

Act 165 Report:
A Biennial Report to the Vermont General
Assembly on Procedures for Facilitating
Development of Small and Micro Hydroelectric
Projects

January 12, 2018

Introduction

The purpose of this report is to inform the General Assembly of progress to date in carrying out Act 165, “An act relating to expediting development of small and micro hydroelectric projects.” In 2012, the Vermont legislature passed Act 165, which directed the Commissioner of the Public Service Department (PSD), in consultation with the Secretary of the Agency of Natural Resources (ANR), to “seek to enter into a memorandum of understanding [MOU] with the Federal Energy Regulatory Commission (FERC) for a program to expedite the procedures for FERC’s granting approval for projects in Vermont that constitute small conduit hydroelectric facilities and small hydroelectric power projects.”¹ Act 165 requires the Commissioner to report to the General Assembly biennially, in perpetuity, on the “progress of the MOU program, including an identification of each hydroelectric project participating in the program.”

As discussed in the 2014 and 2016 reports, after consulting with FERC and many stakeholders, the agencies concluded that it was not feasible to enter into such an MOU, and that the next best way to expedite the development of small hydropower projects in Vermont was to provide greater assistance to developers early on in a project; to better coordinate communications to developers and to FERC; and to identify projects that could gain support from the state resource agencies, then communicate such support to FERC to expedite the permitting process.

An interagency MOU, which was fully executed by the PSD, ANR, and the Agency of Commerce & Community Development (ACCD) in July 2013, provides for such enhanced coordination, including identification of and assistance to developers of low-impact projects of high public value (such as those owned by public entities and those utilizing existing infrastructure), as resources allow. The House Fish, Wildlife & Water Resources Committee encouraged the agencies to proceed with implementation of the interagency MOU in 2014; the three agencies have since developed the Vermont Small Hydropower Assistance Program (VSHAP), outlined below and in our 2016 report.²

To date, no projects have availed themselves of the program, though the agencies have been notified of two projects that will likely apply to the program upon resolution of certain concerns related to property ownership and access. Nevertheless, several hydropower projects in Vermont have been built since the inception of Act 165, without the apparent need for the VSHAP. Other factors, including developer expertise and financial incentives, have moved those projects forward.

Vermont’s hydropower efforts were highlighted in a recently released report from the National Renewable Energy Laboratory (NREL), “State Models to Incentivize and Streamline Small Hydropower Development.”³ NREL examined regulatory streamlining and permitting assistance initiatives – including

¹ <http://legislature.vermont.gov/assets/Documents/2012/Docs/ACTS/ACT165/ACT165%20As%20Enacted.pdf>

² http://publicservice.vermont.gov/sites/dps/files/documents/Pubs_Plans_Reports/Legislative_Reports/Act%20165%20Legislative%20Report_Final_011516.pdf

³ <https://www.nrel.gov/docs/fy18osti/70098.pdf>

VSHAP – along with state financial incentive models, in three states: Oregon, Colorado, and Vermont. Ultimately, they conclude, “Financial incentives alone may not be sufficient to spur new hydropower development. Regulatory streamlining efforts and permitting assistance alone may also not be sufficient. However, a combination of streamlining efforts and financial incentives may provide a path to success for encouraging new small hydropower development.”

1 Vermont Small Hydropower Assistance Program

In the summer of 2015, the PSD, ANR, and ACCD opened the VSHAP to applications, which are accepted on a rolling basis. This voluntary, two-step screening process is designed to assist hydropower developers in identifying potential environmental and cultural resource issues that may require further study in the hydropower permitting process, before a significant investment has been made by a developer in a potential hydropower project, and to coordinate state agency review of potential projects in order to streamline regulatory review and participation in the FERC hydropower licensing process. The first step involves a desktop review of project proposal characteristics; if that screening is successful, the second step is project proposal review based on a site visit, as appropriate. The agencies will provide enhanced assistance to projects that screen as low impact (for instance, waiving scoping periods in the FERC process and/or representing to FERC that agency concerns have been satisfied).⁴

An overview document of the two-step VSHAP program⁵, the Step 1 Screening Criteria Summary and Application Instructions⁶, and the Step 1 Application Form⁷ are all available on the PSD website, <http://publicservice.vermont.gov>. The program process and criteria are explained in more detail below, as described in the Department’s 2016 report, which can also be accessed on the PSD website.⁸

1.1 Step One Screening Criteria and Process Summary

The initial screening process of the VSHAP program requires the developer to providing a certain amount of information to the state agencies to allow them to determine whether a project is likely to qualify as low impact. If a project passes successfully through the initial screening, the state agencies will

⁴ publicservice.vermont.gov/topics/renewable_energy/resources#hydro

⁵ http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/VT%20Small%20Hydropower%20Assistance%20Program%20Overview.pdf

⁶ http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Screening%20Criteria%20Summary%20and%20Application%20Instructions.pdf

⁷ http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Application%20Form_Final.pdf

⁸ http://publicservice.vermont.gov/sites/dps/files/documents/Pubs_Plans_Reports/Legislative_Reports/Act%20165%20Legislative%20Report_Final_011516.pdf

schedule a site visit to assess site-specific criteria. The Step 1 Screening Criteria Summary and Application Instructions⁹ as well as the Step 1 Application Form ¹⁰are available on the PSD website.

1.1.1 Step 1 Criteria

To qualify for a multi-agency site visit, a project must demonstrate it can meet all of the following criteria:

1. Will not be located on Class A waters, Outstanding Resource Waters, or federally or state-protected river reaches.¹¹
2. Will be located at an existing dam, **or** project will not require a dam or other impoundment.
3. Will be located on lands controlled by applicant or otherwise demonstrate support from adjoining landowners.
4. Will not increase the impoundment elevation.
5. Will be operated as true run of river.¹²
6. Have proposed bypass flows that will meet hydrologic standards as defined by the ANR Flow Procedure:¹³

Season	Period	Median Flow Standard ¹⁴	Default (cfs/mi ²)
Fall/Winter	Oct 1 – Mar 31	February	1.0
Spring	Apr 1 – May 31	April/May	4.0
Summer	June 1 – Sep 30	August	0.5

OR

⁹http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Screening%20Criteria%20Summary%20and%20Application%20Instructions.pdf

¹⁰http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Application%20Form_Final.pdf

¹¹ Lists of Class A and Outstanding Resource Waters are available on ANR's Natural Resources Atlas:

<http://anrmaps.vermont.gov/websites/anra/>; federally protected waters can be identified via <http://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact/get-started/sites.asp>.

¹² A true run-of-river project is one which does not operate out of storage and, therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project's impoundment on an instantaneous basis.

¹³ Reference for further detail: http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_flowprocedure.pdf and www.fws.gov/newengland/pdfs/Flowpolicy.pdf.

¹⁴ Application of the fall/winter and spring period flows for spawning and incubation will be determined by the VT Dept. of Fish & Wildlife site-specifically. If not required, the August median flow will be applied year-round.

Where there is virtually no bypass (tailrace discharges at the dam or into plunge pool close to the dam such that adequate circulation is maintained) and will have a spillage proposal of at least 7Q10 drought flow.¹⁵

1.1.2 Step 1 Process

Within 30 days of receipt of a complete application demonstrating a project's compliance with the required screening criteria, the three agencies will contact the applicant to schedule a site visit. The timing of the site visit may depend on the season and current streamflow conditions, in order for natural resources to be properly assessed (site visits will generally take place between May and October; therefore, applicants are urged to submit applications between March and September in order to avoid a long wait). Project sponsors are asked to fill out and return the Step 1 Application Form and submit it to the designated contact at the PSD.

1.2 Step 2 Criteria and Process Summary

The second step of VSHAP process involves on-site evaluation of potential resource impacts and allows for agency staff to determine whether additional studies are necessary.

1.2.1 Step 2 Site-Specific Determinations

For a project to qualify for enhanced assistance (e.g., waiving of pre-filing consultation, supporting shorter comment periods, and/or issuing a letter to FERC indicating that agency requirements are satisfied, as appropriate in each circumstance), it must meet the following criteria as determined by resource agencies during the site visit:

1. When ANR determines, based on a site-specific determination, that:
 - a. Fish passage facilities are not needed;
 - b. Project will not affect threatened or endangered species;
 - c. Project does not significantly alter site aesthetics; and
 - d. Project is not located where there is a bypass of high habitat value.
 - e. Proposed spillage is adequate to address aesthetics.
 - f. Will comply with ANR Stream Alteration Standards¹⁶
2. Where there are direct or indirect impacts to historic and archaeological resources, projects are reviewed on a case-by-case basis by the State Historic Preservation Office, and adhere to recommendations made by that office.¹⁷

¹⁵ The 7Q10 refers to the lowest average streamflow expected to occur for seven consecutive days with an average frequency of once in ten years. If it's a gaged stream, ANR can supply this statistic. If not, use 0.1 csm, the statewide value.

¹⁶ See Environmental Protection Rule, Chapter 27, Vermont Stream Alteration Rule for further guidance: http://www.watershedmanagement.vt.gov/rivers/docs/rv_SARule_12_24_13.pdf.

¹⁷ For a discussion of direct and indirect impacts, see ACCD's *Criteria for Evaluating the Effect of Proposed Telecommunications Facilities, Transmission Lines, and Wind Power Facilities on Historic Resources* at: http://accd.vermont.gov/strong_communities/preservation/review_compliance/telecom_criteria.

1.2.2 Step 2 Process

Within 30 days after a site visit, the agencies will issue a comment letter advising the applicant of potential cultural and natural resource issues that will need to be addressed in the Section 401 water quality certification and FERC processes.

When the applicant has satisfactorily addressed any cultural and natural resource issues raised by the agencies, a joint letter to FERC will be issued indicating that agency concerns have been satisfactorily resolved, agreeing to waive scoping and/or pre-filing consultation, and potentially supporting shorter comment periods in the FERC process.

The timing and scope of this letter is dependent upon the natural and cultural resource issues raised by the project and the steps that have been taken by the applicant to address those concerns, and will be determined on a case-by-case basis.

2 Recent Small Hydropower Activity

Vermont today has 71 FERC-licensed hydropower generation facilities, with a total estimated installed capacity of more than 750 MW.¹⁸ Subtracting the Connecticut and Deerfield River facilities — which are partially located out of state and generally provide their power to utilities and customers elsewhere in New England¹⁹ — and adding in unlicensed facilities, the installed in-state capacity is closer to 200 MW. The generation from these facilities powers nearly 10% of Vermont’s electric load.

Vermont Hydroelectric Projects²⁰

Plant Owner	# of Plants	Capacity (MW)
Green Mountain Power	32	111
Merchants	14	52
Municipal Utilities & Co-ops	9	31
Net Metered	21	5
Totals	76	199

¹⁸ <https://www.ferc.gov/industries/hydropower/gen-info/licensing/licenses.xls>,
<https://www.ferc.gov/industries/hydropower/gen-info/licensing/exemptions.xls>

¹⁹ However, Burlington Electric Department recently announced it has entered into a Power Purchase Agreement with one of the Connecticut River facilities owned by Great River Hydro (<http://www.vermontbiz.com/news/2018/january/05/bed-buy-power-bellows-falls-hydro>).

²⁰ Various sources, including FERC project data, GMP, "The Supply of Electricity" (Integrated Resource Plan, Ch. 3), <https://www.greenmountainpower.com/wp-content/uploads/2017/01/IRP-The-Supply-of-Electricity.pdf>, <http://vermontspeed.squarespace.com/storage/rule-4100-program/Schedule%20B-2017-2018.pdf>, <http://vermontspeed.squarespace.com/storage/projects-with-contracts/STANDARD%20OFFER%20PROJECTS%20WITH%20CONTRACTS.xlsx>, and DPS data and analysis

Several of the utility-owned facilities were originally constructed over a hundred years ago in the first step of providing electricity to local communities and are “unlicensed,” in that they predate federal licensing. A portion of current capacity was added in the 1980s under the Public Utility Regulatory Policies Act (PURPA) of 1978. Spurred by the energy crises of the 1970s, PURPA required utilities to purchase power from independent power producers at the utilities’ avoided costs. Under PURPA, 41 new hydro facilities were constructed in the state; these facilities were financed through long-term contracts where the avoided costs at the time were significantly higher than the wholesale power market prices for much of the contract term.

The pace of hydro development dropped off significantly after the early 1990s, due to a number of factors including stricter permitting requirements, and the development of the most economically viable sites. However, several projects have been developed or redeveloped in the last decade, primarily through the net metering and Standard Offer programs; and many previous PURPA projects moved to the net metering and Standard Offer programs when their PURPA contracts expired.²¹

Credible estimates of the potential for additional hydropower development in Vermont range from 25 MW at 44 sites (ANR, 2008²²) to 90 MW developable at 300 of the states existing 1,200 dams (PSD, 2007).²³ Under any assessment, it is clear that the best hydropower sites have already been developed. There are very few undeveloped sites that could support capacity greater than 1 MW, and a relatively low number in the 500 kW to 1 MW range. There are many potential smaller community and residential sites sized at less than 200 kW. But because the federal permitting requirements for hydropower do not necessarily scale with size, the economics are skewed in favor of larger sites in the absence of incentives that would make the smaller sites capable of supporting up-front environmental and engineering studies, along with the extensive, lengthy permitting process that hydropower must undertake at the federal level.²⁴

One potentially cost-effective way to increase (or at least maintain) hydropower's contribution to Vermont’s electricity mix without developing non-powered dams is to upgrade existing hydroelectric facilities, by installing small turbines at the dams that utilize conservation bypass flows, or by installing new turbines that can operate efficiently and over a wider range of flows. These upgrades may be possible without changing the current operating requirements — i.e., power production can be increased without additional environmental impacts. However, certain upgrades (such as installing new turbines) will likely trigger the need for an amendment to the FERC license or exemption and Section 401 water quality certification, which can discourage their implementation. Depending on when the

²¹ The Vermont Energy Act of 2011 required the PUC to make a Standard Offer contract available to existing hydroelectric plants no later than January 15, 2013.

²² Vt. ANR, The Development of Small Hydroelectric Projects in Vermont (Report to the Legislature, 2008), www.vtwaterquality.org/rivers/docs/rv_smallhydroreport.pdf

²³ Lori Barg, The Undeveloped Hydro Potential of Vermont (Community Hydro, Plainfield, 2007), publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/DPS-Undeveloped-Hydro-Potential-FINAL-VERSION.pdf

²⁴ U.S. FERC, Small/Low Impact Hydropower Program, www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact.asp

project received its authorization, modifications in the operating requirements may be needed, such as an increase in bypass flows. Green Mountain Power has taken advantage of relicensing of some of its dams to change operations in ways that meet modern water-quality standards while increasing output over a historical baseline.²⁵ Increased hydropower output resulting from upgrades that are made after June 30, 2015 to plants smaller than 5 MW also likely qualifies as a distributed renewable generation resource under the Renewable Energy Standard.²⁶

Municipal and private water supply and wastewater treatment pipelines can be retrofitted with turbines, to capture excess pressure in these systems without otherwise altering the system's regular operation. Such in-pipe hydroelectric systems have minimal environmental impact, although they also produce only a small amount of electricity. The town of Bennington,²⁷ city of Barre,²⁸ village of Waterbury, and a small farm in Danby have all pursued this path, following a 2013 amendment to the Federal Power Act that expedited the processing and review of conduit systems.²⁹

Additionally, there are several projects that have recently or will soon come online that are providing insights into what might be required if Vermont were to add more hydropower to the mix – and to retain existing capacity. The table below provides a snapshot of hydroelectric projects that have come online since the passage of Act 165. These include new hydroelectric facilities at existing dams or other infrastructure, upgrades to existing facilities, and previously non-operational facilities that have been brought back into production. Several additional sites are under investigation, but have not been included below.

Hydroelectric Projects Permitted Since ~2012

Project Name	License or Exemption Issue Date	River	FERC-Authorized Capacity (kW)	Notes
Licenses				
Townshend	3/29/12	West River	924	Operational; at an Army Corps flood control dam
Ball Mountain (Jamaica)	4/12/12	West River	2196	Operational; at an Army Corps flood control dam
Vermont Tissue Mill (Bennington)	4/25/13	Walloomsac River	360	Operational

²⁵ GMP, "GMP Upgrades and Doubles Hydro Generation at Otter Creek Hydro Plant in Proctor" (press release, July 2015), news.greenmountainpower.com/manual-releases/GMP-Upgrades---Doubles-Hydro-Generation-at-Otter-C?feed=d51ec270-a483-4f6c-a55e-8e5f8e2238c2

²⁶ legislature.vermont.gov/assets/Documents/2016/Docs/ACTS/ACT056/ACT056%20As%20Enacted.pdf

²⁷ www.vtenergyatlas-info.com/wp-content/uploads/2010/02/Bennington-hydro-final-rpt.pdf

²⁸ Fuss & O'Neill, Barre Micro-Hydro Project (presentation for Community Energy and Climate Change Conference), www.vecan.net/wp-content/uploads/jeff-McDonald_VECAN_Barre-Micro-Hydro-Project.pdf

²⁹ U.S. FERC, Hydropower Regulatory Efficiency Act of 2013, www.ferc.gov/industries/hydropower/indus-act/efficiency-act.asp

Project Name	License or Exemption Issue Date	River	FERC-Authorized Capacity (kW)	Notes
Pownal	4/1/83	Hoosic River	500	Stopped operating in late 1980s; upgraded and recommissioned in late 2017
Otter Creek	10/23/14	Otter Creek	+4528 over previous license	Upgrades at existing facilities during relicensing; operational. Expected production increase of 20%.
Waterbury	2/19/16	Little River	0 (same authorized capacity as previous license, but operationally limited to -1400 kW)	Upgrades at existing facilities during relicensing; in process, expected to be online in early 2018. Expected capacity value decrease of 30% and production value decrease of 10%
Exemptions³⁰				
Troy	12/2/11	Missisquoi River	850	Operational
Qualifying Conduits³¹				
City of Barre	10/28/13	Nelson St. water line pressure-relief valve	17	Operational; conduit project
Yoder Farm	5/10/17	Danby, VT farm irrigation & drinking water line	1.6	Conduit project; status unknown
Village of Waterbury	9/25/17	City drinking water line pressure-relief valve	4	Conduit project; status unknown

³⁰ “Exemption” refers to an exemption from permit expiration. Exemptions are still required to go through a permitting process.

³¹ In accordance with the Hydropower Regulatory Efficiency Act of 2013, FERC created a special process for “qualifying conduit hydropower facilities,” which must generate ≤ 5 MW of power as an incidental use of a non-federally owned conduit. These facilities are not required to receive a license or exemption from FERC, but must file a notice of intent and go through a comment period.



Above: 500 kW hydropower project in North Pownal, redeveloped by Hoosic River Hydro in 2017. Credit: Jim Therrien, New England Newspapers

Conclusion

Hydropower is an essential component of Vermont’s renewable energy portfolio, and the state should preserve its use of local hydropower resources and continue to support environmentally sound in-state hydropower development. However, permitting for hydropower projects of any size can be a long and expensive process, because hydropower projects – unlike solar, wind, biomass, and other grid-connected renewable electricity projects – are required to obtain authorization from the Federal Energy Regulatory Commission. The requirement of a federal permit triggers state review, as delegated under the federal Clean Water Act and the National Historic Preservation Act.

The PSD, in partnership with ANR and ACCD, created the VSHAP to assist potential hydropower developers with understanding the permitting requirements, as well as to define the types of projects that would be likely to obtain a permit in an expedient fashion. The universe of projects that might meet the screening criteria is small, and many of the best sites have either been permitted since the passage of Act 165 or are under active exploration. Regardless of applications to VSHAP, the PSD, ANR, and ACCD will continue to provide appropriate assistance to anyone wishing to explore hydropower development.

The Department looks forward to continued dialog with the Legislature and with Vermont's hydropower stakeholders, who have been instrumental in shaping the assistance program discussed in this report.