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River pollution in Northern Ireland: An overview of causes and monitoring systems, with examples of preventative measures

This paper examines the potential causes of river pollution, pollution monitoring systems in place in Northern Ireland, as well as some examples of preventative measures trialled both here and in other jurisdictions. It has been produced following a request by the Environment Committee to contribute to their preparations for a stakeholder event on River Pollution. **It provides information and examples to generate discussion among Committee Members and stakeholders and should not be taken as conclusive in its considerations.**

Executive Summary

This paper examines the potential causes of river pollution and monitoring systems in place in Northern Ireland (NI), as well as some examples of preventative measures trialled both here and in other jurisdictions. It has been produced following a request by the Environment Committee to contribute to their preparations for a stakeholder event on River Pollution. It provides information and examples to generate discussion among Committee Members and stakeholders and should not be taken as conclusive in its considerations.

Section 2 of the paper identifies a number of examples of approaches taken to preventing pollution. Pollution prevention forms part of the overall process of pollution management (pollution prevention, monitoring, response and enforcement) which is underpinned by effective approaches to water quality management and the implementation of the Water Framework Directive. This includes the implementation of River Basin Management Plans (RBMPs) and complying with environmental regulations for preventing water pollution e.g. consent to discharge permits. As requested by the Environment Committee, the paper explains the operation of a similar system in Scotland under the Controlled Activities Regulations which provides a hierarchy of licensing depending on the risk level of activities. This section also explores Sustainable Drainage Systems (SuDs) as an example of pollution prevention through mitigating the threats caused by overflows of untreated waste into nearby streams, rivers, or other water bodies during periods of intense rainfall. As requested by the Environment Committee, it also presents information on the replacement septic tank scheme in the Republic of Ireland and explains the situation in Northern Ireland. Enforcement may be seen as a form of prevention, and it may be of interest to find out whether current measures, explained under section 5, are considered sufficient.

Section 3 of the paper is concerned with highlighting a number of causes to river pollution using data from DOE. There is a need to investigate further approaches to addressing the ongoing problem of diffuse source pollution, particularly rural diffuse pollution as discussed in section 2.2. A number of other legislatures have introduced diffuse and rural diffuse actions plans such as Scotland and Wales, and England is consulting on one (see Information Box 1). The increased growth in 'other' sources and 'unknown' causes since 2009 suggests a growing problem with detection and further explanation as to whether this is the result of operational problems or other external factors may be needed. Other main causes of pollution include equipment failure and poor practice; does this suggest the need for improved education, awareness development and support across the business, industry and agriculture sectors?

Section 4 focuses on the monitoring of river pollution in NI. Similar to other jurisdictions (as detailed in Section 4.4) when dealing with incidents of pollution, NIEA's Operations Team rely on reports of incidents by the public and industry and on detection by field agents during their ongoing work and monitoring of river bodies. It may be of interest to find out whether current mechanisms for the reporting of pollution incidents are

utilised and efficient. For example, the Pollution Incident Hotline directs calls made outside of office hours to the EA in Reading, who contacts an on-call officer in NI. It may be interesting to find out how many calls are made out of hours and whether this approach affects the response time and efficiency in any way.

Another area considered is the duty/requirement for any business/industry to report a pollution incident. Requirements include the reporting of emissions to water environments under the Pollution Inventory (for NIEA regulated business). However these are required on an annual basis, and it may be of interest to find out whether there are any requirements for the immediate reporting of pollution incidents from all industry/business, similar to Scotland under the Controlled Activities Regulations (CAR).

The responsible operation of business, industry and agriculture in NI is largely controlled through the environmental permitting process. Changes to environmental permitting are to be introduced through the Environmental Better Regulation Bill which will bring a hierarchy of licensing, similar to that in Scotland under the Controlled Activities Regulations (see section 2.3.2). This allows regulators to focus efforts on high risk activities. However, further detail on the operation of this is to be provided under supplementary regulations in Schedule 1 of the Bill, which the Department may be able to provide in due course. It may be of interest to find out whether pollution reporting requirements will be included under the new permitting regime.

Key Points

- The management of water quality under the Water Framework Directive is instrumental in the prevention of river pollution.
- Prevention approaches include the effective implementation of River Basin Management Plans (RBMPs) and complying with environmental regulations for preventing water pollution e.g. consent to discharge permits under the Water Order 1999.
- It has been suggested that it is human activities, such as agriculture and industry, which are the main causes of water pollution in Europe.
- Scottish and Northern Ireland Governments both recognise diffuse pollution as the biggest pollution threat to their respective water environments. Scotland has a Rural Diffuse Pollution Plan with legislation in place to tackle diffuse pollution from rural sources.
- Similar to other jurisdictions, NIEA's Operations Team rely on reports of pollution incidents by the public and industry and on detection by field agents during their ongoing work and monitoring of river bodies.
- Further consideration is needed around the requirements for businesses and industries to report pollution incidents to NIEA and this has been discussed in section 4.2.2
- Problems related to river quality and pollution incidents are not solely an NIEA problem due to the dispersal of responsibilities across departments. Therefore, there may be a need for a more integrated and joined-up approach.
- While departmental re-organisation in May 2016 may bring an opportunity for more joined up working, it is important that work is underway to ensure the effective changeover and amalgamation of two departments (DARD and DOE) with different, and sometimes competing, priorities.
- The current Minister has suggested the creation of an independent Environmental Protection Agency (EPA). However, further details will be needed on the positioning of responsibilities within the new department and EPA to ensure all responsibilities are given equal weight.
- Changes to environmental permitting under the Better Regulation Bill may bring opportunities for improvements, however further detail on the new regime is required.

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1 Introduction

The following paper is principally an information paper to supplement discussion at the Environment Committee's Stakeholder Event on River Pollution. Suggestions made and examples used are not conclusive and have been presented in a way to encourage further discussion, examples and insights from stakeholders.

As requested by the Environment Committee, the paper considers river pollution from the following aspects: pollution prevention approaches through the management of water quality under the Water Framework Directive (WFD) and associated legislation; the main causes of river pollution in Northern Ireland (NI); and the monitoring of pollution incidents in NI. Finally it offers some suggested areas for further consideration.

2 Improving Water Quality and Pollution Prevention

Approaches to managing water quality in the United Kingdom (UK) and the Republic of Ireland (Ireland) are set within the wider legislative framework imposed by the European Commission's Water Framework Directive (WFD). In implementing the WFD member states were required to adopt a process of River Basin Management Planning as a means of managing the often unique conditions and threats to their water resource. River Basin Management Plans (RBMPs) include an assessment of the multiple pressures on the water environment as well as a programme of measures to mitigate these pressures and improve water body status.¹

The purpose of this paper is to identify examples of approaches taken to preventing pollution and improving water quality.

2.1 Managing Water Quality

At the European level there has been realisation of the need to manage the multiple stresses being placed on Europe's water resources with the European Economic Community (EEC) identifying water pollution as a priority matter at its First Action Programme on the Environment in 1973.² The initial response by the EEC included the 1976 Bathing Water Directive, aimed at improving beaches and the 1980 Drinking Water Directive³, which sought to improve the quality of drinking water. During the 1990s European Legislation began to address key sources of pollution such as waste water, agriculture and major industries, with the Directives on urban waste water

¹ Hering, D (2015) Managing aquatic ecosystems and water resources under multiple stress — an introduction to the MARS project. *Science of the Total Environment*, vol. 503–504, pages 10–21[online] available from: <http://nia1.me/2xv>

² Environmental Law [online] Prevention and Control of Water Pollution: UK Legislation. Available from: <http://nia1.me/2xn>

³ EC [online] The Drinking Water Directive. Available from: <http://nia1.me/2xr>

treatment⁴, nitrates pollution from agriculture⁵ and integrated pollution and prevention control (IPPC) which controls industrial emissions⁶.

Building on the success and also key learning points of these policies, a review of EU water policy was initiated. This eventually led to the development of the EU's most far-reaching and holistic fresh water policy – the Water Framework Directive⁷ which was introduced in 2000.

2.2 The Water Framework Directive

The WFD establishes a legal framework for protecting rivers, lakes, estuaries, inland coastal waters and groundwater bodies across Europe. During its first management cycle it required EU member states to aim to achieve "good status" in all water bodies by 2015. 'Good status' refers "*...to good ecological status (or Potential) and good chemical status for surface waters and good chemical and good quantitative status for groundwaters*".⁸ There are exemptions for when specific circumstances justified setting lower standards or extending the deadline. In these instances the achievement of 'good status' can be delayed until 2021 or 2027. These reasons could include:

- unreasonable cost implications;
- technical feasibility;
- unfavourable natural conditions; or
- designation of heavily modified water bodies (HMWBs)

In the case of HMWBs, such as canals and reservoirs, there is only the requirement to achieve good ecological potential, instead of good ecological status.⁹

2.2.1 Implementation of the WFD in Northern Ireland

Having been introduced in 2000, member states were set a timetable to achieve various milestones including transposing the WFD into local legislation and delivering the first river basin management plans (RBMP). This timetable is set out in Figure One.

⁴ EC [online] Urban Waste Water Directive. Available from: <http://nia1.me/2xt>

⁵ EC [online] The Nitrates Directive. Available from: <http://nia1.me/2xq>

⁶ EC [online] Integrated Pollution and Prevention Control (IPPC) Directive. Available from: <http://nia1.me/2xs>

⁷ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy [online] available from: <http://nia1.me/vv>

⁸ European Commission (2009) Common implementation strategy for the Water Framework Directive [online] available from: <http://nia1.me/2y4>

⁹ Annex V, Directive 2000/60/EC [online] available from: <http://nia1.me/vv>

Figure 1: WFD Timetable



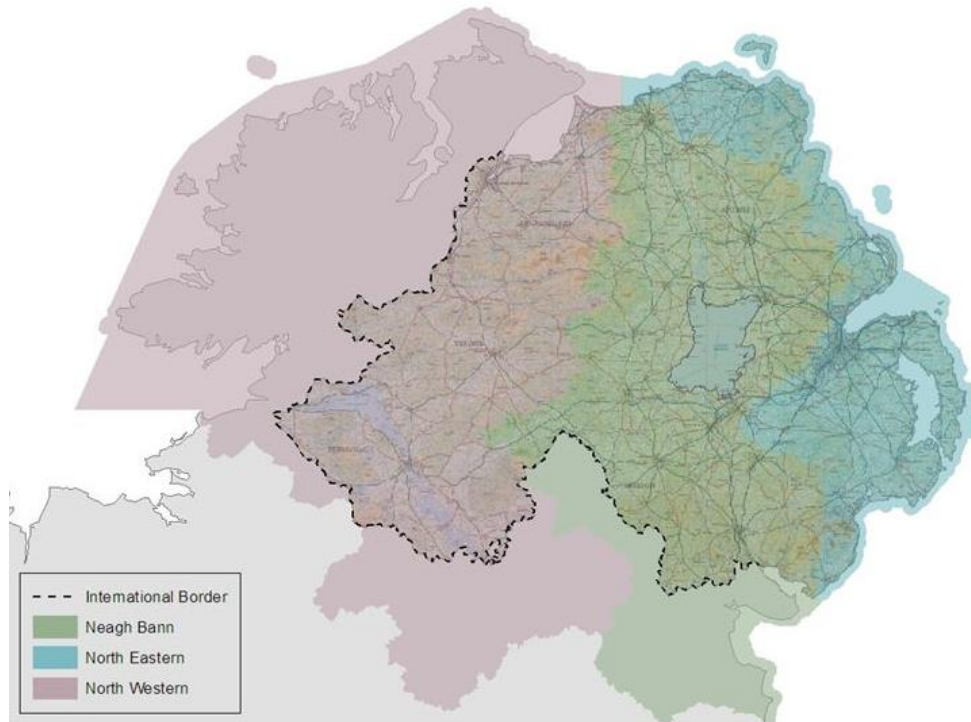
2.2.2 National legislation and identification of River Basin Districts and Authorities

The WFD was transposed into Northern Ireland law through The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 (Statutory Rule 2003 No. 544). This identified the Department of the Environment (and the Northern Ireland Environment Agency) as the responsible authority for co-ordinating the river basin planning process.

2.2.3 River Basin Districts

There are four River Basin Districts in Northern Ireland, three of these cross the border and as such are known as International River Basin Districts (IRBD).¹⁰ Every six years the Department of the Environment (DOE) produces a river basin management plan for three of Northern Ireland's River Basin Districts: the North Eastern, which is the only RBD to sit wholly within Northern Ireland; as well as the Neagh Bann and North Eastern IRBDs – these are shown in figure two below.¹¹ The fourth RBD is the Shannon IRBD; this is the largest in Ireland at more than 18,000 km² stretching from the source of the River Shannon in the Cuilcagh Mountains in Counties Cavan and Fermanagh to the tip of the Dingle peninsula in north Kerry.¹²

Figure 2: A map of the three River Basin Districts in Northern Ireland



Source: NIEA

¹⁰ DoE [2008] *River Basin Management Planning* [online] available from: <http://nia1.me/vw>

¹¹ DoE [2008] *River Basin Management Planning* [online] available from: <http://nia1.me/vw>

¹² Shannon River Basin District [online] available from: <http://nia1.me/2xp>

2.2.4 River Basin Management Plans

The process of compiling the first RBMPS began with a gap analysis which required identifying the current status of the water bodies within the river basin (bad, poor, moderate, good or high) and assessing the 'gap' that must be filled in order to satisfy the requirements of the WFD i.e. that both the ecological and chemical status of all water bodies are 'good'.

Having identified the gaps, a 'programme of measures' was planned. These address what is required to achieve good ecological and chemical status in water bodies 'at risk' of failing to meet these targets. The first programme of measures to achieve good status (or potential) had to be in place by 2012 with the intention of achieving the objectives by 2015. Progress with WFD implementation is reviewed on a six-yearly basis and there are two further WFD planning cycles – up to 2021 and 2027.

2.3 Northern Ireland (Consent to Discharge)

In Northern Ireland, the Water (NI) Order 1999 requires individuals or businesses to acquire consent to discharge from the Northern Ireland Environment Agency (NIEA) before any discharges are made into the water environment. Individuals or businesses that make discharges into the water environment without consent, or that make discharges that do not meet the conditions of their consent, are committing an offence.

Where the source of pollution can be traced, it is the policy of the NIEA, where appropriate, to take action. Article 7 (1) of the Order deals with the main pollution offence, which is:

- '...a person commits an offence if, whether knowingly or otherwise, that person discharges or deposits any poisonous, noxious or polluting matter so that it enters a waterway or water contained in any underground strata';
- 'A person guilty of an offence under this Article is liable on conviction to imprisonment for a term not exceeding three months or to a fine not exceeding £20,000 or to both'.

2.4 Scotland (Controlled Activities Regulations)

The Committee has previously shown particular interest in a model from Scotland which provided for targeted enforcement depending on the level of risk of activities. This is provided in the Scottish equivalent to our Consent to Discharge, known as CAR (Controlled Activities Regulations) authorisation. Controlled Activities Regulations were introduced through the Water Environment and Water Services (Scotland) Act 2003 (or WEWS). The outworking of this is that since 2006 it is an offence to undertake the following activities without a CAR authorisation:

- discharges to all wetlands, surface waters and groundwaters (replacing the Control of Pollution Act 1974 (CoPA));

- disposal to land (replacing the Groundwater Regulations 1998);
- abstractions from all wetlands, surface waters and groundwaters;
- impoundments (dams and weirs) of rivers, lochs, wetlands and transitional waters;
- engineering works in inland waters and wetlands^{13, 14}

It is intended to control impacts on the water environment including mitigating the effects on other water users. Different levels of authorisation apply depending on the activities to be carried out ranging from:

- **General binding rules** (GBRs) – activities that are considered of low risk to the environment are covered by a GBR. You will not have to contact the regulating authority or incur any charges, although you will have to follow a set of rules.
- **Registration** – activities that pose a low individual risk, but may collectively affect the environment, will need a registration, require you to apply to the regulating authority and incur a fee. You will not, however, incur an annual subsistence charge.
- **Licence** – activities that pose a moderate to high risk to the environment will either be a **simple licence** or – for activities that need a more complicated environmental assessment – a **complex licence**. A licence depends on the identification of a ‘responsible person’, who must ensure compliance with the conditions of the licence. In both cases, an application charge will apply and the activity may also be subject to an annual subsistence charge.

The Scottish Environment Protection Agency is the body responsible for enforcing the Regulations.

2.5 Reducing pollution

Run-off from impermeable surfaces such as roofs and roads has been identified as a significant source of diffuse pollution, particularly in urban areas. This problem is compounded here in Northern Ireland due to the fact that over 70% of the public sewer system is ‘combined’,¹⁵ meaning it was designed and constructed to collect both foul sewage and storm water. During periods of intense rainfall the capacity of the combined system is often exceeded causing out-of-sewer flooding of untreated foul sewage. Combined Sewer Overflows (CSOs) – whereby untreated waste is discharged directly into nearby streams, rivers, or other water bodies, is therefore necessary,¹⁶ despite posing a serious pollution threat.

¹³ PAGE 6 - SEPA (2013) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide [online] available from: <http://nia1.me/2xw>

¹⁴ Ibid.

¹⁵ Water and Sewerage Services Bill: DRD Briefing , Committee for Regional Development, meeting on Wednesday, 3 June 2015 [online] available from: <http://nia1.me/2p1>

¹⁶ DRD (2014) Sustainable Water A Long Term Water Strategy for Northern Ireland Part 3: Flood Risk Management and Drainage [online] available from: <http://nia1.me/2p5>

2.5.1 SuDS

One way of mitigating this threat is with the use of Sustainable Drainage Systems (SuDS). There a strong rhetoric for support for SuDS in Northern Ireland with the publication of a SuDS strategy in 2012.¹⁷ However it is only now in 2016, through legislation brought by the Department of Regional Development (DRD) that developers will be required to consider SuDS for all new developments – with the power to refuse surface water connections on that basis.¹⁸

SuDS is the collective term for a number of approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) and amenity issues. SuDS work by effectively mimicking the natural drainage cycle, which is altered by development. There are a large number of SuDS solutions; however, these can be grouped into two main categories: soft and hard.

Soft SuDS are usually landscaped, vegetated features including swales and detention ponds. Hard SuDS include proprietary engineered precast concrete soakaways, permeable paving and attenuation tanks. Many schemes will feature a combination of hard and soft SuDS solutions and this method is recommended by the construction industry research and information association (CIRIA) as the most appropriate technique for maximising SuDS performance.

2.5.2 SuDS in Scotland

The Controlled Activities Regulations (discussed in section 3.2) require the use of all reasonable steps taken to ensure protection of the water environment – including the use of SuDS. Two exceptions exist to this requirement: Where the development is only a single dwelling; and where the discharge is directly to coastal waters (this does not include transitional waters).¹⁹ A survey into the use of SuDS in Scotland has highlighted that the use of SUDS has become standard practice in Scotland, with over 700 sites being listed and nearly 4,000 systems having been implemented.²⁰

In contrast, the current uptake of sustainable drainage solutions for new developments within Northern Ireland is estimated to be below 5%.²¹ One reason for this slow uptake had been the automatic right to connect surface water run-off to a surface or combined public sewer, granted under Article 163 of the Water and Sewerage Services (Northern Ireland) Order 2006.²² This has been addressed via the Water and Sewerage Services Bill which is expected to pass final stage on the 25th January 2016.

¹⁷ NIEA (2012) A Strategy for Promoting the Use of Sustainable Drainage Systems [online] available from: <http://nia1.me/2p0>

¹⁸ McKibbin, D. (2015) Sustainable Drainage System provisions within the Water and Sewerage Services Bill [online] available from: <http://nia1.me/2xz>

¹⁹ SEPA [online] Diffuse pollution in the urban environment (SUDS). Available from: <http://nia1.me/2xy>

²⁰ SUDS in Scotland – the Scottish SUDS database - SR (02)09 cited by SEPA [online] Diffuse pollution in the urban environment (SUDS). Available from: <http://nia1.me/2xy>

²¹ DoE (2014) Revised Planning Policy Statement 15 'Planning and Flood Risk' [online] available from: <http://nia1.me/2pc>

²² NIEA (2012) A Strategy for Promoting the Use of Sustainable Drainage Systems [online] available from: <http://nia1.me/2p0>

Other barriers to SuDS uptake include the lack of knowledge and expertise in SuDS with uncertainty over whole life costs, the extent of land-take required in new developments, future maintenance responsibilities and adoption.^{23 24} To overcome these barriers the Northern Ireland SuDS Strategy recommends a number of actions:

- Specific training for the organisations involved (NIW, DRD, Planning NI, NIEA etc.) to provide an understanding of the applicability, limitations and benefits of SuDS;
- Responsibility for approving SuDS in new developments should rest with a SuDS approving body; and
- NIW should adopt and maintain approved 'hard engineered SuDS' within new developments in accordance with its sewer adoption policy and procedures.

Although the uptake of SuDS has been slow in Northern Ireland it is worth noting that SuDS have been included in 16 of Transport NI's major works schemes during the past 12 years.

SuDS schemes are also included in new developments with NI Water having adopted 59 schemes as part of the sewerage network since 2011. NI Water expects that it will adopt a further 31 schemes in new housing developments during 2015/16.

Source: DRD

The importance of SuDS should not be underestimated. Evidence given to the Regional Development Committee during its scrutiny of the Water and Sewerage Service Bill suggested that not only are SuDS recommended they will in fact become an essential factor in our ability to successfully manage storm water, mitigate flooding and of course reduce pollution incidents.

2.6 The Impact of the WFD and related Directives

Ten years after the adoption of the WFD, EU water policy was chosen as a pilot area for a policy 'fitness check' to ensure it continues to be fit for purpose. This forms part of the European Commission's Smart Regulation Policy, announced in its *Work Programme for 2010*. The purpose of the fitness checks "*...is to identify excessive burdens, overlaps, gaps, inconsistencies and/or obsolete measures which may have appeared over time*"^{25, 26} The results of this 'fitness check' were published in 2012. They confirmed the validity of the EU's current water policy framework. However, in terms of the achievement of good status of many water bodies, there remains a long way to go.²⁷

²³ Bastien, N.R.P., Arthur, S., Wallis, S.G. and Sholz, M. (2007) Towards the best management of SuDS treatment trains[online] available from: <http://nia1.me/2p6>

²⁴ DRD (2015) Draft Consultation Report Sustainable Water Draft Long-Term Water Strategy for Northern Ireland (2014 – 39). DRD: Belfast

²⁵ European Commission (2010) *Commission Work Programme 2010: Time To Act* [online] available from:

²⁶ Kampa, E., Von der Weppen, J. and Farmer, A. (2012) *2nd Stakeholder Workshop for the Fitness Check of EU Freshwater Policy*. European Commission [online] available from: <http://nia1.me/vz>

²⁷ EC (2015) The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks [online] available from: <http://nia1.me/2xx>

3 Pollution Causes

Europe's water resources and ecosystems are extremely vulnerable to threats such as climate change and population growth. However, it has been suggested that it is human activities, such as agriculture and industry, which are the main causes of water pollution.²⁸ This pollution can come from a '*point source*', where there is a specific identifiable origin, such as a sewage pipe or factory wastewater pipe, or a non-point source ('*diffuse pollution*') which, because of its multiple origins, is more difficult to identify.

The prevailing land use of a region or river basin district, will determine the pressures faced by its water environment and this varies greatly across the EU. However, the Scottish and Northern Ireland Governments both recognise diffuse pollution as the biggest pollution threat to their respective water environments.²⁹ Joint guidance produced by the environmental regulators in both Jurisdictions – the Northern Ireland Environment Agency (NIEA) in Northern Ireland and the Scottish Environment Protection Agency (SEPA) in Scotland – identify the main sources of diffuse water pollution in rural areas as run-off from agricultural land and silt and dust from the mining, quarrying, and construction industries.³⁰ The guidance also states that in urban areas sources of diffuse water pollution include pollutants from car parks and transport; heavy metals and pollution washed from roofs and yards; animal faeces, for example from dogs and birds; and incorrect waste pipe connections.³¹

3.1 Northern Ireland Figures

The following section is concerned with causes and source of river pollution in NI as can be identified from DOE data. It illustrates the trends in pollution incident source (Figure 1) and cause (Figure 2) from 2001 to 2014 and highlights any main trends observed.

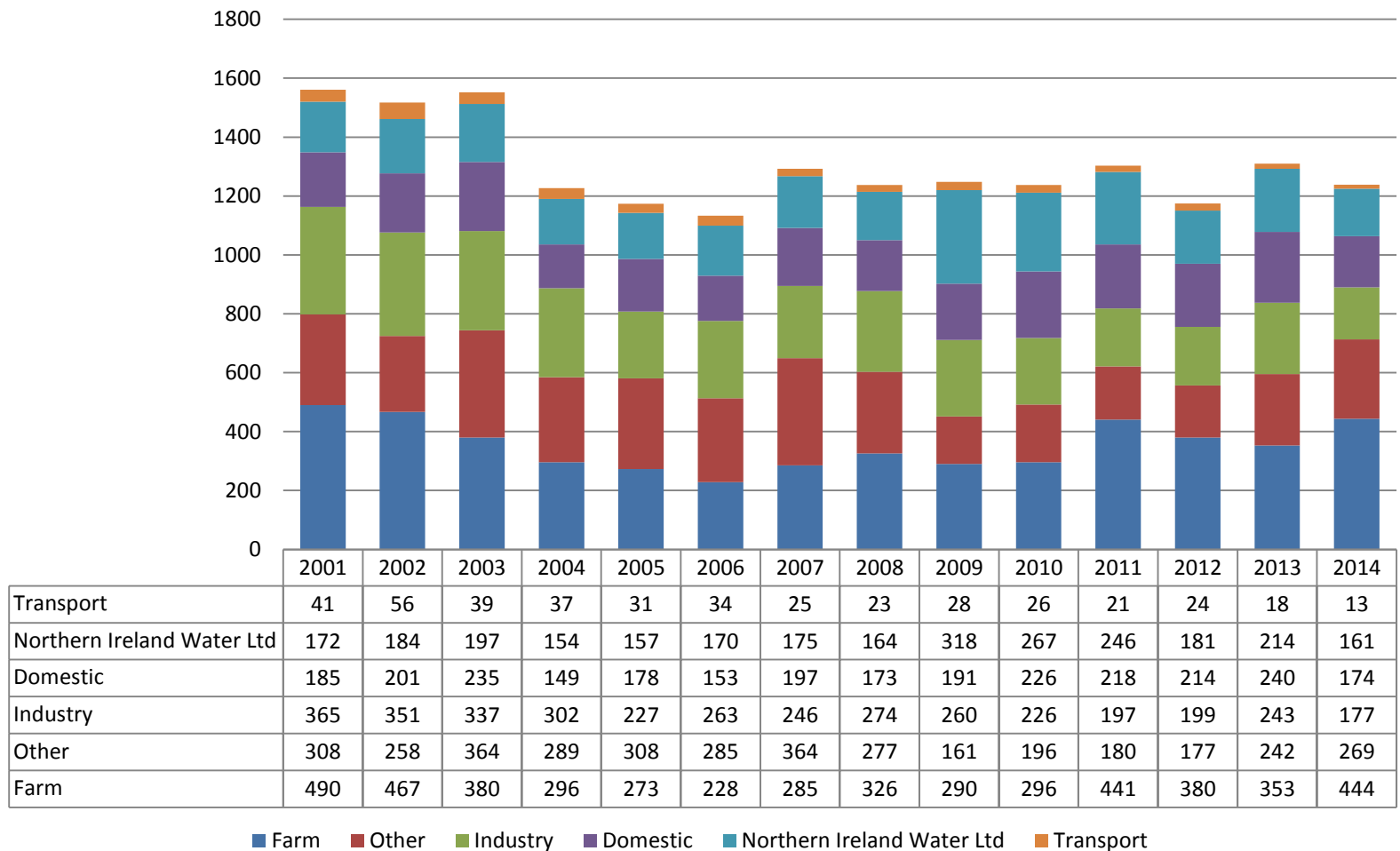
²⁸ Azmat, G. and Scrimgeour, F. (2014) Modelling governance and water pollution using the institutional ecological economic framework. *Economic Modelling*, Volume 42, October 2014, Pages 363–372

²⁹ SEPA and NIEA [online] Preventing water pollution. Available from: <http://nia1.me/2x9>

³⁰ Ibid.

³¹ Ibid.

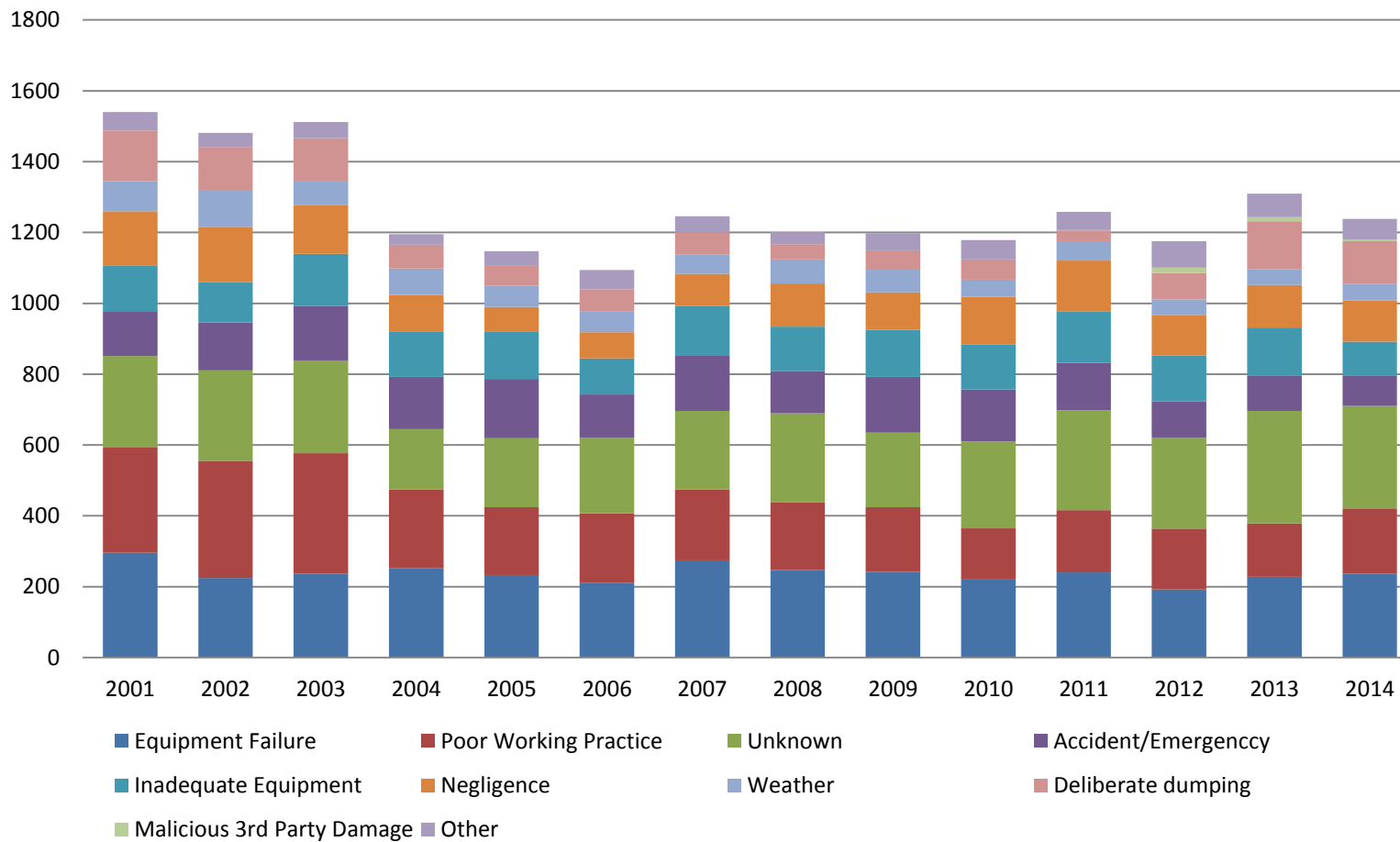
Figure 3: Trend in Incident Source 2001 to 2014



Source: DOE (2013)³²

³² Data provided by DOE and [DOE \(2014\) Water Pollution Incidents and Enforcement 2013](#)

Figure 4: Trend in pollution incident cause 2001-2014



Source: DOE³³

³³ Data provided by DOE and [DOE \(2014\) Water Pollution Incidents and Enforcement 2013](#)

3.1.1 Observations

Figure 3 shows farm source to have been consistently the highest pollution source from 2001 to 2014, showing a slight reduction to 2006, followed by a gradual rise to 2014. The other main contributors seem to fluctuate over the years between 'other', industry and at times NIW. However, NIW appears to have had a decrease from 318 in 2009 to 161 in 2014. In comparison, the number of 'other' sources has increased since 2012 from 177 to 242 in 2013 and 269 in 2014.

Figure 4 shows that poor working practice, equipment failure and 'unknown' have been the main causes of pollution incidents since 2001. In fact 'unknown' appears to have increased since 2009 from 211 to 317 in 2014. Also, deliberate dumping appears to have increased particularly since 2011 from 31 to 136 in 2014.

3.1.2 Consideration Points

The Department has highlighted the importance of tackling and identifying diffuse source pollution suggesting that this may be the cause in some (68%) of river body failures.³⁴ Also, statistics indicate that low severity incidents and farm sources appear to be the largest contributors to river pollution. An increase in 'other' sources and 'unknown' causes since 2009 suggests a growing problem with detection; further explanation as to whether this is the result of operational problems or other external factors may be needed.

As an example, Scotland has a Rural Diffuse Pollution Plan with legislation in place to tackle diffuse pollution from rural sources. Wales also has a Diffuse Water Pollution Action Plan (see Information Box 1).

Information Box 1: Rural Diffuse Pollution Plan

The Rural Diffuse Pollution Plan, produced under the Controlled Activities Regulations, ensures the buy-in and co-ordinated work of key stakeholders. It contains an action plan explaining the actions that Diffuse Pollution Management Advisory Group (DPMAG) and its members are required to perform to ensure a co-ordinated response to tackling diffuse pollution from rural sources. It also has a communications plan requiring members to develop and promote the national awareness campaign.

As a result the National Farmers Union (NFU) of Scotland was keen to be involved in awareness raising for their members, to bring them up to the required standard of compliance. The stakeholders have been involved in joint on-farm workshops and contributed to farmer friendly guidance, including the Farming and Water Scotland [website](#). This is hosted by Scotland's Rural Universities and Colleges which provides ideas, information and contacts to help reduce diffuse pollution from farms.

Wales also has a Diffuse Water Pollution Action Plan available [here](#). England conducted a [consultation](#), September to November 2015, on introducing new basic rules for farmers to tackle diffuse pollution from agriculture (mainly phosphorus).

³⁴ RalSe (Nov 2015) NIAR 626-15 *River Pollution: Background and Summary of Potential Issues*. P. 9
<http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2015/environment/12715.pdf>

As discussed in the previous Research Paper for the Environment Committee *River Pollution: Background and Summary of Potential Issues*, around 33% of river body failures in Northern Ireland are due to point source discharges from Waste Water Treatment Works (WWTWs), industry, sewerage networks, urban runoff and other non-sewered discharges. In England, the Environment Agency (England) has established partnerships with regional River Trusts to engage communities in monitoring urban pollution of their local rivers in an attempt to address urban runoff and pollution. See Information Box 2

Information Box 2: EA River monitoring Partnerships (England)

The South East Rivers Trust work with the Environment Agency (EA) engaging local communities in monitoring urban pollution in their local rivers. This provides feedback to the EA where they are not able to attend lower impact pollution incidents. There is now a trained volunteer task force that can provide a first line of response to assess the situation and report back to the EA. The information is used to update the EA's incident management system and enhance understanding of these rivers, including details of river pollution trends, and gaining knowledge of where habitat improvements are needed.

More information is available [here](#).

It is generally accepted that an On Site Waste Water Treatment Systems (OSWWTS), such as septic tanks, that are well constructed, sited and maintained to approved standards, pose a 'relatively small' pollution risk³⁵. However, a high density of OSWWTS, particularly those that are poorly maintained has been shown to increase the risk of pollution.^{36 37} For example, a study conducted in three rural tributaries of the Blackwater River in counties Tyrone, Armagh and Monaghan found that nutrient levels exceeded acceptable levels more frequently in catchments with higher densities of OSWWTS than those with lower densities.

A survey that recorded the state of OSWWTS infrastructure in the Blackwater area found that of the 113 OSWWTSs surveyed, 35% were at a high risk of having a negative impact on water quality due to the condition of the system, while 73% were assessed as a medium risk. See information Box 3

³⁵ SNIFFER (2009) Review of the Legislative Requirements and Responsibilities Relating to On-site Wastewater Treatment Systems and Their Impact on Water Quality [online] available from: <http://nia1.me/2rd> PAGE 26

³⁶ Arnscheidt, J., Jordan, P., Li, S., McCormick, S., McFaul, R., McGrogan, H.J., Neal, M. and Sims, J.T. (2007) Defining the sources of low-flow phosphorus transfers in complex catchments. *Science of the Total Environment* vol. 382 pp. 1-13 [online] available from: <http://nia1.me/2rc> (subscription required)

³⁷ NIEA [online] River Basin Management Plans: Programme of measures. Available from: <http://nia1.me/2ri>

Information Box 3: Septic Tanks

According to the Northern Ireland Environment Agency (NIEA) there are 113,254 consented On Site Waste Water Treatment Systems in Northern Ireland, whilst there are approximately 16,000 unconsented systems. There are two potential areas of concern in this matter:

1. There is uncertainty with regards the exact figure of unconsented system and more importantly what condition these systems are in; and
2. Where systems are consented, little if anything is known about the condition of these systems and whether or not they are being suitably maintained.

RalSe publication 585-15 discusses the [use of onsite wastewater treatment systems in Northern Ireland](#) in some detail looking particularly at the threat posed to water quality. This paper includes a discussion on the inspection and replacement scheme introduced in the Republic of Ireland in 2012 as a means of improving water quality and looks at some of the early outcomes of this policy.

4 Pollution monitoring

4.1 Background

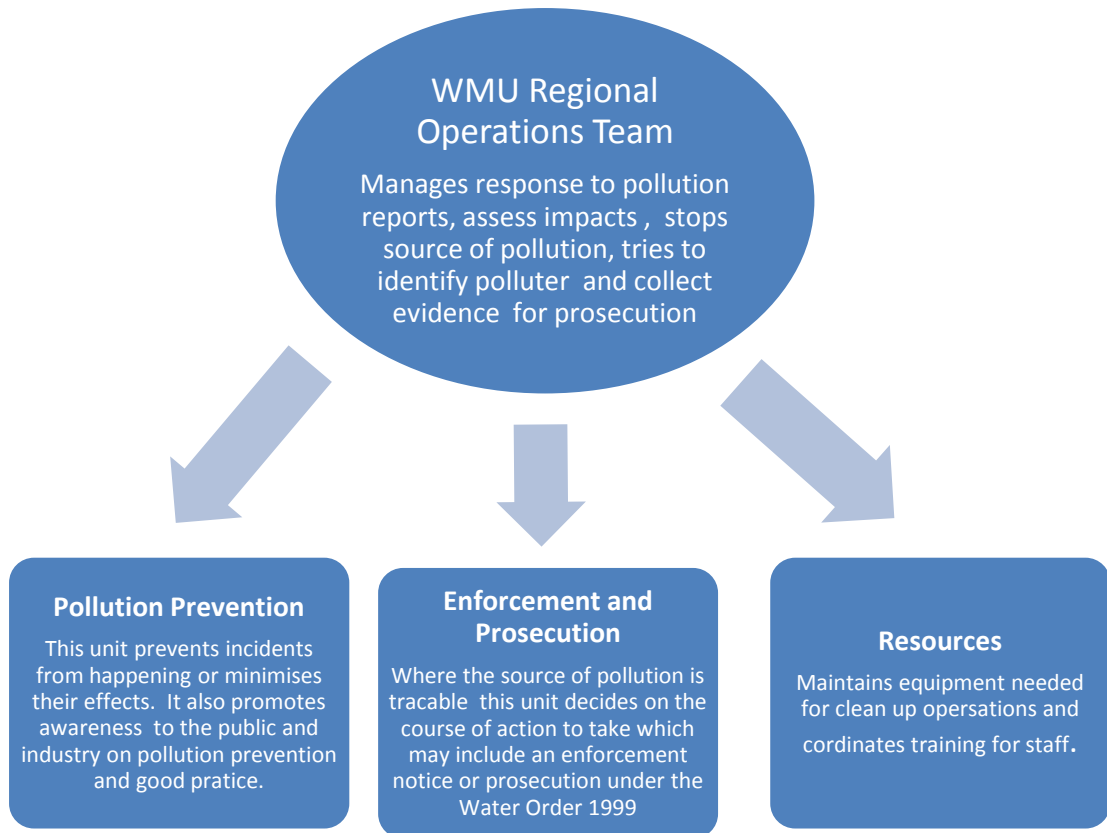
Protection of the water environment is the responsibility of the Northern Ireland Environment Agency (NIEA) under its Environmental Protection Directorate. Within this Directorate is the Water Management Unit (WMU) which aims to conserve, protect and improve both freshwater and marine aquatic environment of NI. The WMU consists of both centrally located scientific staff and field agents located across NI who:

- Take action to combat or minimise the effects of pollution;
- Monitor water quality;
- Prepare water quality management plans;
- Control effluent discharges; and
- Support environmental research

The WMU has a Regional Operations Team formed under terms of the Water (Northern Ireland) Order 1999 and the Control of Pollution (Oil Storage) Regulations (Northern Ireland) 2010.

This team is responsible for preventing pollution of waterways, responding and managing the risk of pollution and taking enforcement action against polluters. It particularly deals with major scale emergency incidents that exceed (or are likely to exceed) the capability of NIEA Response Plans or the Local Government Division. To perform these roles, the team is split into further units, some of which include the following, as shown in Figure 5.

Figure 5: Structure of NIEA Operations Team



Field staff: NIEA relies on external services for field staff provided from Group Environmental Health Committees. Field staff perform a range of duties including pollution investigation, sampling and collecting evidence, clean-up work, pollution prevention, recommendations on discharge consents.

Source: DOE³⁹

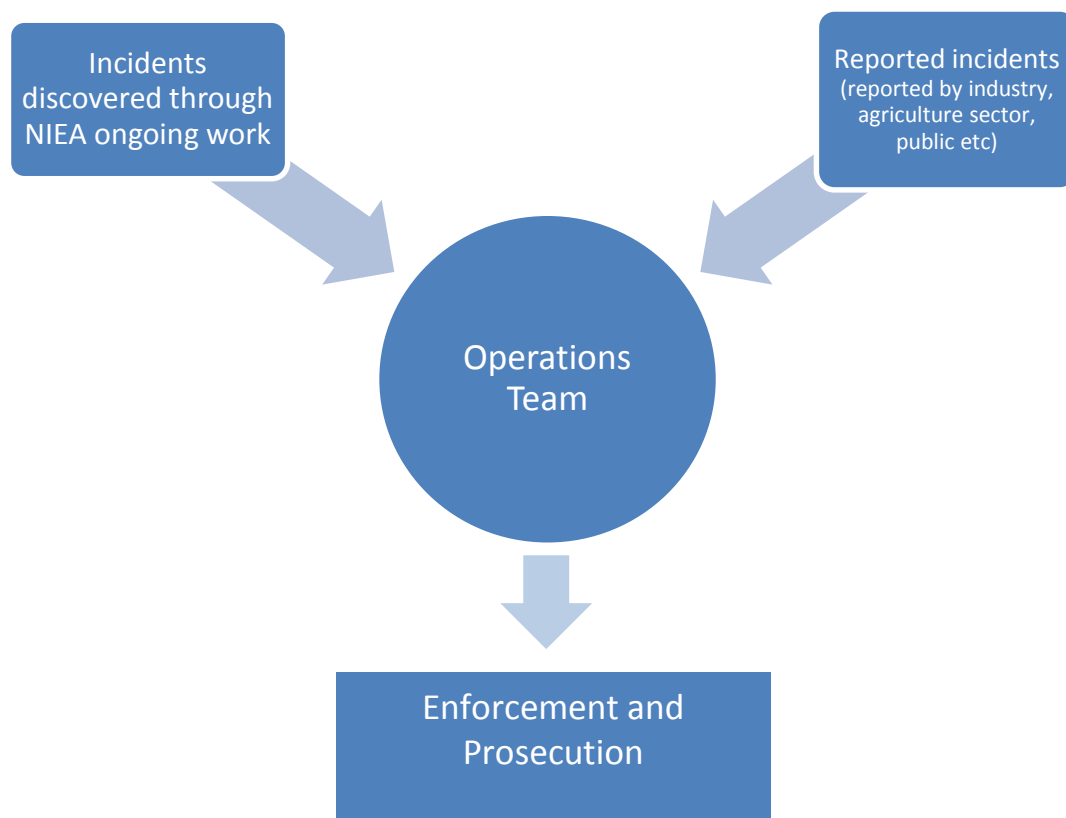
³⁹ The NIEA and Water Pollution <https://www.doeni.gov.uk/articles/niea-and-water-pollution> (Accessed 14/01/2016) and information supplied by DOE (21/-1/2016)

4.2 Monitoring in NI

This section focuses on the monitoring of river pollution. When dealing with incidents of pollution, NIEA's Operations Team rely on reports of incidents by the public and industry and on detection by field agents during their ongoing work and monitoring of river bodies.⁴⁰

Figure 6 illustrates two main avenues of detection described above and illustrates how these may feed into the overall management process for river pollution

Figure 6: Outline of pollution detection and response



Source: Created using information from DOE⁴¹

⁴⁰ ibid

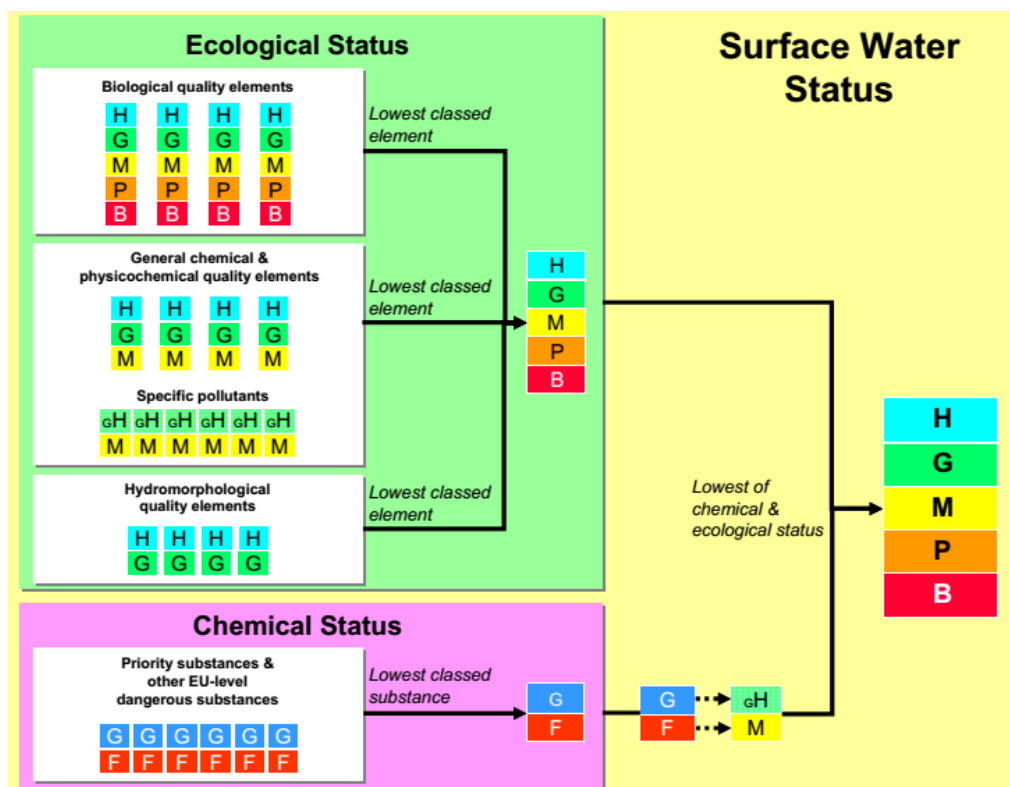
⁴¹ The NIEA and Water Pollution <https://www.doeni.gov.uk/articles/niea-and-water-pollution> (Accessed 14/01/2016) and information supplied by DOE (21/01/2016)

4.2.1 Ongoing work/monitoring

Under the Water Framework Directive, member states are required to monitor and report on the status and classification of water quality, which is determined by assessing a combination of biological, chemical, ecological and hydromorphological quality elements (macroinvertebrates, Ph and ammonia) to assign status from 'high' to 'bad' quality.⁴²

Figure 7 shows how results for different quality elements are combined to assign status of surface water.

Figure 7: Quality elements assessed to assign Surface Water Status



Source: UK TAG⁴³

Classification requirements from the WFD are transposed in Northern Ireland (NI) through the the Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015.

The Northern Ireland figures for status of our water bodies show that 37% meet good status as required under WFD. This is better than England (17%), comparable to

⁴² DOE (2015) [Northern Ireland Water Framework Directive Statistics Report October 2015](#)

⁴³ UK Technical Advisory Group on the Water Framework Directive (2007) [Recommendations on Surface Water Classification Schemes for the Purposes of the Water Framework Directive](#) (p.5)

Wales (39%) and behind Scotland (65%). Ireland is at 52% (rivers only). Northern Ireland has shown the highest level of improvement, from 28% in 2009, to 37%, a 32% increase.⁴⁴

According to information from DOE, around 600 river sites are monitored through the six year river basin management cycle of the WFD. Therefore due to the amount of data, DOE reports on the overall status and not individual measurements.⁴⁵

This may bring about the opportunity for the detection and reporting of pollution to the NIEA Operations Team as explained in Figure 6.

4.2.2 Reports of pollution

Another avenue for the detection of pollution is through reports made to NIEA on pollution or incidents; these may be made by members of the public, industry, farmers etc.

NIEA operates a free phone Water Pollution Hotline available to the public at all times. During office hours calls made are directed to the operations room in Lisburn, where the incident is assessed and passed to field staff for investigation. Outside office hours, calls are directed to the Environment Agency (EA) Communications Centre (Reading), who contact an O-Call Duty E Pollution Officer in NI to respond.⁴⁶

There are examples of approaches which encourage monitoring and investigation of pollution by local communities; one is described in Information Box 4.

Information Box 4: Riverfly Partnerships

This is a community-led initiative to monitor river stretches to identify pollution. Those involved are trained in simple river monitoring techniques, using aquatic animals, which can be checked on a regular basis. Any significant changes can be quickly identified and investigated. Groups are active on the Enler, Lagan, Six Mile Water, Faughan, Derg and Roe rivers.

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This method relies on the actual reporting of pollution by those who detect it. However, in a Code of Practice for farmers under Cross Compliance requirements for the use of plant pesticides (SMR 10) (see Information Box 4), reports are required to be made to NIEA Pollution Unit with any instances affecting fish.⁴⁸

⁴⁴ Information provided by DOE (13/11/2015)

⁴⁵ Information provided by DOE 30/11/15

⁴⁶ Information supplied by DOE (21/01/16)

⁴⁷ Information provided by DOE 13/11/2015)

⁴⁸ <https://www.dardni.gov.uk/publications/code-practice-using-plant-protection-products> p.60

Any breach of Cross Compliance requirements may jeopardise support received by a farmer under the Common Agricultural Policy as detailed in Information Box 5.

Information Box 5: Cross Compliance for farmers

Cross compliance is a key feature of the Common Agricultural Policy. Farmers receiving support under CAP are required to meet a series of requirements towards the protection of the environment and also animal health and welfare and public health. There are two types of cross compliance requirements that farmers are required to meet:

Statutory Management Rules (SMRs) – these are fixed across the EU; and
Good Agricultural and Environmental Condition (GAEC) –these can be tailored to individual Member States.

Those SMR and GAECs that would impact upon river quality and pollution include:

- SMR1 – Protection of water against nitrate pollution
- SMR 10- Restrictions on the use of plant protection products
- GAEC 1- Establishment of buffer strips along watercourses
- GAEC 3- Protection of Groundwater against pollution
- GAEC 4- Minimum soil cover (could have silting impacts)

For more information see RalSe Paper (NIAR 599-15) on [Cross Compliance Standards and Inspection processes utilised by DARD and NIEA](#).

Duty to report

There appears to be requirements for farmers to report pollution in order to keep in line with Cross Compliance under SMR 10.

Under the main enforcing legislation (the Water Order 1999) used by NIEA under its water pollution management role⁴⁹, there does not appear to be any general requirement to report a pollution incident as there is no offence for *not* reporting one. However, reporting requirements appear to be included under licensing conditions.

The Pollution Inventory (PI) records information about releases of substances from industrial activities regulated by NIEA under the Pollution Prevention and Control (PPC) Regulations, and other operators such as large water treatment works.⁵⁰ Regulated industries with a PPC permit are required to record the annual release of specified substances (this includes substances from a number of EU requirements, including the WFD⁵¹). If emission releases are above the stated annual thresholds for specified substances, industries must report this to NIEA to be included in the Pollution Inventory database. These include ‘notifiable releases’ that are unplanned and unauthorised

⁴⁹ See Enforcement in DOE [online] The NIEA and Water Pollution <https://www.doeni.gov.uk/articles/niea-and-water-pollution> (Accessed 14/01/2016)

⁵⁰ NIEA (2013) Pollution Inventory Reporting Form Consultation Document <https://www.doeni.gov.uk/sites/default/files/consultations/doe/pollution-consultation-inventory-reporting-form-revision-2013.pdf>

⁵¹ Ibid p. 4

releases of a particular substance(s) to the environment. These may result from an emergency, mis-operation, accident or plant failure.⁵²

4.3 Consideration Points

- As it appears, NIEA also rely on external reports of pollution, it may be of interest to find out how well utilised the Pollution Incident Hotline is and how often pollution is detected through the Pollution Inventory process, so as to give an indication as to whether further measures could be considered to encourage/require external reporting.
- The Pollution Incident Hotline directs calls made outside of office hours to the EA in Reading, who contacts an on-call officer here. It may be interesting to find out how many calls are made out of hours and whether this approach affects the response time and efficiency in any way.
- It may be of interest to find out whether there are any NIEA manuals or procedures to be followed when responding to pollution incidents and whether these are shared across departments.
- Reporting requirements under the PI are on an annual basis, it may be of interest to find out whether there are any requirements for the immediate reporting of pollution incidents from all industry/business, similar to those for farmers under Cross Compliance requirements.
- The Environmental Better Regulation Bill is currently with the Assembly and aims to streamline all environmental permitting.⁵³ It may be of interest to find out whether pollution reporting requirements will be included under the new permitting regime.

⁵² NIEA Pollution Inventory Reporting – General Guidance Notes
<https://www.doeni.gov.uk/sites/default/files/publications/doe/pollution-guidance-niea-inventory-reporting-guidance-2013.pdf>

⁵³ Environmental Better Regulation Bill as introduced <http://www.niassembly.gov.uk/assembly-business/legislation/primary-legislation-current-bills/environmental-better-regulations-bill/>

4.4 Monitoring in other jurisdictions

The following table presents a summary of the monitoring processes for pollution incidents in other jurisdictions. The table is based on information supplied by each of the respective environment agencies, for which there was a difference in the level of detail provided. Therefore the information provided is not conclusive but provides an indication of the general process.

England and Wales	Scotland	Republic of Ireland
<p>The Environment Agency may become aware of a potential pollution incident by several different means, which includes: receiving third party reports (e.g. members of the public, emergency services, local authorities, asset and site owners/operators); through monitoring activities; and the Environment Agency's own observations. The Environment Agency operates an Incident Communication Service (ICS) that is available to receive incident reports 24 hours/day. The Environment Agency assess information to determine whether an incident has occurred and how or if the Environment Agency should respond (in a prioritised and risk based approach);</p> <p>Reporting Duty</p> <p>Water companies are responsible for the self-reporting of pollution incidents to the EA. The company must use EA guidance to assess whether to make a report. A site operator may be issued with an Anti-Pollution Works Notice to clean up and prevent future pollution incidents.</p>	<p>River pollution complaints and reports are sent to local teams via SEPA's call centre. These may be a mix of public complaints (emails and calls), notified incidents (from Scottish Water, local authorities, public etc) and from SEPA staff that are out on inspections, complaint investigations, routine monitoring, etc. They are passed through to the local teams where they are assessed for priority then investigated accordingly.⁵⁴</p> <p>There is also a National Monitoring Team who's prime task is to undertake routine monitoring i.e. sampling, of rivers, lochs and discharges from public sewage treatment works run by Scottish Water. These samples are analysed and the results collated into water quality data and scores against compliance with the regulations for the licenced sites.⁵⁵</p> <p>Reporting Duty</p> <p>Most licenced sites are required to report incidents; this is a common condition in the CAR (Controlled Activities Regulations) licence, therefore incident notifications can be received this way. As above, local teams triage the issue and investigate accordingly.⁵⁶</p>	<p>In general, long term water pollution is detected via the Water Framework Directive Operational and Surveillance monitoring programme. This covers around 1800 river stations for chemical analysis annually and around 2500 for biological analysis (over a 3 years period).⁵⁷</p> <p>While this approach will throw up long term problems it is more common that localised (sporadic pollution) incidents are reported to EPA or to the Local Authorities by members of the public, farmers, fishermen, or through inspections by local authority or Fisheries Board staff etc. In such cases these are investigated by EPA or by whichever relevant body receives the incident notification.⁵⁸</p> <p>Reporting Duty</p> <p>Localised pollution arising from incident discharges at EPA licenced industrial facilities or from e.g. wastewater treatment plants is required to be reported by the facility (on pain of enforcement proceedings for non-compliance with their licence) or by Irish Water (in the case of water / wastewater facilities).⁵⁹</p>

⁵⁴ Correspondence with SEPA Local Environment Protection Officer (15/01/2016)

⁵⁵ *ibid*

⁵⁶ *ibid*

⁵⁷ Correspondence with Environmental Queries Officer, Environmental Protection Agency (ROI) (18/01/2016)

⁵⁸ *ibid*

⁵⁹ *ibid*

4.4.1 Observations

In a similar way to Northern Ireland, jurisdictions such as Scotland, Wales and England have two main avenues for the detection and reporting of pollution incidents:

1. through the routine water quality monitoring and sampling of rivers by environment agency staff.
2. through external reports made due to reporting requirements for industries and farmers, or voluntary reports by established partnership groups, programmes or general public, industry, farmers, river users etc.

Whichever avenue is used all reports are assessed by a central team to determine the level of response to be made by the respective environment agency and the need for any enforcement action.

5 Enforcement

As referred to under section 2.3.1 above, under the Water (Northern Ireland) order 1999 it is an offence to deliberately or accidentally cause pollution of a waterway, as stated under Article 7:

...a person commits an offence if, whether knowingly or otherwise, that person discharges or deposits any poisonous, noxious or polluting matter so that it enters a waterway or water contained in an underground strata⁶⁰

Where it is possible to trace the source of pollution, it is the responsibility of the NIEA (Enforcement and Prosecution team (see Figure 5)) to decide on the line of action to take.⁶¹ This may include an enforcement notice or prosecution where a person guilty of an offence under Article 7 is:

... liable on conviction to imprisonment for a term not exceeding three months or to a fine not exceeding £20,000 or to both⁶²

In addition to this, a guilty party may:

- have to pay for analysis and court costs;
- be liable for the cost of clean-up operations, which can easily run into tens of thousands of pounds;
- have to pay compensation to angling clubs if a fish kill occurs; and
- suffer reputational damage to their business.

⁶⁰ Water Order (Northern Ireland) 1999 <http://www.legislation.gov.uk/nisi/1999/662/contents/made>

⁶¹ DOE [online] The NIEA and Water Pollution <https://www.doeni.gov.uk/articles/niea-and-water-pollution> (Accessed 20/01/2016)

⁶² Water Order (Northern Ireland) 1999 <http://www.legislation.gov.uk/nisi/1999/662/contents/made>

If it is decided that prosecution is appropriate, NIEA staff collect evidence which is submitted to the Office of the Director of Public Prosecutions.⁶³

6 Further considerations

- As indicated in the [RalSe research paper *River Pollution: Background and summary of potential issues*](#), problems related to river quality and pollution incidents are not solely an NIEA problem due to the dispersal of responsibilities across departments. Therefore, there may be a need for a more integrated and joined-up approach.
- While departmental re-organisation in May 2016 may bring an opportunity for more joined up working, it is important that work is underway to ensure the effective changeover and amalgamation of two departments (DARD and DOE) with different, and sometimes competing, priorities.
- The current Minister has opened up discussion surrounding the creation of an independent Environmental Protection Agency (EPA).⁶⁴ However, further details will be needed on the positioning of responsibilities within the new department and EPA to ensure all responsibilities are given equal weight.
- Effective pollution management (pollution prevention, monitoring and response and enforcement) is underpinned by the effective implementation of the WFD as indicated in this paper.
- To address overarching issues surrounding river pollution, appreciation should be given to the link to the WFD which has an impact on:
 - Pollution prevention
 - Water quality and pollution monitoring
 - Reporting and responding to pollution
 - Partnership working⁶⁵
- Pollution management (including pollution response, monitoring, prevention and enforcement) would appear to be resource intensive and a highly specialised area. It may be of interest to find out whether there has been (or is expected) any impact due to budget cuts and any loss of expertise due to the Voluntary Exit Scheme.
- There is a need to investigate further approaches to addressing the ongoing problem of diffuse source pollution, particularly rural diffuse pollution as discussed in

⁶³ DOE [online] The NIEA and Water Pollution <https://www.doeni.gov.uk/articles/niea-and-water-pollution> (Accessed 20/01/2016)

⁶⁴ DOE (Nov 2015) Durkan seeks views on independent environmental protection agency <https://www.doeni.gov.uk/news/durkan-seeks-views-independent-environmental-protection-agency> (Accessed 25/01/2016)

⁶⁵ England uses the Catchment Based Approach (CaBa) and the Department has suggested the use of the Water Catchment Partnership approach to encourage partnership working. However, the Rural Diffuse Action Plan produced under the CAR regulations in Scotland is an example of using legislation to ensure partnership working (see Information Box 1). However, the question is whether there would be a legislative basis for a similar approach in NI. For further information on the CaBa see RalSe (2015) River Pollution: Background and summary of potential issues. Section 6 <http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2015/environment/12715.pdf>

section 2.2. A number of other legislatures have introduced diffuse and rural diffuse actions plans such as Scotland and Wales, and England is consulting on one (see Information Box 1).

- Other main causes of pollution include equipment failure and poor practice, does this suggest the need for improved education, awareness development and support across the business, industry and agriculture sectors?
- The responsible operation of business, industry and agriculture is largely controlled through the environmental permitting process. Changes to environmental permitting are to be introduced through the Environmental Better Regulation Bill which will bring a hierarchy of licensing, similar to that in Scotland under the Controlled Activities Regulations (see section 2.3.2). This allows regulators to focus efforts on high risk activities. However, further detail on the operation of this is to be provided under supplementary regulations in Schedule 1 of the Bill, which the Department may be able to provide in due course.
- Enforcement may be seen as a form of prevention, and it may be of interest to find out whether current measures (see section 5) are considered sufficient.