Review of the EPA Hydrometric Programme

November 2011

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Community and Local Government.

OUR RESPONSIBILITIES

LICENSING

We license the following to ensure that their emissions do not endanger human health or harm the environment:

- waste facilities (e.g., landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
- intensive agriculture;
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- large petrol storage facilities;
- waste water discharges.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting over 2,000 audits and inspections of EPA licensed facilities every year.
- Overseeing local authorities' environmental protection responsibilities in the areas of – air, noise, waste, waste-water and water quality.
- Working with local authorities and the Gardaí to stamp out illegal waste activity by co-ordinating a national enforcement network, targeting offenders, conducting investigations and overseeing remediation.
- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and the quality of rivers, lakes, tidal waters and ground waters; measuring water levels and river flows.
- Independent reporting to inform decision making by national and local government.

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Quantifying Ireland's emissions of greenhouse gases in the context of our Kyoto commitments.
- Implementing the Emissions Trading Directive, involving over 100 companies who are major generators of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Co-ordinating research on environmental issues (including air and water quality, climate change, biodiversity, environmental technologies).

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of plans and programmes on the Irish environment (such as waste management and development plans).

ENVIRONMENTAL PLANNING, EDUCATION AND GUIDANCE

- Providing guidance to the public and to industry on various environmental topics (including licence applications, waste prevention and environmental regulations).
- Generating greater environmental awareness (through environmental television programmes and primary and secondary schools' resource packs).

PROACTIVE WASTE MANAGEMENT

- Promoting waste prevention and minimisation projects through the co-ordination of the National Waste Prevention Programme, including input into the implementation of Producer Responsibility Initiatives.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

MANAGEMENT AND STRUCTURE OF THE EPA

The organisation is managed by a full time Board, consisting of a Director General and four Directors.

The work of the EPA is carried out across four offices:

- Office of Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

Executive Summary

Introduction

This review arose from a recommendation of the OEA Review that was completed in September 2010. It has been undertaken and directed by a Steering Group, which comprises external and internal nominees with an independent Chairperson and actively supported by staff in the Hydrometric and Groundwater Section, Office of Environmental Assessment (OEA).

The membership of the Steering Group was as follows:

Niall Sweeney, Chairperson (former Clare County Engineer, 1990-1997 and former Offaly County Manager, 1997-2007).

Noel O'Keeffe, County Engineer, Cork County Council and representing the County and City Managers' Association (CCMA).

Vincent Hussey, Office of Public Works (OPW).

Peter Newport, Office of Public Works.

Micheál MacCarthaigh, **Rebecca Quinn**, **Hugh McGinley** & **Donal Daly**, EPA staff.

The Terms of Reference/Brief for the Review were that:

> *The Hydrometric Programme should be reviewed in relation to site selection, uses of the data, rationale and potential for shared services with other EPA field teams.*

During the course of the Review Work Programme, the Brief was extended to include

> *An examination of the possibility of outsourcing the hydrometric work of the Hydrometric and Groundwater Section.*

Work Undertaken

The uses of hydrometric data were considered and are summarised in Section 3 of the Report. The essential role of collection, interpretation and dissemination of high-quality hydrometric data, as an ongoing process, for sustainable management of the environment is highlighted.

An objective scoring procedure for assessing and ranking all the hydrometric stations in both the EPA-LA and OPW hydrometric networks was developed (see Section 4.2). Appendix 3 contains greater detail on the methodology used.

All the stations in the EPA-LA network were reviewed using the scoring system – see Section 4 of the Report. Stations were allocated a score between 0 and 90. Based on this, the existing network was evaluated and it was proposed that a number of stations be dropped – the outcome is summarised in the table below.

Comparison of existing and proposed EPA-LA surface water network*

Station Type	Number of Stations in Existing Network	Number of Stations in Proposed Network
Flow Station Recorder	232	211
Water Level Only Recorder	30	30
Staff Gauge Only Station	163	26
Total	**425**	**267**

** total based on removal of stations subject to stakeholder consultation.*

The proposed reduction in the number of flow stations is due to: i) duplication with an OPW station at one locality; ii) nine flow stations[1] with a score of 0 which therefore are dropped from the programme; and iii) eight flow stations with a score between 1 and 5, thereby indicating that they are low-priority stations and can be dropped from the network.

There is a significant reduction in staff gauge only stations.[2] The reduction is due either to the stations producing inadequate quality flow data or to the fact that the stations were no longer used for assessing water quality. This reduction will lead to only a small reduction in staff time as most of the stations, while registered, were inactive.

The issues that influence the future of the EPA-LA hydrometric programme are outlined in Section 5. These include:

- The need for hydrometric data as an essential component of catchment management, infrastructural development and monitoring of the potential impacts of climate change.
- Retirement of personnel.
- Increased co-operation with OPW.
- Shared services within EPA.
- Use of new technologies.
- Outsourcing of data collection.
- Using a more targeted approach to data collection.

1 Flow stations are equipped with data loggers which provide water level data that can be converted to flows.

2 These are not equipped with data loggers. They were installed to enable the water level to be recorded when water samples are taken. This level can be converted to a flow by Section staff.

Report Recommendations

The recommendations in the Report (see Section 6) are outlined below under a number of headings.

Role of Hydrometric Data Collection

Recommendation 1: That a focused high-quality hydrometric programme be maintained, oriented towards the physical settings (geohydrology) present in Ireland and the pressures (e.g., abstractions, discharges) caused by human activities.

Co-operation with Local Authorities

Recommendation 2: That, when agreed in advance with EPA, the cost of installation of future hydrometric stations should be included as part of the overall capital costs of the project.

Revised Hydrometric Programme

Recommendation 3: That, following consultation with the relevant Local Authorities, low scoring (i.e., low-priority) hydrometric stations be dropped from the EPA-LA programme.

Sharing workload with other EPA staff

Recommendation 4(i): That a feasibility study be undertaken by Laboratory Services and Hydrometric & Groundwater staff to examine the possibility of sharing both workloads as a means of ensuring an optimum use of resources. Deadline: end of 2011 to enable the 2012 work programme to be finalised.

Recommendation 4(ii): That Hydrometric & Groundwater Section staff, as far as is practicable, provide the continuing service to the lakes and TRAC biology teams.

Outsourcing hydrometric data collection

Recommendation 5: That the feasibility of a pilot project to outsource a proportion of data collection (downloading data loggers at approximately 16 week intervals, i.e. every second time) by the water sampling contractor be examined.

Refocusing data collection

Recommendation 6(i): That, arising from this Review, a more targeted and focused approach to hydrometric data collection be adopted.

Recommendation 6(ii): That a greater emphasis be given to assessment of hydrometric data as a means of "adding value" to the work of the Section.

Recommendation 6(iii): That the role of telemetry in improving the efficiency and quality of data collection be assessed.

Use of non-permanent staff (mainly summer students)

Recommendation 7: It is recommended that this means of assisting permanent staff should continue.

Transfer of staff from other agencies (e.g., Local Authorities)

Recommendation 8: The EPA should pursue any opportunities that may arise for suitably qualified persons to be transferred into the Hydrometric & Groundwater Section to fill vacant positions.

Increased co-operation with OPW

Recommendation 9(i): That further discussion at a senior level take place with OPW, and that long-term approaches to collaboration in the collection, assessment and reporting of hydrometric data be examined and agreed.

Recommendation 9(ii): That regular annual or bi-annual meetings be held to help ensure effective co-operation.

Recommendation 9(iii): That a national hydrometric group, led jointly by EPA and OPW and involving all bodies collecting hydrometric data (EPA, OPW, Marine Institute, ESB, Waterways Ireland, Met Éireann, and Rivers Agency, Northern Ireland), be proposed and set up to help prevent duplication of data collection and to share knowledge and information.

Proposed process when further reductions in staff numbers occur

Recommendation 10: That the process outlined below be adopted.

1 An evaluation of the workload and time input required for other staff to carry out the work will be undertaken. In circumstances, for instance, where reductions will result in an Office closure, the time and resource implications will be significant.

2 The options will be evaluated and may include:

- Developing and implementing a risk-based approach to site visits as a means of reducing staff time input and costs (by decreasing visits to low-risk sites) and focusing efforts on the more important and high-risk stations.
- Discontinuing and "mothballing" lower priority sites, following consultation with EPA senior management and the Local Authorities.
- Requesting further assistance from other EPA areas, including transfer of staff.
- Evaluating and organising, if resources are available, outsourcing of some data collection to the water sampling contractor.
- Evaluating and organising, if feasible, outsourcing of some hydrometric data collection to Local Authorities.
- Reducing or ceasing assistance given to the lakes and TRAC biology teams.
- Reducing further the number of flow measurements and visits to download data; while this may be feasible to a limited degree, it will result in a greater likelihood of data gaps and inadequate data.

Action Plan

Arising from the outcome of the Review, the following programme of work is planned and will be incorporated, as appropriate, into the OEA work programme for 2012.

1 Each Local Authority will be informed of the conclusions of the Review; in particular details will be provided on the proposed hydrometric network in each Local Authority arising from the review of the stations. Deadline: Q1 2012.

2 A site-specific health and safety risk assessment will be undertaken by Section staff at all (surface water and groundwater) hydrometric stations; where stations are considered to be "high risk", data collection will cease until the Local Authority undertakes the necessary work. Deadline: Q1 2012.

3 An examination of the feasibility of Laboratory Services staff downloading data loggers while sampling surface water will be undertaken in co-operation with regional laboratory managers. Deadline: Q4 2011.

4 The feasibility of a pilot project to outsource a component of hydrometric work to the water sampling contractor will be examined. Deadline: Q3 2012.

5 A more targeted approach to hydrometric data collection will be adopted following consultation with all staff in the Hydrometric & Groundwater Section. Deadline: end Q1 2012.

6 A meeting with OPW to agree and plan a collaborative approach to data collection, assessment and reporting will be arranged. Deadline: Q1 2012.

7 A review of the role of telemetry in improving the efficiency and quality of data collection will be undertaken. Deadline: Q3 2012.

8 A review of the means by which Section staff can make an increased contribution to "higher level" work, particularly to environmental assessment, will be undertaken. Deadline: Q2 2012.

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1 Introduction

1.1 Background

A review of the Office of Environmental Assessment (OEA) was carried out in 2010 and the Report was presented to the Board of the EPA in September 2010.

One of the recommendations of the Review, regarding the Aquatic Environment Area, stated that

> *The Hydrometric Programme should be externally reviewed in relation to site selection, uses of the data, rationale and potential for shared services with other EPA field teams.*

It was subsequently decided by the OEA Management Team that this review should be undertaken and directed by a Steering Group, which would comprise appropriate external and internal nominees with an independent Chairperson and actively supported by staff in the Hydrometric and Groundwater Section of the OEA.

1.2 Terms of Reference

The Terms of Reference/Brief for this Steering Group were that:

> *The Hydrometric Programme should be reviewed in relation to site selection, uses of the data, rationale and potential for shared services with other EPA field teams.*

During the course of the Review Work Programme the Brief was extended to include

> *An examination of the possibility of outsourcing the hydrometric work of the Hydrometric and Groundwater Section.*

1.3 Composition of the Steering Group

During March 2011 the Steering Group was established with the following membership.

Name	Background
Niall Sweeney (Chair), Chartered Engineer	County Engineer, Clare Co. Council, 1990-1997 County Manager, Offaly Co. Council, 1997-2007
Noel O'Keeffe, Chartered Engineer	County Engineer & Director of Water Services, Cork Co. Council and CCMA representative
Vincent Hussey, Chartered Engineer	Hydrometric Section, OPW
*Peter Newport, Chartered Engineer	Hydrometric Section, OPW
Donal Daly, Chartered Geologist	Manager, Hydrometric and Groundwater Section, EPA
Hugh McGinley	Hydrometric Officer, EPA
Micheál MacCarthaigh, Chartered Engineer	Senior Scientific Officer, EPA
Rebecca Quinn	Scientific Officer, EPA

** Mr. Newport was co-opted onto the Steering Group during the course of the Review.*

1.4 Context of the Review

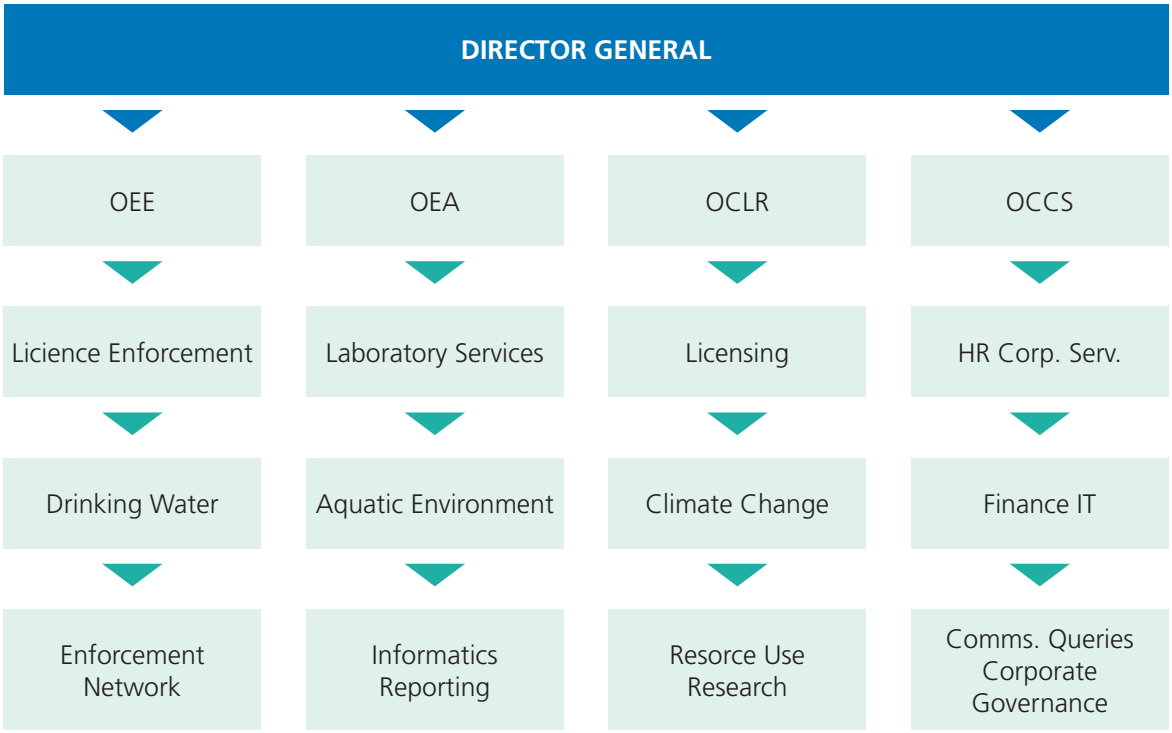
The Office of Environmental Assessment is one of four Directorates within the EPA, as follows:

- Office of Environmental Enforcement (OEE)
- Office of Climate, Licensing and Resource Use (OCLR)
- Office of Environmental Assessment (OEA)
- Office of Communications and Corporate Services (OCCS)

The Office (Directorate) of Environmental Assessment comprises three sections, as follows:

- Aquatic Environment
- Laboratory Services
- Reporting and Assessment

The EPA organisational chart is shown below.



The workload of the Aquatic Environment Section has evolved essentially to meet Irish and European statutory requirements and is divided into four main programmes:

- River Biological Monitoring (Qualitative)
- Lakes Biological Monitoring (Qualitative)
- Transitional and Coastal Water Monitoring (Qualitative)
- Hydrometric and Groundwater Monitoring (Quantitative and Qualitative)

This Review is directed towards the activities of the Hydrometric and Groundwater Programme; while this Programme is oriented primarily towards collection, analysis and provision of information on river and spring flows, and river, lake and groundwater levels, it is also responsible for the national groundwater quality network, reporting on groundwater quality and Water Framework Directive (WFD) reporting. The monitoring networks are managed in a partnership arrangement between the EPA and Local Authorities (the Local Authorities provide the sites and data monitoring equipment, with the EPA supplying the services to read, record, process and publish the hydrometric data).

As stated by the Review of the OEA, September 2010:

> *The EPA is the lead body in providing relevant low and medium flow hydrometric data to Local Authorities and consultants applying for authorisations for developments, such as sewage works and water abstraction. In addition, the Agency is responsible for ensuring adequate data are collected for the EU Water Framework Directive purposes. The EPA is also the lead body in collecting and analysing groundwater level data.*

To facilitate the above activities, the EPA-Local Authority hydrometric network consists of the following infrastructure:

- 262 electronic recorders on rivers, lakes and springs, where continuous water level recording is taking place. Flow data can be derived from 232 of these stations and the remaining 30 are water level only stations.
  - Telemetry equipment has been installed on 96 of these stations.
- 163 staff gauge only[3] stations on rivers.
- 134 electronic data logger stations at groundwater level stations.
  - Telemetry equipment has been installed on 4 of these stations.
- 280 groundwater sampling points at wells and springs for water quality.

The 134 wells in the groundwater level monitoring network are not the subject of this Review; the existing groundwater network was assessed in 2007, many sites were dropped and a new representative network, involving the drilling of over 60 wells and the installation of 24 weirs on springs, was finalised. While hydrometric staff took groundwater samples for water quality analysis in the past, they currently have no involvement as the work is outsourced.

The staff resource structure in place to execute the workload associated with the above activities consists of eight field teams (with 2 persons per team) plus a data processing team based at EPA Dublin headquarters. The locations of the hydrometric offices are shown in Figure 1.1. The total number of approved posts in this structure is 22, with 19 filled at present. Three of the hydrometric posts (field posts) are vacant due to retirements. The staff structure is set out in Table 1.1.

3 No continuous monitoring of either water level or flow occurs at these stations. They were installed and calibrated in order to develop a relationship between water level and flow. The water level was read during the time of water quality sampling and a corresponding flow derived to enable the calculation of nutrient loadings.

Table 1.1: Summary of staff numbers in the Hydrometric and Groundwater Section

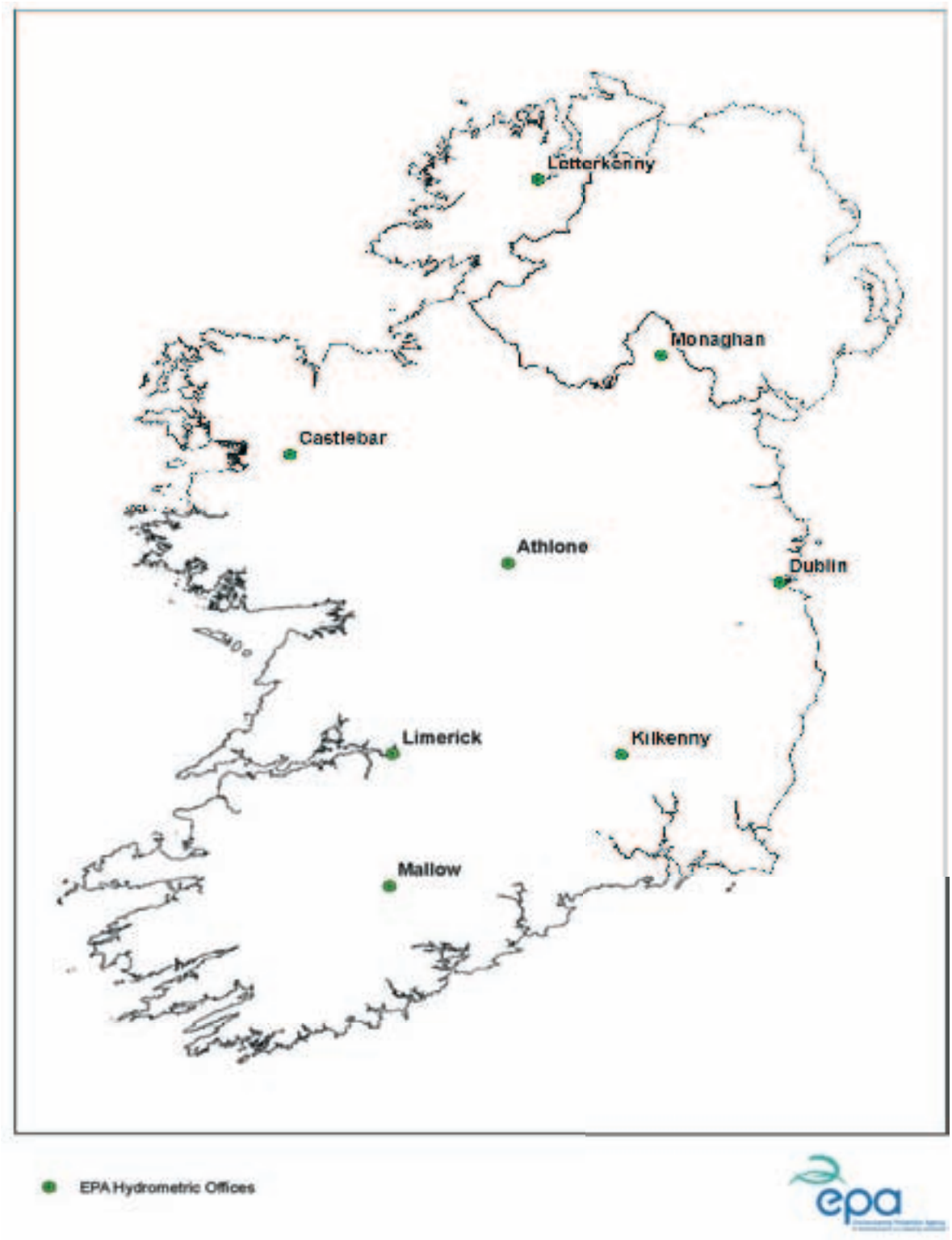
Post	Number Approved	Current Occupancy
Section Manager	1	1
Senior Scientific Officer	1	1
Scientific Officer	1	1
Hydrogeologists	2	2
Administrative Officer	1	1
Hydrometric Officers (8 teams of 2)	16	13
Total	**22**	**19**
Temporary Research Fellows[4]	**2**	**1**

The work undertaken by the hydrometric officers is largely field-based, with fieldwork comprising approximately 70% of work time. Twelve of the current staff qualified originally as civil engineering technicians, while one qualified as a laboratory technician.

This Review therefore is being undertaken in the context of the foregoing, plus the possibility of further field staff retirements in 2012 with a possible scenario for 2014 of 7 out of 16 hydrometric officers being retired. Overarching all of this is current Government policy on reduction of staff numbers and staffing costs generally in the public sector.

4 Funded by STRIVE.

Figure 1.1: Location of current EPA Hydrometric Offices



2 Methodology

2.1 Review Approach

The OEA Management Team appointed a steering group to conduct the review. At the first meeting on 1 April 2011, the Steering Group took the following decisions in relation to the optimum modus operandi:

- The Steering Group would meet on a monthly basis in the EPA offices at Richview, Clonskeagh.
- A Working Group (subset of the Steering Group) with the same Chairperson was set up to meet, between Steering Group meetings, with the purpose of carrying out the necessary research and preparing working papers for discussion and adoption at the Steering Group Meetings. The membership of the Working Group varied over time, depending on the current range of tasks.
- For review purposes, the brief was subdivided into the following sections:
  - Uses of the data;
  - Site selection;
  - Shared services.

2.2 Summary of the Review Process

The Review process included the following:

1 The Terms of Reference/Brief was extended to include the issue of "Outsourcing".

2 The Steering Group met on a total of seven occasions – 01/04, 29/04, 03/06, 06/07, 29/08, 23/09, 7/11 – and the Working Group met on three occasions.

3 The chairperson of the Steering Group met with Mr Micheál O Cinnéide, Director of the OEA, early in the process, for an initial briefing and discussion on the approach it adopted to the Review.

4 The Chairperson of the Steering Group also met, for briefing purposes, with Mr Tony Smyth, Director of Engineering Services (OPW) and Mr Tom Bolger, Assistant Chief Engineer (OPW).

5 Progress Reports were prepared and presented to the Board of the EPA on the following dates:
- 28 June 2011
- 4 October 2011

6 Extensive collaboration took place at Working Group level between EPA and OPW staff in the preparation of working papers and particularly with respect to the modification and proving of the OPW Hydrometric Station Evaluation Model (Methodology for the Strategic Review of Hydro-meteorological Networks).

7 Briefing/information meetings also took place between the Working Group and EPA Licensing Office staff.

8 Communications/liaison took place between EPA and relevant DECLG staff.

9 The critical linkage with the EPA's partners in the Hydrometric Programme, the Local Authorities, was provided by Mr Noel O'Keeffe, the County and City Managers' Association (CCMA) representative on the Steering Group.

3 Uses of Hydrometric Data

3.1 Overview

Surface water is part of the Hydrological Cycle and refers to that water in our rivers, lakes and storage reservoirs. Surface water runoff in the form of river flow is the main phase of the hydrological cycle in which the water is so confined as to make possible reasonably accurate measurements of the volume involved. However, a precise assessment of surface water resources can only be made if reliable flow records are available over a long period of time.

The main determinants of the low flow at a particular location on natural streams (without lakes and unaffected by impoundments or abstractions) are:

- The catchment area contributing to the flow at the location (the greater the catchment area, the higher the flow per unit area).
- The geohydrology of the catchment; as groundwater contributes over 90% of stream flow in dry weather, the proportions of productive and unproductive aquifers in a catchment influence low flows.
- Lack of rainfall.
- The variability in the geology and surface cover, which can vary within catchments as well as from catchment to catchment.

Ireland's surface water catchments comprise a large number of small catchments and a small number of large catchments. There are also a number of significant catchments in which the flow is regulated – Erne, Lee, Liffey, Shannon, Clady (Co. Donegal), Brosna and Suck – and where historic low flow data cannot be taken as an indicator of future low flows.

Features of the low flows in the rivers in Ireland are:

- The wide variations in the ratio of low flows to average flows.
- The flows vary from region to region and within regions.
- In absolute terms, the flow rates are quite small.

The collection, interpretation, dissemination and archiving of high-quality hydrometric data, as an ongoing long-term process, is fundamental to the sustainable management of the environment and is the foundation for informed decision making in terms of economic development, public safety and wise use and protection of water resources. This is summarised in the phrase "You can't manage what you don't measure; unless you measure you cannot tell how well you have managed", and by the following quotation:

> *"Accurate information on the condition and trends of a country's water resource – surface and groundwater; quantity and quality – is required as a basis for economic and social development, and for maintenance of environmental quality through a proper perception of the physical processes controlling the hydrological cycle in time and space … almost every sector of a nation's economy has some requirement for water information, for planning, development, or operational purposes."*
>
> **WMO/UNESCO Report on Water Resources Assessment, 1991.**

3.2 Role of EPA

Article 64 of the Environment Protection Agency Act (1992) outlines the role of the EPA in the hydrometric area – see below.

Hydrometric programme.

64. — (1) The Agency shall, after consultation with such persons or bodies (if any) as may be prescribed, prepare a national programme for the collection, analysis and publication of information on the levels, volumes and flows of water in rivers, lakes and groundwaters in the State (in this Act referred to as "hydrometric data"), and a copy of such programme shall, as soon as may be, be sent by the Agency to the Minister.

(2) A programme under this section may, after consultation with the persons or bodies (if any) referred to in subsection (1), be revised from time to time by the Agency and shall be reviewed at least every five years.

(3) It shall be the duty of the Agency to take appropriate steps to ensure that a programme under this section is implemented and for that purpose the Agency may —

(a) direct a local authority to provide, operate and maintain such gauges and other equipment as it may specify and to furnish specified information to the agency in such manner and at such times as it may specify,

(b) make arrangements with any public authority, or other person or body to provide, operate and maintain such gauges and other equipment as it may specify and to furnish specified information to the Agency in such manner and at such times as it may specify,

(c) provide, operate and maintain gauges and other equipment for recording hydrometric data.

(4) Where the Agency is not satisfied with the response of a local authority to a direction under subsection (3) (a), it shall consult with the local authority concerned, and, if the Agency is still dissatisfied with the response following such consultation, the Agency shall carry out, cause to be carried out, or arrange for, the monitoring concerned and the costs of monitoring may be recovered by the Agency from the local authority as a simple contract debt in any court of competent jurisdiction.

The EPA is also the lead body in collecting and analysing groundwater level data. The co-ordination role for the National Hydrometric Programme involves a number of public bodies, the ESB, and several other parties which collect hydrometric data or have collected such data in the past.

The two main public bodies involved with surface water hydrometric data collection are the:

1. EPA jointly with Local Authorities, with responsibilities and a network oriented towards measurement of medium and low flows. The primary function of the Agency is the provision of 95 percentiles, 50 percentiles and Dry Weather Flows. These parameters were originally required for water resources management, and were recognised as vital to a more general environmental protection role in the past two decades. In addition, the EPA collects data on flooding events at the EPA-LA stations to enable station calibration and as a means of assisting OPW.
2. Office of Public Works (OPW), whose primary engineering function is flood risk management and alleviation, including arterial drainage.

Additionally, data collected by organisations such as the OPW, Met Éireann and the ESB are collated by the Hydrometric and Groundwater Section for use in statutory EU and EEA reporting requirements, and to meet Local Authority, regional River Basin Districts and national needs. The Marine Institute (MI) collects tidal water level data and has 15 hydrometric stations as part of the Irish National Tide Gauge Network. These stations are intended mainly to monitor the effects of climate change in terms of sea level changes and tidal surge forecasting. Waterways Ireland has installed 53 out of a planned 130 hydrometric stations this year. This network is primarily to monitor water levels only on navigable waterways, such as the Royal and Grand Canals and the Shannon-Erne waterway.

The EPA operational role for the national hydrometric programme involves the collection of data at a large number of stations on a continuous basis. Staff in eight regions collect these data using state of the art technology. The data are stored centrally by EPA, validated and processed and made available, through the internet via HydroNet and by correspondence with the water data unit in Richview, to Local Authorities, the public and professionals to meet their needs. The EPA develops policies for the analysis and interpretation of hydrometric data in consultation with experts and stakeholders so as to best serve the public.

3.3 Principal Uses of Hydrometric Data

Hydrometric data are vital to a range of issues relating to the wise use and protection of water resources. These uses include licensing of discharges to surface water; monitoring and controlling abstractions; monitoring flooding; nutrient loading analysis; and catchment management.

The Hydrometric and Groundwater Section makes data available to sectors that include Local Authorities, hydrology consultants, civil engineers, biologists, ecologists, academics, research students, the general public and staff in the licensing and enforcement offices of the EPA. A total of 443 queries for hydrometric data were answered in 2010. A further 1,926 visits were logged on HydroNet (the hydrometric section's website for the dissemination of hydrometric data) and access was granted to 310 users of the low flow model developed in conjunction with the Western RBD. EPA, in common with OPW, operates an open data model, i.e. data are provided free of charge. The uses of the surface and groundwater hydrometric data are summarised in Table 3.1.

The EPA also advises Local Authorities on their hydrometric requirements. The provision of public drinking water and the treatment of municipal waste water are critical public health functions, which are carried out by Local Authorities. Accurate and site-specific hydrometric data must be collected over long periods of time to design, operate and manage water and waste water treatment facilities economically. Each Local Authority maintains a network of hydrometric sites for the current and future requirements of the people it serves. The EPA advises Local Authorities on the management and maintenance of these networks.

Figure 3.1: Hydrometric station on the River Deel monitoring the residual flow after an abstraction for public water supply

The benefits of having access to long-term hydrometric data may not be realised until well into the future, when decision-makers will need to rely on good-quality hydrometric data for effective and cost-efficient planning purposes. The eventual requirement for the data may not have been foreseen and indeed the original purpose of the station may not be its only function, which may only be realised by future generations of hydrometric data users. Ultimately value is added to the collection of long-term records through the statistical analysis of the data by the hydrometric section and the provision of long-term estimates such as 95 percentiles and Dry Weather Flow.

Submissions on the importance and role of hydrometric data were received from the following EPA staff – see Appendix 1:

- Pat Byrne, Office of Climate, Licensing and Resource Use.
- Martin McGarrigle, Manager, Surface Water Monitoring Programme.
- Shane O'Boyle, Manger, Transitional and Coastal Waters Monitoring Programme.

Figure 3.2: Monitoring of flood events provides critical information for mitigation purposes

Figure 3.3: Enabling the assessment of the assimilative capacity of rivers for discharges from waste water treatment plants (WWTPs) allows potential impacts to be assessed

Figure 3.4: Fermoy WWTP during the November 2009 flood (Photo from Cork County Council)

Figure 3.5: Drying up of rivers can occur on a seasonal basis as a result of groundwater abstractions and/or climatological changes in the future

Table 3.1: Uses of hydrometric data

Activity	Purpose
WATER RESOURCE MANAGEMENT	
Water resource planning and management	Monitoring existing drinking water abstractions. Planning and design of future sustainable drinking water abstractions. Drought estimations – assessment of risk to water supplies. Reservoir design. Assessment of ecological impacts of abstractions. Evaluating potential impact of climate change.
Discharges to surface waters	Quantifying nutrient and pollutant loading to rivers, lakes, estuarine and coastal waters. Assimilative capacity calculations for Integrated Pollution Prevention Control, waste water treatment plants and landfill discharges to watercourses.
Hydro-ecological studies	Aquatic biodiversity and habitat assessment. Supporting parameters for WFD sampling. Providing background data in relation to hydromorphology of lakes.
Reporting for EIONET, OSPAR, WISE-SOE	To meet statutory EU and EEA reporting requirements.
Research and education	Increasing the understanding of hydrological processes. River flow, lake and tidal levels as indicators of climate change. Development of legislation and flow standards. Surface water/groundwater interaction studies.
PUBLIC SAFETY	
Flood estimation, flood risk management and flood warning	To aid and inform Local Authorities and emergency services in the provision of flood protection, management and alleviation measures.
Flood alleviation	Designing drainage and flood relief schemes at high-risk areas. Maintenance of river channels to minimise future flooding events.
Modelling	Flow duration curve estimations for ungauged catchments, flood forecast modelling, climate change modelling.
ECONOMIC DEVELOPMENT	
Infrastructure design	Design of roads, bridges, design and upgrading of sewage treatment plants.
Planning and development	Flood risk maps to aid in planning future developments.
Hydro-energy	Planning for hydropower installations.
Fisheries management	Provision of information on low flows.
Navigation	Inland waterways navigation – ecotourism. Sport and water leisure activities.

4 Review of Stations in National Hydrometric Programmes

4.1 Introduction

The starting point of the review was the premise that long-term hydrometric data are critical to sustainable catchment management and economic development in Ireland, and consequently that a national hydrometric network is a critical component of the country's infrastructure. While this is a clear-cut statement, the number of stations required to provide adequate hydrometric data is, to a large degree, a matter of judgement. At the outset, it was decided that all the stations in the EPA-Local Authority surface water hydrometric network should be evaluated in an objective manner, with the aim of ranking the stations in order of relevance and importance. The national hydrometric network has developed on an ad hoc basis, dealing with specific issues and projects over a period of over 70 years. A requirement for a coherent national network has emerged in the past two decades as a result of a more systematic approach to environmental protection arising from the EC Directives. With the agreement of the OPW, it was decided that all EPA-LA and OPW hydrometric stations should be part of the review, so that a holistic approach, which would reduce the likelihood of duplication, was taken. The review of the networks was undertaken in the following manner:

- An objective scoring approach accounting for quality and use of the data was discussed and adopted.
- The process of reviewing individual stations was carried out under the direction of the working group.
- Regular consultation took place between OPW and EPA personnel to ensure consistency of approach and to decide on stations in close proximity to one another.
- An outcome was achieved that recommended closure of some stations and prioritised the remainder.
- The ESB networks, for example in the River Lee and River Liffey catchments, were not included in this review. It is understood that they are re-evaluating and upgrading their network at present.
- Waterways Ireland is also in the process of expanding its network – mainly on canals and navigable waterways; its network was not considered in this review.

4.2 Station Review and Selection Methodology

The review of hydrometric stations was based on the methodology that is recommended by the World Meteorological Organisation and was adopted by JBA Consulting when undertaking the "Strategic Review of the Hydro-meteorological Monitoring Programme" for the OPW in 2008. This methodology was developed primarily to review the network for flood-related data uses. The methodology therefore had to be developed further and amended to include all uses of hydrometric data.

4.2.1 Selection Methodology

The methodology consisted of the following steps:

- Each hydrometric station was designated as either a flow or a water level only station.
- The uses of each station were summarised and scored based on the requirement for the station, as outlined in Table 4.1. These uses are further explained in Section 3 and Appendix 2.
- Each flow station was then scored on the quality of the flow data at both high flows and low flows.
- Stations that are no longer required to fulfil their original function were identified.
- Potential cases of duplication of stations were identified.
- All stations were further categorised into strategic, operational or project stations based on their use score, data quality score and location.

Scores based on the requirements of the stations were assigned as follows:

- Stations that are legally required to provide data in order to fulfil court orders, or are assigned to fulfil EU reporting requirements, or are used for flood warning for towns and villages, scored 10.
- "Primary use" stations, where the provision of the data is needed in carrying out the activity, for example regional water supply schemes, have a use score of 3.
- "Secondary use" stations, where the data are helpful and significantly improve catchment management decision making, for example, provision of flow data for assimilative capacity calculations for small waste water treatment plant discharges, are given a use score of 2. However, without these data, decisions can still be made, although with less confidence and with a higher risk of failure.
- Stations classified as providing "useful data", which would improve a catchment management decision but are not required for authorisation or other such purposes, are given a use score of 1.
- Hydrometric stations can have multiple uses and levels of uses for their data and were scored accordingly.

Water level only stations were scored based solely on the sum of their use scores.

Table 4.1: Scoring system for hydrometric station uses

Use Categories	Scores				
	Legal Requirement	Primary Use	Secondary Use	Useful	No Use
EPA Flow Duration Curve Model	–	3	–	–	0
EU Reporting	10	–	–	–	0
Resource Assessment	–	3	2	1	0
Abstractions	10	3	2	1	0
Important Fishery/Environmental Site	–	3	2	1	0
WFD/Water Quality/Bio Monitoring	–	3	2	1	0
Discharges	–	3	2	1	0
Specific Catchment Study	–	3	2	1	0
Flood Studies Update Programme OPW	–	3	2	1	0
OPW Arterial Drainage	10	3	2	1	0
OPW Flood Warning	10	3	2	1	0
OPW CFRAM[5] (Floods Directive)	–	3	2	1	0
Hydropower	10	3	2	1	0
Navigation	–	3	2	1	0
Climate Change	–	3	–	–	0
Tidal Network	–	3	–	–	0

In the case of stations calibrated to provide flow data, the quality of the calibration at high flows and the quality of the calibration at low flows was also assessed. This was simplified to just 4 scores as outlined in Table 4.2.

5 Catchment Flood Risk Assessment and Management.

Table 4.2: Data quality scores

	Data Quality – High Flows (X)	Data Quality – Low Flows (Y)
Excellent	3	3
Good	2	2
Poor	1	1
Unacceptable	0	0

In order to prioritise stations, a weighted scoring system was adopted. This was undertaken as follows:

- The "use scores" arising from Table 4.1 were added together for each station.
- For stations requiring good-quality low-flow data (for example, stations used for the Flow Duration Curve Model, abstractions and discharges), the total "use score" was multiplied by the data quality score at low flows (Y).
- For stations requiring good-quality high-flow data (such as for the OPW Flood Studies Update Programme, arterial drainage, flood relief schemes, flood warning, catchment flood risk assessment and management), the "total use score" was multiplied by the score for that station's data quality at high flows (X).
- For stations with uses that require both high- and low-flow data (for example, EU reporting, resource assessment, hydropower, important fishery/environmental sites, WFD sites, navigation, climate change and specific catchment studies), the total "use score" was multiplied by both the score for quality of high-flow data and the score for quality of low-flow data.
- The three weighted scores were then added together to calculate the total weighted score for each flow station.
- The focus of this approach is primarily to identify the low-scoring and therefore low-priority stations.

Stations were also assigned to three sub-categories as outlined in Table 4.3.

Table 4.3: Definitions of sub-categories

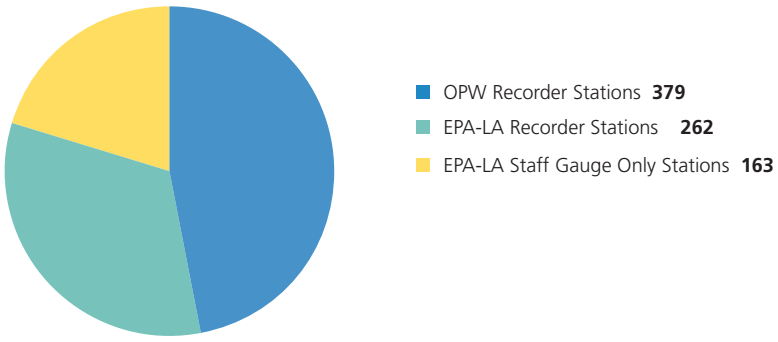
Sub-category	Definition
Strategic	Permanent stations located in strategic locations to provide data for many uses and overall provide data required for the fundamental understanding of the hydrology of Ireland. Such stations are particularly important for modelling.
Operational	Long-term stations installed to provide data for ongoing use such as flow at major waste water treatment plants, abstractions etc.
Project	Temporary stations installed for a defined project to provide data for a specific use. Projects may last for extended periods, sometimes in excess of 20 years.

The outcome of this is that all hydrometric stations have an associated score and sub-category. This information provides the basis for prioritisation of stations, thereby providing the essential information for future decisions relating to the hydrometric programme. Details on the methodology used to prioritise the hydrometric stations are given in Appendix 3.

4.2.2 Review Findings

The combined EPA-Local Authority (EPA-LA) and OPW hydrometric networks consist of a total of 804 hydrometric stations – see breakdown in Figure 4.1. All were reviewed using the methodology outlined above. The results of the review for the 425 EPA-LA stations are given below. The stations are subdivided into "continuous recorder stations" and "staff gauge only" stations. As part of this process, locations where EPA-LA and OPW stations are in close proximity were assessed and, where unnecessary duplication of data collection was considered to be occurring, stations were dropped, depending on the quality of the station. 940 EPA-LA hydrometric stations are no longer active (130 recorder stations and 810 staff gauge only stations) but their data are stored with the active station data in the EPA hydrometric database WISKI and also made available through HydroNet or by enquiry to the Water Data Unit in Richview. Historic data from inactive stations are still valuable and used in catchment management studies.

Figure 4.1: Breakdown of stations



Duplicate Stations

During the course of the review, 42 locations were identified where an initial evaluation suggested that there might be an unnecessary duplication of hydrometric data collection. EPA-LA stations were identified at 22 of these locations; the remainder were locations where two OPW stations were located in close proximity to each other, mainly for flood warning purposes.

On further investigation it was found that of the 22 locations involving EPA-LA stations:

- 7 were not duplicated and both stations were required.
- 1 EPA-LA station is recommended to be dropped from the programme in favour of an OPW station.
- 14 locations will be investigated further to determine the optimum station.

EPA-LA Continuous Recorder Stations

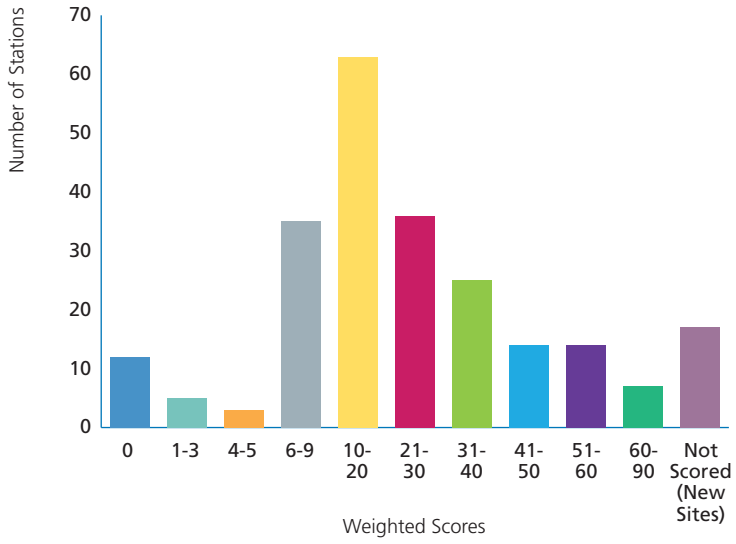
There are 262 hydrometric stations in the EPA-LA network where continuous water level recording is taking place (24 springs, which are part of the national groundwater monitoring network, are included as the process for collecting data is the same). Flow data are derived from 232 of these stations and the remaining 30 are water level only stations.

The results of the scoring process for the continuous flow stations are given in Figure 4.2.

Of the 232 EPA-LA hydrometric stations that provide continuous flow data:

- 12 had a weighted score of 0 and will be dropped from the programme.
- 8 stations scored between 1 and 5. While a maximum score of 5 is somewhat arbitrary, stations with a score in this range are likely to be a low priority for retention in most circumstances.
- 88 are categorised as strategic; 130 are operational and 13 are project stations.
- 17 could not be scored as they are newly installed and not fully calibrated; however, it is likely that these will be retained in the network.

Figure 4.2: Breakdown of weighted scores of stations providing flow data



The water level only stations (mainly on lakes) were scored separately, as station calibration quality is not an issue for these sites. The results are as follows:

- The stations scored in the range 2-19.
- 12 are strategic, 15 are operational and 3 are project stations.

EPA-LA Staff Gauge Only Stations

No continuous monitoring of either water level or flow occurs at these stations. They were installed in order to develop a relationship between water level and flow, so that when a water quality sample was taken the staff gauge could be read by the sampler and noted; the water data unit could then estimate a flow value based on this water level reading, enabling the calculation of nutrient loadings. This practice has declined in recent years. Of the 163 "active" staff gauge sites it was found that flow data were not requested for pollutant loading analysis at 137 stations and therefore flow measurements had not been taken by hydrometric staff for more than three years.

Staff gauge only stations offer limited data and all staff gauges were reviewed based on their current use. It was found that of the 163 staff gauge only stations:

- 86 had a weighted score of 0, indicating either no future use or poor-quality data.
- A further 51 had a poor-quality low-flow rating.

This leaves 26 staff gauge only stations in the network that are required to provide flow data for specific operational purposes or ongoing projects (i.e., actively used to calculate nutrient loadings).

4.3 Outcome of Review of OPW Hydrometric Stations

There are 379 hydrometric stations in the OPW network where continuous water level recording is taking place. Flow data are derived from 245 of these stations and the remaining 134 are water level only stations. These were reviewed by OPW using the same scoring methodology. The results are as follows.[6]

Of the 245 OPW hydrometric stations that provide continuous flow data:

- 35 had a weighted score of 0 and are likely to be dropped from the programme following consultation with stakeholders.
- 21 stations scored between 1 and 5. While a maximum score of 5 is somewhat arbitrary, stations with a score in this range are likely to be a low priority for retention in most circumstances.
- 100 are categorised as strategic; 144 are operational and 2 are project stations.
- 7 could not be scored as they are newly installed and not fully calibrated; however, it is likely that these will be retained in the network.

6 Information provided by OPW.

The 134 OPW water level only stations (mainly on lakes) were scored separately, as station calibration quality is not an issue for these. The results are as follows:

- The stations scored in the range 0-21.
- 10 had a weighted score of 0 and are likely to be dropped from the programme following further consultation with stakeholders.
- 37 are strategic, 90 are operational and 1 is a project station.

A comparison between the existing and proposed OPW surface water network is given in Table 4.4.

Table 4.4: Comparison of existing and proposed OPW hydrometric network

Station Type	Number of Stations in Existing Network	Number of Stations in Proposed Network
Flow Recorder Station	245	210*
Water Level Only Recorder	134	124*
Total	379	334*

* Total based on removal of stations subject to stakeholder consultation.

4.4 Summary

The outcome of this process is as follows:

- All stations in the EPA-LA hydrometric programme have been reviewed using an objective scoring system.
- The results, together with consideration of whether the stations are ranked as "strategic", "operational" or "project", will enable a structured, informed approach to be taken when considering the future EPA hydrometric programme.
- One EPA-LA station is considered to be duplicated by a good-quality OPW station.
- 12 flow stations had a score of 0; it is proposed that these should be dropped from the network.
- 8 flow stations had a score between 1 and 5; this score indicates that they are low-priority stations that, following consultation with the relevant Local Authorities, it is recommended should be dropped from the programme.
- One EPA-LA station is duplicated with an OPW station and should be dropped from the programme.
- All water level only stations provide useful data, although this process has enabled them to be prioritised.

- A large proportion (137 out of 163) of the staff gauge only stations are no longer required or have a poor relationship between water level and flow (station calibration). It is proposed that these should be dropped from the network.
- The OPW has undertaken a review of its network using the same agreed methodology.
- A comparison between the existing and proposed networks is given in Table 4.5.

Table 4.5: Comparison of existing and proposed EPA-LA surface water network

Station Type	Number of Stations in Existing Network	Number of Stations in Proposed Network
Flow Station Recorder	232	211*
Water Level Only Recorder	30	30
Staff Gauge Only Station	163	26*
Total	425	267*

* Total based on removal of stations subject to stakeholder consultation.

5 The Future of the EPA-LA Hydrometric Programme

5.1 Introduction

The factors influencing the future of the hydrometric programme are as follows:

- Constraints to the EPA providing a hydrometric service.
- Sharing of services within EPA.
- Increased co-operation with OPW.
- New technologies.
- Flow duration estimation model (HydroStats).
- Results of station review process.
- Possibility of outsourcing hydrometric data collection.
- Proposal to adopt a more focused approach to data collection.

These are considered in the following sections.

5.2 Constraints to the EPA providing a Hydrometric Service

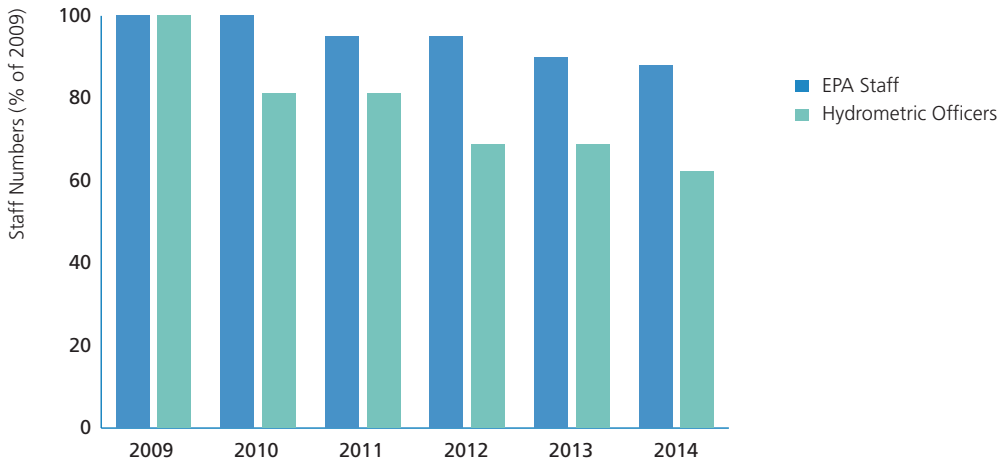
5.2.1 Retirement of Personnel

There are 22 core posts in the Hydrometric and Groundwater Section, including 16 hydrometric officers. However, three hydrometric staff have retired since 2009, and a fourth has indicated that he intends to retire in early 2012. At least six will have retired by 2015, and it is possible that the number may be greater. The Letterkenny Office is likely to close in early 2012 and the Mallow and Monaghan Offices will be staffed by one hydrometric officer. There will be no hydrometric staff in the Mallow Office after 2014.

Under the Croke Park Agreement the EPA must implement an Employment Control Framework to reduce the number of people employed by the organisation. Under this framework the EPA has been directed to reduce the number of employees to 302 (a reduction of 20 staff) by the end of 2014. Within the EPA this is to be achieved through retirements and a moratorium on further recruitment. Therefore, recruitment of replacements is unlikely, as is transfer from other areas of the EPA.

The reduction of staff in the Section is disproportionate relative to the reduction overall in EPA; this is illustrated in Figure 5.1.

Figure 5.1: Comparison of projected percentage reduction of hydrometric officers relative to reduction in overall staff numbers in EPA



5.2.2 Commitment to Groundwater Monitoring Programme

The groundwater level network was reviewed in 2007 and updated subsequently with the installation of new boreholes and flow measurement structures on springs, costing approximately €3.2 million. This is a low-density network relative to other EU countries. It was concluded that a reduction in this network, and therefore of the resources required to maintain it, was not feasible. It is estimated that the staff resource required currently to maintain the groundwater network is approximately 1.5 person years per year; while a substantial proportion of the work can be undertaken by one person, a component would require the involvement of a two-person team. The geographical spread of the groundwater level network can be seen in Figure 5.2.

5.2.3 Budget Reductions

Cuts to Local Authority budgets may affect the maintenance carried out at hydrometric stations and have the knock-on effect of impacting on the quality of data collected. The Local Authority hydrometric budgets are used to:

- Provide or repair data logger equipment and housing for stations.
- Carry out annual maintenance of sites.
- Install or upgrade weirs.

The EPA is responsible for taking flow measurements to calibrate the sites, and downloading and processing the data. Reductions to the EPA hydrometric budget could affect the following:

- Reduction in number of days spent on field work.
- Ability to replace field equipment (replacement of flow measurement equipment, e.g. StreamPro ~€30,000).
- Replacement of hydrometric vans (~€30,000 per van).

5.2.4 Health and Safety Issues

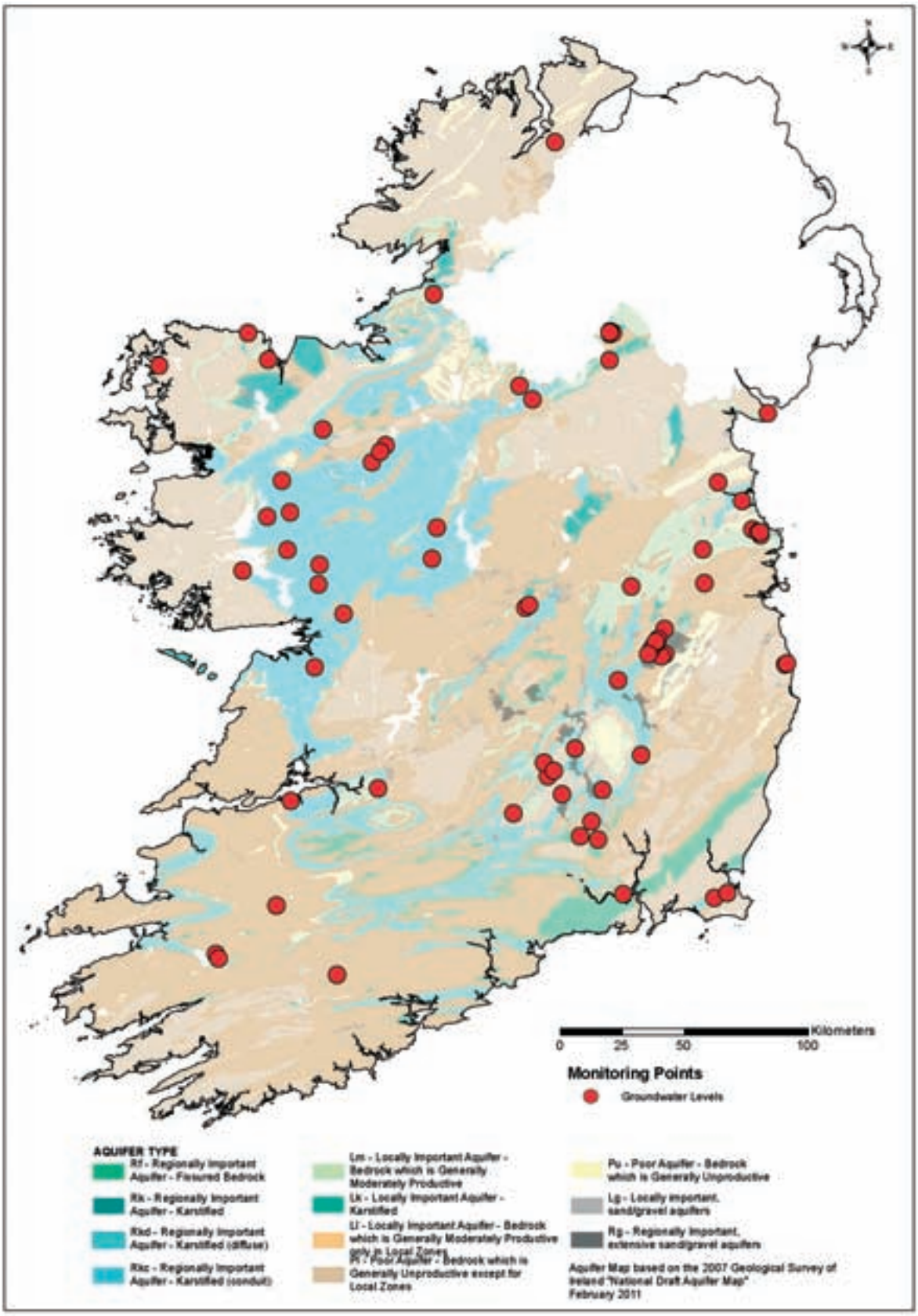
Health and safety related to hydrometric stations has become a major concern in recent years. The stations, including health and safety aspects, are the responsibility of the Local Authorities. Health and safety audits carried out in 2007 identified a number of sub-standard sites. Separate Local Authority audits were carried out by most Local Authorities and there has been a significant improvement as a result. However, the failure of Local Authorities to address health and safety at their stations could lead to:

- Unsafe working conditions for EPA staff and therefore stations being dropped from the hydrometric programme.
- Limited hydrometric data collection.
- Personal liability for EPA (and Local Authority) managers.

From the EPA perspective, reducing staff numbers has health and safety implications which include:

- Lone working, often in remote areas.
- Inability to carry out certain hydrometric activities (medium to high flow measurements, surveys, etc.).

Figure 5.2: Geographical spread of groundwater level network



5.2.5 Co-operation from the Local Authorities

The Hydrometric and Groundwater Section instigated a round of meetings with Local Authorities starting in 2008 to review their individual hydrometric requirements. The outcomes from these meetings varied. The main issues encountered with Local Authorities included:

- A lack of awareness/knowledge of their hydrometric programme and the relevance of their role in the programme.
- Local Authorities facing diminishing financial and personnel resources.
- Hydrometric activities not regarded as a core function.
- A loss of knowledge of general hydrometric work and values through the changing of personnel.

Follow-up contact with several Local Authorities did not yield the desired results in terms of progress on issues raised at the meetings.

A further complication arises with changing personnel within the Local Authorities, and handover of duties/responsibilities of the hydrometric programme is often not prioritised. The ongoing co-operation with Local Authorities is crucial to the full implementation of the hydrometric programme to meet the Local Authorities' own statutory requirements.

5.2.6 Long-term access to sites

There is no formal written way-leave agreement for most stations between the Local Authorities and the land owner on whose land the hydrometric station is installed. This may lead to:

- EPA staff being refused admission to hydrometric stations.
- Loss of long-term stations (climate change stations particularly at risk).
- Loss of stations with significant infrastructural investment.

5.3 Shared Services within EPA

Currently, hydrometric staff assist other areas in EPA in undertaking monitoring, mainly water sampling. The areas assisted and the time inputs are given in Table 5.1. In summary, an input of 0.5 person years is allocated to other work. To date there has not been a need to get assistance from other sections within the EPA to assist with hydrometric work.

Table 5.1: Details of assistance provided to other EPA areas

Hydrometric Office	Estuaries (OEA)	Lakes (OEA)	IPC (OEE)	Air (OEA)
Letterkenny	16 days		6 days	
Limerick	16 days			10 days
Athlone		35 days	10 days	
Mallow	48 days			
Total	80 days	35 days	16 days	10 days
Grand Total	141 days = 28 weeks = ~34 weeks when leave etc. taken into account = 0.65 person year			

Surface water and groundwater are sampled by EPA staff at regular intervals – varying from monthly to bi-annually. Some of the water sampling stations will coincide with hydrometric stations and others will be nearby (within a few kilometres). With some training, these EPA staff could download data loggers, take staff gauge readings, and forward data to the relevant hydrometric office. Initial communications with the regional laboratory managers have indicated that assistance is likely to be possible. However, a feasibility study would need to be undertaken to evaluate fully the potential of this option and the arrangements that would be needed; if feasible, it may be possible to reduce site visits by hydrometric staff to some stations by, perhaps, 30-40%, although when subsequent site visits are made by hydrometric staff, the time needed would be greater than at present. Overall, in areas where assistance can be given by laboratory staff, there would be a significant reduction in the time taken to visit hydrometric stations by Section staff.

5.4 Co-operation with OPW

For historical reasons, there are two equally large complementary hydrometric networks – OPW and EPA-LA – in Ireland, with a smaller ESB network. Each network was set up for different purposes. The ESB network was established in the 1920s to facilitate and manage the generation of electricity using hydropower on the Shannon, Lee, Liffey and Erne systems. The OPW network was established in the 1940s to focus on arterial drainage and flooding. The EPA-LA network was established in the 1970s under the auspices of An Foras Forbartha with a focus on water resources and water quality.

The OPW reviewed current practices in 2008 and the resulting report concluded that "the relationships between the various bodies and individuals involved in hydrometric data collection are largely informal and more importantly rely very much on goodwill. These relationships need to be formalised and strengthened." The recommendations for more formal working relations and active collaboration are increasingly relevant, in view of the likely staff losses in both organisations. Given the necessity for hydrometric data and the similarity of some work procedures in the two organisations, close co-operation between the bodies is recommended. Recommendations from the OPW review undertaken in 2008 are included in Appendix 4. The locations of the EPA and OPW hydrometric offices are shown in Figure 5.3.

5.5 Use of New Technologies

5.5.1 HydroNet

HydroNet is the EPA's web-based application to disseminate hydrometric data to the Local Authorities, consultants and the general public. This application enables the downloading of hydrometric data in various formats (CSV, Excel, Word, PDF). Promotion of the HydroNet website has helped to reduce the number of enquiries to the water data unit.

5.5.2 Telemetry

The Section has recently completed a project to install telemetry capability at 80 EPA-LA surface water hydrometric stations, bringing the total number of hydrometric stations on telemetry to 105. The advantages of having hydrometric stations on telemetry are:

- Provision of daily hydrometric data at strategic locations.
- Early detection of data logger malfunctions or on-site problems, meaning a reduction in the loss of data.
- Provision of a more target-oriented approach to taking flow measurements (although it does not necessarily reduce the number of site visits).
- Improved efficiency in data collection and dissemination.

It has been the experience of both the EPA and OPW hydrometric teams that telemetry does not replace the requirement for site visits; rather it offers the ability to target a site to obtain vital flow measurements to fill gaps in the calibration of the station. Stations still require regular visits, on average at 6-8 week intervals, to ensure that equipment is working correctly and the site is free from debris that would otherwise give false water-level readings.

Figure 5.3: Locations of EPA and OPW hydrometric offices

5.5.3 Equipment

The EPA has invested in new equipment and new technologies to improve hydrometric data collection. Each office has a StreamPro ADCP (Acoustic Doppler Current Profiler) used to take flow measurements. These devices can be used to collect routine flow measurements to build up the calibration of each hydrometric station. The advantages are:

- Quick to deploy and record flow measurements, particularly at medium to flood flows.
- Health and Safety – operator does not have to enter the water.
- Multiple deployment methods – can be used from a boat, bridge or rope traverse.
- Have proved to be highly accurate.

Figure 5.4: Deployment of a StreamPro ADCP to take a flow measurement

The Section has also 4 RioGrande ADCPs designed to take measurements in bigger rivers and flood measurements. These were used to great effect during the November 2009 floods, where EPA teams measured some of the highest flood flows on record (including 700 m3/s at Station 25051, Portumna on the Shannon).

The acquisition of surveying equipment has enabled accurate levelling of stations to ordnance datum, thereby increasing the value of water-level data. This equipment has also been used to level in groundwater boreholes and so allows all water-level data to be recorded relative to ordnance datum Malin. The equipment can also be used to survey debris marks following flood events to provide an accurate maximum flood level.

Figure 5.5: Using GPS surveying equipment

Traditional methods of surveying required the use of measuring tapes, compasses, levels, and a theodolite. All of the calculations were done manually, thereby inducing error probabilities. It could often take a hydrometric team a full day or more to conduct a survey. With the Trimble GPS surveying instrument the process of surveying changed entirely. The instrument provides accurate measurement in 3D (X, Y, and Z planes) that makes it easy for the surveyor to take precise measurements. The whole operation can now take less than an hour.

Figure 5.6: Installation of weir to improve data quality

5.5.4 Hydrometric Station Improvements

In recent years much progress has been made in upgrading and improving the EPA-Local Authority network in co-operation with the home Local Authority. Improvements have been made through the installation of weirs in order to stabilise the relationship between water level and flow at a location, thus improving the quality and reliability of flow data. It also means that fewer flow measurements are required once the station is calibrated as the relationship between water level and flow should remain constant. Health and safety improvements have also been carried out.

5.6 Flow Duration Curve Estimation Model (HydroStats)

While there is an extensive coverage of hydrometric stations in Ireland, clearly not all water bodies can be monitored. Yet there is frequently a need to estimate and predict flows, particularly low flow, for ungauged catchments. An EPA-funded project, carried out jointly by EPA/ESBI/Compass Informatics, has developed a web-based GIS model for producing flow duration curves, based on considering catchments with similar geohydrology. While this model needs further refinement as new and improved hydrometric data become available and there are areas where it should not be applied, it is a powerful tool for estimating 95 percentile flows at many ungauged sites. In addition, it can be used as a means of checking and validating the collected data from existing stations. Further details are given in Appendix 5.

5.7 Outsourcing of Data Collection

During the course of the review, the Steering Group's terms of reference were expanded to include consideration of outsourcing the hydrometric work of the Hydrometric and Groundwater Section. This was logical and timely in the context of outsourcing being raised in the McCarthy Report and also included, for consideration by all Government Departments, in the Croke Park Agreement.

The Steering Group concluded that, given the tight timeframe set for the review report, and the complex nature and variety of outsourcing options, consideration of the issue could at best be of a preliminary nature.

Against this background, therefore, a preliminary analysis was carried out and is included in Appendix 6 to this report. This Appendix includes a summary of the experiences of the Hydrometric and Groundwater Section and the OPW of outsourcing. Three possible options for outsourcing are outlined.

The experience from both organisations was mixed, with no apparent cost savings (rather increases in the OPW experience) and a more positive outcome identified where the work outsourced was straightforward and not of a complex technical nature. However, outsourcing of the less technical and specialised work would enable more staff to give greater emphasis to assessment of the data. In addition, the adoption of this strategy will enable the Section to move towards achieving the objective of the OEA Review to "prioritise added value work (assessment and reporting)".

The Steering Group was however of the opinion that this matter merited a more detailed, separate examination, particularly in the context of the likely reduction in field staff numbers in the Section over the next 3-5 years. Our initial conclusion is that the Agency contractor used for sampling surface waters is likely to be the more feasible option. A contractor such as this would reduce the workload of hydrometric staff but could not replace their input in undertaking the more technical and specialised elements of hydrometric work. Another option would be to investigate the outsourcing of data collection to Local Authority staff.

5.8 Focused Hydrometric Data Collection

5.8.1 Introduction – Role of EPA

The primary role of the EPA/LA hydrometric programme has been to provide data relevant to the activities of Local Authorities, and in more recent times for the licensing and enforcement roles of the EPA. Consequently, while the data are relevant to a broad range of issues, the main objective is to provide statistics and information to enable abstractions and discharges to be assessed, particularly in relation to design, licensing, monitoring and enforcement. This means that the hydrometric work of the EPA is focused on flows that occur during dry weather periods, in particular 95 percentiles and long-term dry weather flows.

Currently, EPA hydrometric staff are required to visit hydrometric stations at approximately 8 week intervals, with a maximum interval of 12 weeks (by comparison, OPW staff aim to visit their stations every 6 weeks). EPA hydrometric staff spend approximately one day each week in the office, mainly downloading, processing and editing data (whereas OPW field staff do not undertake processing or editing of water level data: this work is undertaken centrally by the Processing Unit).

5.8.2 Current Context

The review of the EPA-LA hydrometric programme is timely for the following reasons:

- Ireland has a relatively dense hydrometric network; while the complex geohydrology provides a justification for this, consideration of the requirement for this network should, in principle, be reviewed regularly.
- The instigation of the current EPA-LA network occurred in the mid-1970s; therefore, there are over 30 years' data for 82 hydrometric stations – 68 flow and water level stations and 14 water level only stations. Consequently, good-quality long-record hydrometric statistics are available for these stations, and these statistics can be used to help derive similar statistics for other stations.

- Modelling, while not a panacea and in some circumstances not applicable, is enabling a greater understanding of flow regimes and is providing relevant predicted statistics for many ungauged sites; in particular it provides an estimate of the 50 percentile and 95 percentile flows at these locations.
- Analysis of pollutant loadings in rivers is likely to become a more important issue in environmental assessment than in the past; therefore maintenance of an adequate network to provide this information is essential.
- EPA staff assist OPW in providing flood flows on request when extreme flood events occur; this assistance will need to continue in view of the increasingly important role of flooding and flood alleviation.
- The outcome of the review of the network will enable resources to be focused where the outcome is of greatest benefit.
- There will be reduced staff numbers in the Section for the foreseeable future.

5.8.3 Targeting Data Collection

A more targeted approach is not only feasible but also necessary as a means of getting optimum value from the resources available in the Section. This could involve the following:

- Taking 1-2 flow measurements spread over a wide range of flows each year at good-quality calibrated stations when flows are in the 5-95 percentile range; the purpose of these measurements would be to ensure that the rating calibration is being maintained.
- Focusing flow measurements at calibrated stations during periods of low flow and in particular during drought conditions, when 95 percentile or dry weather flows need to be established.
- Selecting relevant sites that are not in the network where low flow statistics (95 percentile and dry weather flows) would be beneficial.
- Having a work plan in place that would enable a number of flow measurements at targeted sites during low flow periods to be undertaken.
- Using the information from the telemetry stations to indicate when flows are approaching the 90-95 percentile value.
- Assisting OPW when necessary in measuring flood flows and providing other flooding data such as surveys and photo documentation.
- Obtaining assistance from OPW staff, when necessary, to measure critical low flows.
- Undertaking an efficiency audit annually in each Hydrometric Office to ensure that data collection is focused and that there is no unnecessary data collection.

Further details are given in Appendix 7.

5.9 Estimating Staffing Requirements

Predicting the implications of staff reductions due to staff retirements is complicated and difficult for the following reasons:

- The network and the proposed approach to data collection will change somewhat as an outcome of this Review.
- The time input required will depend on the number of stations in the network, the size of the region covered, involvement in other Agency work, assistance provided by other Agency and OPW staff and the level of risk that the Agency is willing to take to maintain continuous records.
- In the next year or so, a considerable time input will be required to undertake health and safety audits, and to check work undertaken by Local Authorities.

Based on the experience to date, the reduced (from 16) staff complement of 13 hydrometric officers will be able to undertake all the work required for the proposed surface water hydrometric programme, and the well level monitoring, while giving assistance to the lakes, and transitional and coastal waters biology teams. This is achievable partly because the surface water programme is reduced somewhat, but mainly because one-person teams are undertaking a substantial component of work (fieldwork and office work) previously done by two-person teams, although the downside of this is that it creates a greater health and safety risk and is an added work pressure on relevant staff. Currently, one hydrometric officer works half-time in each of the Mallow and Limerick offices. In addition, assistance is provided to the Monaghan office by one of the Kilkenny hydrometric officers.

If the groundwater level network was a stand-alone network, the estimated staff time needed is approximately 1.5 person years. This estimation can be made because the work required is relatively predictable.

As future retirements occur, a recommended process for considering the implications is outlined in Section 6.9.

6 EPA-LA Hydrometric Programme – Recommendations

6.1 Role of Hydrometric Data Collection

Hydrometric data are essential to sustainable catchment management, infrastructural development and monitoring potential impacts of climatic change. This provides the context for consideration of the future of the EPA-LA hydrometric programme.

Recommendation 1: That a focused high-quality hydrometric programme be maintained, oriented towards the physical settings (geohydrology) present in Ireland and the pressures (e.g., abstractions, discharges) caused by human activities.

6.2 Co-operation with Local Authorities

Local authorities are likely to need flow information at new hydrometric stations to facilitate the planning and monitoring of proposed municipal and industrial developments.

Recommendation 2: That, when agreed in advance with EPA, the cost of installation of future hydrometric stations should be included as part of the overall capital costs of the project.

6.3 Revised Hydrometric Programme

The outcome of the review of the stations (see Section 4.3) will lead to a reduction in the EPA-LA hydrometric network; the number of data logger stations will reduce from 232 to 211, the number of water level only stations will remain the same, while the number of staff gauge only stations will reduce from 163 to 26. Prior to finalisation of this outcome, Local Authorities will be consulted. While the reduction in the number of staff gauge only stations is considerable (84%), the resulting reduction in staff time needed to collect and process data from these stations will be small, as most were already inactive because data from these stations were no longer being requested.

Recommendation 3: That, following consultation with the relevant Local Authorities, low scoring (i.e., low-priority) hydrometric stations be dropped from the EPA-LA programme.

6.4 Sharing Workload with Other EPA Staff

There is potential for evolving "shared services" as a means of increasing the efficiency of undertaking OEA work, particularly between the water sampling and hydrometric areas. This is the preferred option as an initial response to reducing staff numbers in the Section. In the process, it optimises use of internal EPA staff resources.

Recommendation 4(i): That a feasibility study be undertaken by Laboratory Services and Hydrometric & Groundwater staff to examine the possibility of sharing the two workloads as a means of ensuring an optimum use of resources. Deadline: end of 2011 to enable the 2012 work programme to be finalised.

Recommendation 4(ii): That Hydrometric & Groundwater Section staff, as far as is practicable, provide the continuing service to the lakes and TRAC biology teams.

6.5 Outsourcing Hydrometric Data Collection

Based on a preliminary evaluation, it is concluded that outsourcing data collection will not lead to a reduction in costs and, more importantly, would lead to a loss by EPA and the public sector in the standard of data collection and in the corporate hydrometric expertise and knowledge of local river hydrology. Downloading of data loggers by a contractor is likely to be feasible; however, it is unlikely that the more technical and specialised elements of hydrometric work could be undertaken satisfactorily.

Recommendation 5: That the feasibility of a pilot project to outsource a proportion of data collection (downloading data loggers at approximately 16 week intervals, i.e. every second time) by the water sampling contractor be examined.

6.6 Re-focusing Data Collection

Emphasis has been placed on collecting water level and associated flow information for nearly 40 years by EPA hydrometric staff. Consequently, adequate station calibrations (relationship between water level and flow) have been derived for most stations, and it is now feasible to estimate 50 percentile flows, 95 percentile flows and dry weather flows with sufficient confidence for the majority of stations in the network. This data collection and analysis has enabled the Flow Duration Curve Estimation Model (HydroStats) to be developed; this represents significant progress, although care must be taken in using the model outputs.

The priority for the EPA-LA hydrometric programme is to measure and enable derivation of low flow statistics, while measuring flood flows when necessary as a service to Local Authorities and the OPW. One outcome of this is that less emphasis will be placed on taking flow measurements during periods when flows are in the 10-90 percentile flow range once a calibration has been established. Therefore, it is planned that a slight shift in the future focus of the EPA will be towards taking flow measurements during low flow periods, not only at existing hydrometric stations but also at specifically chosen locations that are not currently monitored. The latter measurements are needed to enable validation of the outputs from the Flow Duration Curve Estimation Model (HydroStats) and provide data for licensing and enforcement of developments in ungauged catchments, particularly for the catchments where the model cannot be used. The data from telemetry stations (see Section 5.5.2) will be used to assist in this approach. In addition, greater emphasis will be given to contributing hydrometric data and analysis to the OEA integrated assessment process.

Recommendation 6(i): That, arising from this Review, a more targeted and focused approach to hydrometric data collection be adopted.

Recommendation 6(ii): That a greater emphasis be given to assessment of hydrometric data as a means of "adding value" to the work of the Section.

Recommendation 6(iii): That the role of telemetry in improving the efficiency and quality of data collection be assessed.

6.7 Use of Non-permanent Staff

Summer students have been used (two students for three months each) to provide assistance. However, their role is largely based on reducing lone working and is not a substantial solution.

Recommendation 7: It is recommended that this means of assisting permanent staff should continue.

6.8 Transfer of Staff from Other Agencies

Under the Croke Park Agreement, transfer or secondment of appropriately qualified staff from other agencies, such as Local Authorities, is an option. However, it is unlikely to be feasible for consideration until after staff numbers in EPA reduce to below 302.

Recommendation 8: The EPA should pursue any opportunities that may arise for suitably qualified persons to be transferred into the Hydrometric & Groundwater Section to fill vacant positions.

6.9 Increased Co-operation with OPW

Co-operation with OPW in maintaining both networks will optimise data collection and processing. However, as OPW is in a similar situation regarding staff losses, this co-operation is unlikely to compensate for staff losses.

Recommendation 9(i): That further discussion at a senior level take place with OPW, and that long-term approaches to collaboration in the collection, assessment and reporting of hydrometric data be examined and agreed.

Recommendation 9(ii): That regular meetings on an annual or bi-annual basis be held to help ensure effective co-operation.

Recommendation 9(iii): That a national hydrometric group, led jointly by EPA and OPW and involving all bodies collecting hydrometric data (EPA, OPW, Marine Institute, ESB, Waterways Ireland, Met Éireann, and Rivers Agency, Northern Ireland), be proposed and set up to help prevention of duplication of data collection and to share knowledge and information.

6.10 Proposed Process When Further Reductions in Staff Numbers Occur

1 An evaluation of the workload and time input required for other staff to carry out the work will be undertaken. In circumstances, for instance, where it will result in an office closure, the time and resource implications will be significant.

2 The options will be evaluated and may include:

- Developing and implementing a risk-based approach to site visits as a means of reducing staff time input and costs (by decreasing visits to low-risk sites) and focusing efforts on the more important and high-risk stations.
- Discontinuing and "mothballing" lower priority sites, following consultation with EPA senior management and the Local Authorities.
- Requesting further assistance from other EPA areas, including transfer of staff.
- Evaluating and organising, if resources are available, outsourcing of some data collection to the water sampling contractor.
- Evaluating and organising, if feasible, outsourcing of some hydrometric data collection to Local Authorities.
- Reducing or ceasing assistance given to the lakes and TRAC biology teams.
- Reducing further the number of flow measurements and visits to download data; while this may be feasible to a limited degree, it will result in a greater likelihood of data gaps and inadequate data.

Recommendation 10: That this approach be adopted.

7 Action Plan

Arising from the outcome of the Review, the following programme of work is planned and will be incorporated, as appropriate, into the OEA work programme for 2012.

1 Each Local Authority will be informed of the conclusions of the Review; in particular details will be provided on the proposed hydrometric network in each Local Authority arising from the review of the stations. **Deadline: Q1 2012.**

2 A site-specific health and safety risk assessment will be undertaken by Section staff at all (surface water and groundwater) hydrometric stations; where stations are considered to be "high risk", data collection will cease until the Local Authority undertakes the necessary work. **Deadline: Q1 2012.**

3 An examination of the feasibility of Laboratory Services staff downloading data loggers while sampling surface water will be undertaken in co-operation with regional laboratory managers. **Deadline: Q4 2011.**

4 The feasibility of a pilot project to outsource a component of hydrometric work to the water sampling contractor will be examined. **Deadline: Q3 2012.**

5 A more targeted approach to hydrometric data collection will be adopted following consultation with all staff in the Hydrometric & Groundwater Section. **Deadline: end Q1 2012.**

6 A meeting with OPW to agree and plan a collaborative approach to data collection, assessment and reporting will be arranged. **Deadline: Q1 2012.**

7 A review of the role of telemetry in improving the efficiency and quality of data collection will be undertaken. **Deadline: Q3 2012.**

8 A review of the means by which Section staff can make an increased contribution to "higher level" work, particularly to environmental assessment, will be undertaken. **Deadline: Q2 2012.**

8 References

Environmental Protection Agency, (2010). Review of the Office of Environmental Assessment. 132p.

JBA Consulting, (2008). Strategic Review of the Hydro-meteorological Monitoring Programme. Report undertaken for the Office of Public Works.

WMO/UNESCO, (1991). Report on Water Resources Assessment. Progress on the implementation of the Mar del Plata Action plan and a strategy for the 1990s. 66p.

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Guidance, Procedures and Training on the Licensing of Discharges to Surface Waters and to Sewer for Local Authorities, (2010). Water Services Training Group.

Appendix 1

Non-technical Guide to Hydrometric Work in the EPA

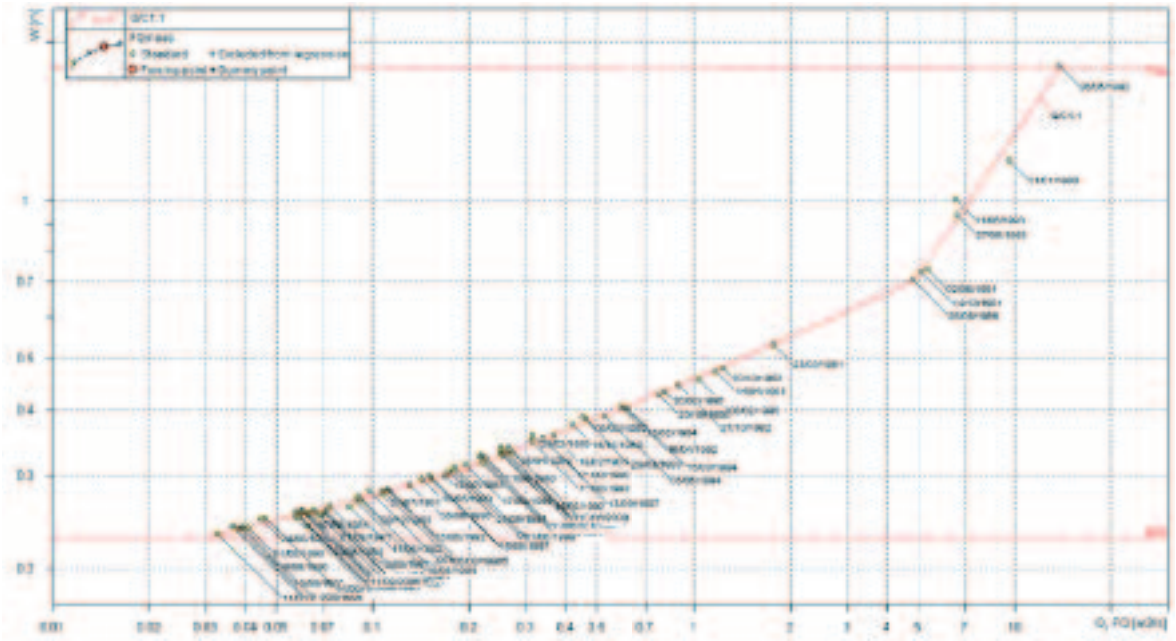
Figure A1.1: Staff Gauge Only Station

Hydrometric stations provide information on river levels (m and mOD Malin); flows (m3/s), lake levels and outflows from lakes are also monitored.

The Local Authority network is made up of two types of hydrometric station, staff gauge only stations and recorder stations. Staff gauge only stations (Figure A1.1) are those that have a staff gauge or graduated metre strip permanently installed at a location on a river. Numerous flow measurements are taken by the hydrometric teams over a wide range of water levels to develop a relationship between the water level of the river and the resulting flow. Over time this relationship can be graphed in the form of water level (vertical axis) vs flow (horizontal axis) (see Figure A1.2), thus enabling a person to make an estimate of flow simply by reading the water level from the staff gauge. The original thinking behind the installation of these stations was that at the time a water quality sample was being taken the sampler could note the water level on the gauge. The EPA water data unit would supply an estimate of flow in order to enable the calculation of nutrient loadings in rivers and in the inflows to lakes used in catchment studies.

However, since most river quality sampling has been outsourced, the staff gauges are no longer read by the sampler and so these stations no longer fulfil the function for which they were installed. In some cases where the staff gauges are read by the regional laboratories' samplers the flow data are provided by the water data unit, but the loading calculations and analysis do not take place.

Figure A1.2: Example of a station calibration or rating curve



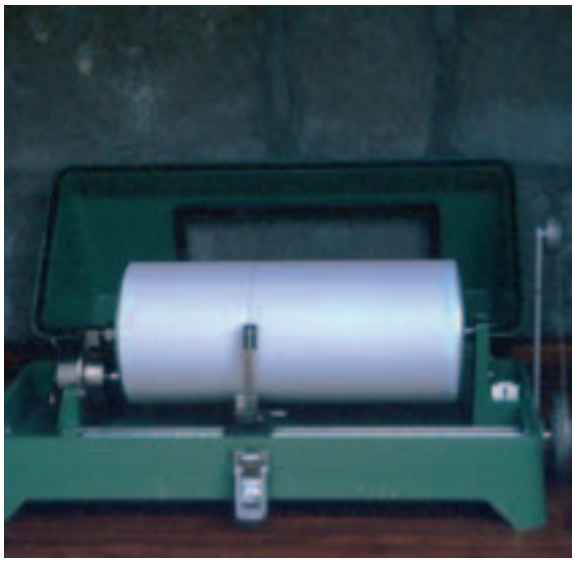


Figure A1.3: Autographic recorder

The second type of hydrometric station is known as a recorder station. These stations have both a staff gauge and an instrument for continuously recording water levels. This type of station was originally installed with an autographic recorder (Figure A1.3). This instrument operated using a float and counter-weight principle that activates a pen marking the water level on a chart. These charts are then digitised to convert the data to a digital format.

All continuous water level recording stations were installed with digital recorders between 1999 and 2001, and the final digitising of the backlog of charts from the old autographic recorders was completed in 2007. All these historic data were added to the EPA's hydrometric archival database, WISKI. (Water Information System Kisters)

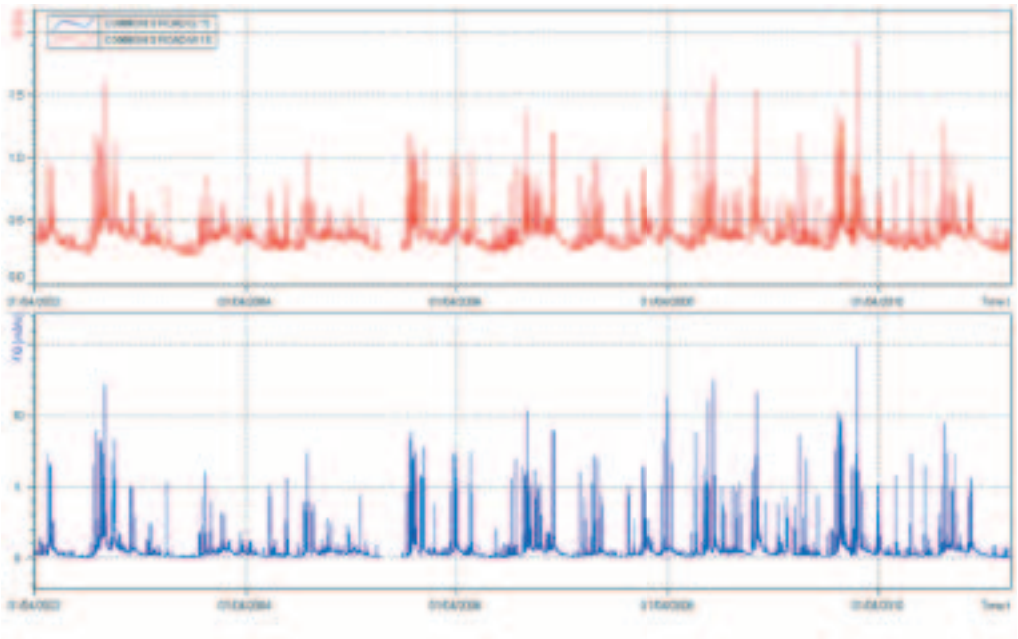
Figure A1.4: Manual download of digital data logger

The modern digital data loggers continuously record water levels every 15 minutes; they are either manually downloaded by the hydrometric teams every six weeks (Figure A1.4) or the data are transmitted via telemetry to the Water Data Unit in Dublin every day. Basic hydrometric river monitoring involves the recording of river levels only. Only when hydrometric staff regularly visit river monitoring sites and undertake measurements can level records be processed to generate flow records.

These recorder stations are thus calibrated by taking a number of flow measurements to establish a station calibration (relationship between water level and flow) so that the continuous water level record can be converted to flow estimates by application of a rating equation; this can be automated to a continuous record of flow using specialised hydrometric software (Figure A1.5).

Continuous records of water level and flow at all Local Authority recorder stations are made available to the public on the EPA website through the application HydroNet.

Figure A1.5: Hydrographs of water level and flow



Hydrological analysis is carried out using these basic data to derive statistical flows such as daily mean flow, 50 percentile flows, 95 percentile flows (on average 5% of the time), dry weather flows (50 year drought), etc.

Calibration of a Hydrometric Station

A large portion of the hydrometric teams' work relates to the calibration of hydrometric sites by taking flow measurements (Figure A1.6) over as wide a range of water levels and flows as possible. Flow measurements are usually carried out using the velocity area method. This involves calculating the cross-section of the river channel at the flow measurement location by dividing the channel into vertical subsections. In each subsection, the area is obtained by measuring the width and depth of the subsection, and the water velocity is determined using a current meter (Figure A1.7). The discharge in each subsection is computed by multiplying the subsection area by the measured velocity. The total discharge is then computed by summing the discharge of each subsection (Figure A1.8).

Figure A1.6: Taking a flow measurement

Figure A1.7: Current meter used to measure velocity

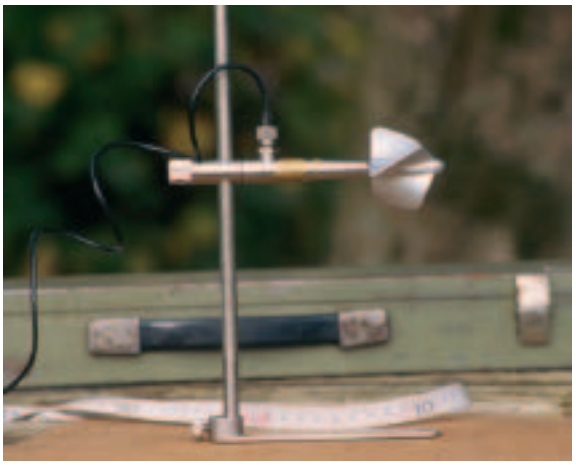
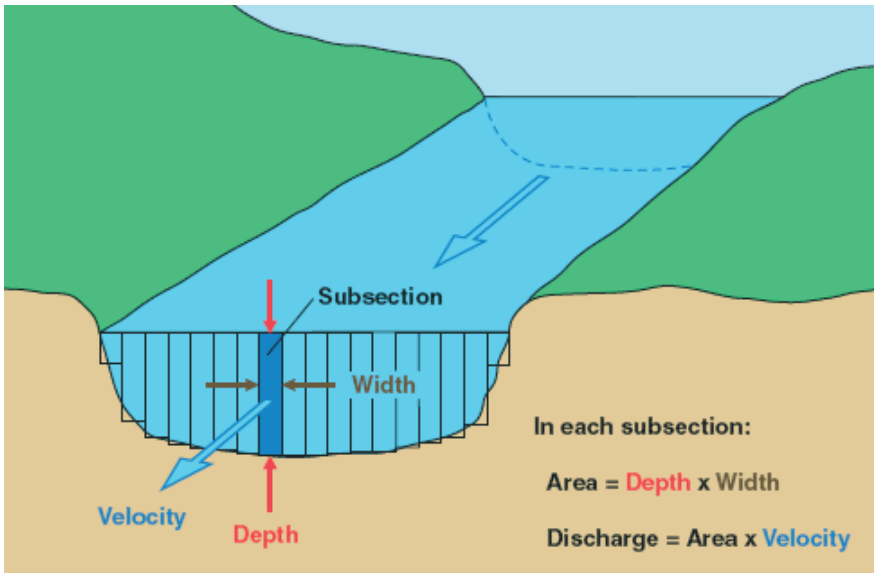


Figure A1.8: River channel divided into cross-sections



The hydrometric section has also invested in new technologies that allow the hydrometric teams to take flow measurements at higher flows and at more inaccessible sites where entry into the water is difficult or unsafe. Acoustic Doppler Current Profilers (ADCPs; Figure A1.9) use the principle of the Doppler effect to measure water velocities instead of a current meter. The ADCP sends a sound pulse into the water and by measuring the change in frequency of that sound pulse as it is reflected back to the ADCP, by sediment or other particulates being transported in the river, Doppler shift can be measured and translated into water velocity. The ADCP also uses acoustics to measure water depth by measuring the travel time of a pulse of sound to reach the river bottom and back to the ADCP.

Figure A1.9: Deployment of an ADCP from a bridge to measure river flow

The ADCP has proved to be valuable as it reduces the time it takes to carry out a flow measurement, makes it possible to take flow measurements in some flooding conditions where otherwise they would not be possible, and also provides a very detailed profile of water velocity and direction for most of a cross-section instead of just at point locations with a mechanical current meter; this improves the accuracy of the measurement.

Figure A1.10: New rectangular weir installed at a hydrometric site

The quality of the flow data obtained from a hydrometric station depends on the quality of the station calibration (relationship between water level and flow, also known as a rating curve) established for that site. The quality of the rating curve can be greatly improved by the installation of a weir or non-standard control to stabilise the river cross-section at the station location (Figure A1.10).

Groundwater Level Monitoring

The groundwater level monitoring network is designed to focus primarily on groundwater bodies that are "at risk" from falling groundwater levels, caused by over-abstraction. The Article 5 Characterisation and Risk Assessment Report indicated that very few groundwater bodies are "at risk" from over-abstraction in the Republic of Ireland. The monitoring networks in these groundwater bodies have been designed to help assess the impacts of abstractions on the groundwater level and the flow of water to associated surface water receptors.

Monitoring networks in "not at risk" groundwater bodies have been designed to help improve conceptual understanding of the flow of groundwater from recharge to discharge areas.

The monitoring network comprises both wells and springs. Water levels in wells are measured using a combination of groundwater level recording data loggers and manual dipping. Spring flow discharge is measured using traditional water level/flow relationships and flow meters.

Appendix 2
Requirement for Hydrometric Data by Other Sections in the EPA

Licensing of Discharges

Requirement for hydrometric data identified by Patrick Byrne, Senior Inspector OCLR

The Environmental Licensing Programme (ELP) within the Office of Climate, Licensing and Resource Use is involved in the assessment of licence applications submitted under a number of different pieces of legislation. The following areas of the ELP's work may involve the use of hydrometric data, by the licence applicants and/or the inspectors in the ELP, in the preparation of licence and review applications and carrying out an assessment of the applications submitted:

- Integrated Pollution Prevention and Control (IPPC) licensing under the Environmental Protection Agency Acts 1992 as amended.
- Waste licensing under the Waste Management Acts 1996 as amended.
- Waste Water Discharge Licensing under the Waste Water Discharge (Authorisation) Regulations 2007, as amended.

Activities specified in the New First Schedule of the EPA Acts are required to hold an IPPC licence; the activities specified include power generation, chemical, food and drink sectors, etc. Waste recovery and disposal activities not authorised by facility permits or certificates are required to have a waste licence. Discharges from agglomerations greater than 500 person equivalents are required have a Waste Water Discharge (WWD) Licence.

IPPC and Waste licences regulate all discharges from the licensable activities including emissions to receiving waters (process emissions from on-site waste water treatment plants, storm water emissions, etc.). WWD licences are more specifically authorisations of the discharges from the agglomeration to the receiving waters (primary discharge from the main waste water treatment plants, secondary discharges from other treatment systems, storm water overflows and emergency overflows).

The Agency currently has approximately 770 IPPC licensed activities, 270 waste licensed activities and 530 WWD applications and licences. While the bulk of IPPC and Waste licences have been assessed and issued, they require periodic review. Currently the Agency is examining all authorised discharges to receiving waters for compliance with SI 272 of 2009 (European Communities Environmental Objectives (Surface Waters) Regulations 2009). This examination and licence review where deemed necessary shall be completed by 22 December 2012 (Article 11 of the Regulations). The examination and licence review requires mass balancing of the existing discharges into the receiving waters; the process requires details of the low flow regime in the receiving water, particularly the 95 percentile and in some cases the dry weather flow (DWF).

The licensing processes require the operator of an activity that is required to hold an authorisation to make a licence application. Within the licence application the applicant shall provide an assessment of all emissions to the environment; in relation to emissions to water the applicant shall calculate a mass balance of the existing or proposed emission and establish if the receiving water body has the capacity to receive the emission while meeting the standards specified in SI 272 of 2009. The minimum parameters necessary to complete the mass balance calculation are:

- Existing or proposed emission limit value.
- Existing or proposed discharge rate.
- Receiving water low flow rate (95 percentile for most parameters and DWF for priority substances).
- Receiving water background water quality.

These numbers are used in the following equation to indicate the resulting concentration in the river after receipt of the process emission. Applicants use the hydrometric data from the EPA website or may use models to establish the low flow rates in the receiving waters.

$$\textbf{C final} = \frac{\textbf{(back * F river) + (C discharge * F discharge)}}{\textbf{(F river + F discharge)}}$$

C final = Resultant concentration after discharge (mg/l)

C back = Background (u/s) concentration (mean) (mg/l)

F river = Flow in river (m3/s)

C discharge = Maximum concentration in discharge (mg/l)

F discharge = Flow of discharge (m3/s)

- Long-term flow records – Low Flow Statistics at selected hydrometric stations (95% percentile and dry weather flows) **www.epa.ie**
- EPA HydroNet – online hydrometric data (water levels, flows and summary statistics) **http://hydronet.epa.ie**
- **www.opw.ie/hydro** Hydro-data provided by the OPW
- EPA Hydrotool: The system provides an estimate of flows exceeded for 5%-95% of time, at ungauged locations. Flows are estimated based on observed flows at similar catchments. Register as a user: **http://watermaps.wfdireland.ie/HydroTool/Authentication/Register.aspx**

Following receipt of an application or licence review the Agency assesses the information submitted and in relation to emissions to water must be satisfied that the existing or proposed emissions are in compliance with SI 272 of 2009, Water Framework Directive, Habitats Directive, etc. The Agency may seek the assistance of the Hydrometric Section of OEA to clarify or confirm the low flow rates used by the applicant and or seek more appropriate flow rates. For example, a catchment comparative analysis may be carried out by the Hydrometric Section for the Inspector.

Based on the mass balancing calculations, the Agency may specify appropriate emission limit values and discharge rates for emissions to the receiving water body. The specified emission limit values may result in a licensee having to make significant investment to waste water treatment upgrading.

The Water Services Training Group has developed guidance for Local Authorities entitled *Guidance, Procedures and Training on the Licensing of Discharges to Surface waters and to Sewer for Local Authorities*. The guidance relies on the use of mass balancing of discharges into receiving water bodies, which requires flow patterns in the receiving water body, particularly 95 percentile flows.

Rivers

Requirement for hydrometric data identified by Martin McGarrigle, Manager Surface Water Monitoring Programmes

Note on national priorities for measurement of river flows, lake levels and groundwater levels in the light of current and future legislative requirements.

The following points may be of use in the context of the current review of the hydrometric network – these focus on the needs of the surface water monitoring programmes especially in the light of some new WFD standards under development in phase 2 of the standards setting process.

1 Wastewater Discharge Licensing

The mass-balancing of proposed and existing discharges into rivers requires a good knowledge of existing flow patterns in the receiving water – in particular the low flow regime is of importance as in meeting the standards in SI 272 of 2009. Licensing staff must mass-balance the discharge into river flows that approximate 95 percentile or lower flow in order to meet the 95% percentile concentration standards set in SI 272 of 2009.

2 Abstraction Controls and Licensing

Primary legislation is to be introduced in 2012 to control the abstraction of water from surface waters and groundwaters. A regulatory impact assessment is to be undertaken in 2011.

Environmental Quality Standards (EQS) for residual flows in rivers and lakes will be set as part of Phase 2 of the setting of EQS for quality elements defined in Annex V of the Water Framework Directive. This may be seen as a further extension of the standards set by SI 272 of 2009.

It is apparent that for both purposes high-quality flow and level information will be required in order to establish the impact of an actual or proposed abstraction on the water body from which it is taken. The impact of differing geologies across the country – karst vs impervious rocks – on observed water flow and levels must be taken into account in order to provide accurate data.

3 Phase 2 of the standards setting process for the WFD will include a standard for suspended sediment or silt flux – meaning the load of suspended sediment that flows down a river system past a given point per unit of time – e.g. kg/day or kg/year. The standard will be referenced to the size of upstream catchment. A set of flux standards is preferred to simply measuring concentration, as concentration is dependent on discharge and flow velocity and is highly variable. An EPA-funded research project is currently working on an optical method for continuous silt flux measurement which when combined with flow will provide kg/hour or kg/day for a given sampling location. Standards for silt loss from catchments will help to reduce the impact of flooding by reducing the amount of silt build-up in rivers and indeed even reduce the amount dredged from harbours. It is essential, however, to have good flow measurements in order to police such standards and to derive the benefits arising from control of silt loss from land.

4 Phase 2 of the standards setting process for the WFD will include a set of standards for total phosphorus (TP) loading to lakes. TP loading is long recognised as the major driver of lake eutrophication. Existing standards for river phosphate concentration are unlikely to be sufficiently stringent to protect all receiving lakes from eutrophication. This is especially so when the episodic nature of TP loading is understood – a significant proportion of all TP loading occurs in a relatively short period of 10 to 20 days each year. The proposal is to set TP loading standards on an individual lake basis – taking the lake's target status as a reference point and setting a pro rata loading standard which allows a certain but limited leeway above the reference condition. We have extended the amount of lake bathymetry considerably over the past few years and we will use this to establish Vollenweider-style models for individual lakes in the monitoring programme. This will necessitate measuring the loading of phosphorus to these lakes in some detail in order to check compliance with the new standard for the individual lake. Obviously, detailed flow data will be required, especially on the dates of the chemical sampling for TP data.

5 The OSPAR Convention is an important international obligation. OSPAR loadings to the marine environment require ongoing measurement of discharge, especially at times of high flow.

6 WISE – Ireland has responsibilities to report on river flows to the European Environment Agency in the context of the State of the Environment Reporting. Climate change is a high priority in these reports and water quantity issues are becoming increasingly important.

7 Flow measurement is essential for the integrated assessment of the relationships between the different water categories and material flows between them. These include, for example, flows from groundwater to surface waters and from surface water to groundwater, the understanding of pathways for pollutant transport, flows from freshwater to transitional water and the tidal movements through estuaries – these are all areas of importance where knowledge of water flows is crucial. A good hydrometric network and an expert technical hydrometric team are essential elements underpinning a more integrated assessment of water quality problems and in providing solutions that will enable Ireland to improve the ecological status of its surface waters in compliance with the WFD objectives.

Transitional and Coastal Waters

Requirement for hydrometric data identified by Shane O'Boyle, Manager, Transitional and Coastal Waters Monitoring Programme

In the context of a review of the hydrometric network of stations, priorities for transitional and coastal waters would be as follows.

1 To maintain the existing network of flow monitoring stations (maintained by EPA, ESB and OPW) used for the OSPAR riverine inputs and direct discharges monitoring programme. This programme is entering its 22nd year, and provides an invaluable long-term and consistent assessment of annual loadings of nutrients and other contaminants to the marine environment.

2 To prioritise measurements of river flow into estuaries and coastal waters that are failing to meet their environmental objectives and are likely to require the application of measures to reduce nutrient inputs. Flow measurements together with nutrient concentration will be required to determine the quantity of nutrient reduction required. So, in addition to the OSPAR sites, measurement of river flows should also be maintained on rivers that flow into estuaries and coastal waters that are currently failing to meet their WFD objectives, areas that are classified by the EPA as eutrophic or potentially eutrophic, and areas that are regarded under the OSPAR Comprehensive Procedure as problem areas or potential problem areas with regard to eutrophication. Needless to say, there is a great deal of overlap between these groupings.

3 Priority should also be given to those sites that could be used to assess the potential effect of climate change on the freshwater input to estuarine and coastal waters. These sites would have to be on rivers were the flow is unregulated (i.e. by dams) and unlikely to be regulated in the future.

4 Flow measurements should be continued on rivers that have a significant influence on the hydrodynamics of estuarine and coastal waters. Among other things, information on river flow is required to produce realistic hydrodynamic models of estuarine and coastal waters, which in turn are often used to assess assimilative capacity and carrying capacity of these waters.

5 Finally, flow measurements into estuaries that may be impacted by upstream water abstraction should also be prioritised.

Appendix 3

Methodology Adopted for Hydrometric Station Scoring

The review of hydrometric stations was based on the methodology used by JBA Consulting when undertaking the "Strategic Review of the Hydro-meteorological Monitoring Programme" for the OPW in 2008, which in turn was based on an approach recommended by the World Meteorological Organisation. The methodology used in the OPW review was developed primarily for flood-related data uses. Therefore, for the purposes of this Review, the methodology was adapted take to account of all aspects of data uses; these are outlined below.

- The EPA-ESBI Flow Duration Curve Model designed to estimate flow duration statistics for ungauged catchments using data from stations with similar catchment characteristics.
- Water quantity data and statistics for EU reporting: OSPAR, WISE, EIONET.
- Resource assessment for planned future water abstractions.
- Important fishery or environmentally significant sites such as freshwater pearl mussels or salmonid waterways.
- Providing data as a supporting parameter for Surface Water WFD sites.
- Assimilative capacity calculations for discharges to rivers to mitigate the impact on receiving waters.
- Specific catchment studies such as The Smart Coast project on the Avoca River.
- The OPW Flood Studies Update Programme to provide improved methods of extreme rainfall and flood estimation for flood risk management.
- Data to implement arterial drainage projects (including flood relief schemes).
- Flood warning for towns and villages susceptible to flooding events.
- CFRAM – Catchment Flood Risk Management Plans as part of a national flood policy that flood risk be managed in a catchment-based manner.
- The operation of existing hydro-power generation schemes and the design of new ones.
- Increasing need for water level data for boating and leisure activities on canals and navigable waterways.
- Monitoring trends in hydrological records to detect impacts from climate change.
- The National Tide Gauge Network – to monitor sea level changes, coastal/tidal flood risk assessment, storm surge monitoring.

Station Review Methodology

All active stations in the EPA-LA and OPW networks were reviewed using the methodology as outlined below.

1 The existing hydrometric register in the form of an Excel spreadsheet was used as a starting point.

2 All recorder stations were identified as water level only stations or stations that provided both water level and flow data. Staff gauge only stations were also reviewed. (No continuous monitoring of either water level or flow occurs at staff gauge only stations. They were installed and calibrated in order to develop a relationship between water level and flow. The water level was read during the time of water quality sampling and a corresponding flow derived to enable the calculation of nutrient loadings.)

3 The uses of hydrometric data in Ireland were identified and separate columns denoting these uses were added to the spreadsheet as shown in Table A3.1.

4 Each station was scored by EPA and OPW personnel for its ability to provide data for each use; for example, an individual station could provide data for the Flow Duration Curve Model and also for assimilative flow calculations for a discharge and for arterial drainage activities. The scores were assigned based on the worth of that station's data to each particular use. The scoring system is also shown in Table A3.1. Stations where the data are required for legal reasons or where the data requirement is of such high priority, e.g. reporting to the EU, were given a score of 10 to ensure their inclusion. Stations were given a score of 3 if the data are essential to carrying out an activity. Stations are given a score of 2 if the data from the station are of secondary use, i.e. they significantly improve decision making but without them catchment management decisions can still be made although with a higher degree of uncertainty. Stations score 1 if the data are of some value but are not essential. Stations score a 0 if their data are of no use to the activity whatsoever.

5 The uses for each water level only station were added together to provide an overall score for individual stations.

6 Each station that is capable of providing flow data had its calibration assessed and scored based on the scores shown in Table A3.2. (For example, a flow station may have an excellent calibration at the low flow range but a poor calibration at the high flow range.)

7 A weighted score was attached to each flow station. This was calculated by firstly adding all the scores for uses that require good quality low flow data and multiplying by the data quality at low flows, then adding all the scores for uses that require good quality high flow data and multiplying the value by the data quality at high flows, and finally adding all the uses that require both good quality high and low flow data and multiplying the value by the data quality both at high and low flows; all three values are then added together to give the final score for that station.

The formula used to calculate the weighted score for flow stations is shown below and a worked example is given at the end of this Appendix.

Weighted Use Score Formula

= (Flow Duration Curve Model + Abstractions + Discharges) x (Data Quality at Low Flows) + (Flood Studies Update Programme + Arterial Drainage + Flood Warning + CFRAM) x (Data Quality at High Flows) + (EU Reporting + Resource Assessment Important Fisheries/Environmental Sites + WFD/Bio Monitoring + Specific Catchment Studies + HydroPower + Navigation + Climate Change) x (Data Quality at High Flows + Data Quality at Low Flows)/2

Or alternatively using the use codes in Table A3.1

= (A + D + G) x (Data Quality at Low Flows) + (I + J + K + L) x (Data Quality at High Flows) + (A + C + E + F + H + M + N + Q) x (Data Quality at High Flows + Data Quality at Low Flows)/2

Table A3.1: Scoring system for hydrometric station uses

Use Code	Use Categories	Scores				
		Legal Requirement	Primary Use	Secondary Use	Useful	No Use
A	EPA Flow Duration Curve Model	–	3	–	–	0
B	EU Reporting	10	–	–	–	0
C	Resource Assessment	–	3	2	1	0
D	Abstractions	10	3	2	1	0
E	Important Fishery/Environmental Site	–	3	2	1	0
F	WFD/Water Quality/Bio Monitoring/	–	3	2	1	0
G	Discharges	–	3	2	1	0
H	Specific Catchment Study	–	3	2	1	0
I	Flood Studies Update Programme OPW	–	3	2	1	0
J	OPW Arterial Drainage	10	3	2	1	0
K	OPW Flood Warning	10	3	2	1	0
L	OPW CFRAM* (EU Floods Directive)	–	3	2	1	0
M	Hydropower	10	3	2	1	0
N	Navigation	–	3	2	1	0
O	Climate Change	–	3	–	–	0
P	Tidal Network	–	3	–	–	0

** Catchment Flood Risk Assessment and Management.*

Table A3.2: Data quality scores

	Data Quality – High Flows (X)	Data Quality – Low Flows (Y)
Excellent	3	3
Good	2	2
Poor	1	1
Unacceptable	0	0

Each station was also assigned to a sub-category as defined in Table A3.3. This is intended to further prioritise stations for future reviews. For example, stations that are only intended as temporary "project" stations can be reviewed annually to ensure that the data generated are still necessary for ongoing assessment or can be safely dropped from the programme due to project completion.

Table A3.3: Definitions of sub-categories 1

Sub-category	Definition
Strategic	Permanent stations located in strategic locations to provide data for many uses and overall provide data required for the fundamental understanding of the hydrology of Ireland. Such stations are particularly important for modelling.
Operational	Long-term stations installed to provide data for ongoing use such as flow at major waste water treatment plants, abstractions, etc.
Project	Temporary stations installed for a defined project to provide data for a specific use.

The station at 10002 Rathdrum was installed by the ESB in September 1952 to assess water resources in the Avonmore catchment for hydropower and was subsequently taken over by Wicklow County Council and the EPA. The station was scored as follows:

- Data from the station are used in the Flow Duration Curve Model and therefore it was given a score of 3.
- Data from the station are also used in reporting to the EU for OSPAR and EIONET and so it gets a score of 10.
- The station is not used to provide data on Resource Assessment, Abstractions, Fisheries, WFD or Flood Warning, Hydro-Power or Navigation, and so scores a 0 for all these uses.
- The station is used to monitor receiving flow for discharges from the Rathdrum Waste Water Treatment Plant and scored 3. The OPW also uses data from the station to plan for arterial drainage works (score of 3) and uses its data for the Flood Studies Update Programme (score of 1). The station has recently been added to the Irish Benchmark Network (IBN) for Climate Change as part of the HydroDetect project (score of 3).
- The station has been calibrated to provide flow data and so data available from the station include continuous water level and flow values. The quality of the station's calibration at both high and low flows is excellent, giving it a total weighted score of 69. The station has also been added to the Strategic Sub-Category of stations because it is used for modeling and provides good-quality data for understanding climate-driven trends in Irish rivers.

Table A3.4: Worked example: Rathdrum Hydrometric Station on the Avonmore River, County Wicklow

10002	**Station Number**
RATHDRUM	**Station Name**
AVONMORE	**Waterbody**
Active	**Station Status**
Recorder	**Station Type**
3	**FDC Model EPA**
10	**EU Reporting**
0	**Resource Assessment**
0	**Abstractions**
0	**Important Fishery/ Environmental Site**
0	**WFD/Water Quality/ Bio Monitoring/**
3	**Discharges**
0	**Specific Catchment Study**
1	**FSU Model OPW**
3	**OPW Arterial Drainage**
0	**OPW Flood Warning**
0	**OPW CFRAM**
0	**Hydropower**
0	**Navigation**
3	**Climate Change**
0	**Tidal Network**
3	**Data Quality – High Flows**
3	**Data Quality Low Flows**
69	**Weighted Score Flow Stations**
23	**Water Level Only Stations Total**
Yes	**Strategic Station**
	Operational Station
	Project Station
Water Level and Flow	**Data Available**
EPA/LA	**Body Responsible**

Appendix 4

Extract from "Strategic Review of Hydro-meteorological Monitoring Programme", JBA Consulting (2008)[7]

Management Arrangement

> *There are few countries where there is a single hydro-meteorological gauging authority. This is largely due to the different requirements of rainfall measurement for climate observation and weather forecasting and for tide data for navigation compared to other purposes such as flood risk management.*
>
> *If a river gauging network was to be built from scratch (starting from 'a blank sheet of paper'), a logical starting point would be to have a single hydrometric body for Ireland. However, the gauging is effective and has not led to unnecessary duplication; and the plans of the ESB to reduce its gauge network and offer river gauges and existing records for the redundant sites to the EPA or the OPW further simplify the picture. Also, the current arrangements could be further strengthened to address one of the major difficulties in operating a modern river flow network – the different hydrometric needs for low flow or water resource/environmental purposes compared to flood risk and arterial drainage management (high flows). While in theory it is possible to have a gauge (or more accurately a rating) that provides flow data for both purposes, in practice it is more difficult. The EPA must inevitably focus on the low flow, water resource and environmental aspects of monitoring and the OPW on the high flows.*
>
> *The role of the EPA in preparing a national programme of hydrological data collection (as required in the Environmental Protection Agency Act, 1992, Section 63) appears to work quite well for non-flood needs. However, the EPA should formally delegate the task of defining the hydro-meteorological monitoring needs for flood risk management to the OPW. Specifically this would mean the OPW identifying the gauging needs for flood risk management using the procedures in this report, and ensuring the required flow and level gauges are maintained by the current operators (or if necessary taking over the gauge operation). The OPW should also take responsibility at the identified gauges for deriving high flow rating curves, processing the peak high flow data, and making it available to the public – irrespective of the gauge owner/operator. The 15-minute/non-peak data would remain the responsibility of the gauge owner/operator.*
>
> *All gauging authorities (Local Authorities, Harbour Authorities, OPW, ESB and DCMNR) should do more to ensure that the published version of the EPA hydrometric register agrees with their own records and that an agreed definition of the purposes of each gauge is included in the register (preferably using the classifications adopted in this review). Project stations should be included in the EPA register.*

7 This report was undertaken by JBA Consulting for OPW. It is a comprehensive report, which is over 200 pages long. This extract is taken from the Technical Summary.

The effective coordination of the bodies involved in data collection is critical to the efficient operations of the hydrometric network. Ireland is blessed with being of a size that the organisations involved are relatively unbureaucratic and there are few barriers to co-operation. However, therein also lies a potential weakness. The relationships between the various bodies and individuals are largely informal and more importantly rely very much on goodwill (both of the organisation and the individuals). These relationships need to be formalised and strengthened. In order to increase robustness and lessen the reliance on goodwill, it is recommended that consideration is given to placing a specific duty on the other gauging authorities to maintain their gauges of river flow, river level, sub-daily rain and tide gauges if identified by the OPW as forming part of the required network.

The Flood Policy Review of 2004 clearly gives the OPW the lead role for flood risk management (both strategically and functionally), and the lead functional role in managing coastal/tidal flooding to the DCMNR. However, there is currently no explicit definition of whether that role includes the collection of hydro-meteorological data (although it could be implied). It should be a function of the OPW, in collaboration with the DCMNR, Met Éireann and the EPA, to review the requirements for, arrange the collections of, and to quality control, archive and disseminate flood related data. Specifically this would cover the collection of sufficient high river flow data to allow development and update of flood estimation of potential tidal surge levels around Ireland, and to monitor the effect of climate change on flood frequency and sea levels.

The future incorporation of the EU Floods Directive into Irish Law perhaps provides an opportunity to confirm the OPW and DCMNT as the 'lead' or competent authorities for fluvial and tidally-influenced flood risk in rivers and coastal/tidal flooding respectively, and to add a duty on them to maintain a suitable hydro-meteorological network for flood risk management. Due to the difficulty in precisely delineating the boundary between gauges for coastal and tide-influenced river flood risk, it may be sensible to give the OPW the over-seeing role for the tidal, coastal and river flood monitoring networks and for the OPW to delegate the responsibility to the DCMNR for coastal and estuarine monitoring. Where other bodies such as the EPA, the ESB and Met Éireann can provide useful data, then the lead authority (the OPW) should put in place arrangements to make sure this data is provided and that they are informed of any proposed changes made to the network.

In advance of any possible legislative changes, it is recommended that written agreement is made between the relevant government bodies as to how flood-related data is to be collected, quality assured, archived and disseminated. This could be organised by the Flood Management Policy Inter-departmental Group set up following the Flood Policy Review, with technical advice provided by the Hydrology and Research Steering Group.

Resourcing

Good quality river flow, river level and rainfall data requires dedicated hydrometric teams. While modern technologies such as data loggers and telemetry have led to some efficiencies, the process can never be fully automated and some of the anticipated savings are difficult to realise in practice. This is because a gauge site, whatever its type and equipment, needs to be inspected regularly and maintained. This is especially true of gauges designed to measure floods where calibrations (ratings) can change and where high flows need to be confirmed by gauging.

The existing hydrometric teams within the EPA and the OPW are close to full utilisation and have limited capacity for spot gauging at times of flood (an essential activity to establish accurate high-flow ratings). This would be especially true if widespread flooding was to occur.

The potential for future savings in resources is therefore limited – unless the number of gauges is reduced. This review has shown that further expansion of the hydro-meteorological network is required, although the net increase is modest when possible redundant gauges are taken into account. Nevertheless, additional resources will be required by the OPW, particularly to install and maintain the project stations required for the CFRAM studies and to ensure that adequate high flow gauging is undertaken – especially if the OPW assumes responsibility for high flow ratings of gauges operated by others. The resources needed to provide data will also increase both in the short-term (for CFRAMs) and long-term (resulting from the Flood Studies Update).

The increasing use of websites to provide data will not necessarily mean saving in manpower, although the efficiency of dealing with data request will increase by using this method of delivery.

Additional resources may also be required by the EPA if it is to assist the OPW in providing the required quality of high flow data for local authority gauges.

Appendix 5
Use of the Flow Duration Curve Model

Ireland has an extensive hydrometric programme; however, it is impractical to monitor every waterbody in Ireland and consequently there was a need to develop a method to predict flow characteristics for ungauged catchments. A procedure called "Region of Influence" has been applied to the estimation of river flows in ungauged catchments in Ireland. The method has been prepared by the EPA in conjunction with the ESBI and Compass Informatics as a web-based GIS application. This application allows the user to select a target site of interest and to identify a set of donor gauged catchments, appropriate to the target site of interest, and to estimate flow information for the ungauged site based on data from the donor catchments. The application can be accessed at **http://193.1.208.39/HydroTool**

The procedure can be applied to all flows and is best represented as a Flow Duration Curve (FDC). The FDC summarises the flow regime of a river is a plot of flow against percentage of time that flow is exceeded. A final set of donor flow duration curves were selected from 145 gauging stations (Local Authority/EPA and OPW hydrometric stations) based on the quality of data and their representative range of catchment types.

This procedure in estimating an FDC for an ungauged catchment benefits from the availability of GIS datasets for soils, subsoils and aquifers, in addition to traditional topographical and climatological catchment descriptors such as catchment area, rainfall, stream length, drainage density, flow attenuation from reservoirs and lakes (FARL – an index that weights each reservoir/lake area by the catchment area that feeds it) and slope (the average surface topographic slope across the catchment). A weighting was derived for the different percentiles of the FDC for each descriptor. An analysis of the performance of the method within the master set of catchments provided the optimum values of these weights and also determined that three is the optimum number of catchments to be chosen from the master set when estimating each percentile for the ungauged catchment.

The application identifies the catchment boundary of the target site and evaluates the catchment descriptors within this boundary. Each descriptor value is then standardised by dividing it by the standard deviation of that descriptor among the master set of catchments. The database of descriptors from the 145 master set of catchments is queried and three donor stations are chosen from the master set, whose descriptors are "closest" to the ungauged site descriptors. The average FDC (average log flow per km2) of this group of three catchments is then calculated and applied to the ungauged catchment area.

The application is unsuitable for use in catchments that contain conduit karst, lakes, upstream abstraction and regulation of the river flow by dams or sluices.

This methodology has been applied in studies of abstractions and emissions throughout Ireland for the 2010 River Basin Management Plans.

It must be borne in mind that flow measurements at the target site are always invaluable and should be undertaken, even for a short period. They can be correlated with longer records at the donor sites, improving the transferred flow estimate.

Appendix 6
Outsourcing

Under the "Croke Park Agreement" the outsourcing of activities must be considered by all government departments. However, it also states that this should be

> *consistent with the efficient and effective delivery of public services.*

The McCarthy Report also highlighted the potential for outsourcing to deliver cost savings for the Irish Public Sector.

Outsourcing is usually considered for any one or a combination of the following reasons:

a) To reduce overall organisation staff numbers.

b) To reduce overall organisation costs.

c) To procure expertise/specialist services that cannot be provided from an organisation's internal resources.

d) To achieve a more efficient delivery of product/services.

e) To provide an end product/service of higher quality.

This matter was considered by the Steering Group and it concluded that, given the tight timeframe for the conclusion of this review, consideration of this issue could at best be of a preliminary nature. A comprehensive examination of this issue would merit a separate review involving, inter alia, detailed costings of all of the elements and options involved.

Against this background therefore the following preliminary "cost-benefit analysis" sets out the arguments that can be advanced in favour of and against outsourcing. The issues are considered under the following headings:

A Reduction in staff numbers.

B Reduction in organisational costs.

C External expertise/specialist services.

D More efficient delivery of services.

E Provision of products to a higher quality.

The experience of EPA and OPW in using outsourcing is summarised and two possible options for outsourcing are considered.

A. Reduction in staff numbers	
Points advanced in favour	**Points advanced against**
■ Outsourcing of part of or all of the work of the section will result in a reduction in staff numbers required in that section.	■ This is achieved either through redeployment to other sections (no advantage to the overall organisation) or through redundancy. ■ Voluntary redundancy will impact on organisation costs.

B. Reduction in organisational costs	
Points advanced in favour	**Points advanced against**
■ Reduction in staff costs ■ Reduction in organisational overhead costs. These could be achieved mainly in relation to running costs of Regional Hydrometric Offices, and costs associated with running vehicles and equipment.	■ Yes, within the section, only if staff are at/near retirement age and/or retire voluntarily. ■ Voluntary redundancy packages will have unplanned for, short-term section/organisational costs. ■ Must be balanced against points listed above. In addition procurement management costs will increase and will be ongoing. These may offset any savings gained here, in the long term. ■ Initially there may be overall cost savings to the organisation. However, once the decision to outsource is taken, the internal resources that performed that function will be redeployed/lost to the organisation, thus eliminating the option to return the function to internal resources. In this context outsourcing costs may very well escalate into the future.

C. External expertise/specialist services	
Points advanced in favour	**Points advanced against**
■ The organisation does not possess the skills/resources to execute this work internally. ■ The work/activity does not have to be carried out in house – it can be done equally well externally. ■ External service providers can come with useful private sector experience and expertise that can benefit both the section and the organisation overall.	■ This is not so in this case. It can be argued that the only repository of the specialist skills and resources required for this work, in Ireland, resides within the EPA and the OPW, at the present time. ■ This may/may not be true. Unlikely that any one service provider possesses, at present, the full range of skills/ resources required here. ■ Given the short-term nature (at least initially) of outsourced contracts, it is unlikely that service providers would expand/upsize for short-term contracts. ■ Owing to the wide range of duties and expertise required, a significant orientation/induction period may be required before a service provider is fully operational. The Hydrometric Programme demands cannot accommodate this scenario. ■ There is no evidence to suggest that there are serious deficiencies in experience or expertise within the section at this time. ■ With outsourced contracts of limited duration there is a tendency for staff to move on to other projects/ employments. Continuity of such external experience/ expertise cannot be guaranteed. ■ It is difficult for a short-term service provider to gain full appreciation of the bigger picture of organisational issues. ■ These issues can only be accurately assessed and tested through a public tendering process.

D. More efficient delivery of services	
Points advanced in favour	**Points advanced against**
■ There is a widely held view that private sector organisations are more efficient than public sector organisations because they are not constrained by the same terms of employment and IR/HR issues.	■ The Hydrometric Section is currently meeting all its targets/tasks as required. ■ It is anticipated that overall efficiency in delivery of service will be achieved, internally, with the critical review and probable reduction in the overall number of hydrometric stations.

E. Provision of product/service to a higher quality	
Points advanced in favour	**Points advanced against**
■ No strong arguments come to mind to support this position.	■ The EPA has established itself as a critically important organisation, at national and EU level, in the whole area of environmental protection, including the area of hydrometric data collection, processing and publication. The quality of these data has not been challenged or found deficient at either level. ■ It can be argued that the quality standards here are achieved, and maintained, through the fact that the organisation is in direct control of all stages of the process. Any break in this chain of control could result in a loss of confidence in quality/validity of the outputs.

In addition to the foregoing there are a number of areas of particular concern, which require careful consideration, with regard to the possible outsourcing of Hydrometric Section operation:

- Inevitably, there will be a detrimental effect on corporate knowledge. In time, this will have significant impact on the ability of the organisation to effectively manage outsourced processes. Corporate expertise will diminish as contracts renew, i.e. the longer outsourcing continues, the less corporate experience there is in the actual activity.
- This will also have an impact on the informed introduction of new technologies. With little corporate experience of testing new technologies, the ability to diversify becomes more dependent on the service provider's expertise and experience. Conflict of interest may also arise as the hydrometric pool in Ireland is small and many service provider consultancies also provide software and hardware options.

- Another concern is with continuity and quality. The nature of hydrometric work can be particularly time consuming, with significant time investment in individual datasets to eliminate gaps in records or resolve problems. It is quite likely that a service provider will not invest in this effort if they are operating on a time/productivity basis. This can lead to a reduction in the overall integrity, quality and completeness of the archive. Furthermore constant change of service provider, or of the personnel deployed by a service provider within a contract, may have an impact on the consistency of approach and methodology.
- Owing to the complexity of hydrometric activity and the multiple technologies and work practices involved, it may prove challenging, if not impossible, to define comprehensively an exact specification for each activity. Inevitably, a fully outsourced section will omit certain activities to the detriment of the archive.
- From time to time specialised data provision projects may arise, such as:
  - Flood Studies Update (FSU) as undertaken by OPW.
  - Unitised Regionalised Flow Duration Curve Model (FDC model) as undertaken by EPA/ESBI.
  - Catchment Flood Risk Assessment and Management (CFRAM) projects as overseen by OPW.

These projects require considerable bespoke knowledge and work input from hydrometric processing. In addition, considerable work can arise with integration of project outcomes into the hydrometric archive, whether it be refined rating curves or dry weather flow estimates. This work may be costly to undertake as contractual extras.

- From time to time ad hoc situations and/or emergencies arise that can require an immediate response from the Hydrometric Section. Such situations can often require cross-office collaboration and/or collaboration with external agencies such as the OPW and Local Authorities. It is very difficult, if not impossible, to build such flexibility into outsourced contacts without incurring very substantial call-out and contingency costs.
- It could be argued that outsourcing of the Hydrometric Section would run contrary to the direction envisaged in the recently published "Review of the Environmental Protection Agency", presented to the Minister for the Environment, Community and Local Government in May 2011. In particular the following recommendations:

  7.3.10 Streamlining data collection (for example, water data) and monitoring requires greater co-ordination across public bodies. It is appropriate that the EPA would take a lead role here in terms of guidance and quality assurance, utilising MoU where appropriate.

  7.3.11 The EPA should continue to develop its high-level support across the organisation in areas such as remote sensing and modelling to support environmental assessment and reporting.

  7.3.12 An evidence-based and statistically driven review of monitoring networks and EPA laboratory services is needed. While this should lead to more cost-effective monitoring and optimising of EPA expertise, it is critical that this does not lead to a diminution in the quality of data collection and analysis.

EPA experience of outsourcing

Historically the groundwater chemical sampling was undertaken by the EPA hydrometric officers, with analysis carried out by the EPA laboratories. In 2006, the monitoring network was reviewed and a decision was taken to outsource all the sampling and analysis because the sampling frequency had doubled from that undertaken previously; additionally the EPA laboratories no longer had the capacity to undertake the analysis (as the volume of samples from Local Authority monitoring also increased). All the sampling and analysis work was outsourced in 2007-2009. All elements were funded with money set aside in the WFD budget for groundwater sampling and analysis.

A framework panel was established for both sampling and analysis elements, i.e. the work was interlinked, with the successful tenderers carrying out the sampling and sub-contracting the analysis. It required significant staff resource to tender initially for the work, although the tendering workload decreased substantially for subsequent contracts. It was envisaged that there would be minimal involvement from EPA staff during the contract period, and it was anticipated that this involvement would be limited to some initial checking and issuing of the data. However, it quickly became apparent that while it was relatively straightforward to co-ordinate with the sampling team, the sub-contracting of analysis resulted in a significant input of EPA staff time to ensure quality of data, e.g. through cross-checking and querying analysis.

In early 2010, internal EPA discussions were undertaken to determine if the EPA laboratories now had the capacity to undertake the groundwater analysis. Both the Monaghan laboratory and the Dublin laboratory indicated that they had some capacity to undertake the work because of a recent reduction in work for the Local Authorities. However, as the sampling frequency had not changed, coupled with staff reductions, it was decided that the sampling element would remain outsourced. Again both sampling and analysis elements were funded with money set aside in the WFD budget for groundwater sampling and analysis, i.e. although the analysis was being done in house, it was being managed as if it was an external contract.

Generally, outsourcing has been beneficial when there has been direct contact with the outsourced staff and where the work has been straightforward, e.g. for sampling (although protocols and advice have still been provided to ensure the sampling is of the correct standard). Outsourcing the more technical elements of work has been more difficult, requiring significant project management time to ensure that the work is done to the same standard as if it was done in house. Although the analysis by EPA laboratories is managed like an external contract, there is direct contact relating to logistics and quality control, and as such there has been a significant reduction in the staff time required to ensure that the data generated are of high quality.

Matthew Craig, EPA

OPW Experience of Outsourcing

Field operation outsourcing

OPW has outsourced field positions by competitive tender on a number of occasions in the past to cover shortfall in resources. Consultancies were engaged to provide a service in the form of one suitably qualified and experienced technician working in a role very similar to that of an established field technician. The cost of outsourcing this work approximated at between 2.86 and 2.7 times the cost of a permanent employee (when indexed against a permanent established staff member at mid-point on the scale including long-term increments) for the contracts awarded in 2007 and 2009 respectively.

Advantages

- The gap in resources was filled temporarily.
- The candidate was technically proficient from the off and only limited training was required, i.e. in technical equipment used by Section and in Section procedures.
- A conscientious service provider requires little supervision.
- The candidate integrated well with established staff.
- Outside service providers can come with useful outside experience and expertise which can benefit the Section overall.

Disadvantages

- OPW had to provide all overheads, e.g. office accommodation, transport, technical equipment.
- Turnover of staff: service provider candidates tend not to be locally sourced. With limited contract duration, there is a tendency for candidates to move on, leading to frequent turnover of contract staff. Six outsourced personnel have filled the position in the South East between 2005 and 2011.
- All investment in job orientation and specialised training is lost when the jobholder changes.

It should be noted that quality processing of OPW hydrometric data is undertaken centrally: field technicians
are not required to use WISKI data management systems for data processing.

Processing/dissemination outsourcing

The OPW also outsourced the Head of Processing Unit role due to a persistent vacancy from 2001 to 2006. A sequence of contracts were awarded to consultants from 2002 to 2006 to provide a suitably qualified candidate for the position. The cost of outsourcing this position was between 2.15 and 1.55 times the cost of a permanent employee (when indexed against a permanent established staff member at mid-point on the scale including long-term increments) for the contracts awarded in 2002 and 2005 respectively. The reduction in cost is probably due to the change from lump sum fee proposal from selected service providers over to open competition tendering under OJEU.

Advantages

- The gap in resources is filled temporarily.
- Outside service providers can come with useful outside experience and expertise that can benefit the Section overall.

Disadvantages

- Owing to the complexity of the role, and the wide range of duties and expertise required, a significant orientation period was required for each candidate before full return was obtained.
- Turnover of staff: service provider candidates tend not to be locally sourced. With limited contract duration, there is a tendency for candidates to move on, leading to frequent turnover of contract staff. Four outsourced personnel filled the position in the Processing Unit between 2002 and 2006 (12 months of this were filled by
  a permanent employee).
- Significant improvement in systems can realistically only be achieved through stable tenure of position and where a full appreciation of systems can be gained over a prolonged period. The relatively short duration of locum candidates severely impacts on the ability of the candidate to identify system improvements and effectively implement change. It should also be appreciated that replacement candidates may have differing areas of expertise and may not be in position to follow through on projects in progress.
- Full advantage of the expertise that a service provider jobholder may bring to a role can only be gained
  through close working with established personnel.
- It is very difficult for a service provider jobholder to gain full appreciation of bigger-picture issues from the organisational point of view. This increases risk of litigation against the Section or assumption of unwanted resource commitments.
- Extensive training may be required by the candidate to get up to speed with a diverse range of software
  and responsibilities.
- On contracts placed, OPW had to provide all overheads, e.g. office accommodation, IT infrastructure and licensing.

Conclusion

It is clear from the foregoing that the whole issue of outsourcing is complex and requires a more rigorous and detailed analysis than that outlined in this review. It is however envisaged that this preliminary assessment will provide an informed background against which the matter can be given more detailed consideration, beyond the scope of this review.

Peter Newport, OPW

Options for Outsourcing

There are three main options:

1 A consulting engineering firm – the option used by OPW.

2 Use of the Agency contractor that takes surface water samples for WFD purposes.

3 Use of technical staff in Local Authorities.

Option 2 is considered to be viable as the Agency already has a contract arranged and the contractor's staff are likely to be driving in the vicinity of many of the EPA gauging stations. However, this contractor would only be capable of downloading the data loggers and therefore could not undertake all the necessary hydrometric work. The average number of site visits to download data loggers is 6 times each year; a contractor could potentially undertake 2-3 of these visits. Option 3 needs further consideration in the context of the Public Service Agreement 2010-2014.

Appendix 7
Targeting Flow Measurements

In the course of the Review, it was established that it would be desirable to develop a more effective and targeted low flow-data collection strategy, which might be used to assess an estimate of the 95 percentile flow at many ungauged stations (or gauged stations where insufficient data are available) and where the data are is required by the EPA or Local Authorities.

Background

The Q95 flow (95 percentile flow) is a significant low-flow parameter particularly relevant in the assessment of river water quality consent conditions. In order to enable the Q95 and other statistical flows to be estimated with reasonable accuracy, complete data logger records from a gauging station on the watercourse are the ideal. However, there are many situations where it is not possible to establish data logger gauging stations; these may be in relation to difficult site conditions, financial resources available, or other considerations. In such circumstances recourse must be made to different methods of data collection.

Description of 'Synchronous' Flow Measurements

In the absence of long-term datalogger data, a programme of synchronous flow measurements would appear to be the best strategy to adopt during low flow conditions in order to provide an estimate of the Q95.

The synchronous flow measurement technique recommended in this report is that flow measurements are carried out (in a dry low flow period when water levels are almost constant) at a predetermined site of interest, and these flow measurements are then related to the recorded flow at a nearby LA or OPW datalogger station where reliable data are available. This will allow the measurements carried out at the site of interest to be factored in direct proportion to the flow at the datalogger station, where the statistical Q95 and other statistical flows (e.g. Q50 or Q99 etc) from long-term data collection are available. The recent introduction of 'telemetry' datalogger stations is of significant assistance in determining the current water levels/flows, and this facilitates the synchronous flow measurement work plan as an Office based exercise.

Preparation and Implementation of a Low-Flow Programme

It is recommended that a comprehensive programme be formulated for each region, county or significant catchment, in advance of low flows, in order to identify where gaps exist or where low-flow measurements are required to meet the needs of the EPA and Local Authorities. Measurements carried out under this programme will also help to verify and validate the flow estimate data supplied from the Flow Estimation Procedure.

The "targeted Q95 data collection strategy" programme can be summarised as follows:

1. Select an appropriate reference data logger station (e.g. a telemetry station) within the river catchment, where good flow records are available and where it is reasonable that a comparison of flows can be established.
2. Establish from the flow records that the flow is at (or possibly below) the 95 percentile flow range. If there are doubts around the validity of the data or if there are no data logger stations close by, then establish that the flows in general are at or below the Q95 range, by examining several telemetry stations in the region.
3. At the predetermined sites of interest, measure the discharge. It is recommended in order to give greater validity to the flow measurements at each station that the flows be measured twice, simultaneously, using different instruments and possibly different cross-sections.
4. Measure the discharge at the reference data logger station, where the estimate flow percentile has been derived from. This will also provide additional validity to the calculations.
5. It is important that if flow measurements are carried out over many days of dry weather, reference to the level of flows from the telemetry stations is noted in order that adjustments to the calculations of the Q95 at the sites of interest are possible.
6. It makes the data more defensible if the low measured flows at the "sites of interest" can be related to the nearest downstream gauging station and factored in proportion to catchment area.
7. It also makes the data more defensible and reproducible if the measurements are repeated in another season or another year, when the flow pattern may be different.
8. The resulting data need to be noted and reported in an appropriate manner.

Note: The above procedure should provide a good assessment of the Q95 flows at most comparable sites of interest; however, it should be noted that as with all methods of flow estimation, there may be exceptions in relation to specific site conditions, e.g. regulated channels. It shall remain the function of the WDU to provide a final judgment on all estimations of flow and to ensure that the processed data are publicly available.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreail;
- scardadh dramhuisce.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil – aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdéan aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

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