Guidance for run-of-river hydropower

December 2013

Impoundments - the use of weirs

This document is part of our set of advice notes to help you design your hydropower scheme. You should read our Guidance for run-of-river hydropower development first, which contains an overview of our guidance and a glossary of technical terms.

Introduction

An impoundment (also known as 'Impounding Works') on a watercourse obstructs or impedes the flow of water. Weirs and dams are examples of impoundments. These structures create an impounded area of water upstream and change the physical nature of the watercourse both upstream and downstream of the impoundment. Impoundments can cause significant changes to river habitats, fish movement, morphology and sediment transport.

These potential changes and their implications are outlined in Annex 1.

Existing weirs

Hydropower schemes on existing weirs are more likely to be approved where:

- the existing weir is in a serviceable condition
- the weir is not within, or does not affect, designated sites
- the objectives of the Water Framework Directive are being achieved and future achievement is not compromised
- there is no risk of deterioration to the status of water bodies from the proposed works
- the weir cannot be removed
- In authorising hydropower schemes that use existing weirs, we will need to assess whether the weir is causing or contributing to a failure to achieve the objectives of the Water Framework Directive (WFD) or a designated site. If this is the case, we may need to ask for modifications to, or even the removal of, the structure in order to achieve these objectives.

If a weir has an existing and necessary use, it is unlikely to be targeted for removal. We may still ask for it to be modified, provided the existing use can be maintained.

We do not encourage hydropower proposals that would involve raising the height of an existing weir.

We may accept small increases in weir height if the primary aim is to compensate for turbine draw-down or to improve fish passage. However, any application to raise the height of a weir must include an assessment of the potential implications in an appropriate environmental report demonstrating no prevention of achievement of the WFD objectives for any affected waterbodies.

New weirs

New weirs on lowland rivers

Given the likelihood of adverse effects on the environment – and the nature of these effects – we are unlikely to approve the construction on lowland rivers of new weirs that are solely for hydropower. This also applies to the reconstruction of weirs that have ceased to be serviceable.

If an application is made to construct a new weir it must include an assessment of the potential implications in an appropriate Environmental Report. This would need to focus on:

- the cumulative effects of weirs on fish migration
- the ecological effects of creating a ponded reach within a river – 'ponding'
- the disruption of in-stream processes such as the transport of sediment
- the effect on flood risk
- the effect on fisheries and conservation
- the effects on navigation rights
- the effects on designated habitats and species
- the effects on other people's rights to, and uses of, water
- how the objectives of Water Framework Directive are to be met.

New weirs on upland watercourses

We recognise that new small weirs on upland watercourses may have fewer effects – and that these effects may be more easily mitigated. New weirs in these locations are generally less than 1.5 metres high for flow division purposes. These may be accepted if their height is minimised. However, they can be associated with the creation of lengthy depleted reaches, the disruption of sediment transport, channel erosion and sediment deposition patterns, as well as specific local ecological effects

You will need to set out the potential effects of any depleted reach in an environmental report. We will need to consider these effects and any proposed mitigation measures carefully and be satisfied that there will be no risks to WFD objectives, or the rights of other users. Any requirements for fish passage will need approval.

Water Framework Directive assessments

We are developing guidance on how to assess the impact of new modifications in the water environment. We must ensure that these do not compromise the targets and objectives of the Water Framework Directive, as well as other legislation. Further advice on these assessments will be included in a revised edition of our Good Practice Guidance for hydropower, to be published in 2013.

Any proposal to construct a new weir, or significantly alter an existing weir, with or without the creation of a depleted reach, will require an assessment for potential ecological and geomorphological effects. Schemes introducing a significant amount of bed and/or bank reinforcement may also need to be assessed for potential impacts.

Developers should talk to their Account Manager as soon as possible, as part of our pre-application process.

The information required to support the WFD assessment will need to be included in the environmental report for the scheme to adequately demonstrate that all obligations will be met. You may need to employ suitably qualified ecologists and geomorphologists to carry out surveys and advise on design options and mitigation measures.

The Environmental Site Audit checklist (Form WR325) can help identify if your scheme will need further assessment to demonstrate WFD compliance. You can download this form from our website[1].

[1] https://publications.environment-agency.gov.uk/pdf/GEHO0211BTMT-e-e.pdf

Annex 1 - Impoundments, weirs and hydropower

Impounding works in the channel (such as weirs) typically disrupt the longitudinal connectivity of rivers. They also tend to change the nature of the physical habitat above and below the structure. This can sometimes affect a significant length of river. Reduced connectivity can have a significant impact on fish migration.

However there are many other potential impacts that we also have to consider. These include looking at whether the structure:

- restricts migration
- interrupts sediment transfer through river systems
- changes patterns of erosion and/or deposition.

Within River Basin Management Plans, the Environment Agency will aim to introduce morphological restoration schemes within water bodies that are failing to meet the objectives of the Water Framework Directive or a designated site. The aim of the schemes will be to enable the water bodies to meet those objectives. Restoration schemes will seek to re-establish, as far as possible, the natural functioning of the river system and to deliver multiple benefits.

We have identified that some existing impoundments are a reason for a water body either not achieving good ecological status under the Water Framework Directive or, if it is within or affects a designated site, not meeting the objectives for the site. We may therefore identify such impoundments as needing removal or modification, irrespective of any hydropower proposals.

If the weir has been targeted for removal, we are unlikely to approve a hydropower scheme on the site. However, we would weigh up the relative social, economic and environmental benefits of the options. In order to proceed, the scheme may have to comply with the stringent tests set out in Article 4.7, 4.8 and 4.9 of the Water Framework Directive.

The situation is different if the weir only requires modification in order for the objectives of the Water Framework Directive or the designated site to be achievable. In such cases, we may consider a hydropower scheme on the weir. However, it will normally have to incorporate the required improvements. No scheme must prevent the achievement of the objectives of the Water Framework Directive or of a designated site. If the addition of hydropower to an existing weir is likely to reduce the ability of fish to pass the barrier, a fish pass will normally be required.

Some barriers have identified uses, such as for navigation, flood risk management, or abstraction. These will be more likely to remain in place.

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