

Common Implementation Strategy for the Water Framework Directive (2000/60/EC)



Identification of water bodies

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Horizontal guidance document on the application of the term
"water body" in the context of the Water Framework Directive

15 January 2003¹

¹ This final version was agreed on the meeting of the Water Directors on 21/22 November 2002 in Copenhagen. The text will undergo a linguistic review and a formatting and consistency check before its final publication.

Foreword

The EU Member States, Norway and the European Commission have jointly developed a common strategy for supporting the implementation of the Directive 2000/60/EC establishing a framework for Community action in the field of water policy (hereafter referred to as Common Implementation Strategy (CIS) for the Water Framework Directive (WFD)). The main aim of this strategy is to allow a coherent and harmonious implementation of this Directive. Focus is on methodological questions related to a common understanding of the technical and scientific implications of the Water Framework Directive.

One of the main short-term objectives of the strategy is the development of non-legally binding and practical guidance documents on various technical issues of the Directive. These guidance documents are targeted to those experts who are directly or indirectly implementing the Water Framework Directive in river basins. The structure, presentation and terminology is therefore adapted to the needs of these experts and formal, legalistic language is avoided wherever possible.

In the context of the above-mentioned strategy, the European Commission (Directorate General for Environment, Unit B.1) was invited to set up an informal process for drafting a horizontal guidance on the application of the term "water body" which is defined in the Directive. This term is essential for several aspects of implementation, such as the typology, the reference conditions, the classification of the status and the monitoring.

A drafting group was established in March 2002 and a first draft was discussed on the Strategic Co-ordination Group meeting in April 2002 and the meeting of the Water Directors in June 2002. Following this meeting in Valencia, the members of the Strategic Co-ordination Group were invited to comment the draft paper in two rounds and revised versions were presented in each meeting of the group. In addition, the Expert Advisory Forum (EAF) on Groundwater discussed and contributed twice to the refinement of the groundwater section in this document.

Due to the active and constructive contribution of all experts in the drafting group, the EAF Groundwater and the Strategic Co-ordination Group, it was possible to present the final draft of the horizontal guidance document on "water bodies" to the meeting in Copenhagen, where the Water Directors reached the following conclusions:

"We, the water directors of the European Union, Norway, Switzerland and the countries applying for accession to the European Union, have examined and endorsed this guidance during our informal meeting under the Danish Presidency in Copenhagen (21/22 November 2002). We would like to thank the participants of the Working Group and, in particular, the leaders of the Directorate General for Environment of the European Commission for preparing this high quality document.

We strongly believe that this and other guidance documents developed under the Common Implementation Strategy will play a key role in the process of implementing the Water Framework Directive.

This guidance document is a living document that will need continuous input and improvements as application and experience build up in all countries of the European Union and beyond. We agree, however, that this document will be made publicly available in its current form in order to present it to a wider public as a basis for carrying forward ongoing implementation work.

Moreover, we welcome that several volunteers have committed themselves to test and validate this and other documents in the so-called pilot river basins across Europe during 2003 and 2004 in order to ensure that the guidance is applicable in practice.

We also commit ourselves to assess and decide upon the necessity for reviewing this document following the pilot testing exercises and the first experiences gained in the initial stages of the implementation."

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1 Introduction

1.1 Background to guidance

The Water Framework Directive (2000/60/EC) is a comprehensive piece of legislation that sets out, inter alia, clear quality objectives for all waters in Europe. In order to make the implementation of the Directive, and the compliance checking of its quality objectives, operational, the concept of "water bodies" has been introduced as the key units to which a number of the Directive's requirements are related.

Several of the working groups of the Common Implementation Strategy for the Water Framework Directive (2000/60/EC) have requested horizontal guidance from the European Commission on the interpretation and application of the term water body. The working groups have asked for such guidance in order to assist them in the preparation of their own guidance on issues such as reference conditions and intercalibration.

In addition, several Member States have contributed to discussions on the application of the term water body, and a number of documents have been produced. These are listed in the Annex to this paper, and are available on the WFD CIRCA system where electronic formats are available. These discussions have revealed that there are different views among Member States on the interpretation, and consequently practical application, of the term water body.

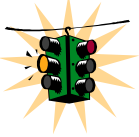
1.2 Purpose of guidance

The purpose of this guidance document is to build on these discussions to develop a common understanding of the definition of water bodies and specific practical suggestions for the identification of water bodies under the Water Framework Directive.

1.3 Structure of guidance

The following section on the background includes general considerations applicable to surface and groundwater. However, the Directive's requirements for characterising, and its objectives for, surface water bodies and bodies of groundwater are different. These differences affect the way the respective water bodies should be identified. Hence, the guidance paper is therefore divided into two main sections. Section 3 provides guidance on the application of the term surface water body. Section 4 provides guidance on the application of the term body of groundwater.

Each section is structured so that it describes the **principles** involved in, and a **hierarchical process** for, sub-dividing river basin districts into water bodies. The main steps in the proposed hierarchies are summarised in **Figure 7** and **Figure 11**.

	<p><i>Look out! The methodology from this Guidance Document must be adapted to regional and national circumstances</i></p> <p><i>The Guidance Document proposes an overall pragmatic approach. Because of the diversity of circumstances within the European Union, Member States may apply this guidance in a flexible way in answer to problems that will vary from one river basin to the next. This proposed guidance will therefore need to be tailored to specific circumstances.</i></p>
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Having said that, it should be clear that the identification of water bodies must be consistent and co-ordinated within a river basin district. In particular, international river basin districts need to develop common approaches for the whole river basin.

2 Background

2.1 Purpose of identifying "water bodies"

The Water Framework Directive covers **all** waters, including inland waters (surface water and groundwater) and transitional and coastal waters up to one sea mile (and for the chemical status also territorial waters which may extend up to 12 sea miles) from the territorial baseline of a Member State, independent of the size and the characteristics².

This totality of waters is, for the purpose of the implementation of the directive, attributed to geographical or administrative units, in particular the **river basin**, the **river basin district**, and the **"water body"**³. In addition, groundwaters and stretches of coastal waters must be associated with a river basin (district).

Whereas the river basin is the geographical area related to the hydrological system, the river basin district must be designated by the Member States in accordance to the directive as the **"main unit for management of river basins"**⁴.

One key purpose of the Directive is to prevent further deterioration of, and protect and enhance the status of aquatic ecosystems, and with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. The success of the Directive in achieving this purpose and its related objectives will be mainly measured by the status of "water bodies". "Water bodies" are therefore the units that will be used for reporting and assessing compliance with the Directive's principal environmental objectives. However, it should be emphasised that the identification of a "water body" is a tool not an objective in itself.

The "water body" should be a coherent sub-unit in the river basin (district) to which the environmental objectives of the directive must apply. Hence, the main purpose of identifying "water bodies" is to enable the status to be accurately described and compared to environmental objectives⁵.

It should be clear that the identification of water bodies is, first and foremost, based on geographical and hydrological determinants. However, the identification and subsequent classification of water bodies must provide for a sufficiently accurate description of this defined geographic area to enable an unambiguous comparison to objectives of the Directive. This is because the environmental objectives of the Directive, and the measures needed to achieve them, apply to "water bodies". A key descriptor in this context is the "status" of those bodies. If water bodies are identified that do not permit an accurate description of the status of aquatic ecosystems, Member States will be unable to apply the Directive's objectives correctly (Figure 1). At the same time, an endless sub-division of water bodies should be avoided in order to reduce administrative burden if it does not fulfil any purpose as regards the proper implementation of the Directive. In addition, the aggregation of water bodies may, under certain circumstances, also help to reduce meaningless administrative burden, in particular for smaller water bodies (cf. chapter 5).

² Articles 2 (1), (2) and (3)

³ Articles 2 (13), (15), (10), and (12) respectively

⁴ Article 2 (15)

⁵ An estimate of the status of water bodies will be required to assess the likelihood that they will fail to meet the environmental quality objectives set for them under Article 4 [Article 5; Annex II 1.5 & 2]. The status of water bodies must be classified using information from the monitoring programmes [Article 8, Annex V 1.3, 2.2 & 2.4]. The status of water bodies must be reported in the river basin management plans [Article 13, Annex VII] and, where necessary, measures must be prepared [Article 11, Annex VI].

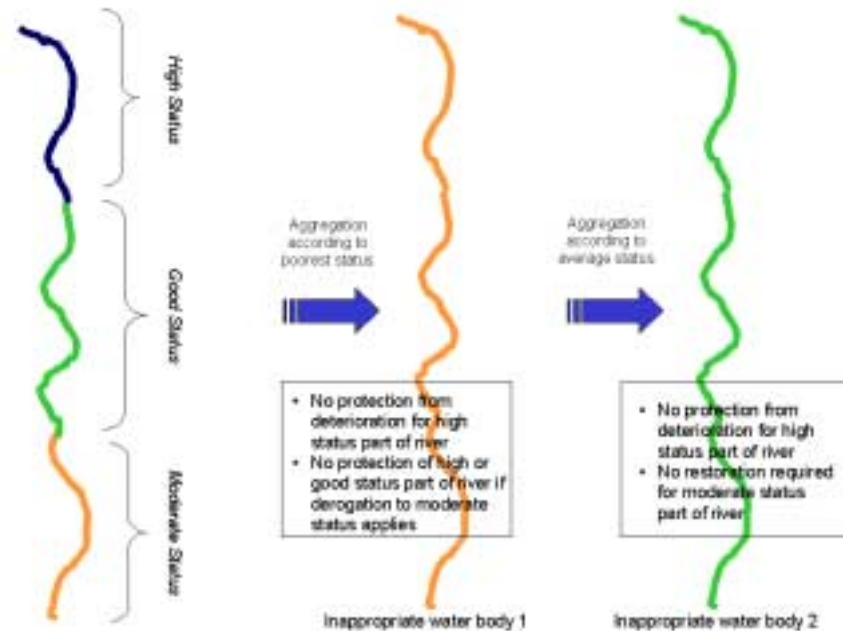
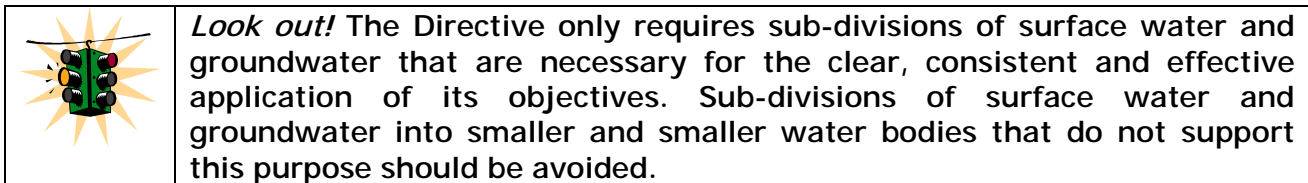


Figure 1: Illustration of the implications for the objectives of the Directive if “water bodies” do not provide for the accurate description of surface water status

2.2 Timetable and refinement for the identification of water bodies

The identification of water bodies should be an iterative and on-going process. The water bodies that Member States are required to identify by 22 December 2004⁷ and report to the Commission by 22 March 2005⁶ will be only a first step. Where necessary, water body identification should be verified and refined in the period before the publication of each river basin management plan.

The Directive requires Member States to identify “water bodies” as part of the analysis of the characteristics of the river basin districts⁷. The first such analysis must be complete by 22 December 2004. The analysis must be reviewed, and where necessary, updated by 22 December 2013 and then every six years.

However, identifying water bodies that will provide for an accurate description of the status of surface water and groundwater will require information from the Article 5 analyses and reviews, and the Article 8 monitoring programmes. Some of the necessary information will not be available before 2004. The information that is available is likely to be updated and improved in the period prior to the publication of each river basin management plan.

It is evident that for the first RBMP, all waters must be assigned to water bodies and their status must be described⁸. However, practical approaches may be required in particular for large numbers

⁶ Article 15.2

⁷ Article 5, Annex II 1.1 & 2

⁸ cf. Guidance document on monitoring (CIS Working Group 2.7).

of pristine waters in remote areas where it can be demonstrated that no significant pressure exist (see also section 5).

In conclusion, verification and refinement steps of water body identification should be foreseen in the implementation process.

3 Specific guidance on surface water bodies

3.1 Definition of body of surface water

Article 2.10 of the Directive provides the following definition of a body of surface water:

*"Body of surface water" means a **discrete and significant element** of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water.*

The application of the definition requires the sub-division of surface water⁹ in river basin (districts¹⁰) into "discrete and significant elements". Although examples of such elements are given ("such as a lake, a reservoir, a stream, river or canal"), the Directive does not provide explicit guidance on how to identify the elements that should be regarded as "discrete and significant", and hence "water bodies". For example, it does not specify how to identify **part** of a river, stream or canal that represents a "discrete and significant element".

The use of the terms "discrete and significant" in the definition of "surface water body" means that "water bodies" are not arbitrary sub-divisions of river basin districts. Each water body should be identified on the basis of its "discreteness and significance" in the context of the Directive's purposes, objectives and provisions.

3.2 Technical interpretation of discrete and significant element

General considerations in relation to the definition and the characterisation requirements for surface water bodies¹¹ establish a number of specific requirements relevant to the identification of discrete and significant elements. These also present a certain hierarchy of definitions which should be in the identification process. They are summarised in the following paragraphs.

3.2.1 Discrete element

For a surface water body to be a discrete element of surface water, they must not overlap with each other or be composed of elements of surface water that are not contiguous.

It is evident that a water body must be discrete **and** significant at the same time, the element of discreteness is not sufficient on its own. In addition, the considerations regarding the aggregation of water bodies may be applied under certain circumstances, in particular for small "water bodies" (cf. chapter 5).

3.2.2 Surface water categories

A surface water body must not be split between different surface water categories (rivers¹², lakes¹³, transitional waters¹⁴ and coastal waters¹⁵). It must be of one category

⁹ Article 2.1

¹⁰ Article 3.1

¹¹ Annex II 1

¹² Article 2.4

or another¹⁶. The boundary of a water body may be established where two different category "meet". (Figure 2)

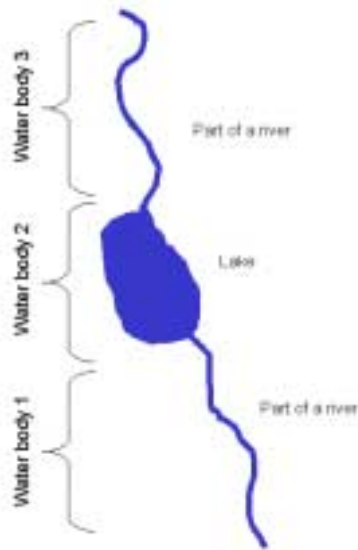


Figure 2: The boundaries to the categories of surface water create boundaries to water bodies

3.2.3 Typology¹⁷

A surface water body must not cross the boundaries between surface water body types. It must be of one type or another since one purpose of characterising surface water bodies is to differentiate them into types¹⁸.

3.2.4 Physical characteristics delineating discrete and significant elements

Physical features (geographical or hydromorphological) that are likely to be significant in relation to the objectives of the Directive should be used to identify discrete elements of surface water.

Geographical or hydromorphological features can significantly influence surface water ecosystems and their vulnerability to human activities. These features can also differentiate discrete elements of surface water. For example, the confluence of one part of a river with another could clearly demarcate a geographically and hydromorphologically distinct boundary to a water body (Figure 3).

¹³ Article 2.5

¹⁴ Article 2.6

¹⁵ Article 2.7

¹⁶ Annex II 1.1(i)

¹⁷ CIS WGs 2.3 and 2.4 are developing guidance on the application of typology systems

¹⁸ Annex II 1.1 (ii)

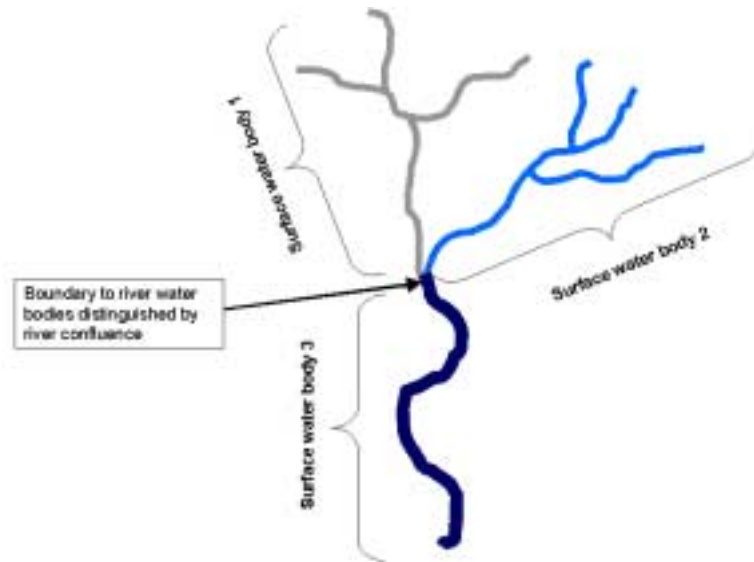


Figure 3: Example of the sub-division of a river on the basis of physical features – in this case a river confluence.

However, the Directive does not exclude other elements, such as a part of a lake or part of transitional water, from being considered as water bodies. For example, if part of a lake is of a different type to the rest of the lake, the lake must be sub-divided into more than one surface water body (Figure 4).

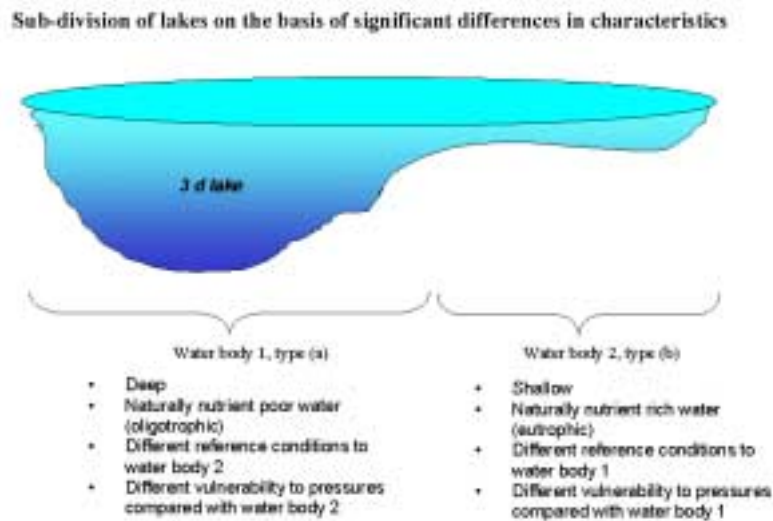


Figure 4: Sub-division of a lake on the basis of a type boundary

3.2.5 Heavily modified and artificial water bodies¹⁹

Heavily modified water bodies may be identified and designated where good ecological status is not being achieved because of impacts on the hydromorphological characteristics of a surface water resulting from physical alterations (Figure 5).

Heavily modified and artificial water bodies²⁰ must be (at least) provisionally identified during the characterisation of surface waters²¹. Their identification and designation should be finalised for the purposes of the first river basin planning cycle on publication of the river basin management plans in 2009. The designations must be reviewed every six years²².

The identification of heavily modified water bodies must be based on the designation criteria set out in Article 4.3. In principle, the boundaries of heavily modified water bodies are primarily delineated by the extent of changes to the hydromorphological characteristics that (a) result from physical alterations by human activity and (b) prevent the achievement of good ecological status.

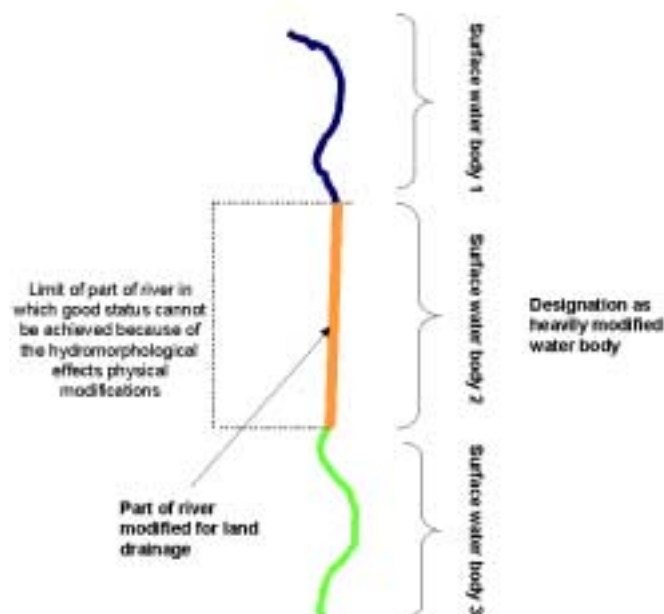


Figure 5: The establishment of water body boundaries through the identification and subsequent designation of heavily modified water bodies

3.2.6 Summary

The above-mentioned criteria can be directly drawn from the Directive. They represent a hierarchy of definitions that is already sufficient to enable a first identification of "water bodies" in the river basin (districts). As first step, the water category and the water body type should be used to draw the boundaries resulting in discrete "water bodies". In a subsequent step, geographical and hydromorphological elements could be considered. However, if such an approach does not lead to a meaningful delineation of "water bodies", other criteria could be used. These other criteria are described in the subsequent section.

¹⁹ CIS Working Group 2.2 is developing detailed guidance on the identification and designation of heavily modified water bodies

²⁰ Article 2.9

²¹ Annex II 1.1(i)

²² Article 4.3

3.3 Other criteria for delineating surface water bodies

The Water Framework Directive provides for the above-mentioned criteria (cf. section 3.2) to identify water bodies. However, there are other considerations or parameters which will help to improve the delineation of meaningful water body boundaries. One requirement that is implicit in the Directive is that the purpose of identifying "water bodies" is to enable the **status**²³ of surface waters to be accurately described. Related to this requirement, there are considerations regarding **pressures** and **impacts**. Furthermore, different **uses** (e.g. drinking waters) and existing or new **protected areas** (e.g. Natura 2000 sites) may be used in the refinement of the "water body" identification. The subsequent sections will focus on aspects of status and protected areas. However, it should be noted that the questions of pressures, status and impacts are closely inter-linked. In the absence of sufficient information on the water status, the results of the pressure and impact analysis²⁴ may be used for identifying meaningful water body boundaries. This will mainly apply for the preparation of the first characterisation.

Member States may identify "surface water bodies" using additional criteria designed to take account of local circumstances and therefore assist in the river basin management planning process.

3.3.1 Status criteria

A discrete element of surface water should not contain significant elements of different status. A "water body" must be capable of being assigned to a single ecological status class with sufficient confidence and precision through the Directive's monitoring programmes²⁵.

Although effects of human activities will always vary no matter what the size of a water body, major changes in the status of surface water should be used to delineate surface water body boundaries as necessary to ensure that the identification of water bodies provides for an accurate description of surface water status (see Section 2 and Figure 6).

It is clearly possible to progressively subdivide waters into smaller and smaller units that would impose significant logistic burdens. However, it is not possible to define the scale below which subdivision is inappropriate. It will be necessary to balance the requirement to adequately describe water status with the need to avoid the fragmentation of surface waters into unmanageable numbers of water bodies. In addition, the aggregation of water bodies may be appropriate, under certain circumstances, to reduce meaningless administrative burden (cf. chapter 5). In the end, it is a matter for Member States to decide on the basis of the characteristics of each River Basin District.

Initially, Member States will not have sufficient information to accurately define the status of waters. Consequently, especially during the period prior to the publication of the first River Basin Management Plan, it may be appropriate to use the analysis on pressures and impacts as a surrogate for status. As understanding of status improves, the boundaries of water bodies can be adjusted. Contiguous elements of surface water within a type that are of the same status may be recombined to avoid unnecessary sub-division of surface waters.

²³ respectively **potential** for artificial and heavily modified water bodies

²⁴ *CIS Working Group 2.1 is developing guidance for the analysis of pressures and impacts.*

²⁵ *CIS Working Groups 2.3, 2.4 and 2.5 are developing guidance on the classification of ecological status and CIS WG 2.7 is developing guidance for monitoring.*

Finally, it is emphasised that the scale chosen for a particular "water body" will have influence on the management of the active involvement of stakeholders and the public²⁶.

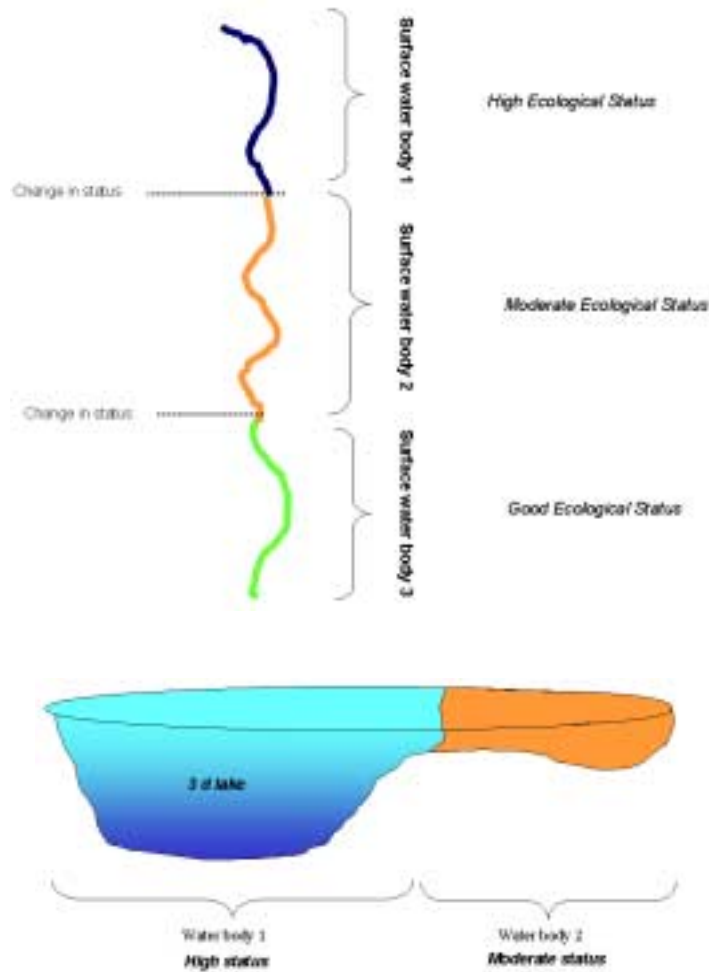


Figure 6: Identification of water bodies according to differences in status

3.3.2 Protected areas

Protected areas are identified under various pieces of legislation such as *inter alia* Natura 2000 sites designated under the Habitat Directive - (92/43/EC). Under the Water Framework Directive, all the protected areas must be considered for an integrated river basin management²⁷. Specific objectives²⁸ were defined and various provisions specify more specific requirements for protected areas (e.g. monitoring²⁹). In consequence, there are additional objectives to be considered for water bodies which are also fully part of a protected area. Hence, the existing boundaries of protected areas may be considered for the identification of water bodies under the Water Framework Directive.

²⁶ CIS Working Group 2.9 is developing a guidance on public participation.

²⁷ Article 6, 7 and Annex IV

²⁸ Article 4 (1) c

²⁹ Annex V, point 1.3.5

The boundaries of water bodies and protected areas will, in most cases, not coincide because both geographical areas are being defined for different purposes on the basis of different criteria. In case a water body would not fully be inside or outside a protected area, it may be considered to sub-divide the water bodies into two parts so that the boundaries coincide.

3.4 Suggested process for the practical application of the term surface water body.

The principles described above for the identification of surface water bodies can be applied in a hierarchical process (see Figure 7).

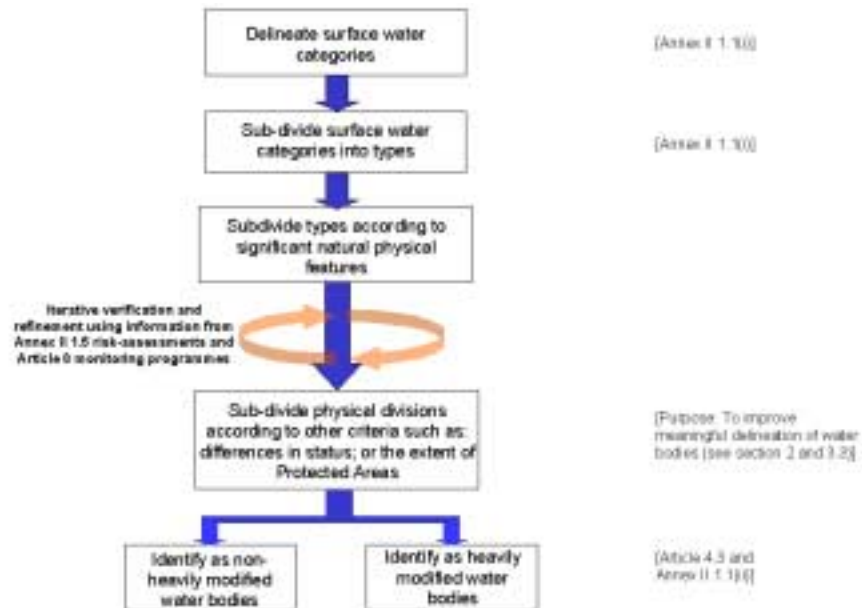


Figure 7: Summary of suggested hierarchical approach to the identification of surface water bodies

To ensure that water bodies do not cross the boundaries of surface water categories (Paragraph 3.2.2), the **suggested first step** in delineating surface water bodies is to identify the boundaries of the surface water categories.

To ensure that water bodies do not cross the boundaries of surface water types (Paragraph 3.2.3), the **suggested second step** in delineating surface water bodies is to identify the boundaries of the surface water types in each river basin district.

To ensure that water bodies represent discrete and significant elements of surface waters, the **suggested third step** in delineating them is to identify boundaries using distinct physical features (Paragraph 3.2.4) that are (a) likely to be significant in the context of aquatic ecosystem characteristics, and (b) are consistent with the examples of discrete and significant elements of surface water given in the Directive's definition (see Section 5.1).

In order to ensure that water bodies are identified in a meaningful way, the **suggested fourth step** in identifying surface water bodies is to identify boundaries on the basis of other relevant criteria (cf. Section 3.3). This approach is also necessary for the identification of heavily modified water bodies (see Section 3.2.5). Initially, in the case of absence of information on status, the pressure and impact assessment³⁰ procedure required under Article 5 will provide estimates of

³⁰ Annex II 1.5; CIS Working Group 2.1 is developing guidance on impact assessment

status changes. The monitoring programmes³¹ will provide the information necessary to confirm status-based boundaries. Hence, an iterative approach for identifying water bodies should be applied. At the same time, it is evident that the delineation of water bodies must be finally agreed at a certain point in time in order to enable the preparation of the river basin management plan. The competent authorities of a river basin district will have to ensure that a balance between an iterative identification and the final assignment of water bodies is achieved.

3.5 Small elements of surface water

The purpose of the Directive is to establish a framework for the protection of **all** waters including inland surface waters, transitional waters, coastal waters and groundwater³². Member States must ensure that the implementation of the Directive's provisions achieves this purpose. However, surface waters include a large number of very small waters for which the administrative burden for the management of these waters may be enormous. .

The Directive does not include a threshold for very small "water bodies". However, the Directive sets out two systems for differentiating water bodies into types³³, System A and System B. Only the System A typology specifies values for size descriptors for rivers and lakes. The smallest size range for a System A river type is 10 – 100 km² catchment area³⁴. The smallest size range for a System A lake type is 0.5 – 1 km² surface area³⁵. No sizes for small transitional and coastal waters are given. The application of system B must achieve, at least, the same level of differentiation as system A. It is therefore recommended to use the size of small rivers and lakes according to system A. However, it is recognised that in some regions where there are many small water bodies, this general approach will need to be adapted. Having said that, it may be appropriate to aggregate water bodies into groups for certain purposes as outlined in chapter 5 in order to avoid unnecessary administrative burden.

However, there are still large numbers of discrete rivers and lakes that are smaller than these thresholds. A possible approach for the protection of these waters is outlined below.

Member States have flexibility to decide whether the purposes of the Directive, which apply to all surface waters, can be achieved without the identification of every minor but discrete and significant element of surface water as a water body.

A suggested approach (see Figure 8) is to:

- include small elements of surface water as part of a contiguous larger water body of the same surface water category and of the same type, where possible.
- where this is not possible, screen small elements of surface water for identification as water bodies according to their significance in the context of the Directive's purposes and provisions (e.g. ecological importance; importance to the objectives of a Protected Area, significant adverse impacts on other surface waters in the river basin district). In such a case, small elements; (1) belonging to the same category and type, (2) influenced by the same pressure category and level and (3) having an influence on another well-delimited water body, may be grouped for assessment and reporting purposes.

³¹ Article 8

³² Article 1

³³ Annex II 1.2

³⁴ Annex II 1.2.1

³⁵ Annex II 1.2.2

- for those small elements of surface water not identified as surface water bodies, protect, and where necessary improve them to the extent needed to achieve the Directive's objectives for water bodies to which they are directly or indirectly connected (i.e. apply the necessary basic control measures under Article 11)³⁶.

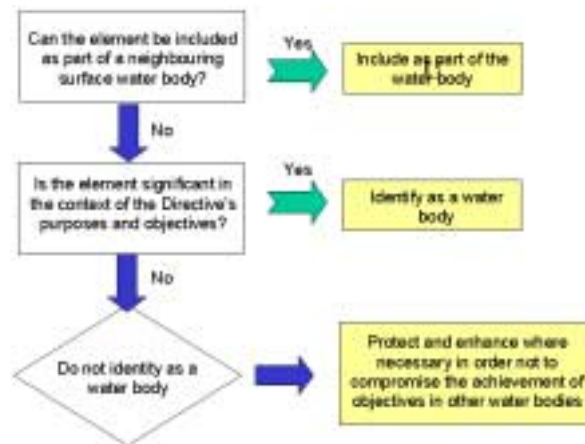


Figure 8: A suggested approach to ensuring appropriate protection of smallest surface waters

3.6 Components of a "surface water body" and wetlands

A "surface water body" comprises the quality elements described in the Directive for the classification of ecological status³⁷.

In concrete terms this means that, e.g., a river water body comprises:

- the hydromorphological quality elements, which include the water flow, the bed of the channel, that part of the land adjacent to the channel that's structure and condition is directly relevant to the achievement of the values for the biological quality elements (i.e. the riparian zone), and
- the relevant biological elements.

In relation to wetlands, this means that those wetlands must be associated with a "water body", which are directly influencing the status of the related "water body". The boundaries of such wetlands must be identified in a pragmatic way in order to meet the requirement of a "discrete and significant" element.

The question of wetlands in the context of the Water Framework Directive will be subject to a separate horizontal guidance documents under the umbrella of the Common Implementation Strategy. It is recommended that this guidance on wetlands, which will emerge in the first half of 2003, should develop the understanding of wetlands as a component of a surface water in more detail.

³⁶ The Article 4.1(a)(iii) priority substances objectives apply to all surface waters regardless of whether they are identified as surface water bodies.

³⁷ Annex V 1.1 & Annex V 1.2

4 Specific guidance on bodies of groundwater

4.1 Definitions

The application of the term body of groundwater must be understood in the context of the hierarchy of relevant definitions provided under Article 2 of the Directive.

- Article 2.2: **Groundwater** means all water, which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
- Article 2.11: **Aquifer** means a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
- Article 2.12: **Body of groundwater** means a distinct volume of groundwater within an aquifer or aquifers.

A body of groundwater must be within an aquifer or aquifers. However, not all groundwater is necessarily within an aquifer.

The environmental objectives of preventing deterioration of³⁸, and protecting, enhancing and restoring,³⁹ good groundwater status apply only to bodies of groundwater. However, all groundwater is subject to the objectives of preventing or limiting inputs of pollutants⁴⁰ and reversing any significant and sustained upward trend in the concentration of any pollutant⁴¹.

4.2 Aquifers

As a consequence of the hierarchy of definitions (Section 4.1), the **suggested first step** in the identification of bodies of groundwater requires a general interpretation of the term aquifer, in respect what constitutes a significant flow of groundwater and what volume of abstraction would qualify as a significant quantity (see Figure 9).

4.2.1 Significant flow

The significance of groundwater flow should be understood in the context of the purpose and provisions of the Directive. Accordingly, a significant flow of groundwater is one that, were it from reaching an associated surface water body or a directly dependant terrestrial ecosystem, would result in a significant diminution in the ecological or chemical quality of that surface water body or significant damage to the directly dependent terrestrial ecosystems.

A key purpose of the Directive is to prevent further deterioration of, and protect and enhance the status of aquatic ecosystems, and with regard to their water needs, terrestrial ecosystems directly depending on aquatic ecosystems⁴². The objective of protecting and restoring good groundwater status⁴³ is designed to help achieve this purpose. It applies to all bodies of groundwater. Consequently, to ensure that the purpose of the Directive can be achieved, the definition of significant flow must encompass all groundwater flow that is important to aquatic and terrestrial ecosystems. Geological strata that permit such flow should therefore qualify as aquifers.

³⁸ Article 4.1(b)(i)

³⁹ Article 4.1(b)(ii)

⁴⁰ Article 4.1(b)(i)

⁴¹ Article 4.1(b)(iii)

⁴² Article 1(a)

⁴³ Annex V 2.1.2 & 2.3.2

4.2.2 Abstraction of significant quantities of groundwater

Article 7 requires the identification of all groundwater bodies used, or intended to be used, for the abstraction of more than 10 m³ of drinking water a day as an average. By implication, this volume could be regarded as a significant quantity of groundwater. Geological strata capable of permitting such levels of abstraction (even only locally) would therefore qualify as aquifers.

If either of the criteria described in Paragraphs 4.2.1 or 4.2.2 are satisfied, the geological strata should be regarded as an aquifer. Most geological strata would be expected to qualify as aquifers as most supply or are intended to supply 10 m³ a day as an average or could serve 50 or more people.

However, it is clear that the requirements are different as regards those groundwater bodies which are being used or are intended to be used for drinking water abstraction (cf. Article 7) and those bodies where groundwater is abstracted for other uses (cf. Annex II 2.3). For the latter, not all groundwater bodies would be identified. The criteria in Annex II 2.3 specify, that only those groundwater bodies must be addressed "*which cross the boundary between two or more Member States or are identified [...] as being at risk of failing to meet the objectives set for each body under Article 4*".

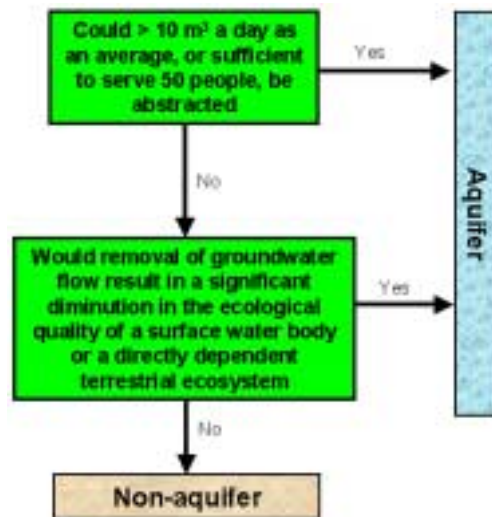


Figure 9: The Directive's definition of aquifer requires two criteria to be considered in determining whether geological strata qualify as aquifers. If either of the criteria is met, the strata will constitute an aquifer or aquifers. In practice, the criteria mean that nearly all groundwater in the Community would be expected to be within aquifers.

4.3 Delineation of bodies of groundwater

The Directive's definition of the term body of groundwater does not provide explicit guidance on how bodies should be delineated.

The delineation of bodies of groundwater must ensure that the relevant objectives of the Directive can be achieved. This does not mean that a body of groundwater must be delineated so that it is homogeneous in terms of its natural characteristics, or the concentrations of pollutants or level alterations within it. However, bodies should be delineated in a way that enables an appropriate description of the quantitative and chemical status of groundwater.

The delineation of bodies of groundwater should ensure that groundwater quantitative status⁴⁴ can be reliably assessed. In some circumstances, quantitative status may be determined using long-term monitoring data. In other cases, an estimation of the available groundwater resource will require a water balance calculation (see CIS 2.7 Monitoring Chapter 4). Delineating bodies of groundwater in such a way that any groundwater flow from one groundwater body to another (a) is so minor that it can be ignored in water balance calculations; or (b) can be estimated with adequate precision will facilitate the assessment of quantitative status.

Member States will need to take into account the particular characteristics of their aquifers when delineating bodies of groundwater. For example, the flow characteristics of some geological strata, such as karst and fractured bedrock, are much more complex and difficult to predict than others. The delineation of water bodies should therefore be regarded as an iterative process, refined over time to the extent needed to adequately assess and manage risks to the achievement of the Directive's objectives.

It may also be the case that there is substantial flow between strata with very different characteristics (e.g. karst and sandstone). The properties of these different strata may mean that they require very different management approaches to achieve the objectives of the Directive. In such cases, Member States may wish to delineate water body boundaries that coincide with the boundaries between the strata. In doing so, Member States should ensure that their ability to adequately assess quantitative status is not compromised.

4.3.1 Geological boundaries

Bearing in mind the above, the starting point for identifying the geographical boundaries of a groundwater body should be geological boundaries to flow, unless the description of status and the effective achievement of the Directive's environmental objectives for groundwater require sub-division into smaller groundwater bodies.

4.3.2 Other hydraulic boundaries

Sub-divisions of an aquifer or aquifers that cannot be based on geological boundaries should be based initially on groundwater highs or, where necessary, on groundwater flow lines (Figure 10).

4.3.3 Taking account of differences in status

The objectives for bodies of groundwater, and the measures required to achieve them, depend on the existing status of the bodies. The bodies should be units of one chemical and one quantitative status that can be characterised and managed to allow the effective achievement of the Directive's objectives. Major changes in the status of groundwater should therefore be taken into account when delineating groundwater body boundaries to ensure that, as far as practical, water bodies provide for an accurate description of groundwater status. In doing so, Member States should bear in mind the need to ensure that groundwater quantitative status can be reliably assessed (see Section 2). Where status is consistent, large bodies of groundwater may be delineated. Where status differences are reduced during a planning cycle, Member States may recombine subdivisions of groundwater of the same status for the purposes of subsequent planning cycles. **However, water bodies must at least be fixed for each plan period.**

Initially, Member States will not have sufficient information to accurately define the status of groundwater. Consequently, especially during the period prior to the publication of the first River Basin Management Plan, it may be appropriate to use the analysis of pressures and impacts⁴⁵ as an indicator of status. As understanding of status improves, the boundaries of groundwater bodies should be reviewed as part of the analyses required under Article 5 prior to the publication of each river basin management plan.

⁴⁴ Annex V 2.1.2. Quantitative status requires assessment of the available groundwater resource [Article 2.27]. This requires a water balance calculation.

⁴⁵ Article 5 and Annex II(2)

It is clearly possible to progressively subdivide the groundwater in aquifers into smaller and smaller units and thereby create significant logistical burdens. However, it is not possible to define a universally applicable scale below which subdivision is inappropriate.

The degree of subdivision of groundwater into bodies of groundwater is a matter for Member States to decide on the basis of the particular characteristics of their River Basin Districts. In making such decisions, it will be necessary for Member States to balance the requirement to adequately describe groundwater status with the need to avoid the fragmentation of aquifers into unmanageable numbers of water bodies.

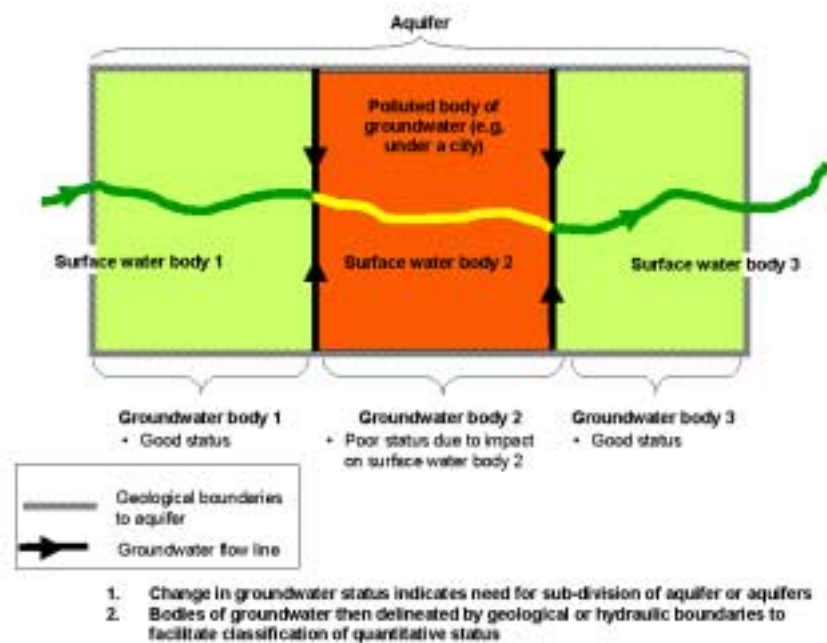


Figure 10: Sub-division of aquifers into bodies of groundwater using hydraulic boundaries

4.4 Upper and lower boundaries to bodies of groundwater

Groundwater bodies should be delineated in three dimensions⁴⁶.

The depth of groundwater within an aquifer or aquifers that needs to be protected and, where necessary, enhanced through its inclusion in a body of groundwater should depend on the risks to the Directive's objectives. This is a matter for Member States to decide based on their assessments of groundwater characteristics and the risks to the Directive's objectives⁴⁷. It should be noted that all groundwater is subject to the 'prevent or limit' objective [Article 4.1(b)(i)] whether or not it is identified as being part of a body of groundwater.

Although most pressures will affect the relatively shallow component of a groundwater flow, groundwater flow at depth can still be important to surface ecosystems - even though this may be over an extended timescale. Human alterations to groundwater flow at depth can affect shallow groundwater and thus potentially the chemical and ecological quality of connected surface

⁴⁶ e.g. Annex II 2.2

⁴⁷ Article 5 and Annex II 2

ecosystems. Deep groundwater may also be an important resource for drinking water or other uses. However, Member States would not be expected to identify deep groundwater as water bodies where that groundwater (a) could not adversely affect surface ecosystems; (b) are not used for groundwater abstraction; (c) was unsuitable for drinking water supply because of its natural qualities or because its abstraction would be technically unfeasible or disproportionately expensive; and (d) could not place the achievement any other relevant objectives at risk.

The Directive's definitions of aquifer and body of groundwater (see Section 4.1) permit groundwater bodies to be identified either (a) separately within different strata overlying each other in the vertical plane, or (b) as a single body of groundwater spanning the different strata. This flexibility enables Member States to adopt the most effective means of achieving the Directive's objectives given the characteristics of their aquifers and the pressures to which they are subject. For example, where there are major differences in status of the groundwater in strata at different depths, it may be appropriate to identify different bodies of groundwater (i.e. one on top of another) to ensure the status of groundwater can be accurately described, and the Directive's objectives appropriately targeted.

Similar criteria should be applied in defining the upper and lower boundaries of the groundwater body as to the geographical boundaries (Section 4.3). In other words, to facilitate the estimation of quantitative status, the upper and lower boundaries should be based first on geological boundaries and then on other hydraulic boundaries such as flow lines.

4.5 Assignment to River Basin Districts

Groundwater bodies must be assigned to a River Basin District⁴⁸.

4.6 Targeting measures within bodies of groundwater

The analyses undertaken in accordance with Article 5 and Annex II of the Directive (see CIS 2.1 IMPRESS guidance), and supplemented by information from the monitoring programmes established under Article 8 (see CIS 2.7 monitoring guidance) will identify those bodies at risk of failing to achieve the Directive's objectives because of specific pressures. This information together with the identification of Protected Areas under Article 6 will enable Member States to target measures on the right pressures in the right parts of their bodies of groundwater. To assist this targeting, Member States may establish zones within which specific measures are required to achieve the Directive's objectives. For example, Article 7 indicates that Member States may establish safeguard zones to help protect water intended for human consumption⁴⁹.

4.7 Suggested process for the practical application of the term body of groundwater

Figure 11 suggests an iterative, hierarchical process for identifying bodies of groundwater based on the principles described in this guidance paper.

⁴⁸ Article 3.1

⁴⁹ Article 7.3

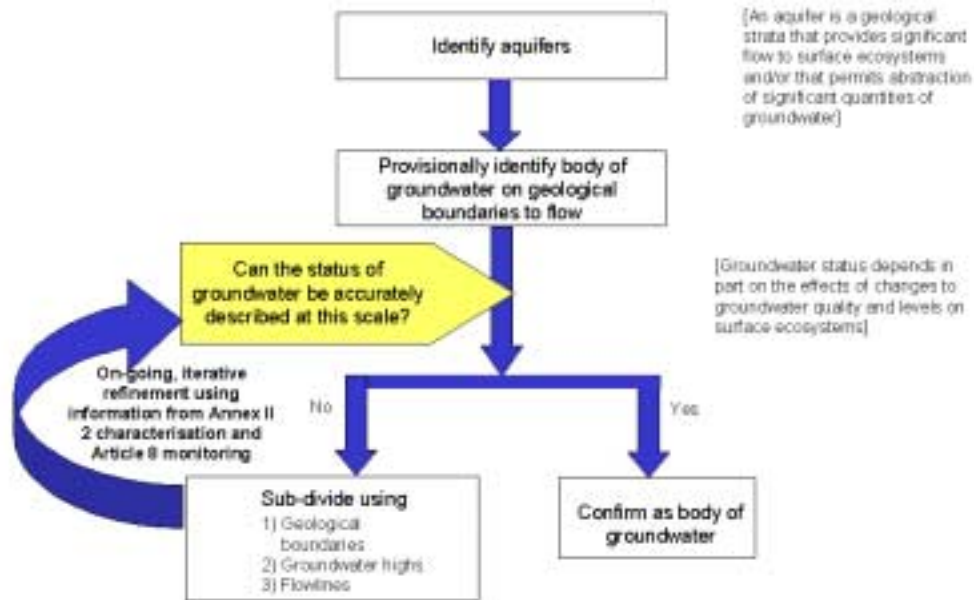


Figure 11: Summary of the suggested hierarchical approach to the identification of bodies of groundwater

5 Aggregation of water bodies

Surface water bodies or bodies of groundwater may each be grouped for the purposes of assessing the risk of failing to achieve the objectives set for them under Article 4 (pressures and impacts)⁵⁰. They may also be grouped for monitoring, reporting and management purposes where monitoring sufficient indicative or representative water bodies in the sub-groups of surface water or groundwater bodies provides for an acceptable level of confidence and precision in the results of monitoring, and in particular the classification of water body status⁵¹.

It is clear that, for management purposes, it may be useful to aggregate water bodies. First practical indications suggest that such an aggregation will also be inevitable when it comes to reporting to the European Commission. At the same time, there are no criteria whether and when such an aggregation is acceptable.

Where contiguous elements of surface water within a type are of the same status, their combination in a single water body will provide for an accurate description of surface water status.

In addition, it will be necessary to apply this aggregation on the basis of clear criteria agreed on river basin district level and in a transparent way. Further details on whether and how aggregation of water bodies for the purpose of reporting is possible need to be discussed and elaborated in the context of the Expert Advisory Forum on Reporting. In the meantime it is recommended to focus particular attention on this issue when testing this guidance document, e.g. in the pilot river basins.

⁵⁰ Annex II 1.5, 2.1 & 2.2. CIS Working Group 2.1 is developing guidance on pressures and impact assessment

⁵¹ Annex V 1.3, 2.2 & 2.4. CIS Working Group 2.7 is developing guidance on monitoring requirements

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