

Submitted to Consultation on Guidance for developers of storage and pump storage hydropower schemes
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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.:

Overall, we found this guidance to be useful in identifying a range of impacts that should be evaluated and considered for storage and pumped storage hydropower schemes. The advice in this document provides a positive opportunity for developers to improve their evaluation of environmental impacts. The decision-framework in the guidance has the potential to improve environmental outcomes associated with future proposed projects, particularly where it is used effectively to direct development of storage and pumped storage hydropower schemes away from areas where there may be significant impacts to important resources like migratory fish and designated sites.

The guidance would benefit from expanded direction on how to determine the scope of impact (and thus analysis), particularly outside of closed-loop systems, where impacts may extend to rivers or designated sites up or downstream of the project area or where multiple projects may have a cumulative effect on a watercourse or waterbody. In these cases, even where the impact of an individual project may be minor, the piecemeal effect of multiple projects together may create a more significant effect, and this should be evaluated within the scope of impact. Flow, sediment and temperature modelling should consider nearby schemes operating together and within future climate-change and water scarcity conditions.

Further, while the guidance notes that developers should address impacts to SACs and designated sites, clear guidance should be provided on how indirect impacts to SACs should be evaluated within the project scope. For example, a waterbody directly impacted by a project may not be designated, but if the upstream system is designated for migratory fish and they move through the impacted waterbody, then the project has a potential to impact the upstream SAC and thus it must be included within the scope of impact.

Pumped storage hydropower often operates quite differently from traditional hydropower, and this requires broader analysis of impacts. For example, hydro-peaking operations result in pulsing flows and temperature changes within lochs, which can be confusing for migratory fish, affecting their movement and passage through loch systems. These impacts can be further compounded by impacts from construction and operation, including the use of artificial lighting and the potential effects of construction and operational pumping noise. Depending on the magnitude, frequency, duration, timing and rate of change of these flows, there can also be effects to thermocline formation and stability, hydrology changes, habitat changes and supersaturation. These impacts also have the potential to result in wider effects on aquatic plants, invertebrates, birds and other animals dependent upon aquatic food webs. All of these factors must be considered within the impact analysis.

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.:

Annex B provides a useful list of potential mitigation options. However, it is important to emphasize the importance of selecting mitigation options that are most relevant to project-specific impacts and, where possible provide multiple benefits. For example, the use of natural design passes such as low-gradient, by-pass channels accommodate all fish species and provide additional fish habitat, as noted in the guidance, but also can be designed to more naturally transport sediments and flows around structures. Additionally, where impacts cannot be fully avoided and mitigated for at the project site, developers should consider additional measures elsewhere in the catchment, such as improving existing fish-passage infrastructure or remove redundant barriers. In addition, long-term monitoring, adaptive management plans and adaptive operating conditions should be required so that unexpected impacts can be identified and corrected (additional detail provided in question 3).

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.:

Adaptive management measures should be put into place to monitor and address potential impacts that may occur, either where mitigation measures proved to be inadequate or where impacts were not predicted initially, including supersaturation or other potential lethal consequences for aquatic life. In several parts of Annex B, mitigation measures are phrased as designing something that is 'small compared to', however not all impacts may be mitigated by simply achieving a simple volumetric comparison and impacts may instead result following subtler thresholds or changes in effect magnitude. Particularly where such simplified assumptions are made on the potential for impact, some level of monitoring and adaptive management should be put in place alongside mitigation measures and adaptive operational conditions to ensure that projects do not result in unintended environmental harm.

4 What else should be included in this guidance?

SSS:

We appreciate that the guidance addresses project screening prior to considering mitigation measures and believe Section 5 and Annex A provide important and clear expectations around the siting of potential projects. This type of decision framework supports consistent implementation of the mitigation hierarchy, where selected project sites (alternatives) avoid harm, and mitigation addresses only the impacts that remain.

We would recommend that SEPA ensure this decision framework meaningfully directs developers towards better practical environmental options, particularly where migratory fish are potentially present within the system. For example, later in the guidance (page 24), it states that “disruption or delay to fish migration can have significant adverse impacts on the distribution and/or abundance of fish populations. Hydropower schemes can pose significant risks to fish migration, and the impacts can extend far beyond the site of the hydropower scheme. Unless such risks can be avoided, authorisation will generally be refused.” The guidance further advises developers to consider sites that are upstream of natural barriers to fish migration or where fish habitat upstream is of poor quality, or very limited, and not important for maintaining the distribution or abundance of fish populations. These recommendations are not explicitly captured within Section 5 and the checklists in Annex A, and in light of the wild salmon crisis, and the renewed commitment to the Wild Salmon Strategy in the Programme for Government, we would strongly argue that they must be added. This would outline a consistent hierarchy of suitable and unsuitable sites, with a clear presumption that systems which do not contain migratory fish or are naturally outside migratory limits are more suitable for storage and pumped storage hydropower development.

In addition, we are concerned that some of the decision screening factors within the checklists in Annex A are based solely on the size of a waterbody (e.g., lochs less than 7.5 ha, streams less than 10km²) or length of impact (e.g., less than 10% of habitat or 20km length). An assessment of habitat quality, in addition to quantity, is a vital consideration and should be incorporated as an additional decision factor, particularly where these smaller waterbodies provide high-quality habitats for migratory fish and other aquatic life and support climate resilience within the wider catchment.

Within Annex A, it would be useful to include a flowchart or guide above Checklist 1, which directs users to the checklist that is the most appropriate starting point for their project. This would be particularly useful where there may be multiple waterbody types within the scope of impact, as it is currently unclear how to navigate through Annex A checklists when there more than one waterbody type is affected by a scheme. For example, where one waterbody is an HMWB and the other is a natural waterbody, which checklist is the most appropriate starting point?

It would be useful for the document to include guidance or minimum criteria for documenting the analysis of potential sites so developers can demonstrate that they have meaningfully considered alternative options that may reduce environmental harm, including, but not limited to, alternative sites away from sensitive habitats, protected sites or waterbodies that support migratory fish populations, or alternative designs and operating regimes to minimize impacts on natural flows, sediment movement and resident aquatic life.

To improve usability, Annex B would benefit from an index or table of contents at the start of the annex to improve navigation to relevant information.

About you

5 Name

What is your name?:

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6 Email

What is your email address?:

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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.:

Fisheries Management Scotland

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

Yes