to be significant, and will affect a wide range of sectors. Based on the 2006 work, improvements to GES from 2009 status by 2015 are likely to bring £2-4 million benefit from rivers.

# 14. Key sector: Collection and Treatment of Sewage

## Pressure: Diffuse and Point Source Pollution

### Background

14.1 Northern Ireland Water (NIW) is the sole provider of water sewerage services in Northern Ireland. Every year NIW collects 133 billion litres of wastewater from 660,000 businesses and households. There has been extensive investment in the provision of wastewater collection and treatment systems in Northern Ireland over recent years. Over the five year period up to 2008 £1.1 billion was spent on services protecting both public health and the environment.

14.2 There are localised and cumulative environmental problems in rural areas caused by sewage from scattered houses and industry which are typically treated by privately operated septic tanks or small treatment works. In Northern Ireland more than 110,000 properties (approximately 20% of the total) are currently without public sewerage provision, representing around 0.3 million people (a fifth of Northern Ireland's population), and generating around 65 million litres of wastewater a day[15].

14.3 NIW has planned investment from 2010 onwards to address some of the significant problems with old combined sewers which, during periods of heavy rainfall, overflow excessive amounts of storm waste water into rivers causing pollution and flooding. However, there may be additional problems associated with a high density of septic tanks some of which may be defective or not maintained properly. A NIEA project is underway to review regulatory controls on septic tanks. In addition it is planned to undertake two pilot studies to investigate the current state of septic tanks in selected areas and the extent of the impact on the aquatic environment. .

14.4 The key pollutants from sewage discharges are:

- nutrients;
- organic matter, ammonia and faecal pathogens;
- toxic substances - from industrial effluent, household chemicals and road run - off; and
- Sewage - related debris.

14.5 Section 13 shows current invertebrate compliance levels which are applicable for this sector.

### Programme of Measures

#### Basic Measures

14.6 Key legislation includes:

- In Northern Ireland the Urban Waste Water Treatment Directive is implemented through the *Urban Waste Water Treatment Regulations (NI) 2007*. The Regulations require that all significant discharges of sewage are treated, before the discharge to an inland surface water, groundwater, estuary or coastal water and that towns and cities above a certain population are provided with an adequate sewer system. The Regulations identifies sensitive areas where receiving waters are susceptible to the amount of nutrients discharged and further treatment is

[15] Neagh Bann Draft River Basin Management Plan, Northern Ireland Environment Agency, 2008.

required. Additionally, the Regulations have also banned the disposal of sewage sludge at sea since 1998.

- The *Water and Sewerage Services (Northern Ireland) Order 2006* establishes a regulatory regime to ensure compliance with environmental, consumer protection and efficiency standards and sets out new rights for consumers. The Order supports the establishment of a government owned company (Northern Ireland Water) to deliver water and sewerage services from April 2007. As a result wastewater discharges from public sewerage infrastructure in Northern Ireland are now subject to enforcement action if the conditions of consent are not met or pollution incidents are caused by a failure to properly maintain and operate the infrastructure.
- Under the *Water (Northern Ireland) Order 1999 (the Water Order)* it is an offence to discharge trade or sewage effluent to waterways or water in underground strata without the consent of the Department of the Environment (DOE). NIEA administers a system of discharge consents which lay down conditions relating to the quality and quantity of effluent that may be discharged. Numerical limits may be placed on a variety of parameters such as Biochemical Oxygen Demand, Dissolved Oxygen, trace metals, temperature, suspended solids, pH, flow and visible oil and grease.
- NIEA regulates major industrial activities under the *Pollution Prevention and Control Regulations (Northern Ireland) 2003*. Small-scale commercial and industrial discharges to sewer systems and waters are licensed or consented by NIW. If the proposed discharge to sewer consists of special category effluent then NIW must refer the application to the NIEA to determine whether or not it should be prohibited or if any specific conditions should be applied to the discharge. Other key drivers for the setting of investment and priorities in this sector are compliance with the Freshwater Fish Directive, the Bathing Water Directive and the Shellfish Directive.

14.7 In terms of planning controls in relation to septic tanks, the Water Order consenting process is the key control for ensuring the protection of Northern Ireland's waters and this operates alongside the planning system by restricting the location of new developments. Domestic, commercial and industrial developments must obtain planning approval. Planning Service has issued a planning strategy for rural Northern Ireland; standards and joint UK guidance for on-site systems are also available. NIEA consents all discharges and undertakes inspections and enforcement where water pollution related to septic tanks and / or proprietary on-site systems is identified. These controls and guidance play a major role in protecting water quality in non mains sewer areas, but problems arise where tanks or systems are not properly planned, designed, managed and operated. NIEA is undertaking research to examine legislative requirements and responsibilities and identification of best practice in relation to on site waste water treatment systems. This will result in a more consistent approach and provide guidance for a wider range of situations.

14.8 Investment programmes and plans include:

- Northern Ireland Capital Works Programme (2007 – 2010) - This is the process through which NI Water agrees with the Regulator, (NIAUR) the organisation's priorities and plans for the next 3 years. It also determines the financial framework for the period, including the levels of non-domestic customer charges. The Capital Works Programme Strategic Business Plan has been agreed to cover the period March 2007 to March 2010. The three year expenditure programme has a budget of £676 million. The Capital Works Programme outputs from the period covering 2007 and 2008 included 52.4km of sewers and completion of projects to upgrade eight Waste Water Treatment Works (WWTW).
- Urban Pollution Management - NIEA works closely with NIW to identify and rectify unsatisfactory combined sewer overflows, to rationalise sewer systems and to reduce the volume spilt from overflows. NIEA issues performance standards that control the flow forwarded for treatment, spill frequency, volume of discharge and associated pollutant loads so

that water quality objectives and the desired amenity value of the receiving waters are not compromised.

- Sustainable Drainage Systems (SUDS) - Sustainable Drainage Systems (SUDS) control the quantity and quality of run-off waters by providing storage in tanks, swales or ponds. This delays or prevents discharge to streams or rivers until there is capacity to accommodate it. SUDS are not widely used in this sector at present however NIEA have produced a draft SUDS strategy with the aim of encouraging wider adoption of SUDS (see Urban Sector for more detail).

14.9 Education and awareness programmes include:

- NI Water's 'Bag It and Bin It' campaign promotes the disposal of sanitary material such as cotton buds in the bin rather than flushing them down the toilet. This keeps them out of the sewage stream altogether, preventing them from being discharged from Combined Sewer Overflows (CSOs) during heavy rain or choking the fine screens at WWTW, both of which can cause pollution.
- Education – The Draft River Basin Management Plans state the importance of the population appreciating its role in controlling the pollution which is caused by what passes to the drains from people's homes. If pollution is reduced at source it lowers the costs associated with its treatment and produces environmental benefits, especially with regards to hazardous substances, nutrients and sanitary litter. For example, not using certain substances in domestic products (e.g. strong disinfectants) reduces the need for treatment to remove them from sewage and reduces their concentration in sewage sludge.

### Additional measures for collection and treatment of sewage

| | | |
|---|---|---|
| COLLECTION AND TREATMENT OF SEWAGE | 12 | Review of wastewater consents |
| | 13 | Provision of wastewater sewerage from currently unsewered properties |
| | 14 | Improved policy, guidance and development control for septic tanks |
| | 15 | Research mapping and investigation of further controls for large unsewered populations |
| | 16 | Phosphate-free laundry detergents |
| | 17 | Development control in relation to sewage treatment capacity and receiving water bodies |
| | 38 | Installation of reed beds and constructed wetlands for sewage treatment |
| | 39 | Awareness programme on septic tank maintenance, installation and design |

## Administrative Costs

#### Additional Measure No. 12

14.10 NIEA cost estimates indicate that one Higher Scientific Officer and one Scientific Officer will be required at £65.9k per year. This will cost £197.7k between 2010 and 2013.

14.11 To support the measure between 2010 and 2013, £180,000 has been estimated for the production of mathematical models for the rivers systems to enable consenting on a catchment basis. The budget is yet to be approved and falls under Measure 25.

14.12 A recurring budget will be required to keep the model updated. These costs have not yet been established. These costs will be more for the implementation of the WFD rather than the development of the model itself.

### Additional Measure No. 13

14.13 The set-up and recurring costs for this Measure are yet to be established.

14.14 The Water Policy Division at the Department for Regional Development would need to establish the costs.

### Additional Measure No. 14

14.15 Information gained from interviews with NIEA staff indicated that the set-up costs of £25k for the whole project will be mainly incurred as staff costs. These staff costs will be sought via routine funding though the normal programme of expenditure.

14.16 Recurring costs in will occur as there is a team that manages the current process. However, this is already recoverable through the charging scheme.

14.17 No additional costs of the Measure are expected. The charging scheme rates are not expected to be influenced by the adoption of the Measure.

14.18 No further work is required to establish costs.

14.19 When an application is received by NIEA the site automatically is inspected, after which the application is decided. With a risk based approach to regulation it is anticipated that there will be a 15% reduction in staff time spent of this task which will free up resources to concentrate more on compliance checking and inspecting unlicensed properties.

### Additional Measure No. 15

14.20 It is too early in the process to establish costs for this Measure. A strategy for enforcement implementation has yet to be developed.

14.21 The work of the Higher Scientific Officer (who is overseeing numerous Measures) will establish estimated costs.

14.22 No savings from the measure are anticipated.

### Additional Measure No. 16

14.23 There will be no costs to NIEA for this measure. The costs will be borne by the manufacturers.

### Additional Measure No. 17

14.24 A bid [to central government] has been submitted for £121.3 k over three years to cover one FTE Higher Scientific Officer for the “traffic light system”.

14.25 Recurring costs will be linked to the updating of the SIMCAT models to be developed under Measure No. 12.

14.26 Resources will be required to answer queries from planning authorities when area plans are reviewed periodically. No estimate of these updating costs has been made to date.

14.27 The outcome of the modelling under Measure No. 12 will inform cost projections.

14.28 It is feasible that there will be some savings in administration in answering queries from local planning authorities but this has not been quantified.

### Additional Measure No. 38

14.29 No administrative costs are expected to arise from this measure.

### Additional Measure No. 39

14.30 Work on establishing estimated costs for this Measure is yet to start, although costs to NIEA are envisaged in enforcement.

14.31 Work is yet to start on estimating the compliance costs in relation to Measure No 39. The awareness programme will issue new guidance, the aim of which is to raise standards for septic tank design, installation and maintenance. Around 2,000 new applications per year will be required to meet the guidance. Work on the guidance is yet to start therefore compliance costs are yet to be assessed.

## Compliance costs

14.32 Compliance costs for Measure No. 12 will be assessed formally at a later date as part of the RIA for the Classification Regulations. The accompanying mathematical models need to be established as the first step towards understanding the benefits and dis-benefits of their application more firmly. The bulk of expenditure on sewer system upgrades will be from 2013 to 2018. The expenditure will be by NIW. However, this would have been carried out to meet Local Water Quality Objectives without the WFD. The Utility Business Plan for 2013 to 2018 is currently with the regulator. The draft determination was published in September with a final determination due in December 2009. The Business Plan will determine funding available for capital works. This will also give an indication of the likely expenditure commitments for investment periods after 2018.

14.33 If the relevant legislation is enabled NIEA can recommend that Northern Ireland Water is compelled to provide sewerage connection to the general public. In principle, the government would give a grant to the water company to implement it with the decision of giving grants falling to the Department for Regional Development. NIEA would input into the decision making process. NIEA therefore considers that compliance costs for Measure No. 13 will need to be established by the Water Policy Division at the Department for Regional Development. However, alternative options would be considered and impacts assessed.

14.34 An informal and preliminary costing by NIEA estimates that there are presently 80,000 unlicensed septic tanks across Northern Ireland. It was estimated in an informal manner during the interview with NIEA staff that these tanks would cost approximately £2 million pounds for the owners to upgrade, some £25 each. The septic tank owners are thought to be almost exclusively householders, though no demographic studies gave been carried out to confirm this assumption.

14.35 Measure No. 15 is in its early stages of formulation. A strategy for enforcement implementation has yet to be developed therefore compliance costs cannot yet be estimated. The work of the Higher Scientific Officer will establish estimates of costs. In principle the measure could expose the water utility company to significant cost as quite large areas of rural populations have single house treatment systems which can be 30-40 years old. However, alternative options would also be considered and a more cost effective solution may be to install/upgrade septic tanks rather than connect to the public sewer. Work undertaken in the Republic of Ireland portion of the North Western IRBD calculated that costs were significantly lower to upgrade septic tanks than connect to the public sewer.

14.36 Measure No. 16 is part of a UK-wide proposal to remove phosphates from laundry detergents, led by Defra. Northern Ireland Water (NIW) estimates the cost of phosphate removal at waste water treatment works (WWTWs) is now in the order of £600K annually. If this measure was be implemented then this cost could be saved.

14.37 Phosphorus levels in Northern Ireland rivers remain high. In 2008, 15.4% of monitored length of river in Northern Ireland had an annual mean greater than 0.1 mg/l of Soluble Reactive Phosphorus. This is above the level in UK guidance when action is required to rectify rivers that may be sensitive to eutrophication.

14.38 NIEA confirmed that there are no discharge consents issued for the manufacture of domestic laundry cleaning products (DLCPs) in Northern Ireland. On the basis that manufacturers in Northern Ireland are not producing DLCP's containing phosphate, legislation banning the sale of phosphate compounds in DLCP's in the UK, should have no impact or additional costs for manufacturers in Northern Ireland.

14.39 A detailed literature review was undertaken as part of the UKWIR/SNIFFER/UKTAG programme of work to determine and quantify key sources of phosphorus from domestic inputs. A combination of marketing data, scientific data and information on product formulations was used to apportion domestic phosphorus loads to sewer. Human inputs via faeces and urine dominate domestic loads of phosphorus to sewer, with main contributions from dairy products, meat and cereals. Laundry products (including phosphonates) account for approximately 18% of the phosphorus load. Including phosphorus in dishwashing detergents increases the overall loads from detergents to 25%.

14.40 Given these percentages, the reduction in phosphate from this measure alone will not significantly alter compliance with objectives but together with other reduction measures it is an important step in improving water quality.

14.41 For the water sector, one would expect the control of phosphates in DLCPs to have the following impacts:

- Reduce the size or need for additional treatment processes to remove phosphate at sewage treatment works;
- Reduce the amount of ferric salt manufacture, transport, storage and dosing needed at WWTW;
- Reduce the number and size of sand filters that may be necessary to remove the ferric contents in effluent after the phosphate removal in order to comply with ferric consents in the water environment;
- Reduce the amount of carbon and energy use by the water industry needed to remove the phosphates in the wastewater and to operate any additional sand filters;
- Reduce the water industry's carbon footprint relating to the embedded carbon in the construction materials of ferric dosing processes and sand filters; and
- Reduce operational carbon from chemical dosing, energy use and transport.

14.42 The resultant reduction in the use of resources for sewage treatment will reduce costs and the environmental impact of the treatment process. This will help the water industry cope with increasing water and detergent use as the number of household increases. The measure would also apply the polluter pays principle in stopping pollution at source.

14.43 The costs of reducing levels of phosphates in laundry detergents has been borne by the manufactures to date, though this could in theory be passed on to the consumer of the detergents. The costs to the manufacturing industry for this measure are not likely to be significant, given that only 10-17%, of the industry still uses phosphates.

14.44 The preliminary Cost Effectiveness Analysis (pCEA) of the WFD stated that the most cost effective way of achieving a reduction in phosphates in water was to place controls on phosphates in domestic laundry cleaning products. The estimated cost to the detergent industry of implementing the measures, as set out in the Defra Impact Assessment, is £4m. Whilst the estimated cost to the water industry of removing detergent-related phosphates from the water at treatment works is at least £5m and may be as much as £14m. Potential associated savings may be realised by Northern Ireland Water as less demand will be made on its wastewater treatment works to remove phosphates.

14.45 One would also expect the measure to reduce the amount of phosphate from diffuse urban sources that enters surfaces water and combined sewer systems through misconnection of washing machines and dishwashers.

14.46 It is worth noting that the benefits of any ban on phosphorus detergents in laundry products would be eroded by time as increasing dishwasher usage leads to increased input of phosphate-phosphorus to WWTWs from this source (assuming the phosphorus content of dishwasher detergents remains the same as now). Extracts for the recent UKWIR and SNIFFER/UKTAG research (2008) states that:

> *"The current ownership of automatic dishwashers is relatively low (36% based on 2006 data) compared with washing machines present in domestic households (over 95%). However, household ownership of dishwashers is increasing significantly with time (Waterwise figures estimate ownership is set to rise to 40% of homes by 2015) and so the input of phosphorus from this source is set to increase in the future".*

14.47 Therefore there may well be justification for extending the ban to cover dishwasher detergents in the future.

14.48 The formulation and implementation of Measure No. 17 to strengthen controls within development area plans is in its early stages. NIEA is yet to plan the work to study the potential compliance costs. In principle, planning authorities could be impacted in making their development decisions. A developer could be impacted if land purchased subsequently gets categorised as a "red zone". In this case the value of the land purchased may fall as development would be restricted.

14.49 Work is yet to start on estimating the compliance costs in relation to Measures No 38 and 39.

14.50 As part of measure 39 an awareness programme will issue new guidance, the aim of which is to raise standards for septic tank design, installation and maintenance. Around 2,000 new applications per year will be required to meet the guidance. These are single householders. Work on the guidance is yet to start therefore compliance costs are yet to be assessed.

## Benefits

14.51 Strategic Environmental Assessment work to support RBMPs in Northern Ireland has identified broad benefits in relation to improving sewer connections, reducing the risks from septic tanks and reducing phosphates in detergents.

14.52 In general, a reduced risk of pollution from poorly planned and / or designed sewerage systems will have indirect positive impacts for biodiversity, human health and population through improved water quality.

14.53 The installation of on-site systems in a consistent manner, and in line with a code of practice and an enforcement system will ensure that the intended level of treatment is achieved, contributing positively to sustainable development. The expected improvement in water quality resulting from these alternatives could have significant positive cross-sector impacts, for instance, in terms of water dependent sectors such as tourism, which depend on good water quality both for consumption and recreational uses (e.g. bathing water, fisheries).

14.54 The increased use of phosphate-free detergents would result in a direct positive impact in terms of water quality and an indirect aquatic biodiversity impact through reduced eutrophication of water bodies. In general, an indirect positive impact across most of the other environmental topics is also likely. In particular, an indirect positive impact to human health would be expected due to the reduction in potential for eutrophication, which could impact on availability of water supplies. Biodiversity may also be indirectly impacted as changes in nutrient composition of some waters could result in a change in species composition, and thus the food chain, where phosphorus is currently abundant. Whether this would be a negative or positive impact is dependent on the current species composition.

14.55 Whilst the water industry will still be required to enhance some works to incorporate specific phosphorus removal there are cost savings to be made by reducing the influent concentration of phosphorus.

14.56 The reduction of phosphate going into sewage treatment plants will reduce the amount of phosphate that sewage treatment plants have to remove, therefore reducing the amount of energy and chemicals (mainly Ferric Chloride) that water companies have to use (see *A Review of Potential Cost Savings to Industry should phosphates be removed from domestic laundry cleaning products,* Atkins study for Defra, 2008).

14.57 It should be noted that phosphate-free detergents are currently available for purchase from some retailers. The effectiveness of this alternative would be directly related to whether an awareness programme is instituted in parallel to educate the public on the benefits of using phosphate-free products. As with any change in product use there may be minor cost implications to individuals; however, these may be offset by the reduction in requirement for new infrastructure to deal with existing nutrient loads from unsewered properties. This alternative has the potential to result in positive impacts.

14.58 The Draft RIA for the WFD (2007) estimated the monetary benefits of meeting various proposed UKTAG standards for rivers in Northern Ireland. In the report Option 1 was to "do nothing". Option 2 comprised the UKTAG standards in their final report to the UK Administrations (August 2006) that are the best available scientific view of the environmental standards and conditions that will protect ecology in the UK water bodies, and therefore ensure compliance with the WFD. Table 14.1 is a summary of the estimated benefits of selected Option 2 standards relevant to improving wastewater discharges.

**Table 14.1 – Summary of potential present value benefits by standard under Option 2, Scenario 3* for Northern Ireland (£ million, 2006), discounted at 3.5% over 30 years starting in year 2015)**

| Standard | Type of benefit | Option 1 | Option 2 |
|---|---|---|---|
| Rivers BOD/DO | Angling | 22 - 180 | 13 – 160 |
| Rivers P | Non-use value | 6 | 6 |
| Rivers Ammonia | Angling | 3 - 27 | 11 – 91 |
| Lakes DO | Angling | No standard | 0.7 - 4 |

* Scenario 3 assumes that measures are taken to achieve good status in 100% of water bodies where there is confidence that standards are failed.

14.59 The above Defra figures are based on a whole range of Measures to meet UKTAG targets, not just the Measures under consideration in this Strategic RIA. However, they should act as a guide on possible later work on quantifying benefits once the details of the measures have been decided.

14.60 The benefits of implementing Measure No. 12 will be assessed formally at a later date as part of the RIA for the Classification Regulations. The accompanying mathematical models need to be established as the first step towards understanding the benefits and disbenefits of their application more firmly. During interview NIEA staff estimated that, as a rule of thumb, 30% of all river pollution in Northern Ireland comes from point sources and 70% from diffuse pollution. By reducing the amount of pollution from point sources, e.g. sewer outfalls, WFD requirements will be met. However, pollution from diffuse sources is more dominant so the measure will not achieve WFD requirements across the board, but it will contribute. As well as improving water quality, if the catchment models allow consenting on a catchment basis, there is the possibility that treatment costs and intensity across different discharges could be optimised across a catchment area. Less intensive treatment can reduces energy requirements and associated greenhouse gas emissions.

14.61 If the relevant legislation is enabled NIEA can recommend that Northern Ireland Water is compelled to provide sewerage connection to the general public. Benefits of improved water quality will be felt

in localised areas and so affect discreet populations. It is likely that householders would appreciate not needing to operate septic tanks. The extent of the work required to assess the benefits of the Measure has not been established at this stage. It is likely that a range of options to pursue a greater uptake in connections to main sewers would be assessed.

14.62 An informal and preliminary costing by NIEA estimates that there are presently 80,000 unlicensed septic tanks across Northern Ireland that would be upgraded under the Measure. The Measure will work alongside, and in conjunction with, other Measures aimed at improving the quality of the environment from diffuse pollution measures from industrial point sources and diffuse pollution sources. The measure on its own might not be enough to meet the requirements of the WFD in isolation, though in certain specific locales it could be. This has not yet been quantified. A long-term view is that once all the septic tanks are discovered and mapped then a correlation with water quality would be helpful in understanding the benefits fully. The assessment would likely identify which unlicensed tanks would be need to be upgraded and prioritise those that did.

14.63 Measure No. 15 is in its early stages of formulation. A strategy for enforcement implementation has yet to be developed therefore benefits cannot yet be estimated. The work of the Higher Scientific Officer will establish estimates of the benefits.

14.64 The benefits of reducing levels of phosphates in laundry detergents for the water industry for Measure No. 16 are anticipated to be greater in Northern Ireland than in England and Wales as there are a much larger number of small sewage treatment works in Northern Ireland. The benefits to NIW of not spending £600k per year (as mentioned earlier) would be realised which could be passed on to the consumer through lower water bills,

14.65 The benefits of reducing/eliminating phosphates in DLCP should not be seen in isolation. The benefits arise from the role that controls on phosphates in DLCP play in a wider strategy to manage phosphates in catchments, with the majority of control having to be undertaken or borne by the Water Industry and Agriculture. Any benefits cannot be delivered by action by one sector alone. Analysis done in the pCEA indicates that controls on phosphates in DLCP should play a role in the overall nutrient programme of measures. The extent of that control is a question that is addressed in the River Basin Management Plans for each RBD, since they will decide how quickly progress is made towards good ecological status.

14.66 The Environment Agency estimated that 170km of the 50,000km of river water bodies in England and Wales would be improved to Good Ecological Status by taking this action on phosphorus. At £22,450 per km per year (WFD benefits figures range from £42.6k/km/yr – £13.3k/km/yr) this would give a benefit of £3.8 million per year.

14.67 Small and medium-sized enterprises (SMEs) make up only a small or negligible proportion of DLCP manufacturers containing phosphates.

14.68 The formulation and implementation of Measure No. 17 to tighten restrictions on development area plans is in its early stages by the development of maps incorporating a “traffic light system”. NIEA is yet to plan the work to quantify the potential benefits.

# 15. Sector: Urban Development

## Pressure: Diffuse and Point Source Pollution

### Background

15.1 Whilst this section is entitled urban development it is equally relevant to development in what are primarily rural areas.

15.2 Rain water, falling upon impermeable surfaces (roads, pavements, yards and roofs), washes pollutants into the drainage system ultimately finding their way to the water environment. Sustainable drainage systems (SUDS) are a vital tool that can be used to reduce both pollution and the quantity of run-off. They mimic a more natural water cycle using a number of techniques including:

- reducing the area of impermeable surfaces to allow infiltration at source; and
- using systems such as artificial ponds or wetlands to allow for some treatment and attenuation before the runoff is discharged back into the water environment.

15.3 Many everyday products are used increasingly often in rural and urban households (for example medicines and cleaning products) which contain a wide range of chemicals that may be harmful to our water environment. There are many potential sources including regulated, unregulated or accidental releases such as:

- contamination from applying pesticides to recreational areas, roads, paths, railways or gardens; and
- accidental misuse or inappropriate disposal of products.

15.4 In addition, misconnection between the sewerage system and surface water drains may result in untreated wastewater entering the environment, rather than going to wastewater treatment works. Incorrect plumbing could mean that wastewater from dishwashers, washing machines, sinks, baths and even toilets is flushed directly into a local river.

15.5 The key pollutants from urban drainage are:

- sediment (e.g. soils, grit and silt) washed off the streets during heavy rain and from construction sites;
- nutrients, organic matter, ammonia and faecal pathogens – associated with misconnection of sewers into surface water drains, sewer chokes and discharges, and faeces from pets and urban wildlife; and
- toxic substances (oils, toxic metals, rubber, and exhaust particles from motor vehicles), spillages and leaks from oil and chemical stores, disposal of waste materials such as paints, oils, lubricants and pesticides.

15.6 There are other environmental impacts associated with the volume of water which flows from urban areas:

- flooding is exacerbated by the rapid run - off of rain from impermeable urban surfaces; and
- run-off to combined sewers exacerbates sewage pollution by causing storm overflows to operate more frequently and sewers to discharge.

# Programme of Measures

## Basic Measures

## Legislation

15.7 Several pieces of legislation control potential pollution arising from activities of this sector including:

- The Water (Northern Ireland) Order 1999;
- Groundwater Regulations (Northern Ireland) 1998;
- European Community Regulation on Registration, Evaluation and Authorisation of Chemicals (REACH) (EC 1907/2006);
- Food and Environment Protection Act 1985 (FEPA); and
- The Control of Pesticides Regulations (Northern Ireland) 1987.

15.8 The legislation is covered in detail in the key sectors on Industry & Other Businesses and Agriculture.

15.9 The *Roads (Environmental Impact Assessment) Regulations (NI) 1999* implement the European Council Directive 97/11/EC of 3rd March 1997 on the assessment of the effects of certain public and private projects on the Environment, in respect of those proposals to construct new roads and to improve new roads to which the Directive applies. The Regulations follow closely the provisions of the corresponding regulations in operation in Great Britain.

## Policy and Best Practice

15.10 In exercising development control Strategic Environmental Assessment work to support the River Basin Management plans in Northern Ireland has identified broad benefits in relation to improving water resources.

15.11 NIEA encourages the use of SUDS in all responses to planning and permitted development applications. SUDS are promoted in the DOE Planning Service Planning Policy Statement 15 (PPS 15) titled 'Planning and Flood Risk'. PPS15 provides information about the principles underpinning SUDS and the possible advantages it may offer in alleviating flood risk in Northern Ireland.

15.12 In relation to new road construction and development the Roads Service has designed SUDS into several new road systems. Current guidance promoted includes 'The SUDS manual' on design and construction standards. This manual provides best practice guidance on the planning, design, construction, operation and maintenance of SUDS to facilitate their effective implementation within developments. SUDS will be embraced, for the regulation of storm drainage, for all new motorways, dual carriageways and improvements to roads of that standard and above, where technically and economically feasible.

## Guidelines

15.13 There are a range of Pollution Prevention Guidelines (PPG) that have been produced jointly by agencies across the UK, that relate to the control of pollution in urban areas including activities relating to construction and domestic properties.

15.14 NIEA general guidelines have been produced to prevent pollution at home and good general practices should be observed in the domestic environment including oil tanks /boilers and connections to sewers. General guidance on pollution prevention can be obtained from the Pollution Prevention Pays series of publications.

15.15 The NIEA Oil Care Campaign exists to help people avoid causing oil pollution incidents and aims to minimise the environmental impact of oil and fuels throughout their lifecycle, by promoting safe

practices for handling, delivery and storage of oil and the proper collection of used oil. A number of Oil Care Campaign advisory publications are available.

15.16 The Health and Safety Executive Northern Ireland promote guidance on the safe disposal of pesticides used for non-agricultural purposes through their Approved Codes of Practice including 'The safe use of pesticides for non-agricultural purposes'

### Additional Measures for urban development

| | | |
|---|---|---|
| URBAN DEVELOPMENT | 18 | Draft Strategy to manage stormwater using SUDS |
| | 19 | Strategy for better management of misconnections |
| | 20 | Development of an extended regulatory toolkit for diffuse pollution |
| | 21 | Update diffuse pollution screening and modelling tool (same measure as 26 and 10) |
| | 22 | Good practice for the storage and handling of hazardous chemicals |

## Administrative Costs

#### Additional Measure No. 18

15.17 Significant work on identifying costs, or savings, is yet to start.

15.18 Development of the Measure is still at the consultation stage before being presented to the Northern Ireland Assembly (NIA) Environment Committee.

#### Additional Measure No. 19

15.19 NIEA cost estimates indicate that 0.25 FTE Higher Scientific Officer and 2.25 FTE Scientific Officer will be required at a cost of £202.8 k between 2010 and 2013.

#### Additional Measure No. 20

15.20 The costs of this measure are yet to be assessed. The work will be in conjunction with work carried out under Measure No. 24.

#### Additional Measure No. 21

15.21 This will be carried out under the same budget as Measure No. 10.

#### Additional Measure No. 22

15.22 No additional cost anticipated in relation to this Measure. There is an existing team of three people (although only a small amount of their time is spent on this).

## Compliance Costs

15.23 Measure No. 18 is in the infancy of its development. The corresponding consultation will be finished by 16 October. The work will then be taken to the NIA Environment Committee in December 2009. No firm dates have been set for the implementation of the measure. Data is available to calculated anticipated compliance costs but the assessment work is yet to be carried out. Anticipated external stakeholders who will bear costs brought in by the introduction of SUDS will be developers, local authorities, Department for Regional Development, Northern Ireland Water and owner/occupiers.

15.24 Measure No 19 will develop a strategy for improving misconnections to storm water sewage. The subject matter is complex and at an early stage of development. Consequently compliance costs are yet to be established. An aim of the measure is to work with other bodies such as Northern

Ireland Water in a strategic approach to educate the polluter and in particular plumbers who make the misconnections.

15.25 Measure No. 20 is in its early stages of development. Compliance costs are not yet understood as they will be dependant on who will be regulated by the General Binding Rules and how. Compliance costs could fall on a wide range of stakeholders including industry, business, local authorities and householders.

15.26 Measure No. 21 is the development of a screening and modelling tool. The output from the tool to will allow NIEA to take a wider look at the potential diffuse source contributions from other sectors such as amenity and recreational sectors and the transport sector. The measure itself will further understanding for other areas of work but will not impose compliance costs in itself.

15.27 Measure No. 22 is to promote and adopt good practice with respect to the storage and handling of hazardous chemicals. No information has come to light in terms of anticipated compliance costs.

## Benefits

15.28 Measure No. 18 is in the infancy of its development. The introduction of SUDS is one of a range of measures to reduce the impacts of sewerage on the environment. The measure will include improvements in the quality of surface runoff waters and contribute to a reduction to the risk of flooding in a managed way. No significant work on establishing the benefits has been carried out to date. The impact will depend on the extent of the implementation of the measure.

15.29 Measure No. 19 will develop a strategy for improving misconnections to storm water sewage. The subject matter is complex and at an early stage of development. No significant work on estimating the benefits has been carried out to date. The Measure will develop a strategy for improving misconnections to storm water sewage. An aim of the measure is to work with other bodies such as Northern Ireland Water in a strategic approach to educate the public and in particular plumbers who make the misconnections. Where identified and acted upon this will stop the problem at an individual source but will be very difficult to completely eradicate the problem.

15.30 Measure No. 20 is in its early stages of development. Benefits are not yet understood as they will be dependant on who will be regulated by the General Binding Rules and how they are applied. In general reducing diffuse pollution will give rise to an overall positive affect on water quality, biodiversity and soils. Stricter controls on diffuse discharges may also require alternative disposal options to be implemented with indirect negative impacts on air quality and climate if additional transport is required or alternative methods of disposal result in air emissions

15.31 Measure No. 21 is the development of a screening and modelling tool. The output from the tool to will allow NIEA to take a wider look at the potential diffuse source contributions from other sectors such as amenity and recreational sectors and the transport sector. The measure itself will further understanding for other areas of work but will not bring benefits in itself.

15.32 Measure No. 22 is to promote and adopt good practice with respect to the storage and handling of hazardous chemicals. The prevention of localised pollution incidents has wider catchment-wide implications as polluting chemicals which cause more severe incidents, such as fish kills, will not migrate downstream. The change in the number of incidents can be costed and the benefits derived. This data is currently available to NIEA but is yet to be analysed.

# 16. Key sector: Forestry

## Pressure: Diffuse and Point Source Pollution

### Background

16.1 Forests and woodland cover 6% of Northern Ireland's land area, with public woodland accounting for 70% of woodland. They provide a wide range of social, economic and environmental benefits, including biodiversity and recreation, and an alternative energy source. In recognition of this the government's target is to increase this figure to 12% over the next 50 years.

16.2 Today there are 86,000 ha of forests, of which the Department of Agriculture and Rural Development (DARD) owns three quarters. Most of this forest is concentrated in the uplands in the north and west of Northern Ireland and is managed by the Forest Service, an Agency of DARD. DARD has published a target for new afforestation of an additional 1,500ha by 2008 at an annual rate of 500ha (DARD, 2006).

16.3 Negative impacts on the water environment from forestry are often local issues, due to poor management practices such as inappropriate deforestation. These practices give rise to:

- Nutrient enrichment from forest activities introducing extra nutrients which can lead to eutrophication;
- Sedimentation from road construction and harvesting operations which cause erosion and sedimentation on susceptible soils. Mobile sediments impact on water quality and can damage sensitive areas;
- flow pattern changes: the amount of water reaching the soil surface is reduced by evaporation of water intercepted by the canopy, and clearfelling of forests may lead to a change in flow patterns; and
- pesticide contamination through incorrect application of pesticides may result in contamination of waters.

### Basic Measures

The Forestry Act (Northern Ireland) 1953

16.4 This Act establishes statutory responsibility for promoting the interests of forestry, afforestation, production and supply of timber and the maintenance of adequate reserves of growing timber.

Environmental Impact Assessment (Forestry) Regulations

16.5 The Forest Service implements Environmental Impact Assessment (Forestry) Regulations (NI) 2006, carrying out environmental impact assessments on projects relating to afforestation, deforestation, forest roadworks and forest quarries. Most forestry projects are eligible for grant aid, so Forest Service is notified that a development is intended. The regulations require Forest service to formally consult with the Northern Ireland Environment Agency (NIEA) in relation to forestry projects.

The Control of Pesticides (Amendment) Regulations (Northern Ireland) 1997

16.6 Prior to the aerial application of pesticides within 250 m of a watercourse, consultation with the water regulatory authority is legally required under the Control of Pesticide Regulations.

16.7 Other Legislation includes:

- Groundwater Regulations (Northern Ireland) 2009;

- The Water (Northern Ireland) Order 1999;
- Food and Environment Protection Act 1985 (FEPA); and
- Plant Protection Products Regulations (Northern Ireland) 2005.

Codes of Practice & Guidelines

Northern Ireland Forestry – A Strategy for Sustainability and Growth

16.8 Legal responsibility for forestry lies with the Forest Service, Department of Agriculture and Rural Development (DARD). Northern Ireland Forestry – A Strategy for Sustainability and Growth confirms forest policy and implementation strategy.

The UK Forestry Standard

16.9 The UK Forestry Standard sets out criteria and standards for the sustainable management of all forests and woodlands in the UK and are the basis for forest monitoring. The UK Forestry Standard is currently being revised and will be supported by a suite of new guidelines.

The Forest and Water Guidelines

16.10 The Forest and Water Guidelines (substantially revised in 2003) set out the environmental principles and standards required in relation to water quality issues.

UK Woodland Assurance Standard

16.11 The Forest Service and some private forestry interests are certified under the UK Woodland Assurance Standard, which is endorsed by the Forest Stewardship Council and assessed by third-party audit. Private woodlands are subject to the requirements of the UK Forestry Standard; about 3,500 ha of private woodland have also been certified under the UK Woodland Assurance Standard, bringing the total of woodland certified in Northern Ireland to 75%.

Guidance Paper - Application of Sewage Sludge to Forestry Land

16.12 This paper details the technical, scientific and environmental factors which should be taken into account when considering the application of sewage sludge to forests in Northern Ireland. It has been prepared by DARD, Forest Service and Agri-Food and Biosciences Institute (AFBI). It should be read in conjunction with Forestry Commission Information Note FCIN079, Use of Sewage Sludges and Composts in Forestry. The paper identifies suitable soil types within Northern Ireland for sewage sludge applications that are consistent with those specified by the Forestry Commission Information Note. It also sets out maximum rates of fertilisation that will meet the nutrient demand of trees. These rates are based on current fertilisation practices operational within Northern Ireland.

Woodland Grant Scheme

16.13 All proposed Woodland Grant Schemes must comply with the UK Forestry Standard and Guidelines including the Forests and Water Guidelines. Special conditions may apply where planting is proposed within sensitive water catchment areas following consultation with NIEA. Grants are conditional on such conditions being met.

Environmental Guidelines for Timber Harvesting

16.14 Timber harvesting, particularly clearfelling, has the potential to have a more significant impact on the environment than other forestry operations. Sound operational practice and cost-efficiency must be combined with care for the environment. These guidelines are intended to assist forest managers, harvesting managers and contractors to organise and carry out felling and extraction operations in a planned, environmentally sensitive manner. Adherence to the guidelines will contribute to sustainable forest management.

16.15 These existing measures are expected to prevent further deterioration in status.

## Additional measure for forestry

| | | |
|---|---|---|
| FORESTRY | 23 | Reduce nutrient loading from forestry in sensitive areas |

16.16 NIEA staff will work with forestry colleagues to address the issue of nutrient enrichment of watercourses due to forestry practices, and in particular in sensitive areas or protected areas.

16.17 Work will involve the assessment of where further action needs to be taken and the most effective means of achieving improvements. The aim is to then

- to introduce more stringent actions for the most sensitive areas, when scientific evaluation establishes a need. For example, nutrient loading could be reduced in sensitive areas by the phased felling of smaller crops rather than felling a large forest block all at once;
- to develop maps indicating where forests should be developed taking account of sensitive and protected areas.
- to ensure that future development is undertaken strictly within statutory regulations, water protection guidelines and codes of practice so that forests will have little or no impact on water quality. That applies especially in environmentally sensitive areas, with a need to limit nutrient and sediment losses and acidification; and
- to assess operations posing a significant threat to water quality on a whole catchment basis.

16.18 The Strategy for Sustainability and Growth already provides a road map for addressing potential difficulties, for example, current unregulated felling and regeneration of forests will be addressed through the introduction of new regulations compelling forest owners to manage their woods with greater consideration to sustainability, including the timing and extent of felling and the composition of regenerating woods.

### Administrative costs

16.19 One member staff 100% FTE HSO Level £ 40.4k per year for three years at a total cost of £121,200.

### Compliance costs

16.20 Measures and actions leading on from this work will impact upon the forestry sector: both publicly and privately owned plantations as well as the associated saw-milling and processing industries through small changes in practice and the application of good practice.

### Benefits

16.21 Aside from the protection of sensitive areas and direct improvements in water quality, there will be benefits associated with forests and woodlands. The annual benefits of the forestry programme are valued at £18 million from value added in timber processing, £1 million in visitor benefits and additional non-monetary benefits to the environment achieved for a cost of £15.3 million net of timber sales and visitor receipts.

16.22 Forests are also more recently being recognised for their role and value in flood alleviation, sediment and nutrient management, which will be significant at the local scale.

# 17. Sector: Industry and Other Business

## Pressure: Diffuse and Point Source Pollution

### Background

17.1 Northern Ireland has traditionally had an industrial economy, most notably in shipbuilding and textiles. The food and drink sector is now Northern Ireland's largest manufacturing industry. The sector employs over 18,000 people with over 330 processing companies. Other large sectors in Northern Ireland include the electrical and electronics sector and the transport equipment sector. The aquaculture industry in Northern Ireland has grown to be an increasingly successful economic sector. At present there are over 100 licensed aquaculture sites.

17.2 The majority of industry is concentrated in industrial estates on the outskirts of Belfast and Londonderry/Derry and other large towns within Northern Ireland. However there are areas where industry is located in more isolated areas. Major industrial estates contain a wide range of businesses from food processors, chemical manufacturers and fuel depots to car washes. Several small streams may flow through these sites and drain into a river, which can be continually affected by various types of pollution from the industrial estate. Within industrial estates drainage networks can often be complex and in many cases small streams are culverted. As new sites are developed and premises change ownership, it is increasingly difficult to locate storm systems, foul sewers, and streams. Companies may not be aware that their drainage is causing pollution, therefore tracing the source and cleaning up becomes difficult when a pollution incident occurs. Industrial sites may also be located in areas where groundwater is vulnerable to inputs of pollutants from spills, leaks or inappropriate disposal.

17.3 Industries which discharge directly to waterways are controlled by the Northern Ireland Environment Agency (NIEA) either through Water Order consent or through a Pollution Prevention and Control (PPC) Permit. Other industries discharge effluent to the public sewer and come under the control of Northern Ireland Water.

17.4 In 2006, industry accounted for 23.2% of substantiated water related pollution incidents. Water pollution associated with industrial premises arises from inadequately treated effluents which can contain:

- Organic matter and ammonia;
- Nutrients;
- Toxic dissolved metals;
- Suspended solids; and
- Hazardous organic chemicals.

17.5 The main water pollution types associated with industrial premises include oil, sewage, chemicals and fine sediments. In addition, certain types of effluent may cause an increase in the temperature in the receiving water.

### Programme of Measures

#### Basic Measures

17.6 Several pieces of legislation control potential pollution arising from activities of this sector.

17.7 Under the *Water (Northern Ireland) Order 1999* (the Water Order) it is an offence to discharge trade or sewage effluent to waterways or water in underground strata without the consent of the

Department of the Environment. NIEA administers a system of discharge consents which lay down conditions relating to the quality and quantity of effluent that may be discharged. Numerical limits may be placed on a variety of parameters such as Biochemical Oxygen Demand, Dissolved Oxygen, trace metals, temperature, suspended solids, pH, and visible oil and grease. Failure to comply with the conditions of a discharge consent is an offence under the Water Order, and, if a discharge is non-compliant, appropriate action is taken by NIEA, depending on compliance history and/or the severity of the breach of consent and its effect on the environment.

17.8 *The Pollution Prevention and Control Regulations (Northern Ireland) 2003* control the operation of any installations or mobile plant carrying out activities listed in Schedule 1 of the Regulations. Industries that require regulation under the PPC Regulations include food processing industries, chemical manufacturers, power plants and intensive agricultural operations. Permit conditions for each installation are set in a similar fashion to Water Order Discharge Consents so as to achieve a high level of protection for the aquatic environment.

17.9 Industries that discharge trade effluent to sewer are regulated by Northern Ireland Water under the *Water and Sewerage Services (Northern Ireland) Order 2006*. Northern Ireland Water administers the system of trade effluent discharge consents and applies standards or restrictions to the composition, strength and flow and of consented discharges. Ultimately discharge of treated water from wastewater treatment works is controlled by Water Order consents

17.10 The *Groundwater Daughter Directive (2006/118/EC)* (GWDD) seeks to protect groundwater by preventing the direct discharge of certain hazardous substances and subjecting the discharge of other substances to an authorisation procedure.

17.11 *European Community Regulation on Registration, Evaluation and Authorisation of Chemicals (REACH) (EC 1907/2006)* is a new Regulation on chemicals and their safe use. REACH aims to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. It will make those who place chemicals on the market responsible for understanding and managing the risks associated with their use. The REACH Regulation will be implemented progressively over a number of years in Northern Ireland with the most hazardous, high volume substances addressed first. Risks to the environment and human health will be identified and, where necessary, controls will be put in place to ensure a high level of protection. This will result in a reduction in the environmental burden of hazardous chemicals and will make a significant contribution to the delivery of good chemical status under the WFD.

17.12 *Under the Fisheries Act (Northern Ireland) 1966* the Department of Agriculture and Rural Development are responsible for the licensing of fish and shellfish farms in Northern Ireland. Licences provide a demonstrably open, participative and effective system of control within the aquaculture sector and guarantee good standards of practice in relation to environmental impact.

17.13 Any application for a fish culture licence in respect of a marine fish farm (excluding shellfish) will be subject to the provisions of the *Environmental Impact Assessment (Fish Farming in Marine Waters) Regulations (Northern Ireland) 1999* where any part of the proposed development: is in a sensitive area, is designed to hold in biomass of 100 tonnes or greater or will extend to 0.1 hectare or more of the surface area.

17.14 In Northern Ireland the Department for Enterprise, Trade and Investment (DETI) grant prospecting and mining licences for exploration and development of minerals. Planning permission for mineral development is also required under the planning system. Applications for all new mines and quarries above a size threshold require an Environmental Impact Assessment under the *Environmental Impact Assessment Regulations (Northern Ireland) 2007*. Under these regulations an Environmental Statement must accompany a planning application which assesses the environmental, social, cultural etc. impacts of the proposed extraction.

17.15 In Northern Ireland a *Review of Old Mineral Permission (ROMP)* for quarries and mines under the *Planning Reform (Northern Ireland) Order 2006* is providing better information about these sites

and their environmental impact. Provisions have been included in the Planning Reform Order that require owners and operators currently holding planning permissions for quarries in Northern Ireland to submit updated versions of the planning conditions attached to those permissions to Planning Service. The Department of the Environment (DOE) have powers to review mineral permissions which may result in the setting of new environmental standards as conditions of existing planning permissions. ROMP can also require an Environmental Impact Assessment to be carried out on mineral sites under the Environmental Impact Assessment Regulations.

## Codes of Practice and Guidelines

17.16 There are a range of Pollution Prevention Guidelines (PPG) that have been produced jointly by agencies across the UK, that relate to the control of pollution from industry.

17.17 Contingency Planning Guidance notes have been drawn up to assist in the development of site specific pollution incident response plans to prevent and mitigate damage to the water environment caused by accidents such as spillages and fires i.e. Pollution incident response planning PPG21. The Control of Major Accident Hazards Regulations (NI) 2000 also requires certain sites to prepare more detailed pollution incident response plans.

17.18 The Environmental Code of Practice for Aquaculture Companies and Traders (ECOPACT) Initiative was launched in Northern Ireland in November 2004 and was developed to bring about the widespread adoption of Environmental Management Systems into the aquaculture industry to provide a strong basis for fish farmers and associated businesses which impact positively on their communities and the environment.

17.19 NIEA regularly carry out proactive pollution prevention work and inspection and enforcement work targeted at industries that are non-compliant. Numerous targeted surveys have been carried out in order to investigate potential pollution pathways, provide advice on pollution prevention and instigate legal proceedings where pollution incidents are discovered and traced. Surveys can cover a very significant and expanding area. Liaison, follow up work and further site visits are required to ensure that companies take appropriate action to minimise long term pollution risks.

## Voluntary Schemes and Guidance

17.20 A UK-wide Levy was introduced on the commercial exploitation of aggregates in recognition of the environmental damage caused by their extraction. In Northern Ireland a voluntary Aggregates Levy Credit Scheme (ALCS) was created whereby aggregate operators can avail of an 80% reduction in the Levy. On joining the ALCS operators sign a legal agreement to comply with all regulatory requirements and to carry out environmental improvements identified by the DOE, following periodic review. On joining the Scheme operators receive a Code of Practice and Audit Protocol which identifies the type of environmental requirements needed to remain within the Scheme.

17.21 Guidance for the Wise use of Water in the Aggregates and Quarry Products Industry has been jointly produced by NIEA and the Quarry Products Association of Northern Ireland.

## Education and Awareness

17.22 NIEA has established a number of industrial sector working groups aimed at improving compliance with Water Order discharge consents. These groups include quarry operators, sand and gravel extractors, fish farm and hatchery owners and peat bog extractors. NIEA also works in partnership with Invest NI to raise awareness of consent compliance and wider environmental protection issues through workshops, seminars and publications.

## Additional Measures for industry and other business

| | | |
|---|---|---|
| INDUSTRY AND OTHER BUSINESS | 24 | Development of an extended regulatory toolkit for diffuse pollution |
| | 25 | Review of consents for point discharge controls |
| | 26 | Update diffuse pollution screening and modelling tool (same measure as 21 and 10) |

## Administrative Costs

### Additional Measure No. 24

17.23 Significant work on identifying costs, or savings, for this Measure has not yet been started. It is part of the same work being carried out under Measure No. 20.

17.24 There is a potential cost saving in that discharge consents may be partly replaced by the GBRs.

17.25 Costs would depend on who and what is chosen for regulation under the GBRs. A Regulatory Impact Assessment (RIA) would be the normal mechanism for assessing the costs.

### Additional Measure No. 25

17.26 A costing spreadsheet supplied by NIEA indicates that work on developing the SIMCAT model will fall under this Measure at £180 k between 2010 and 2013.

17.27 The costs of processing consent applications are already covered by the fees paid during the application process.

17.28 There is a £30 fee chargeable for the review of a consent licence, but it has not yet been decided if the consent holder should be charged because of the review process to implement the Measure.

17.29 The review of consents will be completed using existing resources.

17.30 Recurring costs are met by charges payable by the applicant.

17.31 Funding will be met from normal departmental running costs and application fees charged to the applicants.

17.32 In order to establish firmer costs the number of licenses that would be reviewed needs to be established. However, in principle, it should be a case of “the polluter pays”.

17.33 No anticipated cost-savings have been identified as a result of the Measure.

### Additional Measure No. 26

17.34 This will be carried out under the same budget as Measure No. 10.

## Compliance Costs

17.35 Measure No. 24 is in its early stages of development. Compliance costs are not yet understood as they will be dependant on who will be regulated by the General Binding Rules and how. Compliance costs could fall on a wide range of stakeholders including industry, business, local authorities and householders.

17.36 Compliance costs attributed to Measure No. 25 will depend on the number of licenses that would be reviewed and how that review is funded. A decision is yet to be made whether it would be considered unfair to charge the consent holder for a review of their consent (even though the consent has already been paid for) or, whether the principle of “the polluter pays” should take precedence.

17.37 It is assumed that costs for changing standards will be captured as part of the RIA for the Classification Regulations.

17.38 Measure No. 26 is the development of a pollution model and screening tool to better understand diffuse pollution. The development of the tool will not impose a direct cost to external stakeholders by itself. Under Measure No. 26 the application of results from the tool will be aimed at "industry and other business" including "amenity and a recreational sectors and the transport sector". The compliance costs are yet to be established because the tool has not been developed and its outcomes are as yet unknown.

## Benefits

17.39 Measure No. 24 is in its early stages of development. The extent of the benefits arising from the Measure would depend on who and what is chosen for regulation under the GBRs. This could include industry, business, local authorities and householders. In general, reduced diffuse emissions of dangerous substances, will give rise to an overall positive affect on water quality, biodiversity and soils. Stricter controls on diffuse sources of pollution may also require alternative disposal options to be implemented with indirect negative impacts on air quality and climate if additional transport is required or alternative methods of disposal result in air emissions.

17.40 Measure No. 26 is the development of a pollution model and screening tool. The development of the tool will not impose a direct benefit to external stakeholders by itself.

17.41 Both Measure Nos. 24 and 26 will contribute to alleviating the effects of diffuse pollution from industry. Diffuse water pollution is caused by the combined effect of a large number of small sources of pollution. Commonly, pollution is carried by rainfall into watercourses or into groundwaters. In general reducing diffuse pollution will give rise to an overall positive affect on water quality, biodiversity and soils.

17.42 Measure No. 25 is one of a number of a combination of measures aimed at improving water quality in Northern Ireland to meet WFD requirements. It is not yet known how the current consent limits compare against the limits which will be required under the WFD but this would be considered within a subsequent impact assessment as plans to introduce the measure are progressed.

# 18. Key sector: Historical Engineering, Urban Development, Public Water Supply, Hydropower, Agriculture and Forestry

## Pressure: Freshwater Morphology

### Background

18.1 The WFD requires Member States to manage the impacts to the ecological status of water bodies which result from changes to the flow and physical characteristics of water bodies. It requires action in those cases where these morphological pressures are having an ecological impact which interferes with the ability to achieve WFD objectives.

18.2 Morphological alterations arising from anthropogenic sources can cause significant changes in ecology, can result in habitat loss and can change how much and how fast water drains off the land. Examples of activities causing morphological alterations which can lead to damage or loss of habitats and changes to ecological processes as specified in the dRBMPs are:

- Construction of impounding structures such as dams and weirs on rivers and lakes for water supply and hydroelectric power;
- Dredging for navigation causing disturbance to the substrate;
- Construction of flood walls or embankments for flood defence;
- Historic planting of forests close to the banks of rivers; and
- Land-use pressures from agriculture and urbanisation such as straightening, channelisation and culverting of rivers.

### Programme of Measures

#### Basic Measures

18.3 Basic measures provide a patch-work of regulation, controls and guidance, in part a reflection of the wide range of sectors and pressures which affect this aspect of the water environment.

Planning (Northern Ireland) Order 1991

18.4 Under this legislation planning permission is required for carrying out development of land. Articles 11 and 12 of this Order define ‘development’ as “the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land.” Any land covered by water is included in the definition of land.

Fisheries Act (Northern Ireland) 1966

18.5 The Fisheries Act prevents the removal of any material from the bed of a river without the consent of the Fisheries Conservancy Board. Under this legislation the Department of Culture, Arts and Leisure (DCAL) may approve programmes and give grants for the development of waters for angling (i.e. river enhancement programmes). Part 4 of the Fisheries Act protects fisheries and their habitats making it an offence to obstruct the passage of fish and requires the construction of a fish pass where a weir is built or an existing weir is reinstated or altered. Section 54 of the Fisheries Act requires persons who wish to build dams and weirs or repair existing weirs in rivers to construct fish

passes for the free passage of fish. All fish pass designs and specifications must be submitted to the DCAL for approval before a pass is constructed.

Foyle and Carlingford Fisheries (Northern Ireland) Order 2007 / Foyle and Carlingford Fisheries Act 2007

18.6 This legislation concerns the protection of the aquatic environment, specifically fisheries and is transboundary in nature. Under this legislation in the Foyle and Carlingford areas it is an offence to remove material from the bed of the freshwater portion of a river without the consent of the Foyle, Carlingford and Irish Lights Commission.

Drainage (Northern Ireland) Order 1973

18.7 Rivers Agency an agency within the Department of Agriculture and Rural Development (DARD) have a statutory obligation to maintain free flowing rivers under this legislation and have powers to carry out drainage schemes on any designated waterway. The Agency has general powers to undertake, construct and maintain drainage works (which includes defence) and also emergency works to both watercourses and sea defences.

18.8 Drainage schemes must now meet the requirements of the Drainage Environmental Impact Assessment regulations, by considering significant effects on the environment of the proposed works. Rivers Agency's remit is to undertake such maintenance works while minimising environmental damage and this is done through application of sensitive river maintenance guidelines as outlined in Rivers Agency's Watercourse Maintenance Manual. Work programmes are agreed with DCAL Inland Fisheries and the Northern Ireland Environment Agency and mitigation measures are agreed before commencement of the works. Some river enhancement works are also made as the work proceeds, where appropriate, under the provisions of the Water Order (NI) 1999.

18.9 DCAL works closely with Rivers Agency to provide advice and guidance, under the terms of a Service Level Agreement, to mitigate the impacts of drainage maintenance works on habitat. This requires that all drainage works must include mitigation and, where funding permits, fishery rehabilitation measures under the direction of DCAL Fisheries Technical Officers.

18.10 Anyone wishing to carry out culverting must apply for consent or approval to Rivers Agency under Schedule 6 of the Drainage (Northern Ireland) Order 1973 as amended. Rivers Agency consult with DCAL Fisheries Officers where a culvert proposal might impede fish movements or otherwise impact a fishery. Under the Planning Policy Statement 15 (Planning and Flood Risk) the Department of the Environment (DOE) will only permit the culverting or canalisation of a watercourse in exceptional circumstances. Examples of such circumstances include:

- where such works are necessary as part of a flood relief scheme;
- where the culverting of a short length of a watercourse is necessary to provide access to a development site or part thereof; or
- when it is demonstrated by the applicant that there is no practicable alternative to the culverting of the watercourse.

Water (NI) Order 1999

18.11 The transferred functions under this Order provide DCAL with the powers to carry out dredging works and canal schemes and to promote the recreational or navigational use of any waterway. DCAL also has powers of improvement and restoration for any waterway, and powers of maintenance for any waterway not designated for the purposes of the Drainage Order.

STRATEGIES, SCHEMES AND PROGRAMMES

Northern Ireland Atlantic Salmon Management Strategy

18.12 Work by DCAL under the Northern Ireland Atlantic Salmon Management Strategy and associated management plans will deliver improvements in the physical condition of waters.

Angling Development Programme 2002-2006

18.13 DCAL ran an Angling Development Programme funded under the European Union Peace and Reconciliation Programme from 2002-2006. The programme was designed to develop angling and water based recreation projects. Funds were awarded to enhance angling facilities, develop inland waterway networks and provide visitor amenities. Part of the works that have been undertaken include morphological restoration works such as habitat improvement and improvement of fish passage. For example, funds were used to enhance degraded salmonid habitat along a 1000 metre stretch of the River Blackwater in 2004. This work utilised 'soft engineering' solutions such as fencing off the banks and using logs to stabilise the banks. Surveys that were undertaken after the work was completed showed that there was a general increase in juvenile salmon and trout numbers after the enhancement work.

18.14 The Loughs Agency generally undertakes a large range of ongoing instream enhancement programmes with a view to rehabilitation of the aquatic environment.

Agri-environment improvement schemes

18.15 Some of the measures carried out under agri-environment improvement schemes such as the Countryside Management Scheme contribute to improving morphology impacts for example, by fencing off river banks to prevent cattle trampling the river. Provision of good practice information to farmers by the DARD Countryside Management Branch will also ensure that morphological impacts from agricultural activities are reduced. Rivers Agency has agreed with the Countryside Management Branch to leave a strip less than 2 metres wide or a wider strip greater than 5 metres to act as a buffer strip between cultivated land and rivers. The narrow strip allows machines to reach over fences to work on the river and the wider strip allows a machine to get onto the river bank to work.

GUIDANCE AND ADVICE

18.16 DARD Rivers Agency provides environmental support and advice on new flood defence schemes and maintenance works. This can involve the scoping of proposed works, completion of environmental surveys, consultation with conservation bodies and liaison with NIEA for works at designated conservation sites.

## Additional measures for Historical Engineering, Urban Development, Public Water Supply, Hydropower, Agriculture and Forestry

| | | |
|---|---|---|
| HISTORICAL ENGINEERING (ETC) | 27 | Review of controls on hydromorphology |
| | 28 | River restoration measures |
| | 29 | Strategic appraisal of barriers to fish |

Table 18.1: NI WFD 2009 compliance for morphology

| | | Number or % of water bodies | Morphology |
|---|---|---|---|
| Rivers & Lakes | Total water bodies in NE 114 | No of water bodies less than Good status | 32 |
| | | % | 28.1% |
| | Total water bodies in NW 218 | No of water bodies less than Good status | 81 |
| | | % | 37.2% |
| | Total water bodies in NB in 265 | No of waterbodies less than Good status | 82 |
| | | % | 30.9% |
| | Total water bodies in NI 597 | No of waterbodies less than Good status | 195 |
| | | % | 32.7% |

Key to above table: NI is Northern Ireland. NE is North Western. NE is North Eastern. NB is Neagh Bann.

18.17 Table 18.1 shows (in early 2009) around one-third of all rivers and lakes in Northern Ireland are failing for morphology although there is still further investigation required to classify morphological impacts within NI.

18.18 NIEA produced an initial morphology classification in 2008 using the Rapid Assessment Technique and the Lake MiMAS tool, which have only been recently developed. Further work is needed to carry out a review of the morphology classification results over 2009 and complete further surveys on all water bodies to ensure that classification is complete before the final RBMPs are produced.

18.19 Measure 27: Review of controls on hydromorphology

18.20 A recent UK consultation on mechanisms to deliver WFD requirements on hydromorphology set out a wide range of mechanisms already available for delivering measures to avoid or mitigate hydromorphological impacts from new or ongoing activities. However, it concluded that it would be difficult to assign responsibility for paying for historic modifications resulting from legal activities by private individuals and organisations or where no owner of a modification could be identified.

18.21 The sorts of measures for which there is no obvious funding mechanism are mainly capital works such as removal of weirs and other barriers and redundant structures in river channels, together with rehabilitation of the channel up and downstream of such structures.

18.22 A number of consultees proposed as a solution the establishment of a catchment restoration fund. Such a fund would be used to pay for, or contribute to, the cost of morphological improvements to water bodies where necessary to support the achievement of ecological objectives (see Funding mechanisms for addressing historic morphological pressures on surface water bodies - WT0906CRF)

18.23 Responses to the Government consultation referred to above suggested that Government should pay additional funds for carrying out restoration work which is necessary to achieve WFD objectives. This may be the best solution in circumstances where no person or organisation is responsible for the historic modification or where it would be unreasonable to expect the landowner to meet the costs of necessary work.

18.24 Measure 28: River restoration measures

18.25 The DOE undertook an initial review of existing legislative controls to control physical modifications to surface waters. There are a wide range of restoration measures that can be employed to address morphological impacts. Examples include:

- Re-meandering of straightened channels;
- Re-construction of pools;
- Substrate enhancement work;
- Incorporation of river restoration & fisheries enhancement projects;
- Removal of hard bank reinforcement/revetment, or replacement with soft engineering solution;
- Re-opening of existing culverts;
- Removal of impoundment and de-silting of impounded reach;
- Adoption of operational protocols for impoundments;
- Stabilisation of river banks;
- Fencing programmes to exclude livestock;
- Application of best practice forestry guidelines;
- De-silting of affected river reaches;
- Removal of barriers to fish migration; and
- Updating of existing fish passes and construction of new fish passes.

18.26 Over the first planning cycle measures will be assessed on a site-specific basis to determine those which are technically feasible and cost effective. Further development and implementation of restoration measures will then occur on a prioritised basis with new measures considered for river and lake water bodies that were downgraded from high to good status as a result of morphological impact in the first instance.

18.27 Measure 29: Strategic appraisal of barriers to fish

18.28 A strategic appraisal of any significant barriers to fish movement is being conducted to inform the development of a programme to address significant barriers. The programme will include, where appropriate, the installation of new fish passes or the upgrading of existing passes and the removal of blockages. It therefore, strictly falls outside the remit of this sRIA.

## Administrative Costs

### Additional Measure No. 27

18.29 Work under this measure is currently being met within existing resources.

### Additional Measure No. 28

18.30 Cost estimate data provided by NIEA indicate three sets of projected costs between 2010 and 2013 are provided in table 18.2.:

**Table 18.2 - Costs associated with Additional Measure No. 28**

| | | |
|---|---|---|
| 1 x Fisheries Officer - HSO equivalent.<br><br>Electrofishing £350 - £400 per scheme.<br><br>1 x DARD RA Engineer - HSO equivalent<br><br>**Sub total = £662.4 k** | £405k/yr staff - AFBI;<br><br>£17k/yr Travel and &Subsistence £54.5k/yr maintenance costs;<br><br>Capital = year one start up costs. £34.5k/yr in year 4, 5 and 6.<br><br>1x HSO Biodiversity Officer =<br><br>**Sub total = £1,722.7** | 1x DCAL Fisheries Officer - HSO equivalent;<br><br>1 x DARD RA Engineer - HSO equivalent<br><br>**Sub total = £542.4 k** |
| The total sum for this measure = **£2,927.5 k** | | |

### Additional Measure No. 29

18.31 NIEA advised that Measure No. 29 is not now required because it is not regarded as a "new measure". It is currently being progressed by DCAL in collaboration with the Abstraction and Impoundment Licensing section of NIEA.

## Compliance costs

**Table 18.3 Sectors responsible for morphological alterations in Northern Ireland, as determined in the Art. 5**

| Sectors | No. of water bodies |
|---|---|
| Transport, Storage and Communication | 127 |
| Agriculture and forestry | 116 |
| Land drainage, land claim, flood defence and urbanisation | 105 |
| Electricity, gas and water supply | 24 |

18.32 Table 18.3 shows the sectors responsible for morphological alterations in Northern Ireland. As an indication of the likelihood of the costs of measures to address these pressures - the overall scale of costs for tackling morphology ranges from £1.1 to 2.9 billion for England and Wales (pCEA, 2007). A further draft RIA estimates for river habitat restoration measures alone in England and Wales a value of £0.5 billion.

18.33 Costs for NI will fall upon a wide range of sectors including NIEA, inland navigation, agriculture, local authorities and the Rivers Agency, industry (especially fisheries and power generation), private individuals, and NIW.

18.34 Costs for morphology measures were estimated by the CEA. The results suggest that the provision of screens for fish at abstraction points and other necessary sites, and the provision of fish passes where structures obstruct passage to feeding and breeding sites, would be cost effective and estimated that the Water Industry would be responsible for 7.5% of this cost.

18.35 There is a high degree of uncertainty in relation to the nature and scale of action which will be required to meet WFD objectives in relation to morphology.

18.36 A common measure required (for many countries looking to implement the WFD) is to improve available data, for example to assess the evidence of the extent and nature of morphological pressures; and further understanding of the pressure/impact relationship, and therefore the effectiveness of measures.

18.37 The pCEA suggests that research and analysis to improve understanding of the pressure/impact relationship is likely to be cost-effective. A widely supported way of achieving this is to test and monitor the likely cost-effective measures and measures which are not proven but may be cost effective. Such measures could include:

- the effects of livestock fencing, grip blocking, tree planting;
- learning from the strategic documents produced under the 'maintenance dredging protocol' by navigation authorities; and
- piloting and researching river restoration techniques which do not at present have demonstrable impact on the relevant WFD quality parameters. This could be carried out where Habitats Directive remedies are being delivered.

18.38 Only when the mapping of multiple pressures within a water body is available will the true overall 'effectiveness' of a measure be determined.

## Benefits

18.39 There may be potential to deliver 'win-win' solutions for hydromorphology in some situations i.e. solutions which bring about other environmental and policy benefits. For example,

- the beneficial use of dredged sediment by the ports industry may also be of potential relevance to flood risk management;
- removing the effectiveness of flood defences may have benefits for navigation if it creates intertidal land which will help them to achieve Habitats Directive requirements; and
- measures to decrease the damage caused by cattle poaching river banks may also be those most cost-effective to reduce diffuse pollution from agriculture.

18.40 A Defra consultation on measures for hydromorphology (2006) identified evidence for environmental consequences of hydromorphological pressures in rivers (shown in table 18.4 below). It reflects the wide range of activities/actors and environmental impacts which need to be addressed for this pressure.

**Table 18.4 Rivers: evidence for environmental consequence of hydromorphological pressures (Defra 2006)**

| Specific pressures | Description | Which WFD hydrological and morphological conditions may be affected? | Main environmental impacts |
|---|---|---|---|
| Abstraction | Removal of water from a river channel – for water supply, irrigation, fish farms, quarry dewatering, canals etc | - Quantity of flow<br>- Dynamics of flow | Disrupts habitats<br>Altered sediment regime<br>Disrupts fish habitats<br>Disrupts macroinvertebrates |
| River substrate manipulation | Removal of silt and/or substrate from a river channel – includes dredging for navigation, for creating on-line ponds and for fisheries enhancement e.g. pool creation; addition of gravel for spawning areas. | - Quantity and structure of substrate | Disrupts fish habitats<br>Disrupt macroinvertebrates<br>Alters plant communities<br>Sediment dispersal<br>Mobilisation of fine sediments and pollutants |
| Bed and bank reinforcement | Strengthening of river beds for various purposes (e.g. ford construction, erosion control); flood protection using flood walls, embankments; bank protection using gabion baskets, boulders, sheet piling, wood, willow spiling, geotextiles, etc. | - Quantity and structure of substrate<br>- Structure and condition of riparian zones | Hydraulic alteration (more uniform)<br>Habitat disruption |
| River re-sectioning<br><br>straightening,<br><br>realignment,<br><br>channelization | Reprofiling of bank-face, changes to gradient of channel bed, introduction of artificial substrate<br><br>Engineering to produce ditch-like channels<br><br>Removal of meanders: increase in channel gradient, flow velocity, flood capacity<br><br>Straightening, widening, and deepening of channel | - Dynamics of flow<br>- Channel patterns<br>- Width variations<br>- Depth variations<br>- Quantity and structure of substrate<br>- Structure and condition of riparian zones | Increase flow conveyance<br>Reduce channel/floodplain coupling<br>Disrupt habitats, alters plant, invertebrate and fish communities<br>Altered sediment regime<br>Remobilization of contaminated sediments |
| Culverting | Complete enclosure of river channel, often impassable to fish | - Dynamics of flow<br>- Quantity and structure of substrate<br>- Structure and condition of riparian zones | Disrupt habitats<br>Increase flow conveyance<br>Reduce flow conveyance if blocked<br>Affect fish migration |
| Flow manipulation | Placement of boulders, deflectors, etc. for redirecting pattern of water flow | - Dynamics of flow<br>- Channel patterns | Increase erosion & deposition<br>Alter flow hydraulics |
| Impounding | Backing-up of water through the construction of dams, weirs, sluices, fords, etc | - Quantity of flow<br>- Dynamics of flow<br>- Continuity | Alter flow and sediment regime (dampening)<br>Disrupt fish migration, alter plant and invertebrate communities |

| Specific pressures | Description | Which WFD hydrological and morphological conditions may be affected? | Main environmental impacts |
|---|---|---|---|
| Intensive use | Grazing, removal of riparian vegetation, management of riparian vegetation, poaching, erosion from boat traffic (especially canals). | - Quantity and structure of substrate<br>- Structure and condition of riparian zones | Bank/bed erosion<br>Sediment delivery<br>Loss of habitat |
| Removal of natural barriers | Removal of woody debris, landslips and other instream natural barriers, usually to permit upstream fish migration | - Quantity of flow<br>- Dynamics of flow<br>- Depth variations<br>- Width variations | Alter flow and sediment regime<br>Disrupt habitats<br>Loss of invertebrate diversity |
| Modifications to sediment regime | Poor catchment land management leading to increases in sediment and water run-off | - Dynamics of flow<br>- Quantity and structure of substrate | Changes in erosion and deposition<br>Alteration of plant, invertebrate and fish communities<br>Habitat disruption<br>Potential remobilization of contaminated floodplain sediments |
| Floodplain modification | Construction of flood banks, raising of floodplain levels, limiting channel and floodplain interactions | - Continuity<br>- Channel patterns | Removal of flood storage<br>Change floodplain connectivity<br>Loss of fish nursery and spawning grounds<br>Alter floodplain habitats |

18.41 Benefits are typically calculated for this sector/pressure through angling benefits in

- willingness to pay per angler for increased quality or protection of fishery;
- the number of anglers per km river; and
- conservation benefits through willingness to pay per household per km improved, with the number of households over which to aggregate values.

18.42 Work completed for DCAL (2007) shows that significant net economic impacts can be projected for domestic and tourism expenditure for Northern Ireland. It estimates that the overall net economic impact of recreational angling (including domestic and visitor angling) on the Northern Ireland economy is £22.5 million (based on 2005 participation and expenditure figures). This could rise to between £31.3 million and up to £71.4 million by 2015, depending on market conditions and the impact of policy interventions designed to boost the number of local and visiting anglers, and the typical expenditures of these anglers. The report also estimates that the expenditure impacts of domestic and visitor angling support a total of approximately 778 full-time equivalent jobs in the Northern Ireland economy.

18.43 Whilst the assessment does not provide a monetary value for the benefits associated with increased tourism and recreation, they are noted to be significant and will be attributable to a combination of measures, across all sectors.

# 19. Key sector: Ports and harbours, Aggregate and Fishing / Aquaculture Industry

## Pressure: Marine Morphology

### Background

19.1 There are many morphological pressures on the marine environment around Northern Ireland whose ports play an important role in transporting goods in and out of the country. In 2006, approximately 25 million tonnes of goods were transported through our ports in addition to half a million tourist vehicles. In order to sustain viability and safety in our ports, essential operations like dredging and the engineering of port facilities must be carried out on a regular basis.

19.2 Other morphological pressures on the marine environment include

- the extraction of marine minerals for the construction industry;
- the drive for renewable energy extending into the marine environment. Northern Ireland's target is to produce 12% of electricity from renewable sources by 2012 and 40% by 2025 with at least 25% of this being generated by non-wind technologies;
- Fishing and aquaculture activities, and in particular invasive techniques such as bottom trawling, fisheries-related dredging and bottom-culture mussels. There are extensive aquaculture activities within sea loughs and this industry is important for the Northern Ireland economy. At present there are 64 marine sites licensed for the cultivation of shellfish and 2 marine sites licensed for the cultivation of finfish; and
- the disposal of dredged material within Northern Ireland waters. Although most disposal licences operate beyond the sea area covered by the WFD (i.e. greater than 1 nautical mile from the baseline for coastal waters), there is some licensing of dredged material disposal within sea loughs.

### Programme of Measures

#### Basic Measures

<u>The Inshore Fishing (Prohibition of Fishing and Fishing Methods) Regulations (NI), 1993 (amended in 2008)</u>

19.3 The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Amendment) Regulations (Northern Ireland) 2008 came into operation in July 2008. The Regulations amend the Inshore Fishing (Prohibition of Fishing and Fishing Methods) Regulations (Northern Ireland) 1993 by extending the current ban on fishing by suction dredges in Strangford Lough and Dundrum Inner Bay to all Northern Ireland waters and by introducing a prohibition on dredging for sea fish and extending the prohibition on the use of seine and trawl nets in Belfast Lough westward to an imaginary straight line drawn from Carrickfergus Castle in County Antrim to Grey Point in County Down.

<u>OSPAR</u>

19.4 OSPAR is the international convention for the protection of the marine environment of the North East Atlantic. The UK is one of 15 signatories to the Convention. OSPAR produces many extremely

useful guidelines which NIEA, along with the other UK regulators, use in marine licensing processes. These include:

- OSPAR Guidelines for the Management of Dredged Material; and
- OSPAR Guidance on a Common Approach for Dealing with Applications for the Construction and Operation of Offshore Wind Farms (replaced by agreement 2008-3)

Central Dredging Association (CEDA)

19.5 The Central Dredging Association is an independent, non-profit, non-governmental, professional society. It provides a forum for all those involved in activities related to dredging and promotes good dredging practice.

Marine Works (Environmental Impact Assessment) Regulations 2007

19.6 The Marine Works Regulations apply across the UK, and implement the need for an Environmental Impact Assessment for FEPA licence applications which fall under Annex I of the Environmental Impact Assessment Directive, or under Annex II of the Directive where the project is likely, because of its size, nature or location, to have significant effects on the environment. The Regulations also implement the Public Participation Directive which requires the publicising of FEPA applications.

Harbour Works (Environmental Impact Assessment) Regulations 2003

19.7 Most harbour works fall under the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999. Only those which fall under permitted development, or are outside the planning limit, attract the Harbour Works regulations. The Harbour Work Regulations implement the need for Environmental Impact Assessment for harbour works that fall under Annex I of the Environmental Impact Assessment Directive or under Annex II of the Directive where the project is likely, because of its size, nature or location, to have significant effects on the environment.

The Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) (England and Northern Ireland) Regulations 2007

19.8 These Regulations introduced a new licensing system to cover the extraction of minerals, like sands and gravels from the marine environment by dredging. These Regulations incorporate the requirements of both the Environmental Impact Assessment and Habitats Directives. The Department implements the Regulations through NIEA and aims to ensure that the use of marine dredged sand and gravel remains consistent with the principles of sustainable development. NIEA determines licence applications through a consultation process with other government Departments and organisations with a statutory role, in addition to the wider stakeholder community.

Fisheries (Northern Ireland) Act 1966 as amended

19.9 Under the terms of the Fisheries Act (Northern Ireland) 1966 as amended, DARD is responsible for the licensing of fish and shellfish farms in Northern Ireland.

Foyle and Carlingford Fisheries Bill

19.10 The Foyle, Carlingford and Irish Lights Commission are responsible for licensing and regulation of aquaculture and shellfisheries in the Loughs Foyle and Carlingford.

The Foyle and Carlingford Fisheries (Northern Ireland) Order 2007

19.11 The Loughs Agency operate a number of automated environmental monitoring systems in Foyle and Carlingford and also one approximately 4 miles off Inishowen head.

Part II, Food and Environment Protection Act, 1985 (FEPA)

19.12 Deposits in the sea are controlled by FEPA which is applicable throughout all UK waters. The Department of the Environment (DOE), through NIEA, is responsible for licensing within the Northern Ireland territorial waters. The area covered is from the mean high water spring tide mark out to 12 nautical miles from the baseline. The baseline comprises the mean low water mark on the

open coast, and in a sea lough the baseline is represented by a number of bay closing lines across the mouth of the lough. Any deposit in the sea within this area, whether as a result of construction activity in a port, land reclamation, or the disposal of dredged material requires a licence under the Act.

19.13 Although FEPA covers the disposal of dredged material, it does not cover the practice of dredging. In determining whether to issue a licence, NIEA has a duty to have regard to the need to protect the marine environment, the living resources which it supports and human health and must prevent interference with legitimate uses of the sea. NIEA may also have regard to other matters which it considers relevant. In exercising its duties, NIEA, as licensing authority, implements a thorough consultation process with other parts of Government and public bodies with a statutory role in the management of the marine environment. In determining licence applications, NIEA can also require the applicant to examine practical alternatives to the proposed operation. Licence applications are also published to ensure that a wider group of stakeholders have the opportunity to comment on a proposal.

### Additional measure for Ports and harbours, Aggregate and Fishing / Aquaculture Industry

| | | |
|---|---|---|
| PORTS AND HARBOURS (ETC) | 30 | Development of a Protocol for Maintenance Dredging |

19.14 Defra has already established a Protocol for England and Wales. This Protocol provides assistance to operators and regulators seeking, or giving, approval for maintenance dredging activities that could potentially affect European sites (also known as Natura 2000 or N2K sites) around the coast of England.

19.15 The Government considers that the EC Habitats Directive (92/43/EC) requires maintenance dredging proposals, which could potentially affect European sites, to be assessed in accordance with Article 6(3) of the Directive.

19.16 Representatives of the ports and marine leisure industries have agreed to work in co-operation with Defra, the Marine & Fisheries Agency, the Department for Transport and Natural England to develop an approach which allows the effect of maintenance dredging on European sites to be assessed without placing a disproportionate burden on those who commission or approve maintenance dredging operations. The Protocol sets out the process by which this is achieved.

19.17 The Protocol is based on the following key principles:

- Maintenance dredging is recognised as essential to the safety and continued operation of ports, harbours and marinas, which are themselves fundamental to economic well-being at the local, regional and/or national level;
- Maintenance dredging has been going on for many years in most locations and European sites were, in many cases, designated with these operations already taking place;
- A Baseline Document will be produced to include current and historical information on dredging activities within the area concerned. It will synthesize existing relevant information about the environmental status of the area concerned and, in particular, what is known of the impacts of previous capital and maintenance dredging; and
- The Document will provide the foundation for consistent and informed decision-making by all the competent authorities, in compliance with the requirements of the Conservation (Natural Habitat, &c.) Regulations 1994 (as amended). It will be essential therefore that it is regularly updated, in the form of a reference document, as circumstances and requirements change.

19.18 Once an evaluation of the impact of maintenance dredging has been undertaken and any necessary measures to avoid any foreseeable adverse impacts put in place, future consents should be considered taking account of the condition of the affected European site(s). There will be an

expectation that once the Habitats Directive issues have been dealt with satisfactorily, where nothing has - or will - change in the baseline situation, future assessment of maintenance dredging in keeping with established practice to date, will rarely be found likely to have a significant effect and applications can be approved without the need for a repeat appropriate assessment;

## Administrative Costs

### Additional Measure No. 30

19.19 Existing staff sources would be used within NIEA, with DRD leading the work. No further administrative costs have been identified.

## Compliance costs

19.20 An agreement has been made in principle to the development of a Protocol within Northern Ireland (therefore any costs imposed through changes in administrative procedures are not known but are likely to be minimal). The development of a dredging protocol will provide guidelines and evidence to help determine future dredging proposals and applications. This will assist harbour and port authorities (and other competent authorities) in fulfilling their statutory obligations and minimise the delay and cost to port and marina operators in obtaining consents.

19.21 Given the existence of the England and Wales Protocol this measure will impose no competitive disadvantage on the industry.

## Benefits

19.22 As an integral part of developing a dredging protocol is to prepare a baseline document, describing the current and historical patterns of dredging in relation to the conservation status of the site/area, its benefits will be in the systematic assessment of impacts on these conservation sites.

# 20. Key sector: All sectors

## Pressure: Invasive Alien (Non-native) Species

### Background

20.1 Invasive alien (non-native) species (IAS) are organisms which successfully establish themselves in a locality and then overcome otherwise intact, pre-existing, native ecosystems. There is growing evidence that invasive species can pose a major threat to native flora and fauna. Many invasive species have been either deliberately or accidentally introduced by humans as a result of increased global trade and travel. They can result in loss of natural biodiversity and may have significant economic impact. It is the damage that invasive species cause to native flora and fauna that is the focus of concern in the assessments carried out for the Water Framework Directive. Article 5 Characterisation work (2004) focused on seven species which have been selected because of the known severity of their impact and because of data availability about their presence in Northern Ireland.

20.2 As part of the WFD implementation, NIEA, in conjunction with counterparts in Ireland, have developed a draft ecoregion 17 list of invasive alien species judged to pose a threat to waterbodies in Ireland and Northern Ireland.

### Programme of Measures

#### Basic Measures

The Wildlife Order (NI) 1985 (under review)

20.3 This legislation aims to protect wild animals, birds, plants and their habitats. It is therefore an offence to kill, injure, disturb, take or sell wild animals. The Order contains measures for preventing the establishment of species not native to Northern Ireland which may be detrimental to native wildlife. It is an offence under Article 15 of the Wildlife Order to “release or cause to escape into the wild” any animal (this would include birds and fish) that is not ordinarily resident in or is not a regular visitor to Northern Ireland in a wild state (i.e. species, which according to scientific records, do not naturally occur in Northern Ireland). It is also an offence to release any animal included in Part 1 of Schedule 9 to the Wildlife Order in order to prevent their further spread. Part II of schedule 9 specifically lists plants which it is an offence to intentionally introduce into the wild, this covers non-native plants such as the Giant Hogweed and Japanese Knotweed.

20.4 A review of the Wildlife Order has been completed and a consultation document setting out the Department of the Environment’s proposals for updating and amending the Wildlife Order 1985 went out to public consultation in February 2008. Consultation closed in June 2008. Amendment of this order will make significant changes to Article 15 and the schedule 9 lists.

The Fisheries Act (NI) 1966

20.5 Section 13 of this Act is specifically relevant to the control of non-native fish species. Under this section of the Act if it is decided that the introduction of a particular species of fish would be detrimental to a fishery, an order can be made prohibiting the introduction of live fish or eggs of that species. Enforcement of the legislation is carried out by the Fisheries Conservancy Board now part of the Department of Culture, Arts and Leisure (DCAL), except in the Foyle and Carlingford catchments where the Loughs Agency of the Foyle, Carlingford and Irish Lights Commission is responsible. The current order is the Prohibition of Introduction of Fish Order.

The Prohibition of Introduction of Fish Order (NI) 1979

20.6 This Order prohibits the introduction of specified kinds of fish into any inland waters of Northern Ireland (excluding the Londonderry Area and the Newry Area). Any fish being introduced into waters in Northern Ireland which are prohibited under the Prohibition of Introduction of Fish Order require a permit issued by the Department of Agriculture and Rural Development (DARD) under Section 13 of the Fisheries Act 1966.

Molluscan Shellfish (Control of Deposit) Order (Northern Ireland) 1972 Order

20.7 This Order prohibits the introduction of any molluscan shellfish into any designated waters which have been taken from shellfish beds outside the designated waters. Any shellfish being introduced into any waters in Northern Ireland which are prohibited by the Molluscan Shellfish Order require a permit issued by the DARD under Section 13 of the Fisheries Act 1966.

The Control of Pesticides (Amendment) Regulations (Northern Ireland) 1997 and the Plant Protection Products

20.8 Regulations 2005 control the use of herbicides to control invasive plants in or near water.

Zebra Mussel Management Strategy for Northern Ireland 2004-2010

20.9 The Northern Ireland Environment Agency (NIEA) has developed a management strategy for controlling the spread of zebra mussels in Northern Ireland. The overall aim of the management strategy is to minimise the spread of zebra in Northern Ireland through raising awareness, developing policy and legislation, monitoring and research and developing contingency plans for immediate action in the event of further zebra mussel spread. There is currently no effective means of controlling populations.

Management protocols

20.10 The Rivers Agency has developed a number of protocols for dealing with Giant Hogweed, Himalayan Balsam and Japanese Knotweed for their operatives who carry out works in watercourses. These protocols have been included in Rivers Agency's Environmentally Sensitive River Maintenance guidelines for their contractors.

## Additional measures for Invasive Alien Species

| | | |
|---|---|---|
| ALL SECTORS | 31 | Invasive Species Ireland Project |
| | 32 | Development of Alien Species strategy |

The aim of both additional measures is to prevent the spread of invasive alien species which could downgrade water bodies from good status.

20.11 Measure 31: Invasive Species Ireland Project

20.12 NIEA (formerly EHS) in partnership with the National Parks and Wildlife Service (Republic of Ireland) commissioned the 'Invasive Species in Ireland Project' in 2006. Through the project a risk assessment process has been carried out to identify the most high risk invasive alien species currently in the island of Ireland and those which have the potential to arrive here. Lists for each have been produced. Subsequently the most high risk species from each list are having either management or contingency plans produced for them. Examples include alien crayfish and floating pennywort. In addition wide spread species, which may not have scored highly in the risk assessment process but are still considered to be of a threat, will have best practice management plans produced for them. These species include the better known Japanese knotweed, Giant hogweed, Spartina and Himalayan balsam.

20.13 Measure 32: Development of an Alien Species Strategy

20.14 The aim of this measure is to develop a strategic approach that will link all measures undertaken by various organisations in this area.

20.15 The existing UK Strategy is being used as a basis for this measure.

20.16 There are a number of species which have not yet been recorded in the island of Ireland but could cause significant problems if they became established here, as demonstrated in Great Britain and elsewhere in Europe. Examples include non-native crayfish species, such as Turkish crayfish, Astacus leptodactylus and North American signal crayfish, which can both host the crayfish plague responsible for decimating native crayfish and freshwater fish populations in both Great Britain and Europe. Northern Ireland currently has legislation in place to prevent the importation of non-native crayfish for aquaculture purposes. However, there is currently no legislation preventing the importation of live crayfish as food items. Restaurants and fish and wholesale markets are advised to follow the Crayfish Code of Practice, although no legal enforcement exists.

20.17 A second example of serious concern is *Gyrodactylus salaris*, a parasite which infects the skins and fins of salmon and can both kill and cause serious harm. This parasite is native to waters of the Baltic in Russia, where its impact upon native fish populations is small. However *G. salaris* is thought to have been introduced to Norway by stocking with resistant Swedish stock in the mid-1970s. The only known means of Invasive species in Ireland 88 eliminating the parasite is to poison the whole river system and re-stock. The high frequency of traffic between Great Britain and Ireland and their close proximity renders each susceptible to detrimental species introductions from the other. A prominent invasive species present in Great Britain is zander *Stizostedion lucioperca*, a fish introduced for sport. Other fish species present in Great Britain that could become invasive in Ireland are chub, and ruffe. Species not found in Ireland which are native to Great Britain, such as the muntjac deer could considerably reduce grazing and pasture quality. A notable invasive species of rivers in Great Britain is the Chinese mitten crab, which causes erosion to soft sediment banks of the Thames and consequently concern in terms of flood defence measures. For these species it is important that action is undertaken to assess the risk of their introduction. If a particular species does pose a significant risk, efforts to reduce the risk of introductions and, if the species is found in the wild, control/eradication programmes should be urgently considered.

20.18 The effects of alien species on native biodiversity, the rate at which effects proceed, and the time scales over which negative impacts can be detected are still not fully understood as yet.

## Administrative Costs

### Additional Measure No. 31

20.19 The interview with the internal stakeholder revealed that funding had already been allocated for this measure between NIEA and NPWS and further works will be met within existing resources.

### Additional Measure No. 32

20.20 Estimated costs to NIEA indicate three sets of costs associated with this measure that will amount to **£366k** between 2010 and 2013.

**Table 20.1 - Costs associated with Additional Measure No. 32**

| | | |
|---|---|---|
| Knapsack sprayers (20l) Qty 15 @ £60/unit<br><br>**Sub-total £2,700** | PPE Specific costs - £5000/annum<br>Pesticides - Yrs1 and 2 - £17k/yr Yr3 – 8.5k<br>**Sub total = £57,500** | Staff funding over 5 years £102k/annum) £510 k over 5 years<br><br>**Sub total = £306k for 2010-2013** |
| **Total cost = £366.2k** | | |

## Compliance costs

20.21 The sectors most affected by IAS will depend upon the particular species invasion, numbers, and location, but could affect recreation and amenity, the water industry (NIW), the Rivers Agency and NIEA, as well as threatening economic interests such as agriculture, forestry, fisheries and land use development.

20.22 For example, invasive non-native species of aquatic plants such as Australian swamp stonecrop, also known as New Zealand pygmyweed, can block watercourses, cause drainage problems (particularly in flood prone catchments) and affect water quality. Japanese knotweed can cause severe problems for developments, particularly on brown-field sites, which are often severely infested with rapid growth that can penetrate tarmac. The forestry industry suffers significant economic losses annually due to non-native plants (e.g. rhododendron).

20.23 Action taken for early detection of IAS will reduce the likelihood of costly management and control with reduced health and safety risks to humans from dangerous or pest species, property damage, flood risk and the use of pesticides or other hazardous methods of control. Once a species has gained a foothold, devising safe and effective control measures for wide deployment takes time and involves the consideration of many risks.

20.24 Recent examples of eradication show significant costs for Northern Ireland including:

20.25 Zebra mussel, first identified within NI in 1994. Subsequently the species went on the form very large and dense clusters affecting abstraction and leading to £ 120k costs for clearing one abstraction plant. The following year, several mussels were identified in Loch Neagh. Fortunately, the population did not grow in the same way but due to the large number of abstraction plants at that site, the estimated cost of clean-up would be several million pounds[16].

20.26 Rivers Agency have has recently undertaking undertaken a flood bank alleviation scheme on the River Roe with costs for a 12m stretch of Japanese knotweed cleared for £270k.

20.27 Some of the eradication work is completed by the voluntary sector, for example volunteers river bank spraying. The value of this work is unknown. Furthermore, there are some existing mechanisms for control, for example, under the Countryside Management Scheme farmers can be paid to control non-native plants.

20.28 Based on costs experience elsewhere in the UK an estimate of likely compliance costs across all sectors for the next 15 years would be 3-15 million.

20.29 A notable risk to this measure is that there is currently no mechanism for the island of Ireland to develop a strategy as a whole. At the current time, Northern Ireland is taking the lead in developing measures for control of IAS. There is a current INTERREG funding application for cross-border (across the island of Ireland) for the next 4-5 years for the northern counties of Ireland including NI and the six border counties of Ireland with a value of 3 million euros.

## Benefits

20.30 As well as benefits to the water environment and the avoidance of damage to economic interests and control costs, social benefits will accrue from the public being able to enjoy our natural heritage of native and diverse habitats and ecosystems, unspoilt by encroaching invasive non-native species.

20.31 These values are particularly difficult to value in economic terms, as has been reflected in the work for the CEA and subsequent RIAs in this area. The main direct value for this measure is in the avoidance of greater costs. This importance of early detection and action is evident and the pace at

[16] NIEA interview 10/09/09

which country-wide eradication can become untenable is illustrated with Japanese knotweed. Research has estimated that in Wales alone, it would have cost £53.3 million for a three year eradication programme had it started in 2001, but the cost would be £76 million for such a programme starting in 2007 (Defra, 2007).

# 21. Key sector: Fisheries

## Pressure: All types

### Background

21.1 Migratory fish (including salmonids, eels and shad) need to move freely up and down rivers in order to access feeding, breeding or nursery grounds. Man-made obstructions are a significant barrier to this free movement, and have contributed to the decline of some species; further, lack of screening means that the ingress of fish is also a cause of high fish mortality. Current legislation only requires new obstructions and those undergoing significant modification to introduce a fish pass, and only for salmon and migratory trout.

21.2 New measures are therefore needed in order to allow effective action to be taken to ensure the free passage of all fish, extending the requirement to introduce fish passes to extant obstructions. This is required in order to meet EU obligations to achieve GES under the WFD where lack of access to habitat has a significant impact on the conservation of migratory fish stocks and the ecological status or potential of the affected water bodies.

21.3 Eel hold a unique position from aquaculture of all other species in that they cannot be spawned artificially, and therefore, all the seed for eel culture must be wild-caught. At present, the shortage of glass eel presents a serious problem for the aquaculture industry.

#### Basic measures

21.4 Within Northern Ireland, the Department of Culture Arts and Leisure (DCAL), created in 1999, has a wide-ranging remit which includes, amongst other things, inland waterways and inland fisheries. The Department is responsible for the supervision and protection of salmon and inland fisheries and for fostering the establishment and development of fisheries.

21.5 Salmon and inland fisheries in Northern Ireland are regulated by legislative provisions made under the Fisheries Act (NI) 1966, as amended, and the Foyle Fisheries Act 1952, as amended which provide for the making of regulations and byelaws, annually as required, that specify:

- a licensing regime
- closed seasons
- bag limits
- carcass tagging schemes

21.6 Furthermore, there are provisions in the primary legislation regarding illegal capture (poaching), the protection of juvenile salmon, eggs and spawning areas and the free passage of migratory fish.

Fisheries Act Northern Ireland 1966

21.7 Part 4 of the Act protects fish and habitats. Under this legislation it is an offence to:

- Use or possess deleterious matter for the capture, destruction or injury of fish.
- Pollute a watercourse.
- Take, sell, purchase, possess, obstruct the passage, injure or disturb the spawn or fry of salmon, trout or eels or injure or disturb spawning beds where the spawn or fry of salmon, trout or eels exist.
- Remove any material from the bed of a river without the consent of the Fisheries Conservancy Board (now defunct).
- Disturb spawning salmon or take unseasonable salmon.

• Possess immature salmon for sale, or take undersized pollen.

• Obstruct the passage of fish or fail to protect fish where water is abstracted and requires the construction of a fish pass where a weir is built or an existing weir is reinstated or altered.

21.8 The Department of Culture, Arts and Leisure (DCAL) is responsible, under the provisions of the Fisheries Act (NI) 1966 as amended (the Fisheries Act) for the salmon and inland fisheries of Northern Ireland. Enforcement is carried out by DCAL with the exception of the Foyle and Carlingford catchments.

21.9 Section 54 of the Fisheries Act requires persons who wish to build dams and weirs or repair existing weirs in rivers to construct fish passes for the free passage of fish. All fish pass designs and specifications must be submitted to DCAL for approval before a pass is constructed.

21.10 Sections 58 and 59 of the Fisheries Act impose certain closure periods where water is being abstracted from a river or lake to facilitate the passage of fish and require grids and gratings to be placed at water abstractions and return points.

21.11 The Fisheries Act also allows DCAL to issue exemption certificates from these requirements.

21.12 DCAL also has powers under the Fisheries Act to approve an application by anyone who wishes to improve a derelict water for angling either for their own use or for public angling. The applicant must submit proof that the owner of the fishing rights cannot be found and provide a scheme for the development of the fishery.

Foyle and Carlingford N Ireland Fisheries Order (2007) / Foyle and Carlingford Fisheries Act (2007)

This legislation concerns the protection of the aquatic environment, specifically fisheries and is cross-border in nature. Provisions include making it an offence to:

• Permit any deleterious matter to enter any river

• Fail to leave open a channel of sufficient width and depth to facilitate the passage of salmon.

• Remove material from the bed of the freshwater portion of a river without the consent of the FCILC.

21.13 The legislation also extends the FCILC's existing fisheries regulatory powers (salmon and inland fisheries) to cover the regulation of oysters, mussels, sea bass and tope within the Foyle and Carlingford Areas.

Fishery and habitat management:

NASCO (North Atlantic Salmon Conservation Organisation) Resolutions and Agreements

21.14 DCAL pursues a strategic approach to attempt to address the decline in Atlantic Salmon. The Atlantic Salmon Management Strategy for Northern Ireland has been developed to meet the objectives of the NASCO, an intergovernmental body established by treaty. The core concept is to establish spawning targets at a river and regional level to ensure that in most rivers in most years sufficient adult salmon are spawning to maximise output from freshwater assessments.

Salmon Management Plan

21.15 A Salmon Management Group, which manages the Salmon Management Plan meets regularly to review the Plan and Conservation Limits (CLs). The group also manages the collection of management information and reviews existing regulations and where appropriate makes recommendations for modification or the introduction of new controls based on the interpretation of the data. The data is compiled from habitat surveys, fish counter information, annual electric fishing surveys and a tagging scheme which provides the data on exploitation. The information is held on a

Geographical Information System (GIS) database which is maintained and expanded on an ongoing basis. The GIS and counter databases provide the mechanism to monitor compliance against CLs and trigger management actions to address impacts on the stocks.

Coarse fish and pike management

21.16 The Fisheries (Amendment) Byelaws (Northern Ireland) 2008 (SR 2008 No. 318) came into operation on 24th July 2008. The Byelaws restrict the number of pike which can be taken whilst angling to one per day.

21.17 The Fisheries (Conservation of Coarse Fish) Byelaws (Northern Ireland) 2008 (SR 2008 No. 319) came into operation on 24th July 2008. Anglers can now only catch and retain four coarse fish in one day and these fish must be 25 centimetres or less. The Byelaws also require that a person shall not have in his possession more than four rodcaught coarse fish to use as bait when fishing for pike.

European Eel Regulation

21.18 The European Eel Regulation (EC) No 1100/2007 aims to establish measures for the recovery of the European eel stock. The Regulation requires the establishment of Eel Management Plans for each eel river basin, of which there are three in Northern Ireland, which will demonstrate that at least 40% of the biomass of adult eels from each river basin relative to the best estimate of the potential escapement in the absence of human activities affecting the fishing area or stock are escaping to spawn.

## Additional measures for fisheries

| | | |
|---|---|---|
| FISHERIES | 33 | Implementation of Eel Management Plans |
| | 34 | Mitigation to impacts of drainage maintenance works on habitat |

21.19 Measure 33: Implementation of eel management plans

21.20 Funding through the European Fisheries Fund (EFF) is currently being sought to implement eel management plans to establish measures for the recovery of the stock of European eel. Eel management plans have now been completed for the North Western, North Eastern and Neagh Bann River Basin Districts (December 2008) in accordance with requirements of Council Regulation EC 1100/2007 to establish measures for recovery of the stock of European eel.

21.21 Work is on-going in conjunction with other UK departments, the Department of Communications, Energy and Natural Resources in Ireland and the commercial eel industry to meet the requirements of this Regulation.

21.22 Essentially it is hoped that a balance can be reached between permitting a level of commercial fishing to continue and ensuring that there are adequate measures in place to contribute to conservation of the species and thus allow for both a sustainable eel stock and a sustainable industry in the future.

21.23 There are no commercial eel fisheries within the North Eastern RBD and conditions allow any eel populations to migrate, grow and escape to the sea naturally. The assessment for the Neagh Bann RBD suggests monitoring and fishing can continue, in light of prudent stocking and recent restrictive management. The quality of the water in Lough Neagh and in the River Bann - particularly in the vicinity of the Fishery at Toome - has been a source of major concern in recent years and has serious commercial implications.

21.24 The North Western RBD Plan suggests the eel fishery should be closed to affect a recovery of fish stocks. The situation is likely to be reviewed again with reference to reopening in 2019.

21.25 Almost half the wetted area of Ireland is behind hydropower barriers that are known to impact on eel. The average reported mortality for turbine passage is 28.5% (ICES estimate quoted within the NWRBD EEL Management Plan). Mortality rates are though highly variable and there is size selectivity. However, data for Northern Ireland is currently lacking. These barriers significantly impact upon the ability to meet escapement targets and the ability to replenish stocks. Therefore further management actions include the estimation of mortality and morbidity to be undertaken by the hydropower facilities at Cliff and Cathaleen's falls on the Erne within the RBD. In addition, 'trap and transport' measures are required to mitigate hydropower impacts on eel. A proportion of stocks must be removed and transported further down-river to avoid eel mortality.

21.26 Implementation of the plans is likely to take a number of years due to the need to complete further monitoring.

21.27 Measure 34: Mitigation to impacts of drainage maintenance works on habitat

21.28 This is a requirement for all drainage works to include mitigation and, where funding permits, fishery rehabilitation measures. The measure reinforces and formalises current procedures for liaison and guidance provision between DCAL Fisheries Technical Officers and the Rivers Agency under an existing Service Level Agreement held since 1989.

## Administrative Costs

### Additional Measure No. 33

21.29 Administrative costs relate to long-term assessment work, to begin in 2009/10 for 2-3 years. This will inform what actions should be taken when the eel management plans are reviewed. This work will be completed by AFBI under an existing Service Level Agreement. Therefore no administrative costs are identified.

21.30 In addition, the current European Fisheries Fund (EFF) application on the Neagh Bann will cover 30% of costs, with the remaining 40% to be provided by Fisheries Agency (DARD) and 30% from DCAL. This amounts to £150 k for five years for DCAL, and £200 k for DARD for the next five years, at a total administrative cost of £1,750 k between 2010 and 2015.

### Additional Measure No. 34

21.31 £1,050 k will be required for the installation of three fish counters and structures per year between 2010 and 2013 for this measure.

## Compliance costs

21.32 The outcome of measure 33 (long-term assessment work) will inform our understanding of impacts, compliance costs, and further actions which need to be taken.

21.33 In the North Western RBD, management plans for eel fisheries mean that 17 individual fishermen will have their permits withdrawn from 23rd September. Consideration will be given to the introduction of a diversification scheme for commercial fishermen whereby those exiting the industry and other service providers (who meet tender criteria) will be eligible to compete for 'trap and transport' operations. However, the value of that work and its suitability for those losing their permits is unknown.

21.34 Whilst within the Neagh Bann RBD there are 300 families sustained by 150 boats, generating £2m as a business. The EFF application for the purchase of eel stock is in support of these fishermen (see Administrative costs). The assumption is therefore that no boats will be affected within the Neagh Bann RBD. In the absence of such funding, the Lough Neagh Eel Fishery will inevitably decline and continued employment opportunities in a traditional industry will be lost.

21.35 Likely costs of measures elsewhere in the UK suggest:

21.36 Further measures, likely to be required following completion of measure 33 suggest some significant costs to industry, for example:

21.37 Costs to industry for the introduction of fish passes with the construction of all new obstructions for England and Wales to ensure free passes of fish up and down rivers were estimated at £90.4m per year (Defra, 2008). This would be to achieve implementation of the measures in a prioritised, phased approach by 2015.

21.38 Costs for complex fish pass facilities can amount to £250,000 each, while smaller constructions can cost around £20,000 each. However, where other substantial works are ongoing at the same time, the additional costs of building a fish pass can be significantly reduced and could become effectively marginal.

21.39 Eel passes generally cost less than fish passes and suggested to be in the order of £10,000 each.

21.40 Where novel or complex fish passes are required, as might be the case for hydropower operations, owners or operators will be required to undertake monitoring and surveillance assessment to ensure the necessary accessibility of the fish pass. Owners are likely to sub-contract these assessments, at a cost of £5-8,000.

21.41 The cost of installing screens for the electricity industry are £250,000 per licence.

21.42 Associated with measure 33 is the risk that eel stocks, normally purchased from the Severn will not be available, even if funding is agreed. The eel population crash may make this stock and others within Europe unavailable for purchase.

## Benefits

21.43 Benefits to the water environment accrue from both the increase in fish stocks and diversity of species which will be present.

21.44 Benefits will be felt to the local fishing industries and dependent populations, and more broadly, throughout Europe, given the crash in eel population and importance of the Northern Ireland population within that.

21.45 The implementation of all three eel management plans should ensure continued and significant benefits to eel fish stocks. It is likely that the closure of fishing within the NW district will not be enough where obstructions remain. Where fish cannot easily move about, particularly upstream to colonise, populations are often only maintained by stocking. The ‘Trap and Transport’ technique to mitigate the effects of hydropower obstructions will have to be monitored to assess its impact. However, more novel fish passes may be needed.

21.46 Research commissioned by the Environment Agency and Defra into the economic value of inland fisheries evaluated the economic aspects of fish and fishing in freshwaters (2007)and estimated the total value of commercial eel fisheries (glass, yellow and silver eels) in the order of £1.6m annum; though this varies widely from year to year. Operating costs need to be taken into account in assessing the value of net fisheries, and these could be in the range of 10-20% of the value of the fish.

21.47 The mean willingness to pay (WTP) to prevent “severe decline in salmon populations across all of England and Wales”, linked to a salmon specific disease rather than general river quality, within the study was £15.80 per household per year, which aggregates to a total WTP of around £350 million per year. This may be an overestimate of WTP for salmon alone if respondents were also thinking about their WTP for general river quality when deciding upon their response. So, at worst, WTP could be a third of these values.

# 22. Key sector: Protected Areas

## Pressure: All types

### Background and Basic Measures

22.1 Protected areas are identified as those requiring special protection under existing national or European legislation, either to protect their surface water or groundwater, or to conserve habitats or species that directly depend on those waters.

22.2 The register of protected areas (as required under WFD Article 6) consists of an inventory of protected area sites representing the protected area categories outlined below:

Waters used for the abstraction of drinking water

22.3 This category of protected area replaces the repealed Surface Water Abstraction Directive (75/440/EEC) and will also incorporate groundwaters.

Areas designated to protect economically significant aquatic species

22.4 These are protected areas established under earlier EC directives aimed at protecting shellfish (79/923/EEC) and freshwater fish (78/659/EEC).

Recreational Waters

22.5 These are bathing waters designated under the Bathing Water Directive (76/160/EEC).

Nutrient Sensitive Areas

22.6 These comprise nitrate vulnerable zones designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive under the Urban Waste Water Treatment Directive (91/271/EEC).

Areas designated for the protection of habitats or species

22.7 These are areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection. These are designated under the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC).

22.8 The RBMPs have identified an additional measure for one specific species – the freshwater pearl mussel.

22.9 The freshwater pearl mussel (*Margaritifera margaritifera*) is a large bivalve which lives in the bottom of rivers and streams.

22.10 The freshwater pearl mussel (FPM) is listed on Annexes II and IV of the EC Habitats Directive and Appendix II of the Bern Convention and is fully protected under Schedule 5 of the WCA 1981 and the Wildlife Order (Northern Ireland) 1985. In Northern Ireland, three cSACs, the Cladagh (Swanlinbar) River, the Owenkillew River and the Upper Ballinderry River identified FPM as a cSAC selection feature.

22.11 FPM were originally found throughout most of Ireland (Lucey, 1993; Beasley, 1996). Beasley and Roberts (1996) reported significant declines in the population in County Donegal. Information on the current distribution of FMP in Ireland suggests that the species has undergone a large decline in both absolute numbers and range (Cosgrove *et al.*, 2000). It is thought that drainage activity, poor water quality and pearl fishing have all played a part in drastically reducing the range and numbers of pearl mussels. Recent surveys show very few populations left, and of these there are low numbers of individuals, which show no signs of successful reproduction.

22.12 The long-term survival of FPM also depends on availability of brown trout which is a host-fish, as well as its migratory form (sea trout) and Atlantic salmon. Stocks of trout and salmon have declined

in recent years. This decline in the range of Atlantic salmon and sea trout stocks across Europe in recent years has been matched by a similar recruitment failure in populations of FPM (Young *et al*., 2000).

22.13 Table 22.1 shows a small number of water bodies (rivers and lakes) at less than Good status for freshwater pearl mussel (12, or 2% for the whole of NI), which in part reflects the localised presence of the species. It is not clear the extent of pollution within these water bodies, and therefore the environmental 'gap' which needs to be addressed by further action.

**Table 22.1: NI WFD 2009 compliance for Freshwater Pearl Mussel (FPM)**

| | | Number or % of water bodies | Freshwater Pearl Mussel (FPM) |
|---|---|---|---|
| **Rivers & Lakes** | **Total water bodies in NE 114** | **No of water bodies less than Good status** | 0 |
| | | **%** | **0.0%** |
| | **Total water bodies in NW 218** | **No of water bodies less than Good status** | 8 |
| | | **%** | **3.7%** |
| | **Total water bodies in NB 265** | **No of water bodies less than Good status** | 4 |
| | | **%** | **1.5%** |
| | **Total water bodies in NI 597** | **No of water bodies less than Good status** | 12 |
| | | **%** | **2.0%** |

**Key to above table:** NI is Northern Ireland. NE is North Western. NE is North Eastern. NB is Neagh Bann.

22.14 No data is available for other water bodies.

## Additional measure for protected areas

| | | |
|---|---|---|
| PROTECTED AREAS | 35 | Development of action plans for designated freshwater pearl mussel (FPM) SACs |

22.15 A Species Action Plan with targets and proposed actions has now been published at a UK level. A Northern Ireland Species Action Plan (SAP) for FPM was published in March 2005[17]. The Species Action Plan identified a number of targets and actions aimed at improving the conditions for, and ultimately increasing the population of, the FPM. The main objectives and targets of the FPM SAP are to (i) maintain the size of existing significant populations, (ii) increase the size of these populations and (iii) re-establish populations of FPM in further suitable sites.

22.16 This measure proposes to build upon the NI SAP's objectives for the SAC sites. An application for 2.2m euro Interreg funding has been submitted. If successful, this will cover the cost of producing action plans for designated sites; mapping the extent of mussels and entrance monitoring; and a number of pilot studies.

22.17 It is also hoped that this measure will link with the Countryside Management Scheme (CMS) (run by DARD) as a mechanism to advice farmers. This scheme, opened in 2008, already applies and

[17] http://www.nienvironment.gov.uk/fwpearlmussel_pdf.pdf

has applications from farmers within protected areas. It could therefore provide a further mechanism to introduce good practice measures to reduce sediment and nutrient levels within affected water bodies.

## Administrative Costs

### Additional Measure No. 35

22.18 Interreg funding (of 2.2 million euros) is being sought for this measure.

22.19 There is a significant risk that Interreg funding will not be granted due to high numbers of applications[18]. If this is the case, funding will be needed from within NIEA at an estimated value of £392.40k.

22.20 Notably, there is likely to be a further 12-month period, after funding is granted, required to organise procurement of the research work.

## Compliance costs

22.21 No direct compliance costs are identified with this measure although it is likely that in time farmers and certain industries in the localised area of FPM populations will be affected through changes in practices. Changes in farm practices identified are assumed to be funded through the CMS.

## Benefits

22.22 In great enough numbers, FPM play an important part in improving water clarity by filtering it.

22.23 Actions leading from the SAC Action Plans are likely to lead to the reduction in sediment and nutrient levels. These direct benefits are likely to be followed by indirect benefits related to the improvements in water quality including recreation, tourism and aesthetic value.

[18] Personal Communication, NIEA, 7/09/09.

# 23. Public Participation

## All pressures

### Background

23.1 Small changes in consumer behaviour can provide for significant improvements to the water environment, often a low cost to the regulators, and may provide significant savings for the consumer.

23.2 Furthermore, community action through volunteering and involvement in the charity sector already provides significant improvements in the water environment.

23.3 It is these two areas which are targeted to realise improvements through additional measures.

#### Additional measures for public participation

| | | |
|---|---|---|
| PUBLIC PARTICIPATION | 36 | Facilitate the establishment of River Trusts across NI |
| | 37 | Promotion of efficient use of water |

23.4 Measure 36: Establishment of River Trusts across Northern Ireland. This measure aims to facilitate the establishment of two trusts per year through financial support to the Association of River Trusts.

23.5 Rivers trusts are non government organisations (NGOs) formed by local people to help protect and restore their local river. The initiators of a river trust are often anglers, but other individuals who care about their river are quick to join in. There are now 35 rivers trusts operating over England and Wales.

23.6 All trusts operate from the grass roots, providing advisory services to farmers, interested parties and landowners on watercourse protection and most are involved in practical mitigation work. All trusts are actively involved in a range of education initiatives designed to increase awareness of freshwater issues to a wide audience. The practical achievements of the movement over a short period of time, with limited funds, are well documented.

23.7 In this way, Rivers Trusts can be one of the primary co−deliverers for many Water Framework Directive activities, including public participation and consultation, monitoring, research, developing plans, raising funds and implementing Programme of Measures. They may also have access to funding and networking not available to government.

23.8 To date, one Rivers Trust has been established in Northern Ireland: Ballinderry Fish Hatchery Ltd is a non-profit taking community business owned by the Ballinderry River Enhancement Association (BREA). The hatchery rears around 1.5 million native Ballinderry Dollaghan trout, river brown trout and salmon each year as well as carrying out breeding projects for endangered freshwater species such as the Freshwater Pearl Mussel and White-clawed Crayfish.

23.9 Initial funding has already been provided to develop a start-up pack for two Trusts in NI; fund a Spring Conference in 2010; and allow members to discuss with local groups whether they wish to become a Rivers Trust. Currently, the Six Mile Water Action Group has shown some interest in becoming a Rivers Trust. However, the precise number of Trusts established by the Rivers Trusts project will very much depend on local interest[19].

23.10 Measure 37: Promotion of efficient use of water. The aim of this measure is scope a programme of initiatives to reduce water use, and thereby reduce the need for abstraction from surface water and groundwater, through education and awareness measures. The exact nature of these initiatives, which sectors they will target, and likely reductions will be decided as the programme develops.

23.11 NIW currently has an extensive programme for promoting and improving water efficiency and conservation. This includes:

- continuing to invest on reducing water mains leakage to reduce the 2008/09 leakage levels by 7.6% for 2012/13;
- attending major public exhibitions, hosting events at its Silent Valley Education Centre and organising educational visits to schools and communities;
- travelling throughout the River Basin areas using its Waterbus (mobile classroom) to teach pupils about issues such as water efficiency;
- publishing education leaflets for customers on water topics such as using water wisely;
- running campaigns designed to increase awareness of the need for water conservation and more environmentally friendly lifestyle choices and behaviours;
- implementing and enforcing the requirements of the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 which include an offence for installing or failing to maintain a fitting which wastes or misuses water supplied by NIW;
- by adding to the monitoring network in NI to more accurately measure the volumes abstracted from each of the surface and groundwater sources currently operated by NIW; more detailed monitoring may identify reductions in volume and or sources in the future; and
- the delivery of catchment scale projects with support from NIEA officials to monitor and identify mitigation works which may be required under the Directive to ensure compliance.

23.12 Other actors working in this area include Waterwise which has been working closely with the Energy Saving Trust in developing joint water and energy messaging and advice for the home. This work will feed into an EU Life+ funded project awarded to the Energy Saving Trust and Waterwise, which will pilot the roll out of combined advice through the Energy Saving Trust's existing advice centres. The project will explore the overlaps and conflicts in providing combined advice, as well as the challenges in integrating tailored, localised water and energy messages. The key objectives of the project will be the following:

1) To pilot an innovative approach to provide environmental advice and raise consumer awareness (cross selling with existing services).

2) To actively investigate the viability of combining water saving and sustainable energy advice (identifying synergies/conflicts and carbon saving links between energy and water)

3) To analyse geopolitical differences in three pilot areas (Cardiff, Edinburgh and London)

4) To influence consumer behaviour to reduce their carbon emissions, preserve natural resources and move towards a water saving culture (22,500 consumers taking action)

5) To disseminate the findings of this innovative project (sharing info with other EU states to replicate pilot elsewhere).

23.13 Waterwise has now completed a report (Water and energy implications of showering and bathing behaviours and technologies), which reviews the evidence to date for the types of showers present in UK homes, market trends in shower, bath and spa types, and the changing attitudes and behaviours associated with personal washing.

23.14 This initial work has strengthen the evidence for a need to address rising consumption trends in the area of personal washing within the UK and inform proposals for further research into the water and

energy saving potential of water efficient shower heads and the behavioural factors which determine their success.

23.15 The Good Practice Register of water efficiency initiatives for water and sewerage companies in England Wales (2007) records some of the reduction in demand levels achieved by previous initiatives, which provides evidence of the likely benefits which could be achieved. Examples include:

- Households opting for a meter is assumed to reduce demand by at least 5;
- Low flush toilet retrofit programmes – (with free installation to customers) gave an average reduction of 31 litres/property/day; and
- Promotion of water butts gave potential savings from: 250 to 1300 litres/butt/year or 0.6 to 4.2 litres/property/day.

## Administrative Costs

### Additional Measure No. 36

Administrative estimates are £10k/yr to facilitate the establishment of (potentially) two trusts per year (£30k over 3 years) with a further £50k/yr funding for trust activities and programmes giving a total of £180k.

### Additional Measure No. 37

23.16 £136.3 k will be required between 2010 and 2013 to fund a NIEA Higher Scientific Officer for this Measure. The running costs will be funded from the abstraction and discharge licensing scheme.

## Compliance costs

23.17 There are no compliance costs associated with either of these measures.

## Benefits

23.18 A report for WWF-UK in 2006, *Rivers in trust - the success of the rivers trusts in the UK,* calculates the costs of river restoration works undertaken by the Trusts.

23.19 Using the total figures supplied from all the trusts, the report calculates an approximate rate for restoring an average river. If the total income from the trusts is put against the length of rivers worked on and extra spawning habitats opened, the figure is found to be £722.70/km, (£5,649,364 / 7817km = £722.70) or 72p/metre. Direct length of rivers worked on raise the cost/km to £1,192/km (£5,649,364/ 4739 = £1,192.10/km) or £1.19/m. These figures compare favourably with the costs of similar works undertaken by government agencies.

23.20 The mitigation work of the Rivers Trusts appears to provide a low cost way of reducing nitrogen levels in rivers, in particular.

23.21 Direct benefits arising from work completed by the Rivers Trusts in England and Wales to date include agricultural efficiency through better use of fertilisers and manures; an increase in fish numbers; fishing visits; overnight accommodation; fishing tackle sales; local purchases and income to riparian owners; all add to the economic positives (Welsh Assembly, 2003). Less easy to quantify, is the increase in flood storage capacity following mitigation work, and the reduction in downstream flooding.

23.22 These give a likely indication of potential benefits which could be brought about if two further Trusts were to be established in Northern Ireland.

23.23 A further study on work completed by the Rivers Trusts looked at a project completed by the West Country Rivers Trust (Table 23.1).

**Table 23.1: Estimated Direct Benefit/Cost Ratios (10-year Planning Horizon) for an example Rivers Trusts project (Source: Manning, 2001)**

| | Net Direct Benefit | Project Operational Cost | Benefit/Cost Ratio |
|---|---|---|---|
| Un-discounted | £9,181,844 | £1,064,274 | 8.6 |
| **Discounted (6%)** | £6,771,302 | £1,064,274 | 6.4 |

23.24 This is one of a number of studies which indicate favourable benefit: cost ratios for their work in the range of 6:4.

23.25 If one assumes a similar ratio is applied to £150k further funding to be provided to the Rivers Trusts for project work, a crude benefit value of £100k could be realised from direct benefits.

23.26 Direct benefits derived from measure 37 (water efficiency measures) will fall to water abstractors, whom will save by abstracting less water, thereby reducing the amount of fees payable for the licence. Individual consumers and businesses are also likely to see reduced water bills.

# 24. Competition Test

General statements based on 'Competition Filter' following Guidance on Regulatory Impact Assessment (Cabinet Office, 2003).

*Q1: In the market(s) affected by the new regulation, does any firm have more than 10% market share?*
The only market sector where this may be the case is the water industry and forestry sector.

*Q2: In the market(s) affected by the new regulation, does any firm have more than 20% market share?*
Forestry sector.

*Q3: In the market(s) affected by the new regulation, do the largest three firms together have at least 50% market share?*
Potentially within the eel fisheries sector.

*Q4: Would the costs of the regulation affect some firms substantially more than others?*
Yes, potentially, depending on location and the extent of activities (e.g. size and location of farm) and choice of programme of measures.

*Q5: Is the regulation likely to affect the market structure, changing the number or size of firms?*
No, with the possible exception of impacts on agriculture and commercial fisheries, depending on the extent of the measures required by arable and livestock farmers in particular locations, and the recovery of fish stocks as part of the implementation of the EEL management Plans.

*Q6: Would the regulation lead to higher set-up costs for new or potential firms that existing firms do not have to meet?*
No

*Q7: Would the regulation lead to higher ongoing costs for new or potential firms that existing firms do not have to meet?*
No

*Q8: Is the sector characterised by rapid technological change?*
Numerous sectors are likely to be affected, but the main affected sectors are the water industry and agriculture which are not characterised by rapid technological change.

*Q9: Would the regulation restrict the ability of firms to choose the price, quality, range or location of their products?*
Potentially, depending on the programme of measures adopted within the implementation phase to meet the objectives for each river basin district.

# 25. Small Firms Impact Test

25.1 The sectors affected by the additional measures include a number of sectors with a high proportion of SMEs, including agriculture, forestry, commercial fisheries, recreation and water-based transport.

25.2 Each of these sectors is likely to experience both some benefits and costs associated with the implementation of the measures. The precise impact on small firms is difficult to determine at this stage and at a strategic level, as the impacts will depend heavily upon the programmes of measures adopted within each RBD in the course of the implementation process.

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a) Project 2c Benchmark costs database and guidance on the application of the cost-effectiveness methodology as updated by Project 2e Deriving the Costs and Effectiveness of Delivery Mechanisms. This includes guidance on cost-effectiveness analysis, cost calculation tool and cost database [currently being reviewed].
b) Project 4bc – Nera survey report - Report on National Water Environment Benefits survey
c) Project 3 Guidance on the evidence required to justify disproportionate cost decisions under the WFD. This includes - revised summary guidance

Results of Preliminary Cost Effectiveness Analysis of the Water Framework Directive Revised after Stakeholder Review December 2007(www.wfdcrp.co.uk)
a) Introduction, policy context and methodology and methodology
b) Synthesis report chapters for each pressure Chapter 4.1: Chemicals Chapter 4.2: Water Resources Chapter 4.3: Nutrients Chapter 4.4: Alien Species & Fisheries Chapter 4.5: Morphology & Biodiversity Chapter 4.6: Sanitary Chapter 4.7: Sediment Chapter 4.8: Microbiology Chapter 4.9: Minewaters Chapter 4.10: Planning Chapter 4.11: Temperature Chapter 4.12: Administrative Costs
c) Chapter 5: Sector Summary

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