

Submitted to Consultation on Guidance for developers of storage and pump storage hydropower schemes
Submitted on 2026-09-25 09:43:46

Consultation questions

1 Have we identified the key environmental impacts associated with storage and pumped storage hydropower schemes that should be considered?

Please explain your answer. If you think any impacts are missing, tell us what they are and why they are important.:

Identification of impacts

Whilst the Guidance states that serious environmental harm can result from the operation of hydropower schemes, potential harmful impacts are only identified in the supporting information in Annex B. It would be beneficial to provide a summary of impacts in the main document at part of Section 5 'Screening process' to provide clarity on key considerations.

Whilst impacts on the water environment are understandably the main focus, the substantial impacts on terrestrial habitats should also be recognised, mindful of SEPA's duty as a public body under the Nature Conservation (Scotland) Act 2004 to take actions that ensure biodiversity is not only safeguarded but advanced.

As has been included for fish, the Guidance should also highlight the impacts of hydropower schemes on other aquatic species such as amphibians, plants and invertebrates and request that scheme design and operation should minimise adverse impacts on populations. Impacts on these taxon groups will inevitably have wider ecosystem impacts, including fish and birds and yet their consideration and assessment in hydropower schemes is often very poor, largely due to the lack of legislative protection. It is vital that overall biodiversity loss is considered alongside potential impacts on species of conservation concern.

Annex A- Checklists

Regarding the Checklists provided, there are a number of areas where clarification is needed to ensure impacts from a development are adequately captured.

The question is asked for both natural rivers and lochs if the proposals will impact a designated site for biodiversity and if they do, if this would result in a downgrade in classification to less than good status. If status is not impacted, the proposals are considered 'provisionally acceptable'. As 'status' relates to water classification status, this could be different to impacts the scheme may have on features of a designated site, though the two may be linked. We would argue that it may be possible for a scheme to maintain water classification status but still have impacts on a designated feature. As avoidance of sensitive sites is the first step in the mitigation hierarchy, it would be appropriate for any schemes located in or impacting a designated site to be classed as provisionally unacceptable regardless of if water classification status will be maintained.

In relation to this, it is concerning that if a natural waterbody that is a designated site does not have 'good or high status', proposals are considered provisionally acceptable, seemingly regardless to the impacts on the features of the designated site. It would be useful to have clarity on why SEPA considered the two attributes to be linked within the checklist. As the foundation for nature recovery and an essential contribution to Scotland's 30x30 commitments, designated sites should not be subject to hydropower proposals.

Areas outside designated sites can also be of high ecological value and are not suitable for hydropower developments. Whilst it may be more difficult for this high-level Guidance to capture, Buglife would recommend that the checklists also ask if a water body is of high ecological value which would include sites supporting protected species and Priority Habitats and Species as recognised by the Scottish Biodiversity List.

Proposals are considered provisionally acceptable when a water body or watercourse falls below a certain length or area but there is no explanation provided of how these parameters have been selected. These parameters should be evidenced, or they will be easier to challenge or ignore. It would be helpful in any further consultation on this Guidance for this is to be explained to enable feedback.

2 Do you think the mitigation measures described in the guidance are practical and achievable for developers to implement?

Please explain your answer and identify any measures that may be difficult to deliver.:

Several of the mitigation measures require further clarification to be understood and to be able to be implemented. Developers will be seeking to maximise energy production and may be reluctant to implement some of these measures even if achievable.

For the impacts of hydropowering in the lower reservoir outlet river and the rapid and frequent changes in water levels in reservoirs, mitigation is identified to prevent 'significant changes' in water levels. However, it is important to define what is considered significant or each applicant will make their own determination.

Research to date suggests that lochs with annual water level fluctuations (AWLF) of less than 5 metres and weekly water level fluctuations (WWLF) of less than 0.5 metres support the richest littoral invertebrate communities. When water fluctuations exceed either of these figures, the invertebrate community was impoverished, and where both the AWLF and WWLF are greater than these figures the invertebrate community was extremely poor. Therefore, it would be necessary for schemes to operate within at least the parameters of the WWLF of less than 0.5 metres and ideally less than this as water levels will be fluctuating more frequently within a PSH generating cycle. We would recommend adding this parameter and reiterating in the table that cumulative impacts must also be considered from other hydropower schemes and other water uses when mitigating water fluctuations.

The more a scheme deviates from the natural water fluctuations of a water body, the greater adverse impacts on biodiversity there are likely to be which

is why locating PSH within existing Heavily Modified Water Bodies is a key mitigation approach to include and should drive site selection.

The Guidance considers the impact of artificial barriers on fish migration. We would highlight that barriers can also affect the dispersal of invertebrates as they can travel far shorter distances than fish. We agree that utilising existing structures such as weirs should be prioritised and any new barriers should consider the wider impacts on freshwater ecology and not just migratory fish. Hydro developments can alter or even stop the natural processes in rivers that are so important to maintain healthy biodiversity so prioritising sites for development that are already modified and where mitigation measures can readily be achievable is key to reduce impacts on species ecology and river processes such as sediment transport.

Where natural river processes are impacted, such as loss of normal sediment deposition, mitigation measures can be introduced such as sediment augmentation downstream of reservoir dams. It maybe that suitable materials generated during construction of a scheme can be utilised for this.

The Guidance includes some discussion on sediment management. We would highlight that when a PSH scheme inundates a large area of terrestrial habitat to create an upper reservoir, substantial sediment is generated from degrading substrates. This may necessitate repeated 'flushing' of the upper reservoir for several months before the scheme is fully operational. It has not been clear from the schemes in the planning system at present whether any consideration or mitigation has been proposed to ensure sediment will not enter the lower reservoir during this commissioning process, with the risk that it could then settle and smother benthic plant and invertebrate populations. It would be useful for this impact to be highlighted in the Guidance and appropriate mitigation considered.

3 Are there any additional practicable mitigation measures, emerging technologies or approaches that we should require applicants to consider to reduce environmental impacts?

Please provide examples and explain how they would improve environmental outcomes.:

Whilst not a mitigation measure, we would highlight that eDNA sampling can be an effective approach to determining species assemblages in standing waters. Often samples are collected to assess fish populations, and these same samples can be used to identify invertebrate species as long as samples are representative of important habitats that would be impacted. eDNA techniques are less useful in running waters as the results can include DNA signals from species found at some distance upstream of the development. Ideally, a combination of traditional sampling techniques and meta-barcoding will often provide the most reliable results.

4 What else should be included in this guidance?

SSS:

The Fish Protection Section of the document states "Regardless of the mitigation measures applied, each project should be designed based on a robust aquatic biodiversity baseline, an assessment of the hydraulic and hydrological changes resulting from the hydropower development and an understanding of the fish ecology". We would expect the 'robust aquatic biodiversity baseline' to include an appropriate level of sampling for other aquatic species, particularly amphibians, plants and invertebrates, over the zone of influence of a scheme.

LINK members have engaged with six PSH schemes of which five have not established a robust aquatic biodiversity baseline or provided sufficient assessment on invertebrate impacts. There has often been no clear request in the scoping opinion from consultees that aquatic invertebrate surveys are needed. However, it is clear this is critical information due to the impacts of hydropower developments.

LINK strongly recommend that SEPA include an 'Information Requirements' section in the Guidance for aquatic invertebrates, plants and amphibians. This would provide clarity on what SEPA expect the baseline to constitute rather than leave this open to interpretation.

About you

5 Name

What is your name?:

Craig Macadam

6 Email

What is your email address?:

craig.macadam@buglife.org.uk

7 Are you responding on behalf of yourself, or a business or organisation?

Business/Organisation

If responding on behalf of a business or organisation, please tell us its name.:

Scottish Environment Link

8 Are you happy for us to publish your response to this consultation?

Yes