LOW IMPACT PUMPED STORAGE HYDROPOWER DEFINITION

Guideline for Developers, Resource Agencies, Tribal Nations, and the Public

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www.lowimpacthydro.org

1. Introduction

The Low Impact Hydropower Institute (LIHI) has developed the Low Impact Pumped Storage Hydropower (LI-PSH) Definition in response to the proliferation of proposed new pumped storage hydropower (PSH) projects in the U.S. The growing interest in pumped storage has created a unique opportunity to positively influence PSH facility siting, design, permitting, and operation to minimize its environmental and social impacts.

In late 2023, LIHI, with financial support from the William and Flora Hewlett Foundation, initiated a broad, inclusive process to develop the LI-PSH definition by assembling a 60-member external Advisory Group representing a broad cross-section of the hydropower community with subject matter and technical expertise. The Definition was collaboratively developed over the course of 2½ years in an iterative process that included dozens of meetings, two rounds of public comment, and three rounds of revision. The resulting final Definition leverages LIHI's more than 25 years of experience in evaluating the environmental and social impacts of conventional hydropower facilities but is tailored to the unique characteristics of PSH.

There are 24 operating PSH projects that are regulated by the Federal Regulatory Energy Commission (FERC). All but the Olivenhain-Hodges project (FERC No. P-12473) are open-loop projects and eight are currently in the relicensing process. There are another 19 federally owned projects (not regulated by FERC), all of which are open-loop. In addition, there are four licensed but unconstructed projects and another four projects in the licensing process now - all eight are closed-loop. FERC currently lists 49 active preliminary permits for nine open-loop projects including six open-loop, three using the Pacific Ocean as the lower reservoir, and 40 closed-loop projects. FERC's list of pending preliminary permits includes two open-loop projects and two closed-loop projects.[1]

This guideline is intended to provide direction and suggestions on applying the LI-PSH Definition as a tool to help evaluate the environmental and social impacts of existing and proposed pumped storage projects, regardless of project design (i.e., open-loop, closed-loop, underground, seawater-based). This guideline should be used in conjunction with the LI-PSH Definition with particular attention paid to the defined terms in Appendix A that are used throughout the document where those terms are underlined. The overall goal of the Definition's standards is to first avoid impacts, then minimize remaining impacts, and lastly, to mitigate or treat impacts that cannot be avoided or minimized. Ideally, a PSH project should be sited to avoid most if not all real and potential impacts that may occur over the project's life.

[1] FERC data as of July 13, 2026, accessed July 27, 2026 https://ferc.gov/sites/default/files/2026-07/PendingPermit_7.13.2026.xlsx

2. Guidance for Developers

A project can only be successful with the support of those affected by it, not in spite of their opposition to it. Openness and transparency are critical to gaining that support.

a) Identify all potentially interested constituencies, not just those required under 18 C.F.R. §4.32 and include them in the permit application. Tribes, local communities, agencies, local and regional governments and commissions, NGOs, and others may be interested parties. Do the research and ask locally/regionally if there are others that should be included.

b) Notify all interested parties at the time the preliminary permit application is submitted and FERC assigns a project number. It is best to reach out earlier if possible so that interested parties can weigh in on the proposed site conditions and stay informed about the project. Do not wait for FERC to issue its notice of the preliminary permit application which is unlikely to reach all interested parties. It is best if the parties hear from you first.

c) Proactively engage with interested parties early and often throughout the process and provide methods for them to communicate directly with you.

d) Share information about the FERC process with interested parties and keep them informed about the project's progress.

e) Be humble and respectful of all perspectives, seek to understand and be responsive to all input and concerns about potential impacts. Be willing to modify the project in response.

f) Seek to build positive relationships and collaborate with interested parties to find alternatives that can avoid or minimize project impacts and provide community benefits.

g) Communities are their own experts. Ask them for their ideas and priorities for community benefits before offering any of your own suggestions. General grid benefits do not count as community benefits.

Implementing the LI-PSH definition cannot be rushed, and potential impact areas cannot be dismissed in advance as being not applicable or de minimis. Each impact area must be researched and evaluated thoroughly and carefully. Siting and design alternatives should be taken into consideration to avoid or minimize all potential impacts.

- Avoid sites with cultural resources and values that Tribes and communities identify and consider culturally important.
- Research future water availability for closed-loop projects, and existing water rights including those that have not been exercised.
- Consider all terrestrial species and their habitats that could be impacted including listed species, Tribal trust species, sensitive species, and those of local cultural importance.

- Consider all water-dependent species and their habitats including groundwater dependent species.
- Evaluate the cumulative environmental and social impacts that the project may impose on both local and regional scales.

Additional resources are provided in Section 5 below.

3. Guidance for Interested Parties

A developer cannot fully understand or appreciate all of the local nuances such as local aspects of Tribal and community environmental and social wealth, and the community's needs and priorities – you must educate them.

a) Learn about PSH, its benefits and impacts, and the specifics of the project.
b) Learn about the FERC process (see Appendix A) and make your voice heard at every opportunity.
c) If there is an existing PSH project in your community, sign up with FERC to receive information about it - especially if it is, or soon will be, entering FERC relicensing.
d) Research the PSH development company and their other active or proposed projects.
e) Form coalitions with other interested parties and organizations having shared interests - leverage local expertise and the knowledge base in order to provide well-supported comments.
f) Stay informed about the project's progress and regulatory timelines.
g) Actively participate and commit to remaining involved over several years.

The public may only become aware of a proposed new PSH project once FERC has issued its notice of the preliminary permit application. Even then, not all interested parties may be informed.

- News of a proposed PSH project in your community may come as a big surprise - but don't panic.
- A newly proposed hydroelectric project must undergo a series of procedural steps that can take many years before it is licensed to be constructed and authorized to operate. Most proposed PSH projects are ultimately abandoned and never built.
- FERC provides numerous resources for learning about their permitting and licensing processes and participating in them.

Additional resources are provided in Section 5 below.

4. Closing

LIHI staff are available at all stages of PSH development, permitting and licensing. Our staff can provide expertise, information and additional resources, as well as support and guidance for all parties - anyone who may grapple with the complexities of pumped storage, the FERC process, or the LI-PSH Definition.

This guideline may be updated from time to time. Additional information and resources may be included below and/or posted on the LIHI website.

5. Additional Resources

Federal Energy Regulatory Commission Resources

FERC Pumped Storage Hydro webpage https://www.ferc.gov/licensing/pumped-storage-projects and resources for tribes and the public, including:

- Tribal Participation Guide for FERC Environmental Reviews: https://ferc.gov/tribalrelations/NEPA
- Resources for Public Participation in FERC processes https://www.ferc.gov/media/hydropower-licensing-get-involved
- https://www.ferc.gov/OPP/handouts
- https://www.ferc.gov/participating-online-ferc (resources/links for subscribing to and following a project docket, filing online comments, etc.)
- https://www.ferc.gov/OPP/translated-resources (translated into languages other than English)

Pumped Storage Impacts, Siting, and General Information

Pumped Storage Hydropower in the United States: Emerging Importance, Environmental and Social Impacts, and Critical Considerations. Karambelkar, S., Cantor, A., Bui, T.-K., Turley, B., Fischer, M. and Ames, S. (2025), Pumped Storage Hydropower in the United States: Emerging Importance, Environmental and Social Impacts, and Critical Considerations. WIREs Water, 12: e70017. https://doi.org/10.1002/wat2.70017 https://wires.onlinelibrary.wiley.com/doi/10.1002/wat2.70017

Pumped Storage Hydropower Siting Study: A Report to the Washington State Legislature. (June 2025). Janowitz, K. Washington State University Energy Program Olympia, Washington. Available at: https://wpcdn.web.wsu.edu/cahnrs/uploads/sites/60/2026/03/WSUEEP25-003-PSH-Siting-Study-June-2025-Final.pdf

US Department of Energy: Pumped Storage Hydropower webpage. https://www.energy.gov/cmei/water/pumped-storage-hydropower

Western States Water Council: Pumped Storage Hydropower Webinars. Available at: https://westernstateswater.org/topical-resources/pumped-storage-hydropower/

Community and Tribal Benefits

Gabe Chan and Kristine Chan-Lizardo, *Community Benefits in Energy Projects: Understanding the Building Blocks that Utilities, Cooperatives, and Clean Energy Developers Have Used to Engage Communities*, RMI, 2025. Available at: https://rmi.org/insight/community-benefits-in-energy-projects.

Matthew Eisenson & Romany M. Webb, Expert Insights on Best Practices for Community Benefits Agreements, Sabin Center for Climate Change Law, Columbia Law School, Sept. 2023. Available at: https://scholarship.law.columbia.edu/sabin_climate_change/206

Re-Imagine Appalachia (2024): Information on community benefit plans and community benefit agreements https://reimagineappalachia.org/community-benefits-plans-how-do-they-work-a-deep-dive/

US Department of Energy (2024): Community Benefit Agreements FAQs. Available at: https://www.energy.gov/sites/default/files/2024-12/CBA%20Guidance%20FAQ.pdf

Tallgrass Institute (July 2025): Tribal Benefit Agreements – Designing for Sovereignty. Available at: https://www.tallgrassinstitute.org/s/Tribal-Benefit-Agreements_Tallgrass-Institute_FINAL.pdf

Appendix A – FERC Preliminary Permitting in a Nutshell

1. The applicant submits a preliminary permit application for a specific proposed site to FERC.

2. Once FERC accepts the application as complete and provides public notice, there is a 60-day period for interested parties to formally intervene in the proceeding or to comment on the application. A competing applicant may also file a competing permit application or a notice of intent to file a competing permit application, or a notice of intent to file a license or exemption application for the same site.[2]

3. A preliminary permit is valid for four years with potential extension for up to another four years (or longer in extraordinary circumstances outside the applicant's control) if FERC finds that the permittee has carried out activities under the permit in good faith and with reasonable diligence.

A preliminary permit only:

- Preserves the right of the permittee to be the first to file a license application during the permit's term.
- Allows time to gather data and conduct feasibility and impact studies.
- Does not authorize any construction or land-disturbing activities.
- Does not grant any property rights.

In addition, the permit requires the permittee to:

- Obtain landowner permission to access any non-owned lands.
- Obtain the necessary authorizations and comply with any applicable laws and regulations to conduct any field studies.
- Prevent irreparable damage to the environment of the proposed project during the course of permit-related activities.

Preliminary permits are not transferrable and may be canceled by FERC if the permittee fails to show sufficient progress in studying the project, or for any other good cause. The permittee must file annual progress reports to keep the permit active. Permit conditions are framed to ensure that the permittee does not tie up a site without pursuing in good faith a study of the project's feasibility.

[2] Filing a notice of intent for a license application bypasses the preliminary permit stage all together.

It is important to understand that FERC considers comments and concerns submitted about potential project impacts to be premature at the permit stage - but it is still important to file comments and concerns anyway. FERC also does not consider the financial fitness of an applicant at the preliminary permit stage.

FERC will, however, deny a preliminary permit application if there is a permanent legal barrier to site development (e.g., a clear legal reason the project cannot proceed). At this time, FERC will also deny permits for proposed projects on tribal and federal lands where the Tribe(s) or federal land or facility managers oppose the project.[3]

[3] In October 2025, the Dept of Energy requested that FERC rescind the policy issued in February 2024 denying permits on tribal lands where the Tribes opposed the projects. https://www.energy.gov/sites/default/files/2025-10/403%20Hydropower%20Letter.pdf. FERC received comments but has yet to publish a final rule. Documents related to this matter can be found at FERC Docket # RM26-5.