

# Hydropower Good Practice Guidelines

## Consultation questions - response form

### FINAL FROM MICRO HYDRO ASSOCIATION 22 September 2011

I would like to invite you to take part in our consultation on revisions to our Hydropower Good Practice Guidelines. These guidelines were first published in August 2009 and we are now taking the opportunity to consider a series of amendments and additions to the guidance.

If you would like to respond by hard copy - please use this form and return it to [hydropowerGPG@environment-agency.gov.uk](mailto:hydropowerGPG@environment-agency.gov.uk)

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#### Part 1 - Questions about sections in the first edition of the Good Practice Guidelines

This section contains the technical standards and advice in our first edition of the Hydropower Good Practice Guidelines (GPG). We have inserted new text and questions (in bold and highlighted) at points where we are proposing changes.

Where you suggest changes, it would be helpful if you could provide evidence to support your proposals.

The questions need to be considered in the context of the overall guidance. Please read the detailed proposals before responding.

Section 1  
No questions

**Section 2**  
**No questions**

**Section 3**  
**Question 1**

Are there other effects (both positive and negative) which should be considered on a cumulative basis?

**Answer**

On any watercourse there will be effects of introducing a hydro scheme which should be taken in context with other human interventions (e.g. forestry) when considering licences for water use. Hydro schemes may include the following physical effects:

- 1 depleting reaches - this may affect ecology, giving advantage to some ecosystems and disadvantage to others. It may reduce riparian erosion and risks of flooding.
- 2 impounding water - this may affect ecology, giving advantage to some ecosystems and disadvantage to others. It may both increase and reduce the risk of flooding
- 3 creating obstacles to fish passage
- 4 creating improvements to fish passage
- 5 affecting water temperature locally - this may affect ecology, giving advantage to some ecologies and disadvantage to others

All of these effects will accumulate with the number and scale of hydro schemes on a given watercourse.

## Question 2

We would value your comments on how these cumulative effects could be considered and assessed.

### Answer

The above effects should be considered PRINCIPALLY on a cumulative basis in order to make a proportionate judgment on licence conditions. There will usually be few locations on a watercourse and in a river basin where it is practical or cost-effective to build a hydro scheme. This means that the total effect of hydro schemes and potential hydro schemes in a river basin will generally affect a small proportion of all the watercourses in the river basin which have a similar ecology.

Until some specific evidence of individual and cumulative effects of hydro schemes on watercourse ecology and physical conditions has been gathered, some broad criteria for licensing purposes should be developed; for example:

calculate:

length of depleted reach × mean flow at abstraction point as a proportion of all watercourse lengths in river basin × mean flow of whole river basin

and from this calculation set a level at which cumulative effects could be judged significant.

There should also be clear rules in the guidance on the interpretation of "First come, first served" as there will often be instances where different landowners have access rights to opposite banks of the same watercourse or have potential locations on one watercourse. Until an actual or potential cumulative impact is identified, a simple and literal first-come-first-served rule could be appropriate.

An alternative proposition is that where there are two or more riparian owners to a common resource then agreement must be sought between the interested parties before such a scheme is allowed to proceed. There should be no restriction on whatever agreement the parties wish to make but their agreement should be recorded and form part of the deeds of their properties. Such an agreement will affect the resource for years to come.

## Question 3

Can you suggest ways in which additional protection can be provided for weir pools (where they have been identified as having special importance)?

### Answer

Many weirs have been removed or are destined to be removed from UK rivers (e.g. to improve fish passage or to reduce flood levels). The effect of such removal, or lowering, is always to reduce

turbulent energy in the pool, or possibly to make the pool disappear altogether. The Agency ought to be applying the same criteria and procedure to identify and, where necessary, to protect any valuable habitat in weir-pools, *irrespective of the reason* for their development or modification.

Existing weir pools should each be considered on their own merits. If they are already important then presumably they will be SSSIs.

**Section 4**  
**No questions**

**Section 5**  
**No questions**

**Section 6**

**Question 4a**

Would you propose any further changes to the flow tables for low head schemes? Y/N

Yes

**Question 4b**

Please provide your reasons and any supporting evidence.

On existing mill sites with leats it is impossible for there to be no depleted reach: one of the channels will be depleted, depending on where the turbine is located. If both channels are "main river", then they carry equal environmental importance.

**Question 4c**

If yes, what changes would you propose?

Ref 6.3 correction:

LowFlows 2000 is apparently being replaced by LowFlows 2. Hydropower developers can also access this tool on a fee-paying basis by contacting the Centre for Ecology and Hydrology via <http://www.hydrosolutions.co.uk>

Ref 6.5 Suggested addition:

Rainfall, and hence mean flow, in some years can be twice that of others, so average rainfall figures over several decades should be used for calculating  $Q_{\text{mean}}$ .

Ref 6.8 Suggested changes:

1st para second sentence to read: "Common practice in the UK has been to use between  $Q_{\text{mean}}$  and  $Q_{\text{mean}} \times 1.5$  as the design flow."

Remove 2nd para last sentence since this is at variance with practice, and is an unnecessary restriction. Instead the permitted flow regime should be appropriate to the particular location.

Ref 6.9 Suggested changes:

1st bullet point: a water turbine only achieves a worthwhile efficiency when it can pass a good proportion of its design flow, typically between 2% and 30% depending on machine type and head. (high head **pelton and** turgo-type turbines with multiple valves/nozzles and/or spear valves can operate on extremely low flows)

Ref 6.10 suggested addition:

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With a high head scheme involving no impoundment, flow pulsing is not an issue.

When a significant impoundment has been created behind a high head scheme dam, for example by flooding a stretch of a watercourse, special conditions may need to be set.

Ref 6.11:

Q95, as far as plants and invertebrates are concerned, is generally the HOF that matters, however long the depleted reach is. This is especially so in a very small steep catchment with low baseflow, where the stream might naturally dry out entirely at some times.

For high head schemes the same table is appropriate except that  $Q_{\text{mean}} \times 1.3$  may be used as the default maximum flow.  $Q_{\text{mean}} \times 1.3$  is used as the default for max design flow by SEPA. - see SEPA guidance section 1.3, 'Protection of high flows' pages 14 and 15.

Ref 6.11 suggested addition:

Additional Notes on HOF and FDC for long depleted reaches.

It may be necessary, or advantageous, to apply different HOF criteria in different parts of the depleted reach, for example:

If fish only need the lower part of the depleted reach for migration, HOF restrictions based solely on the needs of migratory fish can be safely ignored in the upper part. In this case, a confluence or an obvious barrier to fish passage will be used define the different regions of the reach.

If the catchment area increases significantly through the depleted reach, the additional contribution will be taken into account in calculating any flow rates in the lower parts of the depleted reach.

If a bywash or fish-pass returns water within 200m of the intake point, this flow can contribute to the (stricter) requirement for the HOF in the depleted reach beyond 200m from the intake.

For very small catchments (especially below 1km<sup>2</sup>), or where high springflow or minewater discharges occur, Low-Flow or other models cannot be expected to give a reliable FDC. These cases need some discretion by the client's consultants and the EA's hydrologists, as alternative methods will be essential to predict the FDC with any degree of accuracy.

## Section 7

No questions

## Section 8

### Question 5

What are your views on including a requirement to ensure fish passage around all new weirs?

### Answer

This should only be a requirement where there is shown to be a likely significant impact on fish populations without such measures. This will mean quantifying the potential for increase in capacity of spawning ground above the scheme in comparison with the available spawning ground below the scheme IN THE SAME RIVER BASIN and imposing the requirement where the proportion is considered by the EA as likely to be significant.

This should apply only to protected species.

See also comments on specific wording in Section 8.1 included in the document "1008 GPG Vsn 1

word version (as on web) - modded GK-S inc DR JW AB IB JA comments.pdf" which was submitted during preparation of consultation.

## Section 9

### Question 6

Are these revised screening and by-wash requirements adequate for the protection of fish as part of the design of hydropower schemes? Y/N

Please provide your reasons and supporting evidence

Neither adequate nor inadequate: there is very little direct evidence to justify particular mitigation measures (some evidence is available for screw turbines). It is clear that other types of turbine will have some effect on fish should they pass through a turbine. The proposed screening levels are a sensible precautionary approach and in any case are needed to avoid turbine damage or malfunctioning.

Protection should be mandatory where protected species are involved.

## Part 2 - New Sections

This includes the additional sections that we propose to incorporate in the revised version of the GPG

New weirs

**There are currently a substantial number of impoundments on our rivers.**

**The Environment Agency is unlikely to approve the construction of new weirs solely for hydropower on lowland rivers due to the likelihood of adverse effects on the environment.**

**However, we are more likely to consider the construction of new low weirs on smaller, upland streams associated with high head hydropower projects. The effects of these are likely to be smaller and more easily mitigated.**

### Question 7

Do you agree with this? Y/N

Please provide your reasons and any supporting evidence

NO (part)

There is a clear dichotomy in this area, and the strictures apply principally to low head schemes. A low head hydro scheme cannot be built without some sort of weir or dam to divert water to the turbine. This in turn implies an impoundment and a weir pool. Impoundments provide a combination of effects from an ecological and water quality and flood-risk point of view, some potentially beneficial and some potentially detrimental. Whilst mitigation measures may serve to reduce the potentially detrimental effects, removal of existing impoundments/weirs may in some cases improve and in some cases worsen the situation.

As the net effect of using an existing weir, raising it, building a new one, or destroying one cannot be assessed accurately, an approach would be to license development (or destruction) on the conditions that proven and/or experimental mitigation measures should be incorporated and that the scheme will be subject to monitoring. The licence can require either further mitigation or, ultimately, re-instatement of the original status if detrimental effects are demonstrated over a period of time, and allow relaxation of mitigation measures if the opposite is the case.

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### Raising weirs

Raising weirs as part of a hydropower scheme is likely to be proposed when:

The weir is raised to compensate for the drop in water level over the weir caused by operating the hydropower scheme.

The weir is raised by an amount over and above scenario 1 to increase electricity generating potential. The second option is likely to have more environmental effects and will be considered accordingly.

### Question 8

Do you agree with our general approach towards raising weirs as of hydropower schemes? Y/N

Please provide your reasons and any evidence to support them.

See answer to question 7

### Multiple schemes on one weir

#### Question 9

Do you have any suggestions for criteria which might be helpful when assessing more than one application for hydropower schemes on the same weir or impoundment?

#### Answer

There should also be clear rules in the guidance on the interpretation of "First come, first served" as there will often be instances where different landowners have access rights to opposite banks of the same watercourse or have potential locations on one watercourse. Until an actual or potential cumulative impact is identified, a simple and literal first-come-first-served rule could be appropriate.

An alternative proposition is that where there are two or more riparian owners to a common resource then agreement must be sought between the interested parties before such a scheme is allowed to proceed. There should be no restriction on whatever agreement the parties wish to make but their agreement should be recorded and form part of the deeds of their properties. Such an agreement will affect the resource for years to come.

### High head

#### Question 10

Do you agree with this approach to the permitting of high head schemes? Y/N

Please explain with evidence what other model/criteria we should use.

NO

The model used by SEPA has been used without any reported adverse effects for many high head schemes over a wide range of scheme sizes and in situations where there are migratory fish and where there are not. This model has proved viable and could be used without change.

See SEPA document: "Guidance for run-of-river Hydropower schemes 25 November 2010" Part A Annexes A & B. available here: <http://www.sepa.org.uk/water/hydropower.aspx>

## Environmental monitoring

### Question 11a

Under what circumstances should environmental monitoring (pre and post scheme) be required in association with the development of a hydropower scheme?

#### Answer

Since the principal concerns are that hydropower schemes may have a detrimental effect on the populations of protected species, watercourses supporting these species, both with and without schemes, should be selected for comparative studies.

These are necessarily likely to be expensive and long-term in nature and it will be important to assess and discount the many other factors that may affect species populations.

### Question 11b

What aspects of the environment should be monitored?

#### Answer

effects on protected species

### Question 11c

Who should fund this monitoring?

#### Answer

Funding should be from DEFRA who have ultimate responsibility for protecting the environment.

Hydro scheme owners, where their watercourses are selected, should be required to provide information on abstraction volumes and the selected watercourse owners should be required to support access for ecological surveys where considered essential.

However, many of these so called ecological surveys cause a considerable amount of disturbance. Ecological surveys should only be allowed where the owner and DEFRA can agree that there is a demonstrable need for them. DEFRA should not be given any extra rights here.

## General observations

### Question 12

Please let us know of any further points that you feel have not been captured in this consultation. If it relates to a specific piece of text it would be useful if you could cross reference it. If not please identify the issue clearly and provide any supporting evidence.

### Answer

## OVERALL OBSERVATION

Having participated in the preparation for this consultation, my main conclusion is that:

### THE GUIDELINES LACK A PROPORTIONATE APPROACH TO LICENSING OF HYDRO-ELECTRIC SCHEMES.

The guidance should be easy to understand and apply, both for EA staff in the field, and for people and organisations wishing to install hydro schemes whether developers or landowners. As it stands, this is not the case, and the document is overly prescriptive and complex. There is a danger that this will lead to many viable and locally beneficial small-scale hydro schemes not being attempted even though they would impose negligible risk.

There should be clear descriptions of EA procedures and limits which enable EA officers in the field, and licence applicants, to assess the scale of risk to the environment which may result from the development of any scheme. There should be simplified and rapid processes for licensing abstraction and impoundment for small-scale schemes which could not have a significant effect on, for example, a protected species or some other necessary use of water.

In these cases, where licensing could be achieved with little work on the part of the EA, the permitting could take place through simple registration of scheme details.

Licence fees should also be proportionate.

### FURTHER DETAILED COMMENTS ON GUIDELINES NOT REFERRED TO IN THE CONSULTATION QUESTIONS FOLLOW.

#### Process

The present approach to issuing GPG2 risks failure if the guidelines do not tie both into policy and into licence application, permitting, and monitoring procedures.

There appear to be opportunities to integrate the documentation which qualifies and quantifies the policies and procedures, from the perspectives both of applicants and of EA staff. Preparing integrated and related documentation will potentially result in streamlining the procedures and avoiding the risk of ambiguities and misunderstandings.

#### *Other comments already documented in the consultation preparation*

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## *stage*

The comments below and suggested revisions to Environmental Site Audit checklists are included in the document "[http://microhydroassociation.co.uk/Documents/1008 GPG Vsn 1 word version \(as on web\) - modded GK-S inc DR JW AB IB JA comments.pdf](http://microhydroassociation.co.uk/Documents/1008%20GPG%20Vsn%201%20word%20version%20(as%20on%20web)%20-%20modded%20GK-S%20inc%20DR%20JW%20AB%20IB%20JA%20comments.pdf)" which was submitted during preparation of consultation and published on the mha forum for comment.

### Designated sites (ref Guidance Section 1 and expanded Guidance Section 3.6)

In Scotland a few systems have gone in on SSSIs and SACs. It would be more appropriate to state that the burden of evidence will rest with the licence applicant to show that notifiable features will not be negatively impacted.

### Environmental Site Audit checklists (ref Guidance Section 2)

The existing checklists are complicated given the potentially numerous consents - one licence and associated application would be better, with the stated process just being an internal one, applied where necessary according to the application details.

The checklists target low head schemes, not all questions need to be asked of mid to high head schemes as answer is obvious - wouldn't it be good to have a mid to high head specific checklist? Also, initial impression is that checklists are not proportionate - catchment size, river type (therefore morphology and ecology), reach impacted - though some of this is perhaps inferred in additional notes. Overall very generic.

#### (ref Guidance Section 2 paragraph 16)

16.1. for schemes with depleted reaches of minor tributaries in a river basin(1), photographic evidence of the watercourse and its riparian habitat may be used to provide evidence of the need or otherwise of a detailed investigation.

(1) A minor tributary under the WFD is one which has a catchment area of less than 10 km<sup>2</sup>

#### (ref Guidance Section 2 Table D)

this is perhaps where the proportionate approach should be considered in the checklist - where v small catchment steep watercourses will naturally have much smaller habitat for macroinvertebrates, and therefore there is scope for a proportionate approach or alternative checklist. Note 24 is surely scale dependent - where much information can be gained: river type - geology, morphology and land use for v small catchments and the inferred habitat for macroinverts. Understandable approach at a large waterbody level where EA data more than likely exists. Note 25, again should be proportionate based on previous comments - lots to talk about here including mitigation measures...

Overall I agree that macro invertebrate surveys are a good parameter for looking at potential impact of a scheme - pre and post development

## (ref Guidance Section 2 paragraphs 24-26)

As in SEPA guidance, add: For schemes on minor tributaries in a river basin, photographic evidence of the watercourse and its riparian habitat may be used to provide evidence of the need or otherwise of a detailed investigation

## (ref Guidance Section 2 site layouts)

suggest include a typical high head scheme layout

## (ref Guidance Section 3.1, 3.2, 4.5, 4.6, 5.1, 7.2, 7.3 - further comments and suggested changes)

see the document "[http://microhydroassociation.co.uk/Documents/1008 GPG Vsn 1 word version \(as on web\) - modded GK-S inc DR JW AB IB JA comments.pdf](http://microhydroassociation.co.uk/Documents/1008%20GPG%20Vsn%201%20word%20version%20(as%20on%20web)%20-%20modded%20GK-S%20inc%20DR%20JW%20AB%20IB%20JA%20comments.pdf)" which was submitted during preparation of consultation and published on the mha forum for comment.

### **What will the responses be used for**

We will take the responses of the consultation to our Hydropower Working Group, review them and consider the responses and any evidence provided to support the development of the revised edition of the Hydropower Good Practice Guide. We aim to publish this by the end of the year.

### **How we will use your information**

We and the Hydropower Working Group will use your information to help shape the development of a revised edition of the Hydropower Good Practice Guide

We will publish all responses after the consultation has closed, unless you have specifically requested that we keep your response confidential. We will not publish names of individuals who respond. We will publish the name of the organisation for those responses made on behalf of organisations. Please indicate on your response if you want us to treat it as confidential.

We will provide a full summary of the responses on our website by 16 December 2011.

For responses received online: If you respond online or provide us with an email address, we will acknowledge your response and send you a summary of responses after the consultation has closed. We will also publish the summary of responses on our website.

### **Confidential responses**

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In accordance with the Freedom of Information Act 2000, we may be required to publish your response to this consultation – including your personal information. We may also show your response to other organisations that ask to see it.

Please let us know if you want us to keep your response confidential, and explain why. We will take this into account when dealing with requests to see responses to this consultation. However, we cannot guarantee confidentiality.

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