

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

January 15, 2016

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 Department of Public Service (DPS) commissioner, 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

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 DPS, 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 DPS, ANR, and ACCD submitted the first iteration of a biennial report required by the Legislature per Act 165 on January 15, 2014.² On January 28, 2014, staff from the three agencies provided a summary of the report and the proposed path forward to the House Fish, Wildlife & Water Resources Committee. The three agencies were encouraged to proceed with the development of tools to assist hydropower developers as proposed in the report, and have since developed the Vermont Small Hydropower Assistance Program.

1 Vermont Small Hydropower Assistance Program

To identify and assist low-impact projects, the agencies developed a two-step screening process: the Vermont Small Hydropower Assistance Program (VSHAP), was rolled out in the summer of 2015. While no projects have applied for review to date, applications will be accepted at any time and reviewed on a rolling basis.

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

² http://publicservice.vermont.gov/sites/psd/files/Pubs_Plans_Reports/Legislative_Reports/Act%20165%20Legislative%20Report_withappendices_011514.pdf

An overview document of the VSHAP program is available on the DPS website.³ 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

The agencies requested public comments on the program elements and materials in the spring and summer of 2014. The draft screening criteria,⁵ combined stakeholder comments,⁶ and summary of comments with reply comments⁷ are available on the DPS website.

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 schedule a site visit to assess site-specific criteria. The Step 1 Screening Criteria Summary and Application Instructions⁸ as well as the Step 1 Application Form ⁹are available on the DPS 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.¹⁰
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.

³http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/VT%20Small%20Hydropower%20Assistance%20Program%20Overview.pdf

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

⁵http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Draft%20Screening%20Criteria_040214.pdf

⁶http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Combined%20comments%20on%20screening%20criteria_052714.pdf

⁷http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Summary%20and%20Reply%20Comments.pdf

⁸http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Screening%20Criteria%20Summary%20and%20Application%20Instructions.pdf

⁹http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Resources/Hydro/Step%201%20Application%20Form_Final.pdf

¹⁰ 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>.

5. Will be operated as true run of river.¹¹
6. Have proposed bypass flows that will meet hydrologic standards as defined by the ANR Flow Procedure.¹²

Season	Period	Median Flow Standard ¹³	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

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.¹⁴

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 DPS.

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.

¹¹ 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.

¹² 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.

¹³ 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.

¹⁴ 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.

1.2.1 Step 2 Site-Specific Determinations

In order 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 the Agency of Natural Resources 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 Standards¹⁵
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.¹⁶

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.

¹⁵ 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.

¹⁶ 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.

2 State of the Market

Vermont today has 71 FERC-licensed hydropower generation facilities, with a total estimated installed capacity of more than 750 MW. Subtracting the Connecticut and Deerfield River facilities — which are partially located out of state and all serve customers outside the state — 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 Projects

Plant Owner	Capacity (MW)
GMP ¹⁷	99
Independent Power Producers ¹⁸	41
Standard Offer ¹⁹	2
Municipal Utilities ²⁰	30
All Other	28
<i>Total</i>	<i>200</i>

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 provided economic incentives for the development of small hydro projects. Under PURPA, 41 new hydro facilities were constructed in the state, though at a higher price relative to those available in the subsequent wholesale power market.

The pace of hydro development dropped off significantly after the early 1990s, due to a number of factors including the loss of economic incentives, stricter permitting requirements, and the development of the most economically viable sites. In recent years, advocacy efforts by the hydropower community led to several studies to analyze the state’s potential for new hydropower resources.

Credible estimates of the potential for additional hydropower development in Vermont range from 25 MW at 44 sites (ANR, 2008²¹) to 90 MW developable at 300 of the states existing 1,200 dams (DPS,

¹⁷ GMP, "The Supply of Electricity" (Integrated Resource Plan, Ch. 3), www.greenmountainpower.com/upload/photos/4773_2014_GMP_IRP_The_Supply_of_Electricity_Chapter_1125_14_Clean_and_Final.pdf

¹⁸ static1.1.sqspcdn.com/static/f/435218/25863851/1421442956143/Schedule+B+-+2014-2015-FY15.pdf?token=TvpupnR2Vg1alnvc0JUzhk%2FY2lc%3D

¹⁹ vermontspeed.com/projects-online/

²⁰ DPS data

²¹ Vt. ANR, The Development of Small Hydroelectric Projects in Vermont (Report to the Legislature, 2008), www.vtwaterquality.org/rivers/docs/rv_smallhydroreport.pdf

2007).²² 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 permit process that hydropower has to undertake at the federal level.²³

One generally cost-effective way to increase 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 are often possible without changing the current operating requirements — i.e., power production can be increased without additional environmental impacts. In some cases, these upgrades can even reduce environmental impacts. Green Mountain Power has taken advantage of relicensing of its dams to change operations in ways that meet modern water-quality standards while increasing output.²⁴ 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.²⁵

Municipal 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 has developed such a project,²⁶ as has the city of Barre,²⁷ following a 2013 change in federal permitting law that expedited the processing and review of conduit systems.²⁸

Additionally, several projects that have recently or will soon come online provide insights into what might be required if we are to add more in-state hydropower to the mix — and to keep what we now have. Several additional sites are under investigation.

²² 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

²³ U.S. FERC, Small/Low Impact Hydropower Program, www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact.asp

²⁴ 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-8e5fbe2238c2

²⁵ legislature.vermont.gov/assets/Documents/2016/Docs/ACTS/ACT056/ACT056%20As%20Enacted.pdf

²⁶ www.vtenergyatlas-info.com/wp-content/uploads/2010/02/Bennington-hydro-final-rpt.pdf

²⁷ 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

²⁸ U.S. FERC, Hydropower Regulatory Efficiency Act of 2013, www.ferc.gov/industries/hydropower/indus-act/efficiency-act.asp

Hydroelectric Projects Permitted Since 2012

Licenses	License or Exemption Issue Date	River	Capacity (kW)	Notes
Townshend	3/29/12	West River	924	Under construction; at an Army Corps flood control dam
Ball Mountain (Jamaica)	4/12/12	West River	2196	Under construction; at an Army Corps flood control dam
Vermont Tissue Mill (Bennington)	4/25/13	Walloomsac River	360	Operational
Otter Creek	10/23/14	Otter Creek	9075	Upgrades at existing facilities; partially complete
Exemptions²⁹				
Troy	12/2/11	Mississquoi River	850	Operational
City of Barre	10/28/13	Nelson St. water line	17	Operational; conduit project



Left: 360 kW VT Tissue Mill Project. Right: 17 kW City of Barre Conduit Project.

²⁹ "Exemption" refers to an exemption from permit expiration. Exemptions are still required to go through a permitting process.

3 Relicensings

There are 19 hydropower facilities licensed in Vermont from the 1980s to the 1990s that will be due for relicensing in the next decade, and as much as 65 MW of hydropower in Vermont will undergo relicensing by the year 2050. This presents both opportunities and challenges to our utilities, third-party project owners, and planners.

Existing dams retrofitted for hydropower, as well as those undergoing relicensing, are required to meet Vermont Water Quality Standards, which were adopted and have been revised in the time since many Vermont hydro projects were first licensed. Projects going through relicensing will likely need to change operations in order to provide adequate flows in the bypass reach, and to operate closer to run-of-river mode. They may possibly need to incorporate fish passage, which can be a considerable expense. In relicensing, projects that had previously stored water in impoundments, for use during peak demand, may no longer be able to do so to the same extent; and projects that had used flows to the detriment of fisheries and other aquatic life may need to sacrifice some production. To some extent, the resulting losses in peak power and production potential can be mitigated by the implementation of modern controls and more efficient equipment. But even so, this issue needs to be considered by hydro plant operators, especially utilities, as they plan for their future electricity portfolios.

Vermont is not the only state with a growing queue of impending hydropower relicensings, and FERC has indicated that it may be difficult to manage the pending workload.³⁰ This is something stakeholders should take into consideration in their preparations for relicensing, and it provides important backdrop for decision makers in terms of prioritizing state resources.

4 Conclusion

Hydropower is an essential component of Vermont's renewable energy portfolio, and the state should preserve its use of the 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 Electric Regulatory Commission. New projects may also require a permit from the U.S. Army Corps of Engineers. These federal permits trigger state review, as delegated under the federal Clean Water Act and the National Historic Preservation Act.

The DPS, in partnership with ANR and ACCD, created the Vermont Small Hydropower Assistance Program 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

³⁰ <https://www.ferc.gov/CalendarFiles/20150513110741-Miles-testimony-05-13-2015.pdf>

either been permitted since the passage of Act 165 or are under active exploration. Regardless of applications to VSHAP, the DPS, ANR, and ACCD will continue to provide appropriate assistance to anybody wishing to explore hydropower development. We look forward to continued dialog with the Legislature and with Vermont's hydropower stakeholders, who have been instrumental in shaping the assistance program outlined in this report.