Cyfoeth Naturiol Cymru
Natural Resources Wales

Guidance Note

Hydropower Guidance Note: HGN 14 Weirs

This Guidance Note has been prepared by Natural Resources Wales (NRW) to provide applicants for abstraction and impoundment licences for hydropower schemes with information on weirs. Its contents may be updated periodically and developers should ensure they read the most recent version.

This guidance is not intended as a statement of law and should be read in combination with and in the context of the relevant enactments and EU obligations. Nothing in this guidance is intended to give NRW power to do anything that it would not otherwise have power to do or exercise any of its functions in a manner contrary to the provisions of any enactment or any EU obligation. In the event of any conflict between this guidance and enactments or EU obligations the latter takes precedence.

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 change the physical nature of the watercourse both upstream and downstream of the impoundment. Impoundments can change river morphology and habitats, and interfere with the movement of sediment and organisms through the channel network.

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

Longitudinal connectivity which allows sediment, animals and organic matter to move naturally through the channel network is an essential feature of river ecosystem structure and function.

Hydropower schemes should avoid further disrupting, or preventing the restoration of, longitudinal connectivity. Developers are encouraged to avoid sites and designs that require building new impounding weirs, or use otherwise removable weirs, that disrupt longitudinal connectivity.

Existing weirs

Hydropower schemes that will use existing weirs are more likely to be approved where:

- the existing weir is required for a licensed and essential use
- 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 by the presence of the weir
- there is no risk of deterioration to the status of water bodies from the proposed works
- the weir cannot be removed now or in the future

To grant licences connected with 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, our first priority will be to seek the achievement of the WFD objectives. This may mean removing the weir or, where this is not possible, asking for modifications to the structure in order to make hydropower development consistent with achieving water body or site objectives.

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

Raising the height of an existing weir

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

Small increases in weir height may be acceptable 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 will need to include an assessment of the potential implications in an appropriate environmental report. The report will need to demonstrate that achievement of the WFD objectives for any affected water body will not be prevented.

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New weirs

In most circumstances, hydropower developers should seek to avoid building new weirs that interfere with the natural movement of sediment, animals or organic matter through the channel network.

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 of new weirs on lowland rivers except with clear and specific justification. This also applies to the reconstruction of weirs that have ceased to be serviceable and which have been identified as preventing the achievement of WFD objectives. We are unlikely to be able to grant licences in connection with applications for such schemes in designated sites and their supporting habitats.

If an application is made to construct a new weir, or restore and make more permanent a degraded non-essential 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 up- and down-stream fish migration
- the ecological effects of creating a ponded reach within a river – ‘ponding’
- the disruption of connectivity dependent processes such as the sediment transport
- the effect on flood risk
- the effect on fisheries, conservation and recreation
- the effects on navigation rights
- the effects on designated habitats and species
- the effects on other people’s rights to, and uses of, water
- the effects on Water Framework Directive objectives

New weirs on upland watercourses

We recognise that small weirs on upland watercourses may have more spatially limited impacts. New weirs in these locations are generally less than 1.5 metres high and designed to divert flow rather than impound water. However, they are often associated with

the creation of lengthy depleted reaches, the disruption of sediment transport, morphological alterations, as well as various ecological impacts. Where fish are present, accommodating upstream fish passage can be difficult due to the width and gradient of the channel. Locating new weirs in fishless reaches, on natural migration barriers and above channel confluences, can help mitigate these impacts.

Developers can reduce the morphological impacts of new weirs by carefully considering weir design and location. Locating weirs and outfalls within steep erosion or high transportation zones, ideally bedrock sections, can minimise impacts. Turbine houses and pipeline routes should be located so as not to impact on the lateral movement of the watercourse. Proposals that reduce the impact on the environment in this manner are more likely to be WFD compliant.

You will need to set out the potential impacts of any new weir and the associated depleted reach in an environmental report. We will need to consider these effects and any proposed mitigation measures carefully and be satisfied that the WFD objectives and the rights of other users will be appropriately protected. Any requirement for fish passage will need careful planning and is subject to our written approval (Please see separate guidance note on fish passage). A sediment management programme may also be required as part of operational conditions.

Water Framework Directive assessments

We have developed guidance on how to assess the impact of new modifications in the water environment. We must ensure that these comply with the requirements of the Water Framework Directive, as well as other legislation. Other Guidance Notes available on our website contain further information.

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

For any proposal to construct a new weir, or alter an existing weir, with or without the creation of a depleted reach, we will need you to provide us with the information that will allow us to assess the risk your proposed scheme poses to river geomorphology and ecology. Schemes introducing a significant amount of bed and/or bank reinforcement may also need to be assessed for potential impacts. 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 can help identify if your scheme will need further assessment to demonstrate WFD compliance. This form is available on our website.

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Annex 1 - Impoundments, weirs and hydropower

Impounding works in the channel (such as weirs) typically disrupt the longitudinal connectivity of rivers. They can also change the nature of the physical habitat above and below the structure. This can sometimes affect an ecologically meaningful length of river, or in the case of fish passage, the ecology of an entire catchment.

Some of the potential impacts that we have to consider are whether the structure:

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

Within River Basin Management Plans, NRW will aim to introduce morphological restoration schemes within water bodies that are failing to meet the objectives of the WFD 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 and ecosystem services. For water bodies at 'high status' for geomorphology under the WFD, any development should not adversely affect that status.

Some existing impoundments may be contributing to a water body either not achieving good ecological status under the WFD or, if it is within or affects a designated site, not meeting the objectives for the site. Such impoundments may be identified as needing removal or modification, irrespective of any hydropower proposals.

If the weir has been identified for removal, we are less likely to approve a hydropower scheme on the site. However, we would consider the relative benefits of the options. In order to proceed, the applicant will have to demonstrate that the conditions set out in Article 4.7, 4.8 and 4.9 of the Water Framework Directive are met with respect to the scheme.
The situation is different if the weir only requires modification in order for the objectives of the WFD or the designated site to be achievable. In such cases, we would be more likely to consider favourably a hydropower scheme on the weir. However, it will normally have to incorporate the required improvements. If the addition of hydropower to an existing weir is likely to reduce the ability of fish to pass the barrier, a fish pass is likely to 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 as long as their established and intended use remains essential.