

**The European Community
Water Framework Directive**

An Introductory Guide

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An FWR Guide

FR/G0001

August 2004

Revised by Neil Tytler

September 2010

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Price: £15.00

(20% discount for FWR Members)

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The EC Water Framework Directive

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Cover Page photograph: Henley Regatta © Ivana Wilson

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1.0 Preface

The purpose of this guide is to introduce the Water Framework Directive (WFD) to a wide audience. Article 14 of the Directive requires Member States to encourage the active involvement of all interested parties in its implementation. In particular public consultation is essential during the production, review and updating of the river basin management plans that form the central theme of the Directive. For public consultation to be meaningful people will need a basic understanding of the principal features of the Directive and how these relate to the situation in their own local river basin.

The overall implementation strategy for the Directive is to ensure a uniform approach throughout the EU whilst allowing for differing physical conditions, such as geology and climate, and the principle of ‘subsidiarity’.

As an aid to public understanding, the Foundation intends to produce a series of guides dealing with major aspects of river basin management and the implementation of the WFD in the UK.

In compiling this guide the authors acknowledge that they have made free use of information from a wide variety of sources, the more significant of which are listed in the bibliography.

2.0 Introduction

Over the past 30 years, a series of EC Directives have had a major influence on UK water law and regulation¹. They addressed priority issues such as water quality objectives for waters used for specific purposes, the control of dangerous substances, the protection of the sea against pollution, the preservation of the fundamental biological and ecological balances of the planet and the adoption of industry specific measures to reduce pollution.

In the 1990s there was concern at the fragmented nature of existing Directives and the lack of progress with their implementation. Inadequate measures for the protection of groundwater were also of concern. In addition there was pressure for a Directive to protect aquatic ecosystems. This culminated in the development, by the European Commission, of a proposal for a more comprehensive approach to water policy that took account of the need for the following: -

- a high level of environmental protection,
- the precautionary principle,
- preventive action,
- the elimination of pollution at source,
- the polluter pays principle
- and costs and benefits.

Further considerations were the need for international collaboration for certain river basins, the variability of environmental conditions in the regions of the Community and the principle of 'subsidiarity'.

The outcome was the WFD adopted by the European Parliament and the Council of the European Union in October 2000. It is notable for four major features, each of which contributed to the contested nature of the debate that led to the final form of the Directive.

1. It was the result of the co-decision process by which the Council of Ministers and the European Parliament have joint responsibility for the final text. A conciliation process was needed to resolve the differences between these two bodies.
2. Many organisations were involved in the consultation process leading to the final draft including national and local governments, water service providers, agriculture, industry, consumer associations and environmental NGOs.
3. It embraces many previous Directives on relevant aquatic issues and ultimately several of these earlier Directives are to be phased out.
4. It embodies the founding principles of sustainable development: environmental, economic and social.

¹ See *Water and the Water Environment: a summary of UK legislation and agreements*. Report FR/R0008. Published 2003 by the Foundation for Water Research.

The Directive is the most substantial piece of water legislation ever produced by the EC, and will provide the major driver for water policy in the UK for the foreseeable future.

3.0 Key Features of the Directive

1. The concept of river basin management is introduced to all Member States through the establishment of *river basin districts*² as the basic management units. For international rivers these *river basin districts* (RBDs) will transcend national boundaries (Article 3).
2. For each *river basin district* a *river basin management plan* must be developed, including a *programme of measures*³, and these form the basis for the achievement of water quality protection and improvement (Articles 11 & 13).
3. Although its prime aims are environmental the Directive embraces all three principles of sustainable development. Environmental, economic and social needs must all be taken into account when *river basin management plans* are being developed (Article 9).
4. The *river basin management plans* shall not allow further deterioration to existing water quality. With certain defined exceptions, the aim is to achieve at least *good status* for all *water bodies*⁴ in each *river basin district*. Definitions of *good status* for surface and groundwater are given at Figure 1. Geographical factors are allowed for when *good status* is defined and the principle of subsidiarity allows Member States some freedom within the overall requirements of the Directive (Article 4).
5. The two previously competing concepts of water quality management, the use of *environmental quality standards* (EQSs) and the use of *emission limit values* (ELVs) are brought together by the Directive in a new dual approach (Article 10).
6. To overcome the previously piecemeal nature of water environment regulation a number of existing directives will be replaced when new local standards are developed to meet the Directive requirements. These local standards must be at least as stringent as those being replaced. Daughter directives are introduced to deal with groundwater quality and for priority substances (formerly known as dangerous substances) (Article 16).
7. Measures to conserve water quantity are introduced as an essential component of environmental protection. Unless minimal, all abstractions must be authorized and, for groundwater, a balance struck between abstraction and the recharge of aquifers (Article 11).
8. The *polluter pays principle* is incorporated through a review of measures for charging for water use, including full environmental cost recovery (Article 9).

² River basin districts – river catchments or groups of catchments.

³ Programme of measures – actions to achieve the environmental objectives of the Directive.

⁴ Water body – all surface freshwater bodies (including lakes, streams & rivers), groundwaters, estuaries and coastal waters out to one mile from low-water.

9. Public participation, and the involvement of stakeholders, is a key requirement of the *river basin management planning* process, thus satisfying this aspect of Agenda 21⁵ (Article 14).

The Directive impacts on every aspect of water use: domestic, industrial, agricultural, leisure and environmental conservation. Besides restrictions on point source discharges the achievement of good status means tackling the problems of diffuse pollution from agriculture and contaminated land. In some instances it may require river re-grading work, or the reversal of land drainage schemes, to restore lost habitats. Environmental organisations hope that implementation of the Directive will result in major improvements to the biodiversity of water habitats.

River basin management is not new to the United Kingdom. It has been practiced in England and Wales since the formation of the former Water Authorities in 1974. The role was later inherited and enhanced by the formation of the National Rivers Authority and more recently the Environment Agency (EA). In Scotland the Scottish Environmental Protection Agency (SEPA) and in Northern Ireland, the Northern Ireland Environment Agency (NIEA) have, to varying degrees, had this duty. Under these arrangements, there has been significant improvement to river water quality in the UK particularly over the last decade. However, water quality objectives set throughout this period tended to be use-based and were not statutory. Furthermore, economic and social aspects were not formerly a part of the river basin management process. The Directive imposes new disciplines and approaches that impact significantly on the environmental regulators.

4.0 The River Basin Management Planning Process

The timetable for the implementation of the Directive is given in Figure 2, which indicates the principal related *Articles*. The river basin planning process is cyclical and the Directive requires periodic updates to the *river basin management plans* and associated *programmes of measures* on a six yearly basis.

For ease of presentation the components of the planning process are discussed separately. In reality the timescales for action overlap in many cases.

4.1 Preliminary Issues

The Directive came into force in December 2000. The first tasks for Member States were to establish the institutional, physical and legal frameworks to facilitate the river basin planning process. These were completed by December 2003.

The Identification of the Appropriate Competent Authorities (Art. 3)

The Directive requires the identification of the appropriate *competent authorities* to manage the development and implementation of the river basin management plans and the following have been designated for the UK regions.

⁵ An agenda for the 21st century to implement sustainable development as expressed in a 400 page negotiated document from the UN Conference on Environment & Development in 1992.

<i>England and Wales</i>	The Environment Agency (EA)
<i>Scotland</i>	The Scottish Environmental Protection Agency (SEPA)
<i>Northern Ireland</i>	The Northern Ireland Environment Agency (NIEA)

The duties of these *competent authorities* include:

- Acting as the government's agent by: providing advice; developing relationships with other statutory bodies; working with those regulated.
- Completing the characterisation of water bodies and implementing the monitoring programme.
- Developing the *river basin management plans*, including the *programmes of measures*, for each RBD and consulting with stakeholders and the public.
- Implementing the approved *programme of measures* to secure the agreed environmental objectives.

Whether economic analysis is part of the remit for the *competent authorities* depends on the UK region. In England and Wales it is the responsibility of the Department for Environment, Food and Rural Affairs (Defra) supported by the EA and Ofwat (the water services industry regulator). In Scotland it is the responsibility of SEPA. In Northern Ireland it is the responsibility of the Department of the Environment and the Department for Regional Development. Note that final approval of the *river basin management plans* and the *programmes of measures* is the responsibility of: -

- the Secretary of State in England,
- the Welsh Assembly in Wales,
- the Scottish Ministers in Scotland,
- and the Government in Northern Ireland.

The Identification of the River Basin Districts (Art. 3)

Under the Directive the basic management units for river basin management planning are the *river basin districts* that may comprise one or more river basins. They encompass lakes, streams, rivers, groundwater and transitional waters (estuaries) together with the coastal waters into which they flow. In the natural state, their ecology will depend on such factors as their hydromorphology⁶ and their physicochemical state. Coastal inlets and bays also influence the ecology of river basins, for example, fish such as sea trout migrate to the headwaters of rivers and streams to breed, the young fish eventually returning to the sea. For the purposes of the Directive, a *river basin district* can therefore be defined as a group of neighbouring river basins and their associated, linking coastal waters.

⁶ The hydromorphology of a water body is defined by its hydrological regime (quantity and dynamics of flow, level, residence time, and the resultant connection to groundwaters) and morphological conditions (depth variation, quantity and structure of the substrate, and both the structure and condition of the riverbank or shore zone).

Ten *river basin districts* have been designated as located entirely in England and Wales; namely, the Anglian, Dee, Humber, North-West, Northumbria, Severn, South-East, South-West, Thames and West Wales *river basin districts* (a small part of the Northumbria *river basin district* lies in Scotland, however there are no identified surface water bodies in this part of Scotland. The groundwater underlying the Scottish part of the Northumbria *river basin district* has been allocated to the Solway Tweed River Basin District).

One has been identified entirely within Scotland, namely the Scotland *river basin district*, whilst the Solway Tweed *river basin district* is shared with England.

In Ireland, the North Eastern *river basin district* is the only one entirely in Northern Ireland. The province shares with the Republic of Ireland the Shannon, Neagh Bann and the North Western *river basin districts*.

The Irish situation provides the only examples of the international management of RBDs in the British Isles. The situation is different in continental Europe where implementation of the Directive for major river basins such as the Rhine and the Danube requires significant international co-operation.

Figure 3 lists and shows the location of the UK *river basin districts*.

4.2 The Transposition of the WFD into UK Law (Art. 24)

This transposition was a complicated issue in the UK since the responsibility for river basin management is generally devolved to the regions. It was necessary to identify the *river basin districts* before transposition since some transcend regional boundaries and in Ireland some cross international boundaries. Accordingly the responsibility for UK *river basin districts* is as follows:

- For *river basin districts* entirely in England, the Secretary of State (Defra), and for those entirely in Wales the National Assembly for Wales. Where *river basin districts* cross boundaries the Secretary of State and the Assembly acting jointly.
- For *river basin districts* entirely in Scotland, the Scottish Executive, and for those entirely in Northern Ireland the DoE (Northern Ireland).
- Both the Northumbria and Solway-Tweed *river basin districts* straggle the border between England and Scotland and needed separate consideration.
- Three *river basin districts* overlap between Northern and Southern Ireland and these are the only truly international ones in the UK. The responsibility for the part of these *river basin districts* in Northern Ireland rests with Department of the Environment (NI) and international protocols have been developed to deal with cross border issues.

The transposition process was completed with the adoption of the following National legislation.

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.
- The Water Framework Directive (Implementation) Regulations (Northern Ireland) 2003.
- The Water Environment and Water Services (Scotland) Act 2003.

Further Regulations were necessary to cover the two RBD shared between England and Scotland.

- The Water Environment (Water Framework Directive) (Northumbria River Basin District) Regulations 2003
- The Water Environment (Water Framework Directive) (Solway Tweed River Basin District) Regulations 2004

4.3 Components of the River Basin Management Planning Process

The river basin management planning process comprises nine identifiable components a number of which have overlapping timescales.

1. *Assessment of the current status of the river basin districts:* their characteristics, the impact of human activity and an economic analysis of water use.
2. *Setting environmental objectives for identified water bodies in the river basin districts:* including the establishment of reference standards⁷ and the classification of water bodies.
3. *Establishment of monitoring programmes for each water body:* to meet surveillance, operational and investigative needs.
4. *Gap analysis:* essentially determining for each *water body* any discrepancy between its existing status and that required under the Directive.
5. *Setting up programmes of measures:* the means by which *water bodies' good status* will be preserved or restored, as appropriate.
6. *Development of the river basin management plan:* essentially the pulling together of all the elements considered to date firstly in draft form for public consultation and then in final form for approval by Ministers.
7. *Public information and consultation:* the process by which stakeholders and the public are informed of progress with Directive implementation and consulted on the draft *river basin management plans*.
8. *Implementation of the programme of measures:* basically the period over which the measures in the plan are executed.
9. *Evaluation of effectiveness of the plan and the programme of measures:* the core of a six yearly cycle of plan updates with the new plan being in place once the previous plan period is ended.

⁷ Under Annex II of the Directive, each Member State needs to prepare reference conditions for each type of surface water body (including hydromorphological and physico-chemical quality elements).

These components, in terms of Directive Articles and timescales, are shown in Figure 2, which illustrates the ambitious scope of the Directive. Unlike the EC Urban Wastewater Treatment Directive, which principally involved actions by sewerage services providers, the Water Framework Directive requires actions by a wide range of players. Industry, agriculture, local authorities, planning bodies and others whose activities impinge on the water environment are all involved in the achievement and maintenance of environmental objectives that are legally binding. Complying with the implementation timetable is therefore a major challenge.

However, it is clearly recognized that the timetable is tight and that existing information was used extensively during the development of the first *river basin management plans*. To allow for this, and changing pressures within the river basins, the Directive provides for the updating of the plans every six years with implementation of the new plans following immediately on completion of the old.

5.0 The Assessment of Current Status (Arts. 5, 6 and 7)

This first component was crucial to the planning process since it provided the baseline information concerning the *river basin districts*. It identified the types of water bodies present in each *river basin district* for which environmental objectives were set, the pressures upon them, and any special features that had to be taken into account. These features are consistent with the application of sustainable development principles and comprise for each *river basin district*: -

- An analysis of its characteristics;
- A review of the impact of human activity;
- An economic analysis of water use;
- The establishment of a register of protected areas including the identification of waters used for the abstraction of drinking water.

5.1 The Characterisation of the River Basin Districts (Art. 5)

The Directive covers all waters: inland, transitional (estuarial) and coastal. Coastal waters extend for one mile off shore for ecological status requirements and to all territorial seas⁸ for chemical status.

The initial characterisation of the *river basin districts* involved the identification of the *water bodies* that comprise it. A *water body* is a coherent sub-unit in the river basin to which environmental objectives will apply. Directive requirements for the characterisation, and the subsequent setting of objectives, are different for surface waters from those for groundwaters.

For surface waters, the characterisation process required the *river basin district* to be sub-divided into the different water categories: rivers, lakes, transitional waters (estuaries), and coastal waters. Each category was then sub-divided into types based on physicochemical and hydromorphological factors that might significantly

⁸ The waters in the 0 – 12 nautical mile zone from the coast.

influence the presence and abundance of plants and animals in, and about, the surface *water body*. Local factors that may influence water status were to be taken into account when identifying *water bodies*, such as pressures and impacts, protected areas and water use, for example, for water supply, navigation, cooling water, etc.

Any *heavily modified water bodies* or *artificial water bodies* in the river basin were provisionally identified. These constituted individual water bodies for which different, somewhat relaxed, environmental objectives were set. *Heavily modified water bodies* are water bodies that, as a result of alterations by human activity, are substantially changed in character: for example, a river that has been altered from its natural state by channelling to prevent flooding of urban or rural land. *Artificial water bodies* are water bodies that have been created by human beings; for example, a reservoir built for water supply purposes or to provide canal feed-water. Different surface *water body* types are illustrated in Figure 4.

A *body of groundwater* is a distinct zone of an aquifer. An aquifer is a distinct geological stratum, of sufficient porosity and permeability to allow a significant flow of groundwater that, if it entered a body of surface water, might be expected significantly to affect its ecology. A further criterion is that the flow should be sufficient to allow abstraction at a minimum rate of 10m³ of drinking water per day. The majority of UK groundwaters are covered by these criteria. The degree of subdivision of aquifers into *water bodies* is for Member States to decide on the basis of the particular characteristics of their *river basin districts*. A hierarchical approach to the delineation of bodies of groundwater is illustrated in Figure 5.

The outcome of this process of typology was the identification of *water bodies* with like characteristics that can be placed in a series of groups for which reference standards denoting *good status* were developed.

5.2 The Review of the Impact of Human Activity (Art.5)

This review includes the identification of the significant pressures to which the *surface* and *groundwater bodies* in the *river basin district* may be subjected and the risk these pose to the achievement of Directive environmental objectives.

For **surface water bodies** these include significant pressures and risks associated with:

- Point and diffuse sources of pollution from urban, industrial, agricultural and other installations and activities.
- Water abstractions for urban, industrial, agricultural and other uses, including seasonal variations and total demand, and loss of water in distribution systems.
- Water flow regulation, water transfer and diversion.
- Morphological alterations to water bodies.
- Land use patterns including the main urban, industrial and agricultural areas and major fisheries and forests.
- Other significant anthropogenic impacts.

For **groundwater bodies** these include significant pressures and risks associated with:

- Abstraction for drinking water, industrial, agricultural and other purposes; volume and rates of abstraction, chemical composition, etc.
- Discharges to groundwater; location, rates and chemical composition, etc.
- Land use in the recharge catchment of the *groundwater body*.
- Variations in water-table levels.
- Pollution sources.

Note that a significant pressure is one that on its own, or in conjunction with other pressures, may lead to a failure to achieve one, or more, objectives of the Directive. So the relationship between *water bodies* within a *river basin district* is important since, for example, pollution downstream may occur as a result of upstream discharges to a *water body*.

Risk assessment entails determining the magnitude and cumulative effects of these significant pressures and the characteristics of water bodies that determine their susceptibility to them. It is also necessary to identify any significant upward trends in water pollution and the criteria for establishing the starting point for trend reversal.

The timescale for the review of the impact of human activity is short and the initial outputs were needed before the new monitoring procedures were in place. The task was undertaken using existing methodologies and information and, where there was uncertainty, using the *precautionary principle*. The assumptions and uncertainties were set out when the review was published in March 2005⁹.

5.3 The Economic Analysis of Water Use (Art. 5)

Economic analysis is a key element of the river basin management planning process. The role is illustrated in Figure 6. The first stage of the economic analysis of a *river basin district* included the following activities:

The economic analysis of water use: assessing how important water is to the economy and socio-economic development of the *river basin district* and initiating investigations of likely trade-offs between socio-economic development and water protection. The process provided the economic profiling of the *river basin districts* in terms of general indicators.

The economic input to the establishment of a base-line scenario: investigation of the dynamics of the *river basin districts* aided in the assessments of forecasts of key

⁹ Summary reports of the Article 5 analysis reported to the Commission in March 2005 - <http://webarchive.nationalarchives.gov.uk/20080305115859/http://www.defra.gov.uk/environment/water/wfd/article5/index.htm>

economic drivers likely to influence pressures on *water bodies* and therefore their status. This included reviewing changes in general socio-economic variables, key sector policies that influence water use, economic growth and planned investment linked to existing water regulation.

The assessment of the current levels of recovery of the costs of water services: this was concerned with water service provision, the extent to which financial, environmental and resource costs are recovered, how cost recovery is organised and the way in which key water users contribute to the cost of water services.

Preparing for cost effective analysis and investigating ways of enhancing the information and knowledge base: analysis of the cost effectiveness of *river basin management plans* is required later. At this stage the aim is to recognise gaps in existing data, and the means to deal with them, and to collate information in a format that will be useful at that time.

5.4 The Register of Protected Areas (Art. 6,7)

Registers have been created for each *river basin district* indicating details and the location of the protected areas. Although not exclusive, the Directive lists the following:

- Areas that are either used or are intended to be used for the abstraction of drinking water for human consumption (Art. 7).
- Areas designated for the protection of economically significant aquatic species.
- Bodies of water designated as recreational waters, including bathing waters designated under Directive 76/160/EEC.
- Nutrient-sensitive areas including areas designated as vulnerable zones under directive 91/676/EEC and areas as sensitive areas under Directive 91/271/EEC.
- Areas designated for the protection of habitats or species or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directives 92/43/EEC and 79/409/EEC.

5.5 Outputs from the Assessment of Current Status

The assessment described above provides an understanding of the *river basin district* in terms of: -

- The nature of its constituent *water bodies* and their grouping into types with like characteristics.
- Situations where there are risks to the achievement of *good status* for surface and groundwaters.
- Situations where higher levels of protection are necessary.
- *Heavily modified* and *artificial water bodies* where only *good ecological potential* is possible.
- Possible situations where other derogations may be needed.

- An economic analysis of water use, its importance to the community, pressures on resources, and how cost recovery is undertaken.

This initial assessment provides the basis for the development of the environmental standards necessary to achieve *good status* for the *water bodies* identified and for the development of the monitoring of surface water status, groundwater status and protected areas.

6.0. Setting Environmental Standards

There were two mutually dependant developments needed before environmental standards could be determined for the various *water body* types: namely; the derivation of a classification system to be applied to all water bodies so as to assess the extent of their deviance, if any, from *good status*, and the determination of type-specific reference standards representative of each class and the boundaries between them.

6.1 The Classification System for Surface Water Bodies

The reason for the grouping by type of each *water body* in a *river basin district* is to allow the identification of reference standards of the ecological conditions appropriate to each *water body* group if each were in a pristine state. Since the purpose of the Directive is to maintain water quality where this is already at least of *good status*, and to restore waters failing to achieve this, it is essential to have an effective means of classifying the status of the various types of *water bodies*. The Directive requires that *water bodies* be classified in accordance with the following ecological status system using biological, hydromorphological and physicochemical elements set out in Directive Annex V. The classification for surface *water bodies* is as follows:

High status. Very little, or no, anthropogenic alteration to the physicochemical and hydromorphological quality elements and biological quality elements expected for the type of *water body* in pristine condition.

Good status. Reflecting undisturbed conditions, or minimal disturbance. Values of the biological quality elements for the *water body* type show low levels of distortion resulting from anthropogenic activity, but deviate only slightly from those normally associated with the *water body* under undisturbed conditions.

Moderate status. The values of the biological quality elements for the *water body* deviate moderately from those normally associated with that body under undisturbed conditions and show moderate signs of distortion resulting from anthropogenic activity and are significantly more disturbed than under conditions of *good status*.

Member States may further classify waters as *Poor* or *Bad* to reflect stages of deterioration beyond *Moderate* status.

6.2 Reference Standards for Surface Waters

Whilst the Directive indicates in qualitative terms the nature of the hydromorphological, physicochemical and biological elements to be included in the assessment of the status of *water bodies* it does not give quantitative values for these elements. These values are to be identified for each *water body* type in each eco-region through a EU wide, harmonised inter-calibration exercise¹⁰. This should ensure that: -

- Member States use comparable ecological quality assessment systems and harmonised ecological quality criteria.
- Ecological criteria are agreed for the designation of sites of *good ecological status*.
- Agreed numerical *Ecological Quality Ratio* values are established for the class boundaries between high-good and good-moderate classes.

The *Ecological Quality Ratio* for a water body is simply the ratio of the observed biological value to the reference biological value. It is close to 1 for a *water body* exhibiting high status and close to zero for a *water body* exhibiting bad status.

This inter-calibration exercise covered all surface *water body* types and includes *heavily modified* and *artificial water bodies* to facilitate the identification of *maximum, good and moderate ecological potential* for an alternative classification system for such *water body* types.

On 30 October 2008, the Commission published the results of the inter-calibration exercise in a Commission Decision published in the Official Journal of the EU.¹¹

In the first phase of inter-calibration it was not possible to inter-calibrate all biological quality elements in all water categories. The existing gaps are due mainly to the lack of development of WFD compliant national assessment methods and the lack of data for some quality elements. The inter-calibration exercise will therefore be continued in a *second phase* from 2008 to 2011 in order to achieve comparable and WFD consistent class boundaries for all biological quality elements.

6.3 The Classification of Groundwater Bodies

The classification of groundwater bodies is not as complicated as that for surface waters, although the monitoring of change to groundwater status can be very complex. Groundwater bodies are classed as of *good status* when both their *quantitative status* and their *chemical status* are good. That is, when direct and indirect abstractions have minimal effect on the *water body's* ability to support dependant ecosystems and when it complies with Directive requirements for maximum levels of defined pollutants.

¹⁰ http://ec.europa.eu/environment/water/water-framework/objectives/status_en.htm#_Results_of_the

¹¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008D0915:EN:NOT>

6.4 Outputs from the Classification of Water Bodies

The classification process provides the basis for the following: -

- Identification of the characteristics of *good status* for all groups of *water bodies*.
- Establishment of the current status of all *water bodies* (using existing data).
- Determination of where action is needed.

7.0 The Establishment of Monitoring Programmes (Art. 8)

Having established the criteria for the classification of *water bodies* it is essential to establish an integrated monitoring programme that embraces the physical, chemical and biological data needed to assess the status of surface and groundwater bodies in each RBD. The Directive required this to be in place by December 2006.

7.1 The Design of Monitoring Programmes

The detailed requirements for the design of monitoring programmes are given in the Annexes to the Directive. Annex VIII gives an indicative list of the main pollutants; Annex IV deals with protected areas; Annex V provides details of how the programme should be designed, what should be monitored for and how the results should be presented. Advice concerning interpretation of the complicated requirements has been prepared as part of the Common Implementation Strategy. The advice will be modified once the Daughter Directives on Priority Hazardous Substances and on Groundwater are implemented.

The information needs drive the design of monitoring programmes and, although the principles are the same for both surface waters and groundwaters, it is convenient to list them separately.

7.2 Reasons for Monitoring Surface Waters

Monitoring information is needed for the following reasons: -

- Classification of status of all *water bodies*, or groups of *water bodies*.
- To support risk assessment procedures.
- Design of future monitoring programmes.
- Assessment of long term changes whose causes are both natural and anthropogenic.
- Assessment of compliance with standards and objectives.
- Estimation of pollution load transfers across international boundaries or into seas.
- Assessing the efficacy of measures applied to *water bodies* designated as at risk.
- Ascertaining formerly unidentified reasons for failure to achieve environmental objectives.
- Assessing the impact of accidental pollution.
- Use in inter-calibration exercises.

7.3 Reasons for Monitoring Groundwaters

Monitoring information is needed for the following reasons: -

- Assessment of quantitative status of all *groundwater bodies* or groups of bodies.
- Estimating direction and rate of flow in *groundwater bodies* that cross international boundaries.
- Supporting impact assessment procedures.
- Assessment of long term trends whose causes are both natural and anthropogenic.
- Establishing the *chemical status* of groundwater bodies, or groups thereof, determined to be at risk.
- Investigation of upward trends in pollutant concentration and their reversal either due to natural causes or the application of positive measures.

7.4 The Nature of the Monitoring Programmes

The requirements for the design of surface water monitoring programmes illustrate the move away from the former static protocols implicit in the old directives to a more dynamic, risk based approach where pressures due to hydromorphological and physicochemical factors are linked to biological indicators of environmental quality. Accordingly a network of monitoring sites has been established to classify all *water bodies* using a combination of surveillance, operational and investigative monitoring of prescribed quality elements to satisfy the information needs identified above.

Essentially, *surveillance monitoring* will be used to validate risk assessments and determine long term changes, *operational monitoring* will be used to determine the status of *water bodies* identified as being at risk and how this changes as result of the *programme of measures* and *investigative monitoring* will be used to establish reasons for failure.

The building of the monitoring network has been influenced by the nature of the individual *water bodies*, the analysis of the pressures and risks associated with them, the classification system to be applied and the extent of the existing monitoring network.

Examples of these pressures include the following:

For rivers and lakes: nutrients, acidification, abstraction, morphology, alien species.

Additionally for rivers: hazardous substances, pesticides, urban pressures, flow regulation, mine waters, pollution incidents.

For transitional and coastal waters: nutrients, hazardous substances, organic enrichment, morphology, commercial fishing, alien species.

Additionally for transitional waters: abstraction and industrial intakes and discharges.

For groundwaters: nutrients, pesticides, minewaters, contaminated land, point sources, abstraction, urban pressures.

Figure 7 illustrates how these varying situations might influence the monitoring regime for a hypothetical system of transitional and coastal water bodies.

7.5 Outputs from the monitoring programmes

The monitoring programme will ultimately provide the following: -

- Data from the reference sites to enable class boundary conditions to be established for all groups of *water body* types.
- The data to enable the classification of all individual *water bodies*.
- The means of monitoring progress with the implementation of the *river basin management plans* and associated *programmes of measures* and the basis for their subsequent revision.
- Early warning of new problems.

Note that the new monitoring programmes have not been in place long enough to provide sufficient data for the initial *river basin management planning* exercise so there will be significant reliance on data gathered through existing monitoring arrangements.

8.0 Gap Analysis

Gap analysis is essentially the determination for each *water body* within each *river basin district* of any discrepancy between its existing status and that required under the Directive. The analysis is very wide reaching and includes the following areas of activity:

Early output from the reference sites established under the monitoring programme will determine the class boundaries for the surface water classification system and thus facilitate the classification of each *water body*. Their classification will be based on whichever is the worst, their *chemical* or *biological status*. Since the full monitoring programme started late in the planning cycle this classification was primarily based upon existing data.

For surface *water bodies* that are already at *high* or *good ecological status* the focus will then fall on any gap between existing measures and any future measures needed to maintain that status. Where the current status of surface *water bodies* falls below that required for *good ecological status* attention is focused on measures to restore this status. For surface *water bodies* identified as *heavily modified water bodies* or as *artificial water bodies* the process is similar except that the aim is *good ecological potential*. A similar gap analysis process is used to identify where action is needed to protect or enhance the quality of *groundwater bodies*.

Where *water bodies* must have special protection, such as those used for public water supply, gap analysis is used to explore the difference between current practice and that needed under the Directive.

The output from the first stage of the economic analysis is important here to determine any gap between current measures and those necessary to protect economically important *water bodies*, to relieve pressures on resources, and to ensure equitable cost recovery under the *polluter pays principle*.

The gap analysis process provides the basis for the development of the *programme of measures*, a key component of the *river basin management plan*.

9.0 The *Programme of Measures* (Art. 11)

The *programme of measures* is at the heart of river basin management planning. It sets out the actions to be taken during the plan period to secure Directive objectives. It builds on the gap analysis and includes the following considerations:

- Proposals for any modification of the current procedures for licensing abstractions and consenting discharges should they not prove sufficient for Directive requirements.
- *Basic measures* required to implement Community legislation for the protection of water in the *river basin district* as set out in the directives listed in Figure 8.
- Any pricing measures, or other economic instruments intended to provide incentives to encourage more sustainable and efficient water use.
- If the above is not sufficient to meet Directive requirements, Member States may need to employ *supplementary measures* such as those listed in Figure 9.
- In exceptional cases *additional measures* may be needed to protect the aquatic environment: this may be so for international river basins.

The Directive refers to use of the *combined approach* to river water quality management: the use of both *environmental quality standards* (EQSs) for the *water bodies* and *emission limit values* (ELVs) for any discharge of effluent to them. The *environmental quality standards* are the prime driver when *emission limit values* are being considered. Emission standards from relevant Community legislation provide the minimum standards but tighter controls on effluent discharges will be needed if these minimum standards are insufficient to meet Directive requirements. Diffuse pollution also falls under these controls, but its elimination will also require compliance with codes of good practice designed to minimise risk.

The *programme of measures* identifies: -

- Any *heavily modified* and *artificial water bodies* within the RBDs and the actions necessary to secure and maintain their lesser objective of *good ecological potential*.

- Any *derogations*, permanent or temporary, that are sought in respect of individual *water bodies*.

The Directive includes a number of provisions that allow Member States to set lower environmental standards for specific *water bodies* where there are legitimate technical and economic reasons. In this way a balance may be struck between the three principles of sustainable development: environmental, economic and social. Indeed economic analysis forms an important aspect of the development of the *programme of measures* and is used to: -

- Evaluate the costs and effectiveness of potential measures.
- Support the designation of *heavily modified water bodies*.
- Construct a cost-effective *programme of measures*.
- Evaluate whether costs are disproportionate.
- Assess the financial implementation of the *programme of measures*.

Instances where the costs of measures to bring a *water body* into compliance with Directive requirements are disproportionate to the benefits gained, or where there is no feasible alternative solution, may form the basis upon which to seek a permanent derogation. Alternatively, where there is insufficient information for final decision concerning the appropriate measures, or the measures are very costly, a temporary derogation may be sought to allow extra time for the requirements to be met. In this context, it should be appreciated that river basin planning is a cyclical process in which the plans and associated *programmes of measures* are reviewed on a six-yearly basis.

10.0 Development of the River Basin Management Plan (Art. 13)

A *river basin management plan* must be prepared for each *river basin district* and must encompass the milestones of river basin management planning described above. It should be noted that the *river basin management plan* is essentially a snapshot in time and is the subject of continual review. Essentially, the first-generation *river basin management plans* represent the transition between the initial analysis and implementation of the Directive. Their cyclical updating is a refining process based on improved data and understanding and allowing for real changes of circumstances in the river basins. The principal mechanism for achievement of the Directive requirements is through the implementation of the *programme of measures*.

There are two important features of the planning process before the *river basin management plans* can be finalised.

1. Stakeholders and the general public must be consulted on their content and the proposals in them (See 11.0 below).
2. The appropriate government minister must approve them.

A guide to the content of the *river basin management plan* document is given at Directive Annex VII and is summarised in Figure 10. The information required is very extensive covering every aspect of the river basin planning process and, if requested by the Commission, access to supplementary information must be made available by the Member State.

Essentially the Plans perform the following functions:

- They act as an inventory and documentation mechanism for the information gathered including: environmental objectives for surface and ground waters, quality and quantity of waters, and the impact of human activity on *water bodies*.
- They co-ordinate *programmes of measures* and other relevant programmes within the *river basin district*.
- They form the main progress reporting mechanism to the EC as required by Directive Article 15.

The first *river basin management plans* were published at the end of 2009 and indicate the quality and quantity objectives to be achieved by 2015.

11.0 Public Information and Consultation (Art. 14)

Active involvement by interested parties is a core principle of the *river basin planning* process: in particular during the production, review and updating of the *river basin management plans*.

The involvement of interested parties in the UK began with the public consultation process that preceded the incorporation of the Directive into law. In England and Wales, respondents to this process, and other notable stakeholders, were invited to join a national Stakeholder Group, and a similar organisation in Northern Ireland, to act as a sounding board on implementation issues. In Scotland the organisation is called the National Advisory Group.

To engage the wider general public in each river basin district Liaison Panels were established in England and Wales, Advisory Groups in Scotland and Catchment Stakeholder Groups in Northern Ireland. The Directive requires that Member States shall ensure that, for each *river basin district*, they publish and make available for comments to the public (including users) the following: -

- A timetable and work programme for the production of the plan, and the consultation measures to be taken, at least three years before the beginning of the plan period.
- An overview of the significant water management issues identified in the river basin, at least two years before the beginning of the plan period.
- Draft copies of the *river basin management plan*, at least one year before the beginning of the plan period.

- On request, access to background documents and information used for the development of the draft plan.

To allow active involvement and consultation with interested parties, including stakeholders and the public, Member States must allow six months for written comments on these documents.

12.0 Water Framework Daughter Directives

The Directive sets out requirements for the Commission to propose further laws to protect against water pollution. Two “daughter directives”, the first on protecting groundwater and the second on reducing pollution of surface waters by pollutants on a list of priority substances are, introduced.

12.1 Priority Substances (Art. 16)

As part of the WFD, in December 2008 the new Priority Substance Directive (2008/105/EC) was adopted. The new directive includes environmental quality standards (EQS) for the concentrations of currently 33 priority substances (or groups of substances) that pose a threat to surface waters (rivers, lakes, estuaries, coastal waters and artificial or heavily modified water bodies). Within this list currently 20 substances that are thought to pose the greatest risk to the aquatic environment are further identified as Priority Hazardous Substances. The list that forms Annex X to Directive 2000/60/EC is given in Figure 11.

12.1.1 Implementation of the Priority Substances Directive (2008/105/EC) into UK Law (Art. 13)

Adopted on the 28th December 2009 Member States had until 13th July 2010 to transpose this new Directive into domestic legislation.

In England and Wales the Environmental Quality Standards that provide the basis for the chemical status classification of surface water bodies were published on 22nd December 2009 in the River Basin Districts Surface Water and Groundwater Classification (Water Framework Directive) (England and Wales) Direction 2009 and part 5 of the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Direction 2009 to the Environment Agency. The EQS must also apply to surface waters that are not classified as bodies of water, for the purposes of classification. In addition there is a need to consider amendment to the Dangerous Substance Daughter Directives. Transposition is to be completed by establishing either amended Directions to the EA, and/or new regulations (which will repeal the series of Surface Waters (Dangerous Substances) (Classification) Regulations made between 1989 and 1998) to transpose the Dangerous Substance Directive (76/464/EEC). A consultation on the approach to transposition is expected to take place well before July 2010 in time to meet the transposition deadline.

Scotland transposed the 2008 Priority Substances Directive by The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009 SSI 2009 No. 420, see section 12.2.1 below.

For Northern Ireland it is proposed that following consultation the 2008 directive will be transposed by The Water Framework Directive (Priority Substances and Classification) Regulations (Northern Ireland) 2010, in October 2010.

12.2 Groundwater (Art. 17)

Article 17 of the Water Framework Directive sets objectives for groundwater quality, including an objective to meet “good chemical status” by 2015, an objective on pollution trends and an objective to prevent or limit the input of pollutants to groundwater. Clarification of these objectives is however, left to the new daughter directive. Currently the main legislation relating to Groundwater is the 1980 Groundwater Directive (80/68/EEC). The new Groundwater Directive (2006/118/EC) will replace the 1980 Directive in December 2013 but until then two Directives will operate alongside each other.

12.2.1 Implementation of the Groundwater Directive (2006/118/EC) into UK Law (Art 12)

In December 2006 the new Groundwater Directive (2006/118/EC – the 2006 Directive) was adopted and came into force on the 16th January 2007.

In England and Wales Article 6 of this 2006 Directive was implemented by the Groundwater (England and Wales) Regulations 2009 (SI 2902) which came into force on 30th October 2009. Other Articles in the 2006 Directive are transposed elsewhere, largely via the WFD river basin management planning process.

Scotland transposed both the 2006 Groundwater Directive and the 2008 Priority Substances Directive together by The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009 SSI 2009 No. 420. These Regulations modify provisions of the Water and Environment and Water Services (Scotland) Act 2003 (the WEWS Act) and the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR).

For Northern Ireland the transposition of the 2006 Directive was achieved by introduction of the Groundwater Regulations (Northern Ireland) 2009 that came into operation on 10th August 2009. Articles 3, 4 and 5 of the 2006 Directive deal with the assessment of the chemical status of groundwater bodies and the identification of significant and sustained pollution trends and starting points for their reversal. These are new requirements for groundwater protection and are transposed by regulations 7-11 of the 2009 Regulations. Article 6 of the 2006 Directive deals with pollution prevention aspects of groundwater and is also implemented by the 2009 Regulations and meets the “prevent or limit” objective of Article 4(1)(b)(i) of the WFD, that applies to all groundwater whether or not it is a groundwater body.

13.0 Implementation of the Programme of Measures (Art. 11) and Reporting Progress (Art. 15)

The Directive requires that the *programme of measures* associated with each *river basin district* is in place by December 2009 at the latest and that all the measures therein are made operational by December 2012 at the latest. Each *programme of measures* is to be updated by December 2015 and every six years thereafter with any new, or revised, measures being made operational within three years of their establishment.

The published *river basin management plans* and their incorporated *programmes of measures* must be submitted to the European Commission within three months of their publication. Thereafter, Member States must submit an interim report describing progress with the implementation of the *programmes of measures*.

The Commission will publish a report in 2012 and every six years thereafter for submission to the European Parliament and the Council of Ministers. The report will include the following.

- A review of progress with Directive implementation.
- A review of the status of surface and groundwaters undertaken in coordination with the European Environment Agency.
- A survey of the *river basin management plans* submitted by Member States, including suggestions for the improvement of future plans.
- A summary of the responses made to each Member State that submitted a report, or recommendation, under Article 12 concerning matters that cannot be resolved at Member State level.
- A summary of any proposals, control measures and strategies against the pollution of water as indicated in Article 16.
- A summary of the responses to comments made by the European Parliament and the Council of Ministers on previous implementation reports.

Various other periodic implementation reports to the European Parliament and the Council of Ministers are to be made by the Commission.

It is also intended that the Commission will convene, in line with the reporting cycle, a conference of interested parties on Community water policy from each Member State to comment on the Commission's implementation reports and to share experiences. Participants will include representatives from the *competent authorities*, the European Parliament, NGOs, social; and economic partners, consumer bodies, academics and other experts.

14.0 Evaluation of the Effectiveness of the Plan and Programme of Measures (Art. 11)

The *river basin management plans* and *programmes of measures* are not intended as a once only exercise, but as a dynamic process based upon a six-yearly cycle of updating. In this way changes to the pressures on a *water body*, both natural and anthropogenic, can be recognised and new measures developed to overcome them. Furthermore, refinements to the monitoring programme, and the availability of further data, will enable fine-tuning to existing measures and give early warning of new problems so that appropriate action can be taken.

The evaluation process also gives the opportunity to review existing *water body* classifications; any *derogations* obtained during the preceding plan period, and the general effectiveness of the *programme of measures* in the achievement of *good status* in designated *water bodies*. It will also provide the basis for compiling the progress reports required by the Directive.

15.0 Climate Change

Although climate change is not explicitly included in the text of the WFD, the step-wise and cyclical approach of the WFD river basin management process makes it well suited to handle climate change. From the Article 5 characterisation reports assessed for the Commission's WFD implementation report in 2007¹², there were no indications that climate change pressures are significantly putting the achievement of good status at risk in the first RBM cycle. However, it is important that river basin management plans take account of the medium and long-term implications of climate change, as there is a large potential for synergies between WFD objectives and adaptation aims. For the second and third River Basin Management cycles due in 2015 and 2021, it is expected that the impacts of climate change and climate variability will be fully integrated into the process of river basin management¹³.

16.0 Conclusion

The Water Framework Directive is, without doubt, the most comprehensive approach to water policy ever produced by the EU: its scope is breathtakingly wide and at first glance its detail is daunting. Yet we have seen that the outline *river basin planning process* is essentially based on the following elementary steps:

1. Identify the *water bodies* that comprise the *river basin district* and the pressures upon them.
2. Establish the environmental objectives that signify *good status* for each *water body*.

¹² COM(2007) 128 final, 'Towards sustainable water management in the European Union and its Annex SEC(2007) 362

¹³ Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance Document No. 24 River Basin Management In a Changing Climate, Technical Report – 2009 -040

3. Set up a monitoring programme to measure *water body* status.
4. Establish and implement a *river basin management plan* and a *programme of measures* to achieve and maintain *good status*.
5. Review and update the *river basin management plan* and the *programme of measures* to take into account any change of circumstances.

As implementation of the Directive unfolds we will see how complex the above steps become and observe the economic, social and political implications of the sustainable development principles embodied in the *river basin management planning* process.

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Figure 1 Definitions* of Surface Water and Groundwater Status

'Good surface water status' is that achieved by a surface water body when both its 'ecological status' and its 'chemical status' are at least good.

'Ecological status' is an expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as of *'good ecological status'* when they meet Directive requirements.

'Good surface water chemical status' means that concentrations of pollutants in the water body do not exceed the environmental limit values (ELVs) specified in the Directive.

'Good groundwater status' is that achieved by a groundwater body when both its quantitative status and chemical status are good.

'Quantitative status' is an expression of the degree to which a body of groundwater is affected by direct and indirect abstractions. If this complies with Directive requirements the status is good.

'Good chemical status' is ascribed to a groundwater when it meets Directive requirements for the maximum levels of defined pollutants.

* *Based on the definitions given in Article 2 of Directive 2000/60/EC.*

Figure 2 Water Framework Directive – Implementation Timetable**

Date		Article
Dec 2000	Directive enters into force	
Dec 2003	Requirements transposed into national law.	24
	River basin districts (RBDs) and competent authorities identified.	3
Dec 2004	For each RBD:	
	-Complete analysis of river basin characteristics including a review of pressures and human impacts on water status. Identify heavily modified and artificial waters.	5
	-Economic analysis of water use.	5
	-Establish a register of protected areas and identify waters used for the abstraction of drinking water.	6, 7
Dec 2005	Identify significant upward trends in water pollution and criteria for establishing the starting point of trend reversal.	17
Dec 2006	Establish environmental monitoring programmes.	8
	Publish, for consultation, work programme for producing the first river basin management plans (RBMPs).	14
	Establish environmental quality standards for substances included on the first priority list and controls on principal sources.	16
Dec 2007	Publish interim overview of significant water management issues in each RBD for consultation.	14
Dec 2008	Publish draft RBMPs for consultation.	14
Dec 2009	Finalise and publish first RBMPs:	13
	-designate heavily modified water bodies;	
	-set environmental objectives;	
	- finalise programme of measures to meet objectives.	11
Dec 2010	Ensure 'true cost' water-pricing policies are in place.	9
Dec 2012	Ensure that programme of measures is operational.	11
	Publish timetable and work programme for second RBMPs.	
	Report interim progress in implementing measures.	15
Dec 2013	Review first RBMPs and publish interim view of issues for the second RBMP.	
Dec 2015	Achieve environmental objectives specified in the first RBMP.	4
	Finalise and publish the second RBMPs with revised programme of measures (to be achieved in 2021)	13, 14, 15

** Based on information drawn from Directive 2000/60/EC.

Figure 3 UK River Basin Districts

There are ten RBD's wholly within England and Wales: -

1. Anglian
2. Dee
3. Humber
4. Northumbria
5. North-West
6. Severn
7. South-East
8. South-West
9. Thames
10. West Wales

Note: A small part of the Northumbria *river basin district* lies in Scotland, however there are no identified surface water bodies in this part of Scotland. The groundwater underlying the Scottish part of the Northumbria *river basin district* is allocated to the Solway Tweed River Basin District.

A detailed map can be viewed and downloaded at: -

Map: http://www.environment-agency.gov.uk/static/documents/Research/rbds_ew_1661654.pdf

There is one Cross Border RBD between England and Scotland: -

Solway – Tweed

A detailed map of the Solway and Tweed RBD can be viewed and downloaded at: -

Map: http://www.environment-agency.gov.uk/static/documents/Research/solway_map_1462978.pdf

The rest of Scotland is defined as one RBD.

A detailed map can be viewed and downloaded at: -

Map: <http://www.euwfd.com/RiverBasinDistrictinScot.pdf>

There is one RBD wholly within Northern Ireland: -

North Eastern

A detailed map can be viewed and downloaded at: -

Map: <http://www.ni-environment.gov.uk/pubs/publications/IRBDmap.pdf>

There are three International RBDs between Northern Ireland (UK) and the Republic of Ireland

1. Shannon

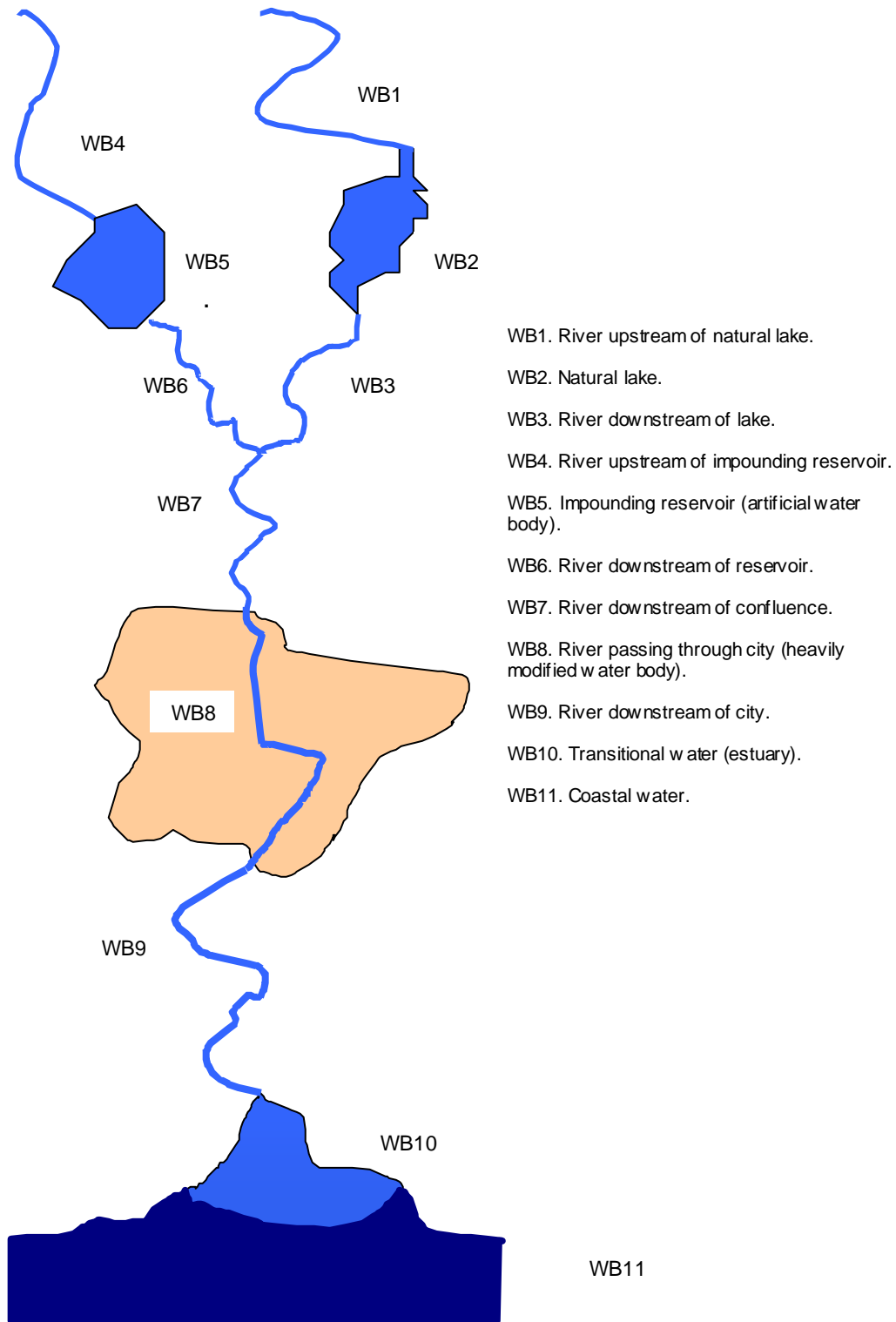
2. North Western IBRD (covering Erne-Foyle-Swilly and Melvin basins)
3. Neagh Bann IBRD (covering the Lough Neagh River Basin Carlingford Bay and Dundalk basins)

A detailed map can be viewed and downloaded at: -

Map: <http://www.swanireland.ie/page.php?page=irbd&leaf=1>

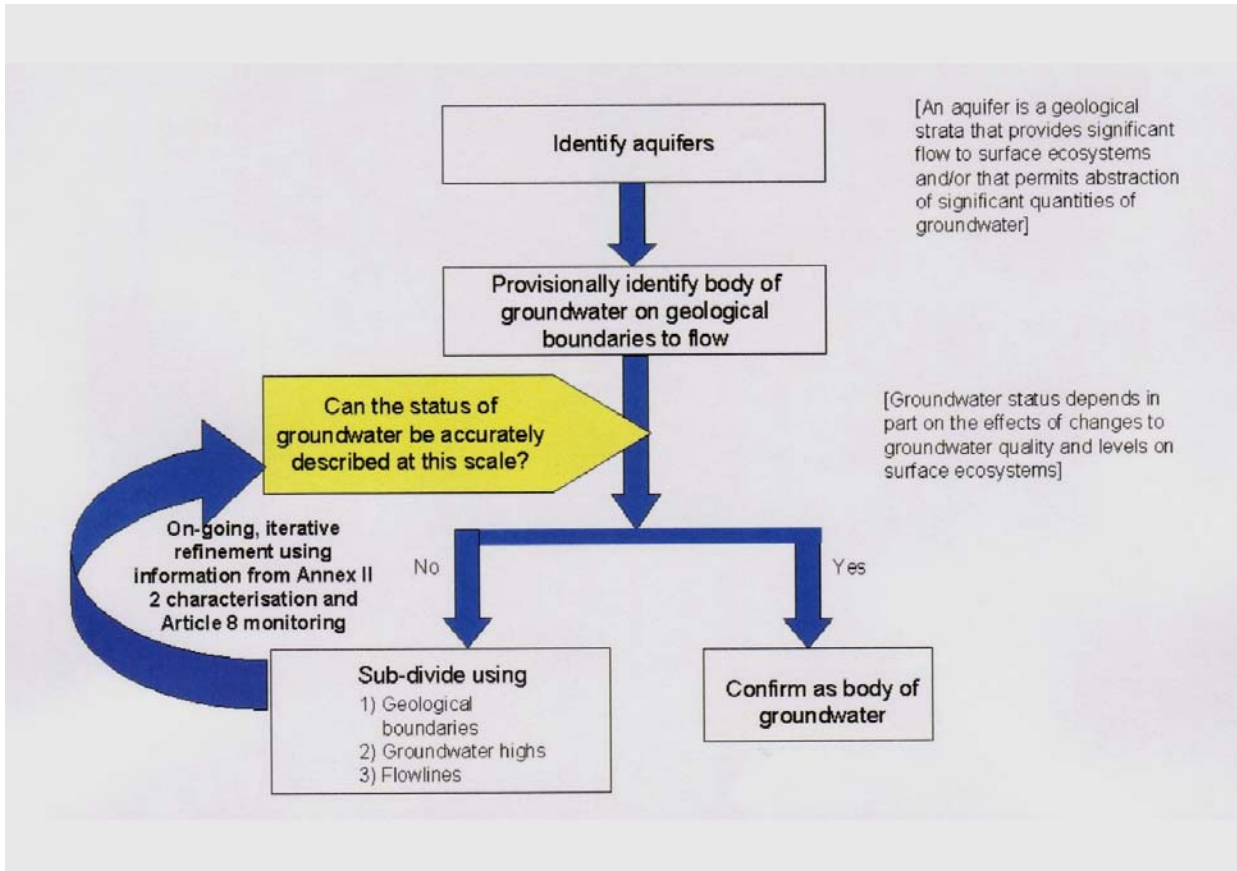
Note. The Directive requires that river basins that cross national frontiers must be assigned to an international RBD and the Member States involved must together ensure the co-ordination of measures for its implementation.

Figure 4 Examples of the designation of surface water bodies



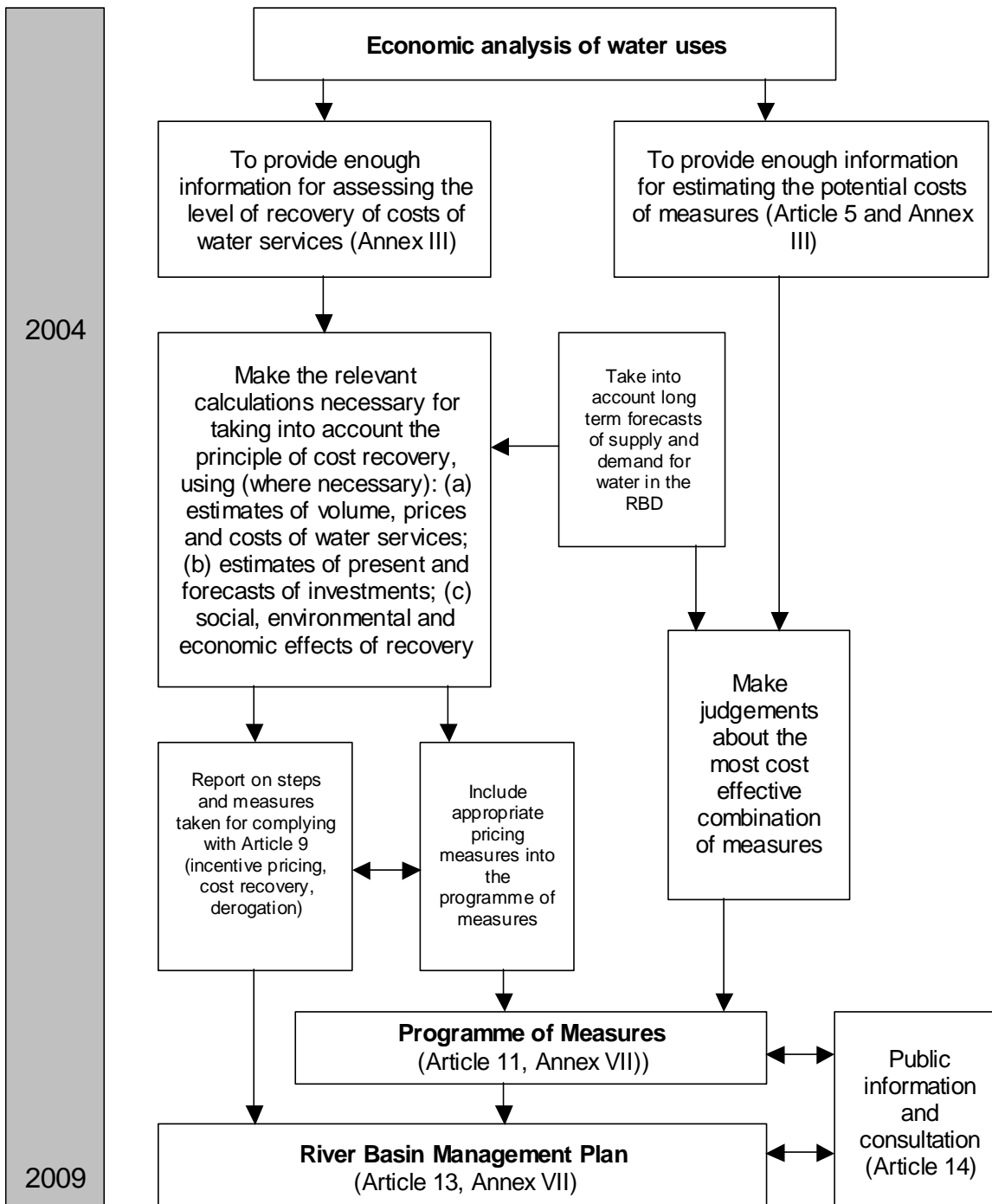
Note: Based on Guidance Document No 2, Common Implementation Strategy for the Water Framework Directive (2000/60/EC). © European Communities, 2003

Figure 5 A hierarchical approach to the designation of bodies of groundwater



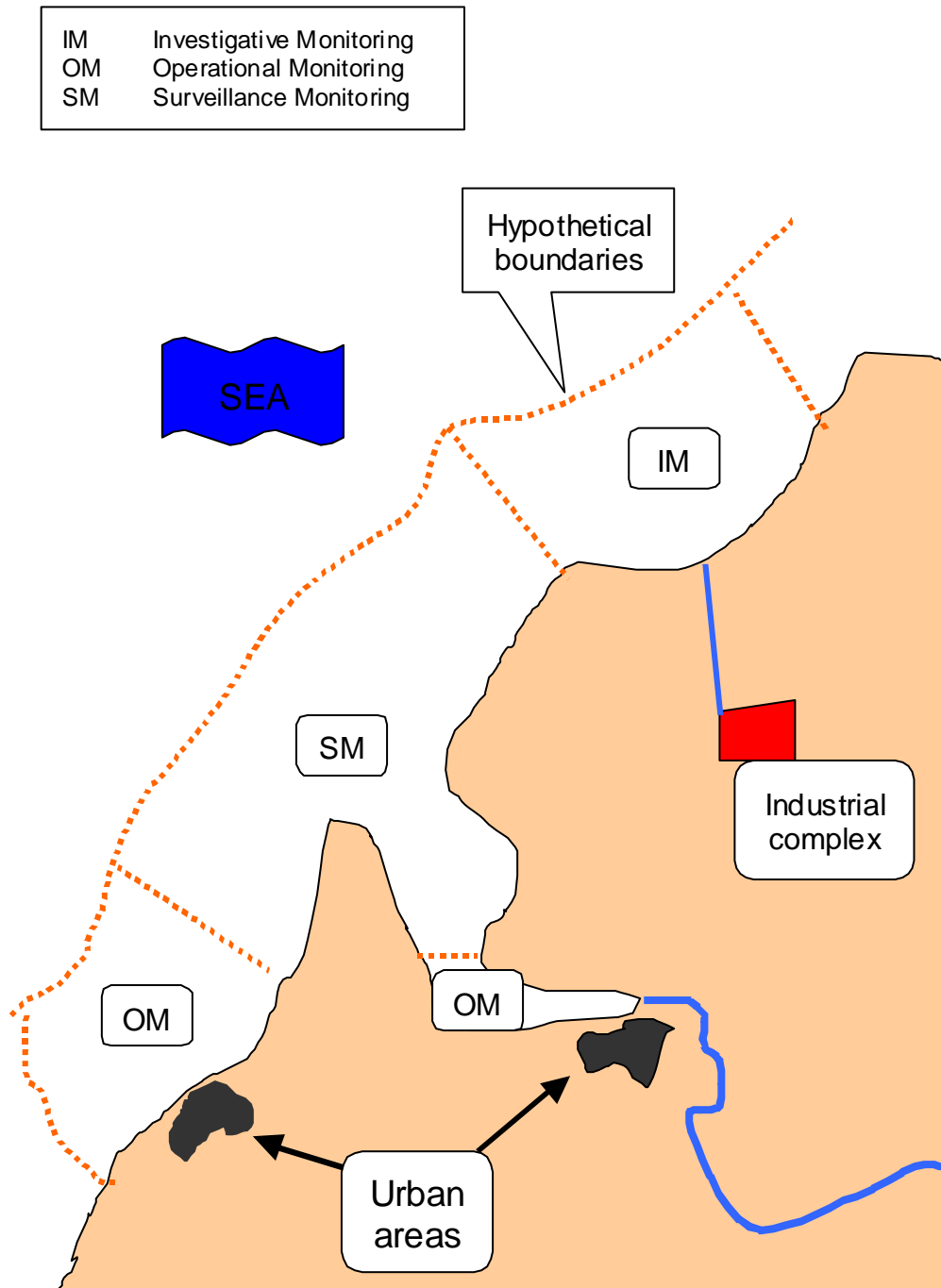
“Summary of the suggested hierarchical approach to the identification of bodies of groundwater”. Figure 11 taken from Guidance Document No 2, Common Implementation Strategy for the Water Framework Directive (2000/60/EC). © European Communities, 2003

Figure 6 The role of economic analysis



“The *Explicit* Economic Functions of the Economic Analysis”. Figure 1 taken from Guidance Document No 1, Common Implementation Strategy for the Water Framework Directive (2000/60/EC). © European Communities, 2003

Figure 7 A monitoring regime for a hypothetical system of transitional and coastal waters



Note: Based on Ferguson, A. (2004). 'Preparing the Ground – What, Where, When of Monitoring'. Paper presented to CIWEM symposium 'Water Framework Directive – So Far, so Good?' London, March 2004.

Figure 8 Basic measures to be included in the *Programme of Measures*

Measures required under the following Directives.

- The Bathing Water Directive (76/160/EEC).
- The Birds Directive (79/04/EEC).
- The Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EEC).
- The Major Accidents (Seveso II) Directive (96/82/EC).
- The Environmental Impact Assessment Directive (85/337/EEC).
- The Sewage Sludge Directive (86/278/EEC).
- The Urban Wastewater Treatment Directive (91/271/EEC).
- The Plant Protection Products Directive (91/414/EEC).
- The Nitrates Directive (91/676/EEC).
- The Habitats Directive (92/43/EEC).
- The Integrated Pollution Prevention and Control Directive (96/61/EC).

Based on Annex VI (Part A) of Directive 2000/60/EC.

Figure 9 Supplementary measures that may be included in the *Programme of Measures*

The following is a non-exclusive list of the supplementary measures that may be included in the *Programme of Measures*.

- Legislative, administrative, economic and fiscal instruments.
- Abstraction and emission controls.
- Negotiated environmental agreements.
- Codes of good practice.
- Demand management measures.
- Efficiency and re-use measures.
- Artificial re-charge of aquifers.
- Recreation and the restoration of wetlands.
- Construction projects.
- Desalination plants.
- Rehabilitation projects.
- Education projects.
- Research, development and demonstration projects.
- Other relevant measures.

Based on Annex VI (Part B) of Directive 2000/60/EC.

Figure 10 Summary of the issues to be covered in the *River Basin Management Plan*

The RBMP for each RBD should include the following.

1. General description of the characteristics of the RBD, including a map showing the location and boundaries of the surface and ground water bodies and a further map showing the types of surface water bodies within the basin.
2. Summary of the significant pressures and the impact of anthropogenic activity on the status of surface and ground waters including: point source pollution, diffuse pollution and related land use, the quantitative status of water including abstractions, and an analysis of other impacts of human activity on water status.
3. Map showing any protected areas.
4. Map of the monitoring network.
5. Map showing the results of the monitoring programme showing the status of all water bodies and protected areas.
6. List of the environmental objectives set for all water bodies, including those where the use has been made of derogations.
7. Summary of the economic analysis of water use.
8. Summary of the *programme or programmes of measures*.
9. Register of any more detailed programmes and management plans and a summary of their contents.
10. Summary of the public information and the consultation measures taken, their results and the changes to the plan as a consequence.
11. List of *competent authorities*.
12. Contact points and procedures for obtaining background documentation and information, including actual monitoring data.

Based on Guidance Document No 1, Common Implementation Strategy for the Water Framework Directive (2000/60/EC). © European Communities, 2003

Figure 11 List of Priority Substances in the field of water policy

LIST OF PRIORITY SUBSTANCES IN THE FIELD OF WATER POLICY

Number	CAS number ⁽¹⁾	EU number ⁽²⁾	Name of priority substance ⁽³⁾	Identified as priority hazardous substance
(1)	15972-60-8	240-110-8	Alachlor	
(2)	120-12-7	204-371-1	Anthracene	X
(3)	1912-24-9	217-617-8	Atrazine	
(4)	71-43-2	200-753-7	Benzene	
(5)	not applicable	not applicable	Brominated Diphenylether ⁽⁴⁾	X ⁽⁵⁾
	32534-81-9	not applicable	Pentabromodiphenylether (cogener numbers 28, 47, 99, 100, 153 and 154)	
(6)	7440-43-9	231-152-8	Cadmium and its compounds	X
(7)	85535-84-8	287-476-5	Chloroalkanes C ₁₀₋₁₃ ⁽⁴⁾	X
(8)	470-90-6	207-432-0	Chlorfenvinphos	
(9)	2921-88-2	220-864-4	Chlorpyrifos (Chloropyrifos-ethyl)	
(10)	107-06-2	203-458-1	1,2-dichloroethane	
(11)	75-09-2	200-838-9	Dichloromethane	
(12)	117-81-7	204-211-0	Di(2-ethylhexyl)phthalate (DEHP)	
(13)	330-54-1	206-354-4	Diuron	
(14)	115-29-7	204-079-4	Endosulfan	X
(15)	206-44-0	205-912-4	Fluoranthene ⁽⁶⁾	
(16)	118-74-1	204-273-9	Hexachlorobenzene	X
(17)	87-68-3	201-765-5	Hexachlorobutadiene	X
(18)	608-73-1	210-158-9	Hexachlorocyclohexane	X
(19)	34123-59-6	251-835-4	Isoproturon	
(20)	7439-92-1	231-100-4	Lead and its compounds	
(21)	7439-97-6	231-106-7	Mercury and its compounds	X
(22)	91-20-3	202-049-5	Naphthalene	
(23)	7440-02-0	231-111-14	Nickel and its compounds	
(24)	25154-52-3	246-672-0	Nonylphenol	X
	104-40-5	203-199-4	(4-nonylphenol)	X
(25)	1806-26-4	217-302-5	Octylphenol	
	140-66-9	not applicable	(4-(1,1',3,3'-tetramethylbutyl)-phenol)	
(26)	608-93-5	210-172-5	Pentachlorobenzene	X
(27)	87-86-5	231-152-8	Pentachlorophenol	
(28)	not applicable	applicable	Polyaromatic hydrocarbons	X
	50-32-8	200-028-5	(Benzo(a)pyrene)	X
	205-99-2	205-911-9	(Benzo(b)fluoranthene)	X
	191-24-2	205-883-8	(Benzo(g,h,i)perylene)	X
	207-08-9	205-916-6	(Benzo(k)fluoranthene)	X
	193-39-5	205-893-2	(Indeno(1,2,3-cd)pyrene)	X
(29)	122-34-9	204-535-2	Simazine	
(30)	not applicable	not applicable	Tributyltin compounds	X
	36643-28-4	not applicable	(Tributyltin-cation)	X
(31)	12002-48-1	234-413-4	Trichlorobenzenes	
(32)	67-66-3	200-663-8	Trichloromethane (chloroform)	
(33)	1582-09-8	216-428-8	Trifluralin	

(1) CAS: Chemical Abstracts Service.

(2) EU number: European Inventory of Existing Commercial Substances (Einecs) or European List of Notified Chemical Substances (Eilincs).

(3) Where groups of substances have been selected, typical individual representatives are listed as indicative parameters (in brackets and without number). For these groups of substances, the indicative parameter must be defined through the analytical method.

(4) These groups of substances normally include a considerable number of individual compounds. At present, appropriate indicative parameters cannot be given.

(5) Only Pentabromobiphenylether (CAS-number 32534-81-9).

(6) Fluoranthene is on the list as an indicator of other, more dangerous polyaromatic hydrocarbons.

Based on Annex II of Directive 2008/105/EC