

SOUTH EASTERN RIVER BASIN DISTRICT PROJECT IDENTIFICATION AND MONITORING OF PRIORITY SUBSTANCES AND RELEVANT POLLUTANTS UNDER THE WATER FRAMEWORK DIRECTIVE

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ABSTRACT

The targets set in the Water Framework Directive (WFD) are ambitious. By 2015 all waters should have 'good status' and deterioration in existing water quality status is not acceptable. For surface waters good status requires both good chemical status and good ecological status.

Good chemical status is determined by reference to existing Environmental Quality Standards (EQS) for substances identified in WFD Annex IX, and by EQS values which are currently being determined for priority substances listed in WFD Annex X.

Ecological status determination requires assessment of three groups of elements: biological quality elements (e.g. flora, fish, phytoplankton and fauna); chemical and physico-chemical elements supporting the biological elements (e.g. thermal, oxygenation & nutrient conditions and chemical pollutants (known as "relevant pollutants") extracted from the universe of substances listed in WFD Annex VIII); and. hydromorphological elements supporting the biological elements (e.g. flow regime, morphology).

Chemical substances therefore play a part in the determination of both chemical status and ecological status.

The South Eastern River Basin District Management System which is the first project initiated by the Department of the Environment, Heritage and Local Government (DEHLG) to assist with the implementation of the WFD in Ireland has been supporting the development of a national screening process and the implementation of a national monitoring programme to address chemical pollutants in surface waters.

In 2003 a National Dangerous Substances Expert Group was established, by the DEHLG to assist with developing lists of dangerous substances relevant to water quality in an Irish context and to design a substances screening monitoring programme to support implementation of the WFD in Ireland. The group produced a Discussion Document: "Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" which explains the rationale behind the development of these lists and the screening monitoring programme.

After reviewing available datasets the Expert Group identified 161 candidate relevant pollutants that have potential relevance in an Irish context. These candidate substances along, with the priority substances identified by the WFD, will be subjected to a screening monitoring process to assess their relevance in the Irish aquatic environment. The lists set out in the document are evolving and will be reviewed periodically to take account of developments such as changes in human practices and new scientific research findings which might identify additional substances that may warrant future investigation.

INTRODUCTION

Whilst Ireland largely enjoys cleaner waters than much of the rest of Europe, the usage of chemicals throughout all sectors of society has become increasingly widespread during the past century. Examples of potential sources of substances include everyday household products, which contain substances that could, potentially, have an adverse effect on water quality. Commercial activities such as construction, agricultural, forestry, mining, pharmaceutical, food processing and manufacturing processes also use potentially dangerous substances. Substances are also produced and emitted as the bi-product of other processes, for example emissions from vehicle combustion engines can

contaminate runoff from transportation routes. Similarly, inappropriate disposal of materials presents a risk of contamination of surface waters and/or groundwaters.

LEGISLATION

▪ The Water Framework Directive

In response to the increasing threat of pollution and the increasing demand from the public for cleaner rivers, lakes, beaches, etc., the EU has developed the Water Framework Directive (WFD) (2000/60/EC). This Directive is unique in that, for the first time, it establishes a framework for the protection of all waters including rivers, lakes, transitional waters, coastal waters, groundwater, as well as their dependent wildlife/habitats, under one piece of environmental legislation.

Specifically the WFD aims to:

- protect/enhance all waters, surface waters and groundwaters
- achieve "good status" for all waters by December 2015
- manage water bodies based on river basins (or catchments)
- use a "combined approach" of emission limit values and quality standards
- get the public involved
- streamline legislation.

▪ Irish Water Policy Regulations

Ireland completed the first step in implementing the WFD in December 2003 by making the European Commission (Water Policy) Regulations, (S.I. No. 722 of 2003) which transposed the WFD into Irish Law. These Regulations appoint the Environmental Protection Agency (EPA) and the relevant Local Authorities as the competent authorities for the Directive's implementation.

KEY OBJECTIVE OF WATER FRAMEWORK DIRECTIVE

A key objective of the Water Framework Directive (WFD) is that all waters achieve good status by 2015. Good status for surface waters requires both good chemical status and good ecological status.

Chemical status is determined by reference to existing Environmental Quality Standards (EQS) for substances identified in Annex IX of WFD, and by EQS values which are currently being determined for the priority substances listed in Annex X. These groups of substances are collectively referred to as "priority action substances" in this paper. Annex X was established by Decision No 2455/2001/EC in November 2001 and lists 33 priority substances or groups of substances for which measures have to be developed for their progressive reduction. Eleven of the priority substances are listed as priority hazardous substances and a further 14 of the priority substances are under review as possible priority hazardous substances. The WFD states that measures for priority hazardous substances are to be aimed at the cessation or phasing-out of discharges, emissions and losses.

Ecological status determination requires assessment of three groups of elements:

- 1) Biological quality elements e.g. flora, fish, phytoplankton and fauna;
- 2) Chemical and physico-chemical elements supporting the biological elements e.g. thermal, oxygenation & nutrient conditions and chemical pollutants extracted from the universe of substances listed in Annex VIII; and
- 3) Hydromorphological elements supporting the biological elements e.g. flow regime, morphology.

Chemical substances, therefore, play a part in the determination of both chemical status and ecological status.

Whilst the specific synthetic and non-synthetic priority action substances, have been agreed at European level (Annexes X and IX), the WFD requires Member States to identify, other specific synthetic and non-synthetic substances which are present at sufficient levels to impact or cause a risk to water status. These "other" substances are referred to as "relevant pollutants" and are to be selected

from Annex VIII of the WFD, which effectively lists the “universe of chemicals”. The identified substances can be relevant at national, river basin or sub-basin level.

Both the priority action substances and the relevant pollutants will be either:

- synthetic (in which case high status requires that concentrations are close to zero and below the level of analytical detection) or
- non-synthetic (in which case high status requires that concentrations remain within the range of naturally occurring background levels).

Good status for synthetic and non-synthetic pollutants requires compliance with environmental quality standards set according to Annex V section 1.2.6 of the WFD.

In addition to the priority action substances and relevant pollutants, the chemical and physico-chemical elements supporting ecological status also include “general components” for each type of water body which are identified in Annex V of the WFD. General components relate to materials in suspension, substances which contribute to eutrophication (in particular, nitrates and phosphates) and substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc.) as well as physical parameters such as temperature, oxygen and salinity conditions.

ESTABLISHING NATIONAL PRIORITY ACTION, CANDIDATE RELEVANT POLLUTANTS & CANDIDATE GENERAL COMPONENTS SUBSTANCES LIST

In Ireland a National Dangerous Substances Expert Group was established to assist with developing lists of priority action, candidate relevant pollutants and candidate general components for surface waters in Ireland and to design a substances screening monitoring programme as part of the Implementation of the WFD. The document produced by this group was "Discussion Document-Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" which describes the rationale behind the development of these lists and the monitoring programme.

The approach used for the identification of dangerous substances in Irish surface waters is in accordance with guidance issued by the Common Implementation Strategy (CIS) IMPRESS working group, which was dedicated to the identification of pressures and assessment of impacts within the characterisation of water bodies according to Article V of the WFD. In accordance with IMPRESS guidance, Ireland has adopted a combined top-down and bottom-up approach for deriving dangerous substances lists.

Step 1 – Starting Point

The starting point of the selection process entails examination of the list of main pollutants, as set out in Annex VIII of the WFD, which constitutes the “universe of chemicals”.

Step 2 – Screening

The screening step involves collating information about known pollution sources and impacts, and on the production and usage of substances to identify a working list of substances which are discharged to water bodies. The data collation process involves investigating sources of information such as chemical registers, existing water quality datasets and information from existing obligations such as the Dangerous Substances Directives (DSD), United Nations Environmental Programme - Persistent Organic Pollutants list (UNEP POPs), European Pollutant Emission Register (EPER) and Combined Monitoring-based and Modelling-based Priority Setting Scheme (COMPPS) programmes. The datasets are then assessed with a view to excluding substances for which there is adequate confidence that they are not being discharged into water bodies from the working list.

Step 3 – Test for Relevance

This step aims to select from the working or candidate list of substances those which that are likely to cause, or are already causing, harm to the environment. Selection should ideally be based on an

assessment of the environmental significance of concentrations necessitating obtaining data on concentrations and comparing these with suitable benchmarks. Concentration data can be obtained by monitoring or modelling approaches. Relevant substance benchmarks identified include LC50, NOEC, PNEC, EQS or critical load. EQS are supposed to reflect the good status condition of a water body. IMPRESS notes that EQS have not been derived for all potential relevant pollutants.

Step 4 – Safety Net

This entails an iterative review of the list to ensure that substances that may be environmentally significant are not incorrectly excluded from the list of specific pollutants.

Step 5 – Final Outcome

The process produces a list of specific pollutants relevant to a river basin district or to particular water bodies within a river basin district.

PRIORITY ACTION SUBSTANCES

Priority action substances are defined, for the purposes of the discussion document, as those substances for which legislative instruments have been or are to be laid down at the Community level i.e. substances listed in Annex IX and Annex X of the WFD

The priority substances, including priority hazardous substances, listed in Annex X of the WFD comprise a list of substances identified by a COMMPS procedure (Combined monitoring-based and modelling-based priority setting). In the application of the COMMPS procedure, monitoring data from fresh surface waters and sediments from Member States were evaluated. In addition for more than 310 substances, data available on production, use and distribution in the environment and their toxic effects were used for the modelling approach for those substances for which the available monitoring data were insufficient. The COMMPS procedure identified 33 priority substances. EQS values for Annex X substances are currently being developed on behalf of the European Commission. It is anticipated that the Commission will bring forward standards for these substances in the latter part of 2004 or early 2005.

The other substances for which legislative instruments have been put in place at European level are the DSD List I substances. Daughter Directives, as listed in Annex IX, establish EQSs for 18 substances. Ten of these substances are also listed in Annex X of the WFD, leaving 8 remaining daughter directive substances which must be considered under the transitional arrangements of the WFD.

The substances listed in Annexes IX and X have been identified at European level and there is no discretion regarding their consideration under the WFD. Consequently 41 substances are to be included on the priority action substances list.

Candidate Relevant Pollutants

The starting point of the relevant pollutant selection process entailed examination of the list of main pollutants as set out in Annex VIII of the WFD “universe of chemicals” potentially all substances not identified as priority action substances (Annex IX & Annex X of the WFD) need to be considered as candidate relevant pollutants or candidate. In the compilation of this list, the Dangerous Substances Directive was first looked at and substances previously identified as List I and II substances were added to the list as a starting point. The following existing obligation programmes were also identified for consideration in accordance with the IMPRESS guidance.

- Clean Technology Centre (CTC) project – ‘Inventory and tracking of Dangerous Substances in Ireland and Development of Measures to Reduce their Emissions/Losses to the Environment’
- UNEP POPs - United Nations Environmental Programme - Persistent Organic Pollutants (POPs)

- OSPAR - The Convention for the Protection of the Marine Environment of the North-East Atlantic
- EPER - European Pollutant Emissions Register.

In addition to the main lists of substances identified by IMPRESS the expert group assessed the inclusion of other groups of pollutants associated with significant commercial activities in Ireland. These included substances associated with pesticides usage, aquaculture and weed control products. The expert group also considered findings of recent studies into endocrine disrupting substances.

The expert group reviewed the datasets to screen the substances based on the output from existing registers and monitoring programmes in Ireland. The following rationale was applied:

- Substances which had been included in previous monitoring programmes and found to be consistently not detected at significant levels were dismissed from the candidate list.
- Substances which had been prohibited from distribution and use for over 10 years were also excluded from the candidate list.
- Alternatively, where there was no information from monitoring programmes or no ban on or lack of authorisation for the substance, a precautionary principle approach was adopted and substances remained on the candidate list.

The total number of substances on the candidate relevant pollutants list is 161. Table 1 shows a summary of the substances added to the candidate relevant pollutants list.

Table 1 - Summary of Substances added to Candidate Relevant Pollutants List

Source of Substances	Total Number of Substances/ Groups added to Relevant Pollutants List
DSD List II	91
CTC Project	3
UNEP POPs	2
OSPAR	3
EPER	2
Pesticides of possible relevance	42
Control Products Introduced to the Aquatic Environment	2
Endocrine disrupting substances - BKH report	8
Endocrine disrupting substances - WRc - Usage Review in an Irish Context	4
Endocrine disrupting substances - Com(2001)262 – Usage Review in an Irish Context	4
Total Number of Substances /Groups	161

Candidate General Component Substances

General components relate to materials in suspension, substances which contribute to eutrophication (in particular, nitrates and phosphates) and substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc.). Guidance states that the relevant pollutants and general physico-chemical components should be considered separately. The expert group considered 18 substances for the general components list.

NATIONAL SUBSTANCES SCREENING MONITORING PROGRAMME

A National Substances Screening Monitoring Programme is due to start in November/December 2004. This programme will include monitoring for the full lists of priority action, candidate relevant

pollutant and candidate general component substances to test for the relevance of all candidate parameters and provide data towards the further requirement to establish EQS levels for Irish waters. The programme will initially include 23 sites, which incorporate sites downstream of major towns, sites associated with diffuse activities including agriculture, mining, forestry activities and rural households.

Table 2 identifies the locations of the 17 surface water and four groundwater sites. There are two additional point source related sites; at a major waste water treatment plant and a major landfill.

Figure 1 indicates the initial monitoring sites for the National screening monitoring programme.

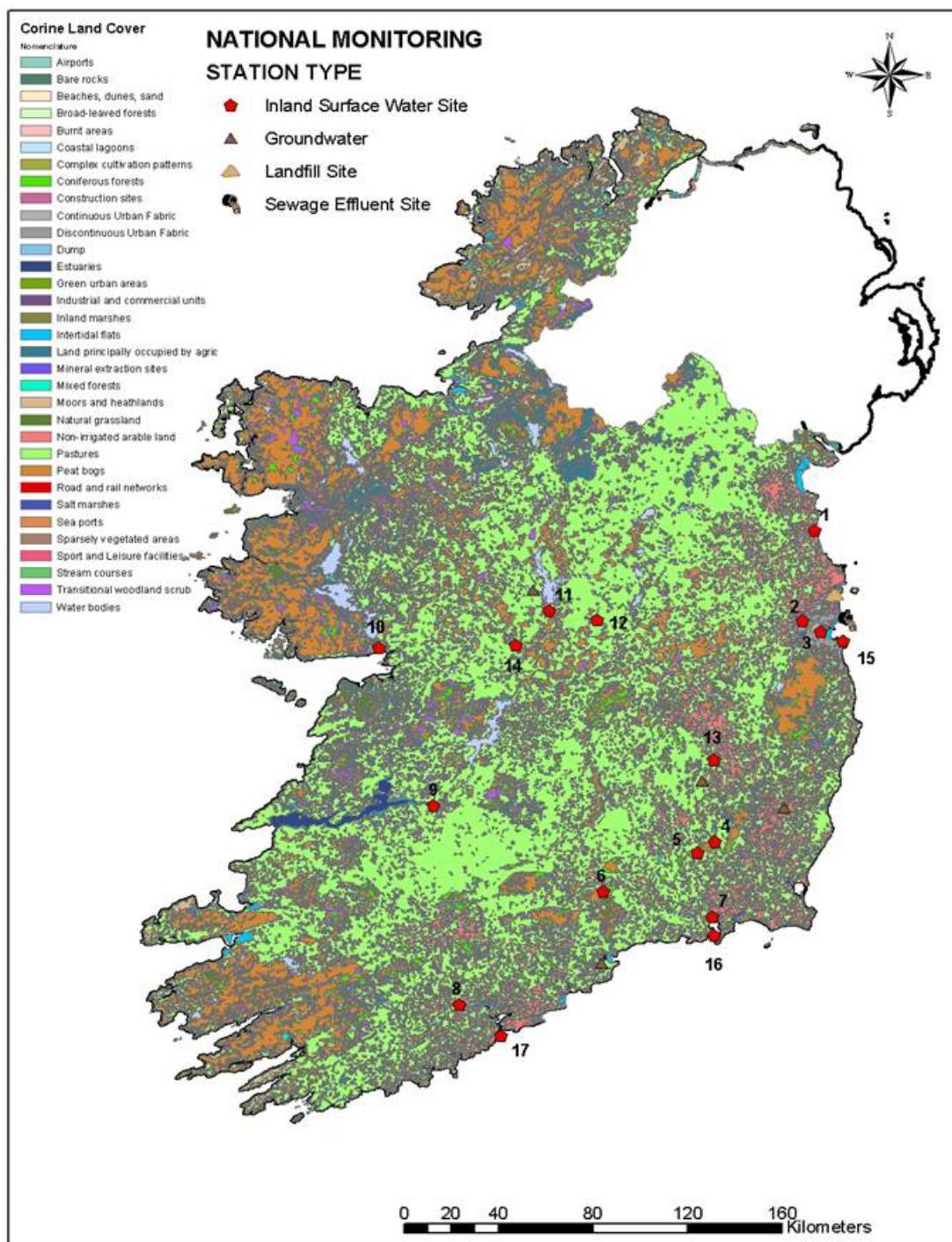


Figure 1 - Initial Monitoring Sites for the National Substances Screening Monitoring Programme

The 18 month monitoring programme includes for monthly water monitoring at the selected sites. Once-off sediment and biota monitoring will also be undertaken at the sites.

Target site programmes will be developed in response to the findings of the first six months of initial site sampling and will continue for a full year, i.e. months 7-18. It is hoped that the findings of this monitoring programme will help to reduce the list of candidate relevant pollutants.

Table 2 – Surface Water Sites for the National Substances Screening Monitoring Programme

Number	River/Embayment	Location
1	River Boyne	Downstream of Drogheda
2	River Liffey	Upstream of Dublin City
3	River Liffey	Downstream of Dublin City
4	River Barrow	Upstream of St. Mullins
5	River Nore	Upstream of tidal limits
6	River Suir	Upstream of tidal limits
7	River Suir	Downstream of Waterford City
8	River Lee	Downstream of Cork City
9	River Shannon	Downstream of Limerick City
10	River Corrib	Downstream of Galway City
11	River Shannon	Downstream of Athlone
12	River Brosna	Downstream of Mullingar and Tullamore
13	River Barrow	Upstream of Carlow town
14	River Suck	Downstream of Ballinasloe
15	Dublin Bay	Downstream of Dublin City
16	Waterford Estuary	Downstream of Waterford City
17	Cork Harbour	Downstream of Cork City

CONCLUSION

Currently the expert group is progressing with the procurement of a contract to provide the analytical capabilities for the National Substances Screening monitoring programme. This is due to start in November/December 2004. It is however important to note that the approach to the dangerous substances is an iterative one and further review of the lists will be carried out.