

Exemptions to the Environmental Objectives under the Water Framework Directive allowed for new modifications or new sustainable human development activities (WFD Article 4.7)

Status box

Version no.: 6.0

Date: 30 October 2006

Author(s): Drafting Group on Environmental Objectives and Exemptions (list of members enclosed)

Background:

Further to the Environmental Objectives Paper, the Drafting Group was asked to draw up a document providing guidance for the application of WFD Art. 4.7. A first draft was sent around and discussed in March 2006. In addition, written comments were invited by the end of May, which were discussed on 9 June 2006. Then, the drafting group had the opportunity to react again until 14 July 2006. A new version was discussed at the 5 October SCG-meeting. The current version is the result of the discussions in this SCG meeting.

Request to Water Directors:

The Water Directors are invited to endorse the policy paper on Exemptions to the Environmental Objectives under the Water Framework Directive allowed for new modifications or new sustainable human development activities (WFD Article 4.7)

Contacts: Gilles.Crosnier@ec.europa.eu



COMMON IMPLEMENTATION STRATEGY FOR THE WATER FRAMEWORK DIRECTIVE



EXEMPTIONS TO THE ENVIRONMENTAL OBJECTIVES UNDER THE WATER FRAMEWORK DIRECTIVE

allowed for new modifications or new sustainable human
development activities (WFD Article 4.7)

POLICY PAPER

Disclaimer:

This document has been developed through a collaborative programme involving the European Commission, all the Member States, the Accession Countries, Norway and other stakeholders and Non-Governmental Organisations. The document should be regarded as presenting an informal consensus position on best practice agreed by all partners. However, the document does not necessarily represent the official, formal position of any of the partners. Hence, the views expressed in the document do not necessarily represent the views of the European Commission.

EXEMPTIONS TO THE ENVIRONMENTAL OBJECTIVES UNDER THE WATER FRAMEWORK DIRECTIVE ALLOWED FOR NEW MODIFICATIONS OR NEW SUSTAINABLE HUMAN DEVELOPMENT ACTIVITIES (WFD ARTICLE 4.7)

Contents

1. INTRODUCTION	5
2. SCOPE OF ARTICLE 4.7	6
2.1 What kinds of modifications, alterations and activities are concerned?	6
2.2 What is considered as a deterioration of status and potential?	7
2.3 Does it apply to temporary effects?	8
2.4 Does it apply to small-size projects?	8
2.5 Does it apply to plans and programmes?	8
2.6 How are the effects of the modifications or activities on the water body's status assessed?	9
2.7 What are new sustainable human development activities?	9
2.8 Can article 4.7 be applied to all the water bodies affected by a new modification?	10
2.9 Can article 4.7 be applied to protected areas?	10
3. KEY CONCEPTS	11
3.1 What are "all practicable steps" taken to mitigate the adverse impact on the status of the body of water?	11
3.2 What is an "overriding public interest"?	11
3.3 What kind of aspects should be considered when comparing benefits of achieving environmental objectives under Article 4 with benefits of the new modifications and alterations to human health, to the maintenance of human safety or to sustainable development?	12
3.4 How to ensure that the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option?	12
4 LINKS WITH RIVER BASIN MANAGEMENT PLANS (RBMP)	14
4.1 Baseline for 4.7	14
4.2 Reporting the use of article 4.7 exemptions in the RBMP and public consultation	14
4.3 Article 4.7 and the designation of heavily modified water bodies (HMWB)	15
5. STEP BY STEP APPROACH	16
6. CONCLUSIONS	18
ANNEX 1: AN EXAMPLE OF COST-BENEFIT ANALYSIS FOR HYDROELECTRIC POWER PLANTS	19
ANNEX 2: DRAFTING GROUP MEMBERS	21

1. INTRODUCTION

The discussion on environmental objectives has made significant progress and a paper has been endorsed at the June 2005 Water Directors' meeting¹. There is now a general agreement that socio-economic considerations should not be taken into account in defining surface water status or groundwater status but should be taken into account when setting objectives for water bodies, including deciding whether §3, 4, 5 and 7 of Article 4 can be relied on. Therefore, the question of the sound implementation of those possibilities has become of importance.

The exemptions for WFD Article 4 are the provisions in articles 4 §4, §5, §6 and §7.

The agreed document on environmental objectives has clarified issues related to the place in the planning process of article 4.4 (extension of deadlines) and article 4.5 (less stringent objectives). The existing guidance documents on "economics and the environment" and "identification and designation of heavily modified and artificial water bodies" bring also interpretation of key concepts.

However, article 4.7 (new modifications or new sustainable human development activities) is very specific and was only touched upon briefly.

This paper is intended to clarify key questions and important concepts when implementing practically the provisions of article 4.7, in order to ensure adequate comparability between Member States.

¹ This paper is available at:
http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/environmental_objectives&vm=detailed&sb=Title
and will be referred to in this document several times.

2. SCOPE OF ARTICLE 4.7

Article 4.7 sets out circumstances in which failure to achieve certain Water Framework Directive objectives is permitted. The article can be used in the following circumstances:

- 1) When failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or
- 2) When failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities.

For both provisions a set of conditions have to be met (see also chapter 3). The full text of article 4.7 is displayed in the text box below.

WFD Article 4.7

Member States will not be in breach of this Directive when:

-failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or

*-failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities
and all the following conditions are met:*

- (a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;*
- (b) the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;*
- (c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and*
- (d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.*

The question of the timing of application of Article 4.7 was discussed in the drafting group.. In summary, it was generally agreed that the provisions of Article 4.7 are fully applicable now. For cases which occurred between the adoption of the WFD and today, there would have to be a case-by-case assessment.

At this stage, some practical questions need to be addressed. They will be dealt with in the paragraphs below.

2.1 What kinds of modifications, alterations and activities are concerned?

Under the first point of 4.7), the impacts of **new modifications** to the physical characteristics of a surface water body and alterations to the level of groundwater bodies are addressed.

The impacts of those modifications and alterations may be limited to the water bodies in which modification works are undertaken; or extend to water bodies beyond those in which the modification works are undertaken. For example, the abstraction of water from a body of groundwater may cause adverse impacts in an associated surface water body.

Modifications to the physical characteristics of water bodies means modifications to their hydro-morphological characteristics. The impacts may result directly from the modification or alteration or may result from changes in the quality of water brought about by the modification or alteration. For example, the hydro-morphological characteristics of impoundment created for hydropower and water supply can dictate the oxygen and temperature conditions resulting in a deterioration of ecological status in the impounded water and in the downstream river. These may be different from those in a natural water body.

The second point of 4.7) relates to the impacts of **new sustainable human development activities** on surface water, provided those impacts only cause deterioration from high status to good status. For example, the settlement of a new industry in a pristine area could create new discharges of pollutants that would lead a surface water body to deteriorate from high to good status.

Note that Article 4.7 does not provide an exemption if deterioration caused by inputs of pollutants from point or diffuse sources drives the water body to a status below good.

A generic approach for small business developments affecting the same water body may be considered when applying the second point of 4.7).

If the resulting development is not causing a deterioration of status on the water body scale, art. 4.7 does not have to be used (for example if replacing one activity by another).

2.2 What is considered as a deterioration of status and potential?

The ecological status (or the potential) of a water body is expressed in terms of “classes” (e.g. high, good, moderate, poor or bad). Ecological status and potential classes are established on the basis of specific criteria and boundaries in accordance with the annex V of the WFD. In the context of Article 4.7, the objectives of preventing deterioration of status refer to **changes between classes rather than within classes** (see also Environmental Objectives Paper, section 2). Member States do not, therefore, need to use article 4.7 for negative changes within a class.

This paper does not address the links between the use of the exemption under Article 4.7 and the general objective of progressively reducing pollution from priority substances and ceasing and phasing out emissions, discharges and losses of priority hazardous substances.

2.3 Does it apply to temporary effects?

Fluctuations in the condition of water bodies can sometimes occur as a result of short-duration human activities, such as construction or maintenance works. If the condition of each affected water body is adversely affected for only a short period of time and recovers within a short period of time² without the need for any restoration measures, such fluctuations will not constitute deterioration of status. The application of Article 4.7 will not be required.

For example, temporary impacts due to the establishment of the modification during the building phase are not addressed if no deterioration of status or potential could be expected thereafter in the water body or parts of the water body.

Article 4.6 provides, under certain conditions, an exemption for temporary deterioration of the status of bodies of water in certain circumstances, which are exceptional or could not reasonably have been foreseen. An exemption under Article 4.7 will be unnecessary in those cases in which an Article 4.6 exemption is applicable.

2.4 Does it apply to small-size projects?

The **size of the project is not the relevant criteria** to trigger article 4.7. The relevant approach is to assess if a given project, whatever its importance is, will result in deterioration of the status of a body of surface water or groundwater or prevent the achievement of good ecological status, good ecological potential or good groundwater status or from high status to good status of a body of surface water. Thus, **projects of any size may fall under article 4.7.**

However, for small projects not falling within the scope of the EIA Directive (85/337/EEC) a generic approach can be used in order to reduce the assessment burden.

2.5 Does it apply to plans and programmes?

Clearly, article 4.7 does not apply to plans and programmes. However, in general, plans and programmes include:

- (a) Policies intended to inform decisions on potential future projects; or
- (b) Implementation plans for one or more specified projects.

Thus, if Article 4.7 is likely to apply to any projects agreed in or under a plan or programme, the plan or programme should take into account of the Directive's conditions for using Article 4.7. For example, plans and programmes should give consideration to:

- Alternatives that would not result in significant adverse impacts on the water environment;
- What practicable steps should be taken to mitigate the adverse impact on the body of water;
- The reasons for the modification, and whether they are of overriding public interest or benefit to the environment, human health, human safety or sustainable development.

² No definition will be given of 'short period of time'. However, the frequencies mentioned for the monitoring programmes (Annex V 1.3.4 and 2.2.3) can serve as an indication.

Plans and programmes prepared by Ministries or by public authorities may fall under the requirements of Directive 2001/42/EC on Strategic Environmental Assessment. Among other things, the Strategic Environmental Assessment must consider the likely impacts on the water environment. This should include considering whether the conditions of Article 4.7 could be met if the plan or programme was implemented. For more detail on practical interaction between the SEA Directive and the WFD, see the Commission's Guidance on the implementation of Directive 2001/42/EC³.

2.6 How are the effects of the modifications or activities on the water body's status assessed?

In weighing up the benefits of achieving the WFD objectives on the one hand and the benefits of the new modifications to human health, the maintenance of human safety or sustainable development on the other, Member States should take into account the extent to which impacts on the water environment will be mitigated. The estimation of impacts of hydromorphological changes and of accompanying measures must be validated a posteriori e.g. by monitoring programmes.

For projects falling under the scope of the Environmental Impact Assessment Directive (85/337/EC), the information provided by such an assessment should be used in helping to determine if the conditions of Article 4§7 are met. Even more, avoiding duplications by – if possible - a joint procedure which correctly reflects the provisions of EIA and WFD can be a pragmatic and cost-effective solution.

For projects which do not fall under the scope of the EIA Directive, Member States should set a specific water assessment procedure to determine if the conditions of Article 4.7 are met (see also section 2.4 and section 4 on river basin management plans).

2.7 What are new sustainable human development activities?

The Directive does not give a definition of those activities. In general such activities cannot be defined per se through a set of criteria or policies but are framed by the relevant decision making process requirements within an open ended and iterative procedure. The exact definition for an activity falling under sustainable development will thus depend on the time, scale, involved stakeholders and information available. Relevant process requirements are provided in the WFD itself, the SEA, EIA and “Aarhus” Directives and should be guided by the principles of the EC Treaty, being the *“polluter pays principle, the precautionary principle and preventive action, and the principle of rectification of pollution at source”*. Guiding principles on sustainable development can be found in the Renewed EU Sustainable Development Strategy (EU SDS), which was adopted by the Council in June 2006⁴.

Furthermore, the decision making process should follow the principles of “good governance”, including policy coherence, social inclusion and transparency and make best use of the availability of alternatives.

The flow chart in chapter 5 of this paper provides an example for such an iterative approach, which should allow the re-assessment of the potential identification of a sustainable development activity done at the beginning, i.e. in case a better alternative is available.

³ Available at: http://ec.europa.eu/environment/eia/030923_sea_guidance.pdf

⁴ Available at: <http://register.consilium.europa.eu/pdf/en/06/st10/st10117.en06.pdf>

Like all WFD exemptions, article 4.7 does not apply when the provisions of articles 4.8 and 4.9 are not fulfilled. In other words, use of **the exemptions is allowed when they guarantee at least the same level of protection as existing Community legislation and provided that they do not permanently exclude or compromise the achievement of the wider objectives of the WFD under Article 1 in other bodies of water within the same river basin district.**

2.8 Can article 4.7 be applied to all the water bodies affected by a new modification?

In certain situations, one project will be located in a given water body but will cause deterioration of the status and/or prevent the achievement of good status/potential in others. In addition to the deliberations in the Environmental Objectives Paper no further guidance can be given at this stage. It would be useful, however, to discuss examples on how to practically implement these provisions in the future.

2.9 Can article 4.7 be applied to protected areas?

Protected areas are the areas designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation for habitats and species directly depending on water.

In line with articles 4.1(c), 4.2, 4.8 and 4.9, article 4.7 exemption can be applied to protected areas to the extent that these are also water bodies if and only if:

- it guarantees at least the same level of protection as the existing Community legislation(s) under which the area has been designated (article 4.9), and
- it is consistent with the implementation of other Community environmental legislation (article 4.8).

In other words, **article 4.7 cannot be used as an exemption from fulfilling the legal requirements of other Directives.**

For example, a new development is proposed that would cause deterioration of status and a failure to achieve the objectives for a Natura 2000 site. In such a case, in order to fulfil both the WFD and the Habitats Directive:

- The relevant conditions set out in Article 4.7 of the WFD for allowing deterioration of status would have to be met to the extent that it is a water body; **and**
- The conditions set out in Article 6 of the Habitats Directive (92/43/EEC) for allowing a failure to achieve a Natura 2000 site's objective would have to be met.

3. KEY CONCEPTS

Article 4.7 exemptions are allowed under a set of four conditions, see a) through d) in the box on page 5, which all must be fulfilled.

Those conditions are not defined in the Directive, thus, a common understanding of key concepts is needed.

3.1 What are “all practicable steps” taken to mitigate the adverse impact on the status of the body of water?

As article **4.7 requires only mitigation**, it is at first important to make a clear distinction between:

- Mitigation measures, which aim to minimise or even cancel the adverse impact on the status of the body of water, and
- Compensatory measures, which aim is to compensate in another body of water the “net negative effects” of a project and its associated mitigation measures.

Article 4.7 does not require compensatory measures.

The notion of “steps” addresses potentially to a wide range of measures in all phases of development, including maintenance and operation conditions, facilities’ design, restoration and creation of habitats....

The wording “all practicable steps”, in analogy with the term “practicable” used in other legislation, suggests those **mitigation measures should be technically feasible; do not lead to disproportionate costs; and are compatible with the new modification or sustainable human development activity.**

3.2 What is an “overriding public interest”?

This concept is also used in the Habitats Directive (92/43/EEC) and other EC law. Though there is no case law from the European Court of Justice on the application of this concept to the Habitats Directive, the European Commission’s “Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC: Assessment of plans and projects significantly affecting Natura 2000 sites”⁵, may bring some clarification.

It is reasonable to consider that the reasons of **overriding public interest**⁶ refer to situations where plans or projects envisaged prove to be indispensable within the framework of:

- Actions or policies aiming to protect fundamental value for citizen’s lives (health, safety, environment);
- Fundamental policies for the State and the society;
- Carrying out activities of an economic or social nature, fulfilling specific obligations of public services.

⁵ November 2001. This paper gives some consideration to defining “Overriding public interest”. Find it at http://europa.eu.int/comm/environment/nature/nature_conservation/eu_nature_legislation/specific_articles/art6/index_en.htm

⁶ Note that the consideration of “overriding public interest” only applies to the first part of Article 4.7c, not to the second part.

Furthermore, public participation will contribute considerably in determining overriding public interest.⁷

3.3 What kind of aspects should be considered when comparing benefits of achieving environmental objectives under Article 4 with benefits of the new modifications and alterations to human health, to the maintenance of human safety or to sustainable development?

The Environmental Objectives Paper gives in its section 3 detailed examples of the different categories of benefits linked to the achievements of environmental objectives. The document also describes the difficulty to achieve full assessment of benefits (monetary or not).

The benefits of achieving the environmental objectives of Article 4 include:

- In case of deterioration of status, those benefits and opportunities foregone as a result of the deterioration of status (e.g. loss of biodiversity); and
- In case of failure of reaching good status or potential, those benefits that would be provided if the achievement of good status or good ecological status were not prevented (e.g. drinking water supply is not longer possible);

Those “water costs” (negative benefits) have to be put in balance with the potential benefits and other costs (increase of use of other natural resource, including global impacts) of the new modifications and alterations to human health, to the maintenance of human safety or to sustainable development. Thus, other categories of possible benefits and costs will have to be considered and –if possible- calculated. A list with examples is given in the Environmental Objectives Paper.

In conclusion, an **analysis of the costs and the benefits** of the project adapted to the needs of the Directive is necessary to enable a judgement to be made on whether the benefits to the environment and to society of preventing deterioration of status or restoring a water body to good status are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development.

This does not mean that it will be necessary to monetise or even quantify all costs and benefits to make such a judgement. The appropriate mix of qualitative, quantitative and, in some cases, monetised information should depend on what is necessary to reach a judgement and what is proportionate and feasible to collect.

3.4 How to ensure that the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option?

Those alternatives solutions could involve alternative locations, different scales or designs of development, or alternative processes. Alternatives should be assessed in the early stages of

⁷ See Guidance Document No 8: Public Participation in relation to the Water Framework Directive on http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents&vm=detail&sb=Title

development and at the appropriate geographical level (EU, National, RBD) against a clear view of the beneficial objectives provided by the modification.

For projects under its scope, the use of the requirements of the EIA Directive can help to assess the different possible alternatives.

And, as stated below in section 2, references to the existing plans and projects could help in considering whether there are reasonable alternatives.

4 LINKS WITH RIVER BASIN MANAGEMENT PLANS (RBMP)

There are several obvious links to the RBMP that need to be addressed.

4.1 Baseline for 4.7

Annex VII of the WFD describes the information that should be included in the RBMP. Under point A.4, the current status of the water bodies must be assessed as a result of the monitoring programmes. Under point A.5, the environmental objectives established for surface waters and groundwaters must be listed, including identification of the use of the exemptions and the associated information required under Article 4.

The risk of deterioration of status occurring should be assessed at the time a new modification or alteration is being considered. The assessment of risk should be based on the best information available on the status of those water bodies whose status is likely to be affected by the proposed project. Such information should include the latest information from the monitoring programmes required under Article 8 and information obtained from any environmental impact assessment undertaken for the project.

4.2 Reporting the use of article 4.7 exemptions in the RBMP and public consultation

Under article 4.7 (b), there is a general provision that “the reasons for those modifications and alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years”. This is a reporting obligation and does not mean that Member States must wait until the publication of the River Basin Management Plan before allowing a new physical modification or new sustainable development activity to proceed.

In many cases projects will be developed within the RBMP six-year cycle.

For modifications and alterations within the scope of the Environmental Impact Assessment Directive, Member States must ensure that the public concerned is given the opportunity to express an opinion before the project is initiated.

Even if timing of a project is such that consultation on the river basin management plans will not provide the opportunity for interested parties to express their views in advance of those decisions, Article 14 requires Member States to encourage the active involvement of all interested parties in the implementation of the Directive. It is recommended that Member States ensure that such opportunities are provided in relation to projects that are outside the scope of the Environmental Impact Assessment Directive but likely to result in deterioration of status or to prevent the achievement of good ecological status, good ecological potential or good groundwater status.

The information provided through such consultations will help Member States in reaching a judgement on whether the exemption conditions are met and will reduce the likelihood that interested parties will challenge the subsequent decision.

If a modification or alteration goes ahead in the middle of a river basin planning cycle, the reason for that modification or alteration must be set out in the subsequent (update of the) river basin management plan.

4.3 Article 4.7 and the designation of heavily modified water bodies (HMWB)

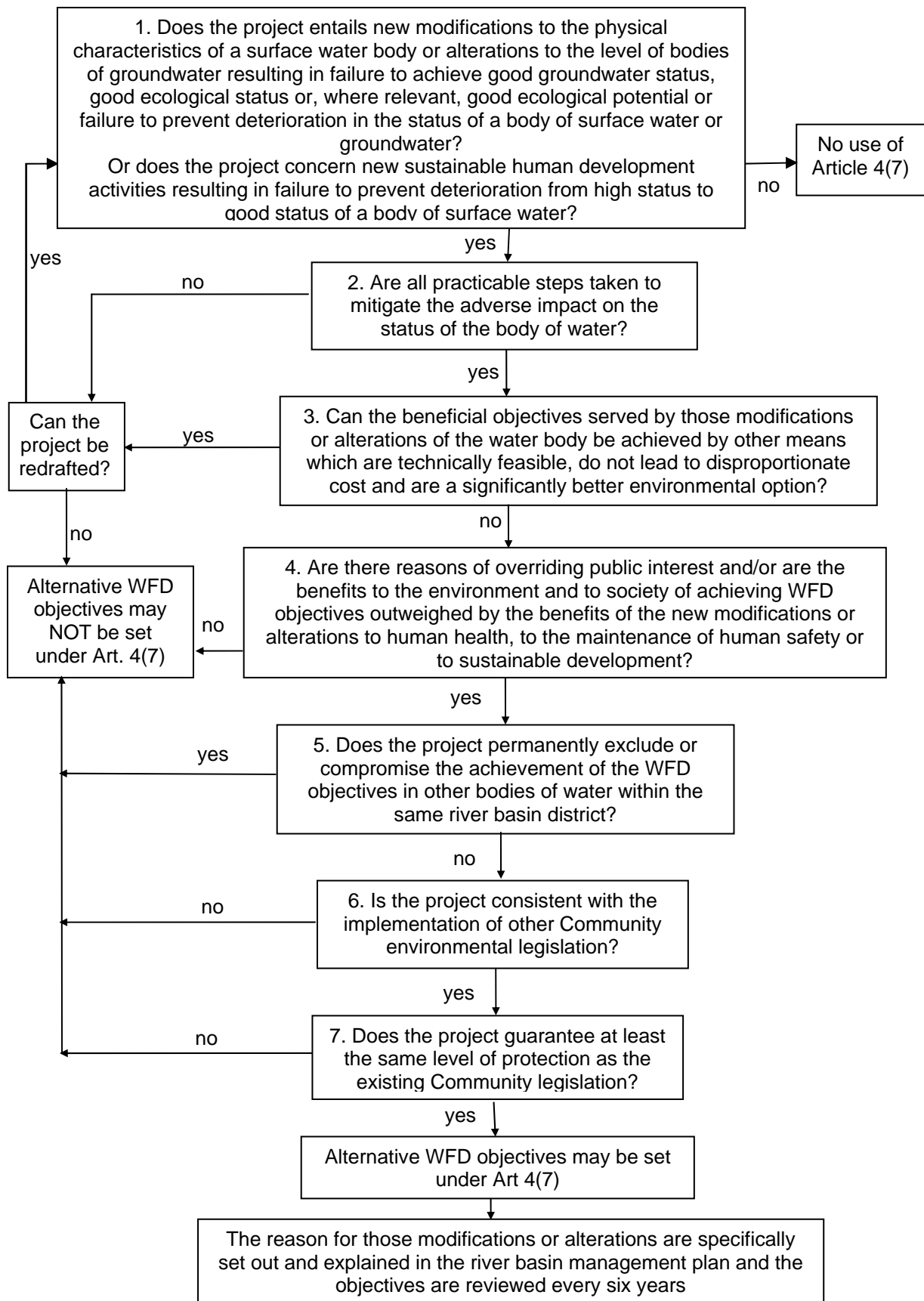
After a new hydro-morphological alteration has occurred, it may be that the water body qualifies for designation as a heavily modified water body in accordance with Article 4.3 in the next planning cycle. There is no requirement that the designation has to wait until the publication of the next River Basin Management Plan. However, **water bodies cannot be designated as HMWBs before the new modification has taken place** because of the anticipation of the significant hydro-morphological alteration.

After the application of article 4.7 and in case of designation of new HMWBs, the step by step approach developed within the HMWB guidance document should be applied without the "provisional identification-step".

5. STEP BY STEP APPROACH

In the figure below, the conditions under which Art. 4.7 can be applied are presented in a stepwise approach. This flow chart aims to be a practical tool when considering application of article 4.7.

In comparison to the exact text of the Directive (art 4.7)c), the order of box 3 and 4 have been changed. This is done for two reasons. Firstly, the considerations in box 2 and 3 may result in adaptations of the project. This is not the case for the considerations from box 4 onwards. Secondly, box 3 refers to the process of looking for alternatives, which should be done at an early stage of drafting the project, when better alternatives are available.



6. CONCLUSIONS

The paper clarifies some key elements regarding the use of article 4.7 and thus can provide a starting point for the practical application. In the view of practical experiences and cases, this document may have to be revised and updated, with the inclusion of examples, case studies and jurisprudence.

Such permanent improvements in understanding and application are fully in line with the dynamic and iterative process of implementing the Water Framework Directive from now to 2027.

ANNEX 1: AN EXAMPLE OF COST-BENEFIT ANALYSIS FOR HYDROELECTRIC POWER PLANTS

This example is extracted from a publication by the German Federal Environmental Agency, “Hydroelectric Power Plants as a Source of Renewable Energy – legal and ecological aspects” (November 2003).

The following comments solely comprise a comparison of hydroelectric power plants of different sizes, whose efficiency and environment-compatibility are compared on the basis of economic and ecological criteria. An overall economic comparison with other energy resources, such as nuclear power or the fossil energy resources coal, oil and gas, cannot be carried out at present, because appropriate methods have not yet been developed.

From the overall economic point of view, the support of a particular sector is only useful when positive external effects are to be expected from the provision of these goods, which do not benefit the provider of the goods. Here the situation can arise that, due to the lack of incentive, the goods in question are supplied in a smaller quantity than appears to be rational from the economic point of view. In the opinion of proponents of hydroelectric power plants, such positive external effects are generated by these installations, because they produce electricity without carbon dioxide emissions. In comparison to electricity production with calorific power plants, benefits thus accrue to society as a result of avoided external costs, which society should reimburse to the owners and operators of hydroelectric power plants. In an overall economic assessment, however, negative external effects have also to be taken into consideration.

In a report commissioned by the Federal Environmental Agency, the Institute for Ecological Economic Research - *Institut für Ökologische Wirtschaftsforschung IÖW* surveyed different approaches to the evaluation of positive and negative effects of small hydroelectric power plants, and undertook an overall economic assessment (IÖW 1998). To start with, positive external effects – that is, advantages due to electricity production without carbon dioxide emissions – were estimated on the basis of different costing methods. These were then compared with negative effects on watercourses (negative external effects).

In Germany in 1994, the base year, there were 4,633 hydroelectric power plants (owned by power supply companies and others) with a capacity of under 1 MW and a net production of 1.46 TWh. In relation to total electricity consumption in Germany amounting to 447 TWh from public supply, 0.33% was covered by small hydroelectric power plants. Assuming that the production of 1 kWh of electricity in Germany gives rise to 0.57 kg of CO₂, electricity production by small hydroelectric power plants resulted in 826,500 tonnes of CO₂ being avoided. According to the method of assessment (GEMIS 3.0 1997), Fankhauser 1995, INFRAS et al 1996, Hohmeyer, Gärtner 1992), positive external effects of between 42 million and 601 million DM were achieved.

As a method of assessing negative external effects, the monetary valuation of biotopes was included in the investigation. The method was developed within the framework of the regulation on intervention contained in the Federal Nature Conservation Act, in order to be able to determine the level of compensation payments. According to the model used (fund model, investment model, compensation claims for specific biotopes), different values arise for compensation payments per square metre of biotope. For the assessment of small hydroelectric power plants on the basis of these values, it was estimated to what extent – in terms of surface area – CO₂-free energy production would "offset" intervention in a

watercourse. In the "most unfavourable" assessment for hydropower (higher value for the biotope affected, lower costs for CO₂ emissions), with small installations only intervention in an area of about 70 square metres is "compensated". In the "most favourable" assessment for hydropower (low compensation claim for the biotope, high costs for CO₂ emissions), the area is about 30,000 square metres. This would represent, for example, a river valley strip 50 metres wide and 600 metres long – an area that could in most cases be affected by the head-bay and the erosion section (tail-bay) (see Table).

Table: Cost-benefit analysis of small hydroelectric power plants – intervention area (in m²) compensated by positive external effects (IÖW 1998)

Biotope assessment	Fund model		Investment model		Model for compensation claims for specific biotopes	
CO₂ costs	798 DM/m²		448 DM/m²		28 DM/m²	
Hydroelectric power plant capacity	<50kW	50-100kW	<50kW	50-100kW	<50kW	50-100kW
Square metres of compensatable intervention						
GEMIS 3.0	71	252	127	450	2,038	7,208
Fankhauser	165	581	293	1,036	4,688	16,580
INFRAS	193	682	343	1,216	5,503	19,463
Hohmeyer/Gärtner	1,041	3,682	1,855	6,559	29,677	104,958

Even when the overall economic assessment of small hydroelectric power plants is fraught with uncertainties and problems, it nevertheless shows, that intervention in nature and landscape connected with small hydroelectric power plants results in external costs that are not to be ignored, also considering climate protection. The smaller the installation, the less favourable the values.

ANNEX 2: DRAFTING GROUP MEMBERS

Ales Bizjak	Slovenia	ales.bizjak@izvrs.si
Alice Baverstock	UK	alice.baverstock@defra.gsi.gov.uk
Anna Törner	Eurelectric	atorner@eurelectric.org
Anna-Stiina Heiskanen	EC/JRC	anna-stiina.heiskanen@jrc.it
Caterina Sollazo	Italy	sollazo.caterina@minambiente.it
Gilles Crosnier	EC/DG ENV	gilles.crosnier@ec.europa.int
Jan Brooke	NAVI TF	jan@janbrooke.co.uk
Joachim D'Eugenio	EC/DG ENV	joachim.D'Eugenio@ec.europa.eu
Geir Tabol	Norway	gta@nve.no
Giorgio Pineschi	Italy	pineschi.giorgio@minambiente.it
Hanna Höhberg	Copa-Cogeca	hanna.hogberg@copa-cogeca.be
Jorge Rodriguez Romero	EC/DG ENV	jorge.rodriguez-romero@ec.europa.eu
Jens Brøgger Jensen	Denmark	jbj@mst.dk
Jose Luis Ortiz Casa	Spain	jlortiz@mma.es
Lotten Sjölander	Sweden	lotten.sjolander@naturvardsverket.se
Manuel Sapiano	Malta	manuel.sapiano@mra.org.mt
Marie-Françoise Bazerque	France	marie-francoise.bazerque@ecologie.gouv.fr
Marieke van Nood	EC/DG ENV	marieke.van-nood@ec.europa.eu
Niels Peter Norring	COPA-COGECA	nnp@dansklandbrug.dk
Peter Pollard	UK	peter.pollard@sepa.org.uk
Sjoerd van Dijk	The Netherlands	sjoerd.van.dijk@minvenw.nl
Stefan Scheuer	EEB	stefan.scheuer@eeb.org
Sybille Pawlowski	Germany	sibylle.pawlowski@munlv.nrw.de
Thierry Davy	France	thierry.davy@tiscali.be
Trond Syversen	Norway	trond.syversen@sft.no
Ulrich Irmer	Germany	Ulrich.irmer@uba.de
Wouter van de Bund	EC/JRC	wouter.van-de-bund@jrc.it