

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Village of Morrisville, Vermont

Project No. 2629-014-Vermont

NOTICE OF AVAILABILITY OF FINAL ENVIRONMENTAL ASSESSMENT

(December 16, 2014)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission) regulations, 18 CFR Part 380 (Order No. 486, 52 FR 47897), the Office of Energy Projects has reviewed the application for license for the multi-development Morrisville Hydroelectric Project, located on the Green River, Elmore Pond Brook, and Lamoille River in Lamoille County, Vermont, and has prepared a final Environmental Assessment (EA) for the project. The project does not occupy any federal land.

The final EA contains the staff's analysis of the potential environmental impacts of the project and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the final EA is on file with the Commission and is available for public inspection. The final EA may also be viewed on the Commission's website at <http://www.ferc.gov> using the "eLibrary" link. Enter the docket number, excluding the last three digits in the docket number field, to access the document. For assistance, contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll-free at 1-866-208-3676, or for TTY, (202) 502-8659.

You may also register online at <http://www.ferc.gov/docs-filing/esubscription.asp> to be notified via email of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

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Kimberly D. Bose,
Secretary.

FINAL ENVIRONMENTAL ASSESSMENT
FOR
NEW MAJOR HYDROPOWER LICENSE

Morrisville Hydroelectric Project
FERC Project No. 2629-014
Vermont

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, DC 20426

December 2014

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
AW	American Whitewater
Certification	water quality certification
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
D2SI	FERC Division of Dam Safety and Inspections
DO	dissolved oxygen
EA	Environmental Assessment
Morrisville	Village of Morrisville
ESA	Endangered Species Act
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FGRR	Friends of Green River Reservoir
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
Interior	U.S. Department of the Interior
ILP	Integrated Licensing Process
kV	kilovolt
LRRA	Lamoille River Anglers Association
MDTU	MadDog Chapter of Vermont Trout Unlimited
mg/l	milligrams per liter
msl	mean sea level
MW	megawatt
MWh	megawatt-hours
National Register	National Register of Historic Places
NHPA	National Historic Preservation Act
NERC	North American Electric Reliability Council
NGVD	National Geodetic Vertical Datum
NOI	Notice of Intent
NPCC	Northeast Power Coordinating Council
NRI	National Park Service's National Rivers Inventory

ACRONYMS AND ABBREVIATIONS (continued)

Morrisville Project	Morrisville Hydroelectric Project
PA	Programmatic Agreement
PAD	Pre-Application Document
RM	River Mile
SD1	Scoping Document 1
SHPO	State Historic Preservation Officer, Vermont Department of Historic Preservation
USGS	United States Geological Survey
VPC	Vermont Paddlers Club
Vermont ANR	Vermont Agency of Natural Resources
Vermont DEC	Vermont Department of Environmental Conservation
Vermont FWD	Vermont Fish and Wildlife Department

EXECUTIVE SUMMARY

Proposed Action

On April 25, 2013, the Village of Morrisville, Vermont (Morrisville), filed an application for a new license to continue to operate and maintain its 4.99-megawatt (MW) Morrisville Hydroelectric Project. The project is located on the Green River, Elmore Pond Brook, and Lamoille River, in Lamoille County, Vermont. The project does not occupy federal land.

Project Description and Operation

The Morrisville Project consists of the following four developments (listed from upstream to downstream): Green River, Lake Elmore, Morrisville, and Cadys Falls. The Green River, Morrisville, and Cadys Falls developments each include a dam, impoundment, and powerhouse with installed capacities of 1,890 kilowatts (kW), 1,800 kW, and 1,300 kW, respectively. The Lake Elmore Development includes a dam and impoundment, but does not include generating facilities. The project bypasses approximately 180 feet of the Green River at the Green River Development, 900 feet of the Lamoille River at the Morrisville Development,¹ and 1,690 feet of the Lamoille River at the Cadys Falls Development.

Morrisville operates the Green River Development in store-and-release mode; drawing the reservoir down as much as 10 feet during the winter to meet downstream flow requirements and for generation at the Green River, Morrisville, and Cadys Falls Developments. The Lake Elmore Development is operated in run-of-river mode, except for a 2-foot drawdown for 2-4 weeks in the fall to allow shoreline property owners to perform maintenance on their docks and piers. The Morrisville and Cadys Falls Developments are operated in run-of-river mode year-round.²

The average annual generation for the Morrisville Project is 1,300 megawatt-hours (MWh), which is used by Morrisville to meet the power needs of its regional retail customers within the Village of Morrisville and surrounding communities.

¹ There are two bypassed reaches at the Morrisville Development, a primary bypassed reach that is 380 feet long and a secondary bypassed reach that is 900 feet long.

² The current license does not require Morrisville to operate the Lake Elmore, Morrisville, or Cadys Falls Developments in run-of-river mode; however, Morrisville has operated these developments in this mode for much of the existing license term.

The current license requires a 5.5-cubic-foot-per-second (cfs) minimum flow in the bypassed reach of the Green River Development, a 12-cfs minimum flow in the primary bypassed reach of the Morrisville Development, a 135-cfs minimum flow downstream of the confluence of the Morrisville Development tailrace and bypassed reach, and a 150-cfs minimum flow downstream of the confluence of the Cadys Falls Development tailrace and bypassed reach.

Proposed Measures

In its license application, Morrisville proposes to:

- continue to operate the Green River Development in store-and-release mode;
- continue to release a 5.5-cfs minimum flow to the bypassed reach of the Green River Development;
- develop a plan to monitor dissolved oxygen (DO) in the tailrace of the Green River Development, and implement measures, if necessary, to prevent DO levels that may be harmful to aquatic resources;³
- increase the limit on releases from the Green River Development during the May 1 to October 31 period (i.e., the normal maximum elevation) from 160 cfs to 283 cfs;⁴
- remove the Lake Elmore Development from the project and permanently set the spillway opening at elevation 1,139 feet msl;
- continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode;
- release a 28-cfs minimum flow into the Morrisville primary bypassed reach;⁵
- release an 8.5-cfs minimum flow into the Morrisville secondary bypassed reach;⁶

³ In comments filed on July 24, 2014, Morrisville proposed to adopt the staff-recommended alternative to develop a DO monitoring and improvement plan discussed in the draft EA.

⁴ Historically, from May 1 to October 31, Morrisville has voluntarily limited releases to 160 cfs to maintain water quality for the trout fishery in the Green River downstream of the Green River Development.

⁵ In comments filed on Jul 24, 2014, Morrisville increased its proposed minimum flow for the Morrisville Development primary bypassed reach from 12 to 28 cfs. The effects of a 28-cfs minimum flow are evaluated in this EA.

⁶ In comments filed on Jul 24, 2014, Morrisville increased its proposed minimum

- release a 54-cfs minimum flow into the Cadys Falls bypassed reach;⁷
- continue to release a 135-cfs minimum flow downstream of the confluence of the Morrisville Development tailrace and bypassed reach;
- continue to release a 150-cfs minimum flow downstream of the confluence of the Cadys Falls Development tailrace and bypassed reach;
- provide two 6-hour-long releases of up to 283 cfs for whitewater boating between April 1 and October 31 each year downstream of the Green River Development;
- develop a river access site at the Green River Development near Garfield Road that includes an access road and day-use parking area, river access trail, and safety signage for whitewater boating;
- provide advance notification to American Whitewater (AW) of the two 6-hour-long scheduled releases and provide short-term public notification (via the internet) when releases at the Green River Development are expected to exceed 160 cfs;
- continue to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam (i.e., 1,219.75 feet msl) during common loon nesting season (approximately May 1 to August 1);
- enhance recreation facilities at the Morrisville Development by installing signage for the parking area downstream of the Morrisville dam, installing trailhead and route signage for the Clark Park walking trail, and repairing fencing at Clark Park;
- relocate the Cadys Falls portage take-out to the location of the Morrisville portage put-in and Cadys Falls boat launch, and install directional signage along the Morrisville and Cadys Falls portage routes (including both put-ins and take-outs);
- remove a 0.4-acre parcel of land from the project boundary at the Morrisville Development; and
- develop and implement a Historic Properties Management Plan (HPMP).

Public Involvement and Areas of Concern

Before filing its license application with the Commission, Morrisville conducted

flow for the Morrisville Development secondary bypassed reach from 4 to 8.5 cfs. The effects of an 8.5-cfs minimum flow are evaluated in this EA .

⁷ In comments filed on Jul 24, 2014, Morrisville increased its proposed minimum flow for the Cady's Falls Development bypassed reach from 12 to 54 cfs. The effects of a 54-cfs minimum flow are evaluated in this EA.

pre-filing consultation in accordance with the Commission's Integrated Licensing Process. The intent of the Commission's pre-filing process is to involve the public early in the project planning process and to encourage citizens, governmental entities, tribes, and other interested parties to identify and resolve issues prior to an application being formally filed with the Commission. As part of the pre-filing process, staff conducted scoping to identify issues and alternatives. Staff distributed a scoping document to stakeholders and other interested entities on June 22, 2010. Scoping meetings were held in Morrisville, Vermont on July 21, 2010.

Morrisville filed its license application on April 25, 2013. On November 5, 2013, staff requested comments, recommendations, and terms and conditions, in a notice that the license application was ready for environmental analysis.

The primary issues associated with relicensing the project are mode of operation at the Green River Development, minimum flows in the Morrisville and Cadys Falls bypassed reaches, whitewater boating releases, and recreational access. Below we briefly discuss the anticipated environmental effects of issuing a new license for the project under the staff alternative.

Alternatives Considered

This final EA analyzes the effects of continued project operation and recommends conditions for any new license that may be issued for the project. In addition to Morrisville's proposal, we consider two alternatives: (1) Morrisville's proposal with staff modifications (staff alternative); and (2) no action – continued operation with no changes.

Under the staff alternative, the project would include all of Morrisville's proposed measures except for: (1) the minimum flows proposed for the Morrisville and Cadys Falls bypassed reaches because staff recommends higher flows that would provide more habitat and protection for the existing trout fisheries, and (2) the minimum flows for the Lamoille River downstream of the confluences of the tailraces and bypassed reaches of the Morrisville and Cadys Falls Developments because staff recommends operation of these developments in run-of-river mode which would make these flows unnecessary.⁸ In addition to the measures proposed by Morrisville, Commission staff recommends the

⁸ In this final EA, Commission staff only describe the environmental effects of removing the Lake Elmore Development from the project and do not make a recommendation regarding this proposal. A decision on the removal of the Lake Elmore Development from the project will be addressed in any license order that is issued for the project.

following additional seven measures: (1) release minimum flows of 70 and 12 cfs into the Morrisville primary and secondary bypassed reaches, respectively; (2) release 25 cfs of the 70-cfs minimum flow for the Morrisville primary bypassed reach over the primary spillway crest to improve the visual character of the Morrisville dam; (3) release a 100-cfs minimum flow into the Cadys Falls bypassed reach; ; (4) develop and implement a Whitewater Operation Plan for the Green River Development that includes procedures for providing: (a) five annual gradually ramped-up 6-hour-long releases of flows between 140 cfs and 283 cfs, for whitewater boating on the Green River, (b) advance notification to AW and the Vermont Paddlers Club of the five annual releases, and (c) short-term public notification, via the internet, of any releases that would be expected to exceed 140 cfs; (5) an Operation Compliance Monitoring Plan (OCMP); and (6) a Recreation Plan to ensure appropriate enhancement, operation, and maintenance of project recreational facilities.

Staff Alternative

Aquatic Resources

Continuing to operate the Green River Development in store-and-release mode would maintain existing conditions for the trout fishery in the Green River and aquatic resources in the Green River Reservoir. Increasing the limit on releases from the Green River Development during the May 1 to October 31 period from 160 cfs to 283 cfs would allow Morrisville to provide whitewater boating flows and would not adversely affect aquatic habitat or water quality. Run-of-river operation of the Lake Elmore Development (whether relicensed or removed from the project and operated in the manner proposed by Morrisville) would maintain conditions for the existing healthy fish populations in the impoundment and Elmore Pond Brook downstream of the development. Operating the Morrisville and Cadys Falls Developments in run-of-river mode would maintain conditions for the existing healthy fish populations in the impoundments and downstream sections of the Lamoille River. Monitoring DO in the tailrace of the Green River Development would identify any low DO conditions that may be harmful to aquatic resources and would ensure that measures are implemented to protect aquatic resources downstream of the dam. Increasing the minimum flows in the Morrisville and Cadys Falls bypassed reaches (i.e., 70 cfs in the Morrisville primary bypassed reach, 12 cfs in the Morrisville secondary bypassed reach, and 100 cfs in the Cadys Falls bypassed reach) would substantially increase the amount of available aquatic habitat for fish and macroinvertebrates. Implementing an OCMP would ensure that the measures recommended by staff and the agencies have the intended benefits and would reduce the likelihood of misunderstandings about project compliance.

Terrestrial Resources

Continuing to operate the Green River Development in store-and-release mode would maintain existing plant communities in the wetland complex downstream of the Green River Reservoir that are adapted to store-and-release operation; however, drawdowns would continue to dewater portions of Green River Reservoir which could prevent the establishment of some littoral vegetation in the Green River Reservoir. Continuing to maintain the Green River Reservoir 3 inches below the crest of the dam (i.e., 1,219.75 feet msl) would ensure that loons are able to access nests throughout the nesting season.

Recreation

Constructing a Green River access site at Garfield Road, improving the Morrisville and Cadys Falls portage routes, upgrading the Clark Park walking trail and fence, and installing signage at all project facilities would improve recreation opportunities and the user experience across all project developments. Developing a recreation plan that describes the operation and maintenance of all new and existing project facilities would document how these recreation facilities will be maintained throughout the term of any new license. Including provisions to limit erosion and sedimentation in the recreation plan would limit impacts from ground-disturbing activities during construction of the new recreation facilities.

Providing five annual gradually ramped-up whitewater releases at the Green River Development and providing notification of these releases and any other releases exceeding 140 cfs as part of a Whitewater Operation Plan would improve whitewater boating opportunities on the Green River. The proposed notification procedures would help to ensure maximum use of the flows provided.

Operating the Lake Elmore Development in an instantaneous run-of-river mode and maintaining a water surface elevation of 1,139 feet msl (whether relicensed or removed from the project and operated in this manner as proposed by Morrisville) would continue to provide boating and angling opportunities.

Aesthetics

Releasing 25 cfs (approximately one inch of water) over the Morrisville primary spillway would improve the visual character of the Morrisville dam.

Cultural Resources

Continued operation and maintenance of the project could affect historic resources; however, developing the proposed Historic Properties Management Plan (HPMP) would provide a mechanism for addressing the effects of any future modifications or activities that could potentially affect the characteristics of the Green River Dam and Morrisville

and Cadys Falls facilities that are eligible or potentially eligible to be listed in the National Register of Historic Places (National Register).

No-Action Alternative

Under the no-action alternative, the project would continue to operate as it has in the past. None of the proposed or recommended measures would be implemented and there would be no enhancement of environmental resources.

License Conditions

Staff recommendations for conditions of any new license for the project are based on the analysis presented in this final EA. Draft license articles are attached in Appendix A.

Conclusions

Based on our analysis, we recommend licensing the project as proposed by the licensee, with some staff modifications and additional measures.

In section 4.2 of the final EA, we estimate the likely cost of alternative power for each of the three alternatives identified above. Our analysis shows that during the first year of operation under the no-action alternative, project power would cost \$415,900, or \$31.99/MWh less than the likely alternative cost of power. Under the proposed action alternative, project power would cost \$261,600, or \$22.47/MWh less than the likely alternative cost of power. Under the staff alternative, project power would cost \$223,400, or \$22.85/MWh less than the likely alternative cost of power.

We chose the staff alternative as the preferred alternative because: (1) the project would continue to provide a dependable source of electrical energy for the region (12,452 MWh annually); (2) the 4.99 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the recommended environmental measures proposed by Morrisville, and additional measures recommended by staff, would adequately protect and enhance environmental resources affected by the project. The overall benefits of the staff alternative would be worth the cost of the proposed and recommended environmental measures.

We conclude that issuing a new license for the project, with the environmental measures we recommend, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.

Morrisville Hydroelectric Project FERC Project No. 2629-014–Vermont

1. INTRODUCTION

1.1 APPLICATION

On April 25, 2013, the Village of Morrisville, Vermont (Morrisville), filed an application for a new license to continue to operate and maintain its 4.99-megawatt (MW) Morrisville Hydroelectric Project (Morrisville Project). The project consists of four developments, located on the Green River, Elmore Pond Brook, and Lamoille River, in Lamoille County, Vermont (figure 1). Three of the developments (Green River, Morrisville, and Cadys Falls) include facilities to generate electricity, but the Lake Elmore Development is a storage facility that does not include facilities to generate electricity. The project has an estimated annual generation of 13,000 megawatt-hours (MWh). No new generation facilities or capacity are proposed and the project does not occupy any federal lands.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Morrisville Project is to continue to provide a source of hydroelectric power to meet the power needs of Morrisville's regional retail customers within the Village of Morrisville and surrounding communities. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a license to Morrisville's for the continued operation of the Morrisville Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational

opportunities; and (4) the preservation of other aspects of environmental quality.

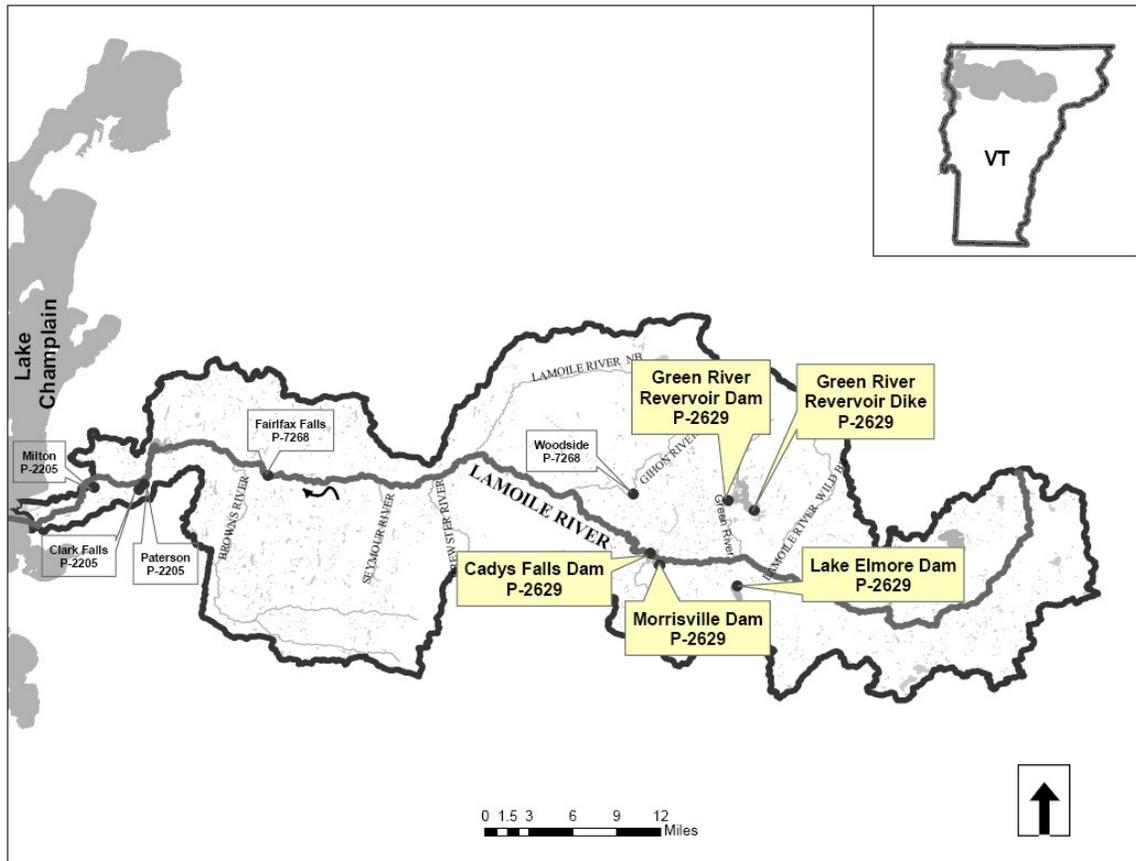


Figure 1. Location of the Morrisville Project and other hydroelectric projects in the Lamoille River Basin (Source: Staff).

Issuing a new license for the Morrisville Project would allow Morrisville to generate electricity at the project for the term of a new license, making electric power from a renewable resource available to its customers.

This final environmental assessment (EA) assesses the effects associated with continued operation of the project, evaluates alternatives to the proposed project, and makes recommendations to the Commission on whether to issue a new license, and if so, recommends terms and conditions to become a part of any license issued.

In this final EA, we assess the environmental and economic effects of operating and maintaining the project: (1) as proposed by Morrisville in their license application, and (2) with our recommended measures. We also consider the effects of the no-action alternative. Important issues that are addressed by this final EA include mode of operation at the Green River development (store-and-release versus run-of-river), minimum flows in the Morrisville and Cadys Falls bypassed reaches, whitewater releases

to the Green River, and recreational access.

1.2.2 Need for Power

To assess the need for project power, we reviewed the licensee's present and anticipated future use of project power, together with that of the operating region in which the project is located. The Morrisville Project currently generates an average of 13,000 MWh annually; as proposed the estimated average annual generation would be about 12,823 MWh.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Morrisville Project is located in the Northeast Power Coordinating Council, Inc. (NPCC) region of the NERC. According to NERC's 2013 forecast (NERC, 2013), from 2014 through 2023, summer demand in the NPCC region is projected to grow at an annual rate of .84 percent.

We conclude that power from the Morrisville Project would help meet a need for power in the NPCC region in both the short- and long-term. The project provides power that displaces generation from non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A new license for the Morrisville Project would be subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the Interior. Interior, by letter dated December 31, 2013, requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

1.3.1.2 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and

state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Interior timely filed, on December 31, 2013, recommendations under section 10(j), as summarized in Table 11 in section 5.3 *Fish and Wildlife Recommendations*. In section 5.3, we also discuss how we address the agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On January 30, 2014, Morrisville applied to the Vermont ANR for a 401 water quality certification (certification) for the project. The Vermont ANR received the application for certification on January 30, 2014. On November 7, 2014, Morrisville withdrew and refiled its application for certification. The Vermont ANR received the application for certification on November 7, 2014. The Vermont ANR has not yet acted on the application. The certification is due by November 7, 2015.

1.3.3 Endangered Species Act

Section 7 of the ESA requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. No federally listed species or their habitats are known to occur in the vicinity of the Morrisville Project.⁹ Therefore, we conclude that the Morrisville Project would have no effect on any federally listed species.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of

⁹ <http://www.fws.gov/newengland/pdfs/VT%20species%20by%20town.pdf>

the applicant's certification.

The state of Vermont does not have a Coastal Zone Management Program. Therefore, a CZMA consistency certification is not required.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires that every federal agency “take into account” how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

The Commission designated Morrisville as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA on June 22, 2010. Pursuant to section 106, and as the Commission’s designated non-federal representative, Morrisville consulted with the Vermont Department of Historic Preservation (Vermont SHPO) and contacted affected Indian tribes¹⁰ to locate, determine National Register eligibility, and assess potential adverse effects to historic properties associated with the project. By letter filed July 25, 2014, the Vermont SHPO determined that the project would have “no effect” at the Green River, Lake Elmore, and Morrisville developments, and “no adverse effect” at the Cadys Falls Development.¹¹ Morrisville proposes to develop a Historic Properties Management Plan (HPMP), in consultation with the Vermont SHPO, that provides measures for the protection and management of historic properties within the project’s area of potential effects (APE). In its July 25, 2014 letter, the Vermont SHPO recommends the development of an HPMP for the project. In its license application, Morrisville proposed to file a draft HPMP with the Commission by October 1, 2013; however, a draft HPMP has not yet been filed with the Commission.

1.4 PUBLIC REVIEW AND COMMENT

¹⁰ Commission staff and Morrisville have contacted three Indian tribes (The Saint Regis Mohawk Tribe, Penobscot Indian Nation, and Stockbridge-Munsee of the Mohican Nation) throughout the pre-filing process due to their historical presence and use of the project area; however, no responses were filed. These tribes are federally-recognized in New York, Maine, and Wisconsin, respectively. There are no federally-recognized tribes in Vermont.

¹¹ The Green River dam, and Morrisville and Cadys Falls facilities are located within the project boundary and are eligible or potentially eligible to be listed in the National Register.

The Commission's regulations (18 CFR, sections 5.1 to 5.16) require applicants to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

Relicensing of the Morrisville Project was formally initiated April 26, 2010, when Morrisville filed with the Commission a Pre-Application Document (PAD) and a Notice of Intent (NOI) to license the Morrisville Project using the Integrated Licensing Process (ILP). The Commission issued a Notice of Commencement of Proceeding on June 22, 2010.

1.4.1 Scoping

Before preparing this final EA, we conducted scoping to determine what issues and alternatives should be addressed. During the pre-filing consultation process, scoping meetings were held to determine what issues and alternatives should be addressed in the EA. Scoping Document 1 (SD1) was issued on June 22, 2010. Scoping meetings were held in Morrisville, Vermont on July 21, 2010, to request comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. An environmental site review was held on July 20, 2010.

In addition to comments provided at the scoping meetings, the following entities provided written comments pertaining to SD1, the PAD, and additional study needs:

<u>Commenting Entity</u>	<u>Date Filed</u>
Vermont ANR	August 24, 2010
American Whitewater (AW) and Vermont Paddlers Club (VPC; jointly)	August 24, 2010

1.4.2 Interventions

On November 5, 2013, the Commission issued a notice accepting Morrisville's application to relicense the Morrisville Project and soliciting motions to intervene and protests. This notice set January 6, 2014, as the deadline for filing protests and motions to intervene. The following entities intervened.

<u>Intervenor</u>	<u>Date Filed</u>
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Vermont ANR	December 27, 2013
AW and VPC (jointly)	January 2, 2014
MadDog Chapter of Trout Unlimited (MDTU)	May 6, 2014 ¹²

1.4.3 Comments on the Application

A notice requesting conditions and recommendations was issued on November 25, 2013. The following entities commented:

<u>Commenting Entity</u>	<u>Date Filed</u>
Vermont ANR	December 27, 2013
Interior	December 31, 2013
AW and VPC (jointly)	January 2, 2014 and February 3, 2014

Morrisville filed reply comments on February 14, 2014.

1.4.4. Comments on the draft EA

On June 25, 2014, the Commission issued a draft EA. Comments on the draft EA were due by July 25, 2014. The following entities filed comments:

<u>Commenting entity</u>	<u>Date filed</u>
AW	July 10, 2014
Lamoille River Anglers Association (LRAA)	July 16, 2014
MDTU	July 23, 2014
Vermont ANR	July 24, 2014
Morrisville	July 24, 2014
Eric Nuse	July 24, 2014
Friends of Green River Reservoir (FGRR)	July 24, 2014
Vermont SHPO	July 25, 2014

2.0 PROPOSED ACTION AND ALTERNATIVES

¹² This motion was filed late and was denied by Commission notice issued on June 20, 2014.

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative as the baseline environmental condition for comparison with other alternatives.

2.1.1 Existing Project Facilities

The existing Morrisville Project consists of the following four developments, listed from upstream to downstream (figures 2 through 5, below):

Green River Development

The existing Green River Development (figure 2) is located on the Green River and consists of: (1) a 360-foot-long, 105-foot-high concrete arch dam that includes, near its center, a 60-foot-long ungated spillway with a crest elevation of 1,220 feet above mean sea level (msl); (2) a 200-foot-long, 16-foot-high earthen embankment (Green River Dike) with 2-foot-high wooden wave barriers approximately 1.25 miles southeast of the concrete arch dam; (3) a 653-acre impoundment with a storage capacity of 17,400-acre-feet and a normal maximum elevation of 1,220 feet msl; (4) a 16-foot-long, 12-foot-high intake structure¹³ and a 22-foot-long, 16-foot-wide intake-valve house equipped with a 6-foot-diameter head gate valve; (5) a 25-foot-long, 30-foot-diameter steel pipe leading from the intake-valve house to a 0.67-foot-diameter minimum-flow valve in a 14-foot-long, 13-foot-wide outlet-valve house; (6) a 116-foot-long penstock, that includes a 6-foot-diameter, 94.5-foot-long buried, steel section that bifurcates into two 3-foot-diameter, 21.5-foot-long steel sections; (7) a 32-foot-long, 37-foot-wide concrete powerhouse containing two 945-kW turbine-generating units for a total installed capacity of 1,890 kW; (8) a 14.5-foot-long, concrete tailrace; (9) a 45-foot-long, 15-foot-high concrete gravity weir that creates a 180-foot-long, 11-foot-deep stilling pool downstream of the concrete arch dam; (10) a 5-mile-long, 34.5-kilovolt (kV) transmission line connecting the powerhouse to the regional grid; and (11) appurtenant facilities.

The bypassed reach at the Green River Development is the 180-foot-long stilling pool impounded by the concrete gravity weir. Morrisville currently operates and maintains an existing scenic overlook located near the dam and 86 acres of land south and east of the dam for hunting and trapping at the Green River Development. Morrisville also operates and maintains an angling access site at the Green River Dike

¹³ The intake opening is located at elevation 1,148 feet msl (72 feet below the normal maximum water surface elevation of 1,220 feet msl).

that includes a foot path and parking area off of Garfield Road.

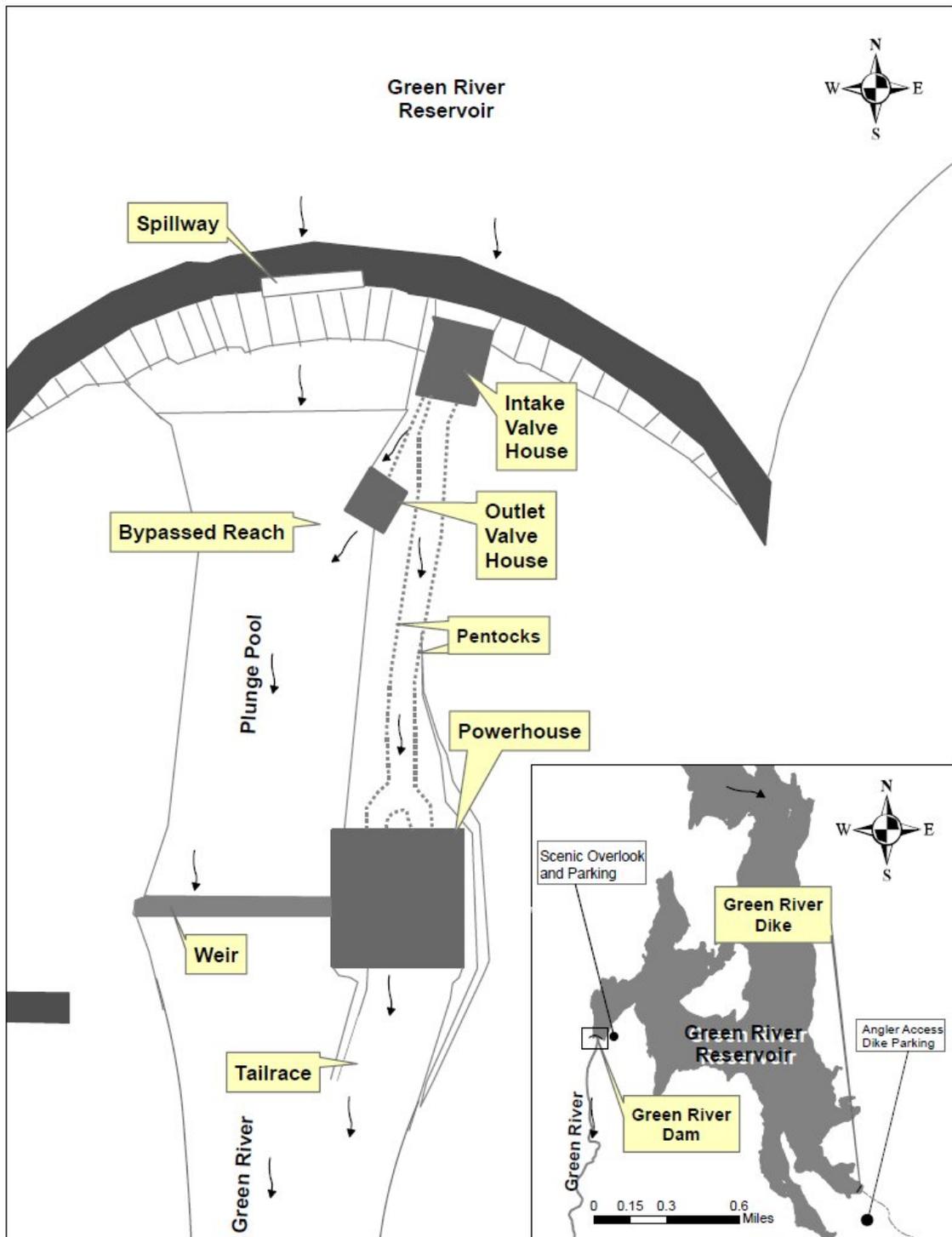


Figure 2. Green River Development site plan (Source: staff).

Lake Elmore Development

The existing Lake Elmore Development (figure 3) is located on Elmore Pond Brook and consists of: (1) a 26-foot-long, 10-foot-high concrete gravity dam and spillway with a crest elevation of 1,139 feet msl; (2) two concrete retaining walls, one approximately 90-foot-long at the west end of the dam and one approximately 30-foot-long at the east end of the dam; (3) a 300-acre impoundment (Lake Elmore) with a 1,000-acre-foot storage capacity and a normal maximum water surface elevation of 1,139 feet msl; (4) a 8.3-foot-long, 3.5-foot-high intake structure and a 8.5-foot-long, 7.5-foot-wide regulating gatehouse equipped with two 2.5-foot-wide, 2.5-foot-high wooden headgates; (5) a 2.5-foot-long concrete-lined tailrace; and (5) appurtenant facilities.

Morrisville currently operates and maintains an existing day use area that provides fishing access and limited parking at the Lake Elmore Development.

Morrisville Development

The existing Morrisville Development (figure 4) is located on the Lamoille River and consists of: (1) a 384-foot-long, 37-foot-high concrete gravity dam comprised of a 138-foot-long concrete retaining wall, a 30-foot-long intake and gatehouse section, and a 216-foot-long spillway that includes two 108-foot-long, 4-foot-high Obermeyer inflatable crest gates and has a crest elevation of 627.79 feet msl; (2) a 141-foot-long, 8-foot-high concrete wall approximately 260 feet northwest of the dam that includes a 60-foot-long overflow section (secondary spillway) with 2-foot-high wooden flashboards; (3) a 15-acre impoundment with a 72-acre-foot storage capacity and a normal maximum water surface elevation of 631.79 feet msl; (4) a 30-foot-long, 16-foot-high intake structure and a 28-foot-long, 36-foot-wide regulating gatehouse equipped with one 12.58-foot-wide, 11.75-foot-high wooden headgate, one 9.58-foot-wide, 8.17-foot-high wooden headgate, and one 2-foot-wide, 1-foot-high minimum-flow orifice; (5) one 7-foot-diameter, 150-foot-long buried steel penstock and one 10-foot-diameter, 150-foot-long buried, steel penstock; (6) a 54.5-foot-long, 30.5-foot-wide concrete-brick powerhouse containing a 600-kW turbine-generating unit and a 1,200-kW turbine-generating unit for a total installed capacity of 1,800 kW; (7) two concrete lined tailraces, one 17.5-foot-long and one 14.0-foot-long; (8) a 435-foot-long, 34.5-kV transmission line connecting the powerhouse to the regional grid; and (9) appurtenant facilities.

The Morrisville Development creates a 380-foot-long primary bypassed reach downstream of the spillways and a 900 foot-long secondary bypassed reach downstream of the secondary spillway. There are no existing project recreational facilities at this development; however, Morrisville currently operates and maintains two existing parks with various recreational amenities upstream of and adjacent to this development. The parking area at the powerhouse, located within the project boundary, provides access to the park adjacent to the development.

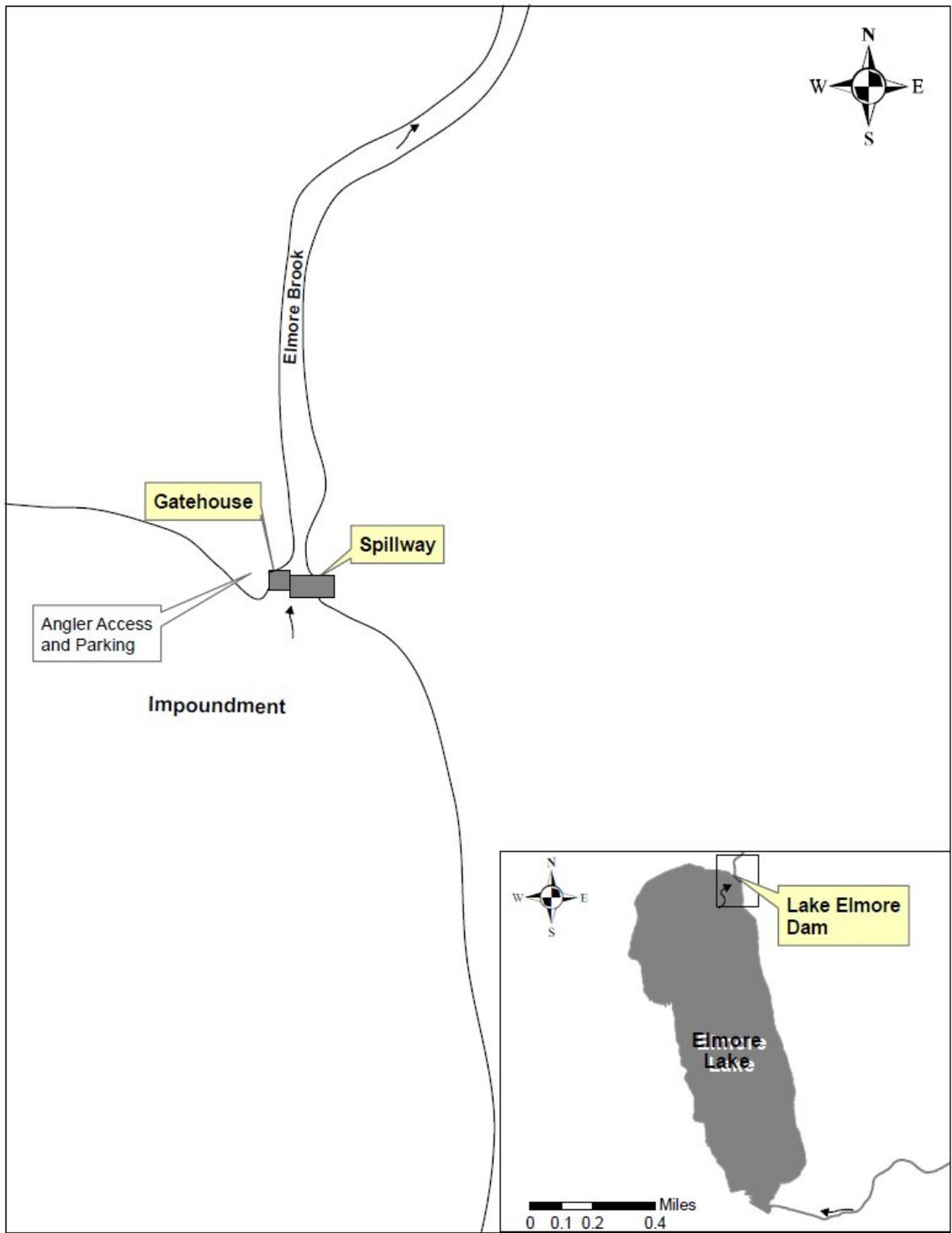


Figure 3. Lake Elmore Development site plan (Source: staff).

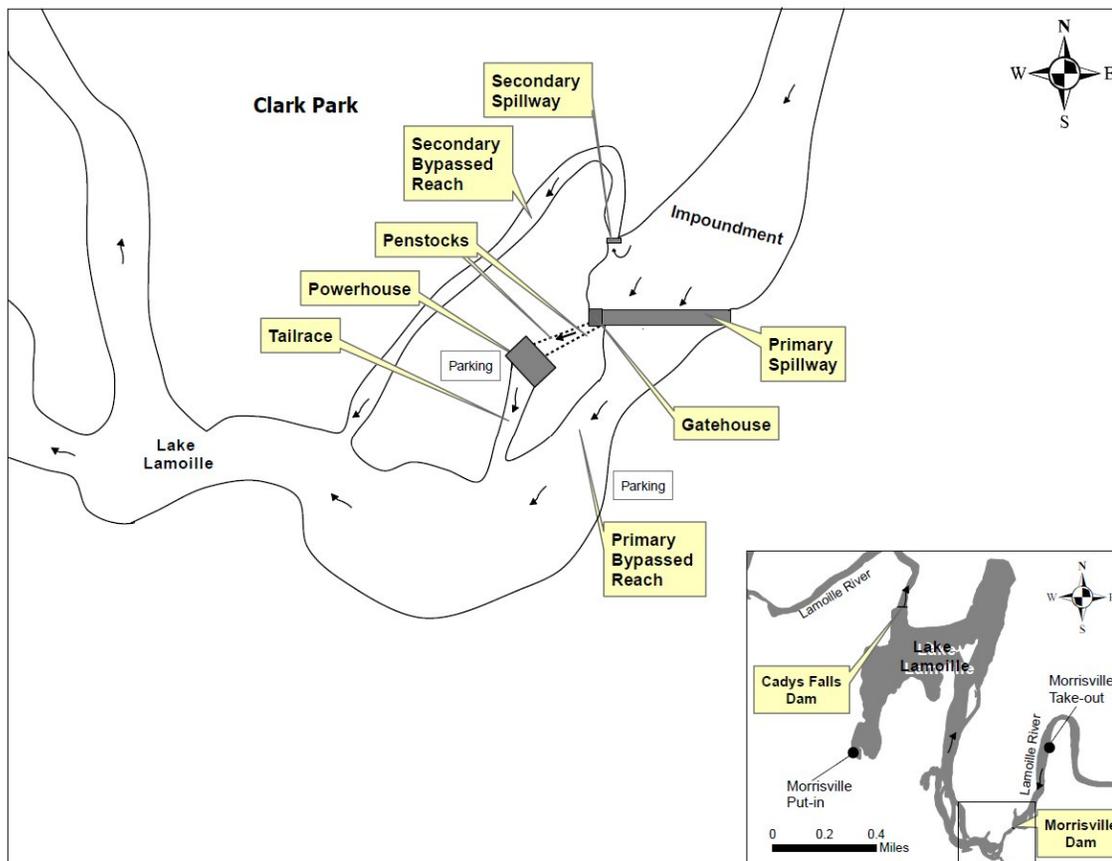


Figure 4. Morrisville Development site plan (Source: staff).

Cadys Falls Development

The existing Cadys Falls Development (figure 5) is located on the Lamoille River approximately 1 mile downstream of the Morrisville Development and consists of: (1) a 364-foot-long, 41-foot-high concrete gravity dam comprised of a 23-foot-long embankment section, a 186-foot-long spillway section with 3.5-foot-high wooden flashboards and a crest elevation of 576.89 feet msl, a 60-foot-long intake and gatehouse section, and a 95-foot-long non-overflow section; (2) a 150-acre impoundment (Lake Lamoille) with a 525-acre-foot storage capacity and a normal maximum water surface elevation of 580.39 feet msl; (3) an 18-foot-long, 9.2-foot-high intake structure and a 29-foot-long, 40-foot-wide regulating gatehouse equipped with two 10-foot-wide, 10-foot-high wooden headgates; (4) a buried, steel penstock that includes a 7-foot-diameter, 1,110-foot-long section leading to a 35.6-foot-high, 29.7-foot-diameter concrete surge tank and bifurcates into a 90-foot-long, 8-foot-diameter section and a 30-foot-long, 9-foot-diameter section; (5) a 96-foot-long, 46-foot-wide concrete-brick powerhouse containing a 600-kW turbine-generator unit and a 700-kW turbine-generator unit for a total installed capacity of 1,300 kW; (6) a 12-foot-long concrete-lined tailrace; (7) a 150-foot-long, 34.5-kV transmission line connecting the powerhouse to the regional grid; and (8) appurtenant facilities.

The Cadys Falls Development creates a 1,690-foot-long bypassed reach. Morrisville currently operates and maintains a boat launch and a canoe portage route (from take-out to put-in) at the Cadys Falls Development.

The project boundary encloses 1,086 acres and covers approximately 4, 1.5, and 2 miles of the Green River, Elmore Brook, and Lamoille River, respectively. The project boundary around the impoundments is generally established by contour elevations that are the impoundments' normal maximum water surface elevations. At the dams, powerhouses, and recreation areas at the Morrisville and Cadys Falls Developments, the boundary is established by metes and bounds, including a 5 mile-long, 30-foot-wide transmission line corridor at the Green River Development. At the downstream end of the Morrisville Development, the boundary encloses approximately 0.4-acres on the eastern side of the Lamoille River adjacent to the Morrisville Development. Morrisville indicates that the 0.4-acre land parcel does not serve a project purpose and proposed to remove it from the project boundary. The project boundary does not include all the recreational facilities at the Green River Development, including 33 acres of the existing 86 acres of Morrisville-owned land available to the public for hunting and trapping and the existing angling access site in the vicinity of the Green River Dike. No federal or tribal lands are located within the project boundary.

2.1.2 Project Safety

The Morrisville Project has been operating for over 48 years under the current license which was issued August 28, 1981 (effective May 1, 1965). During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. As part of the relicensing process, Commission staff would evaluate the continued adequacy of the proposed project facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to ensure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

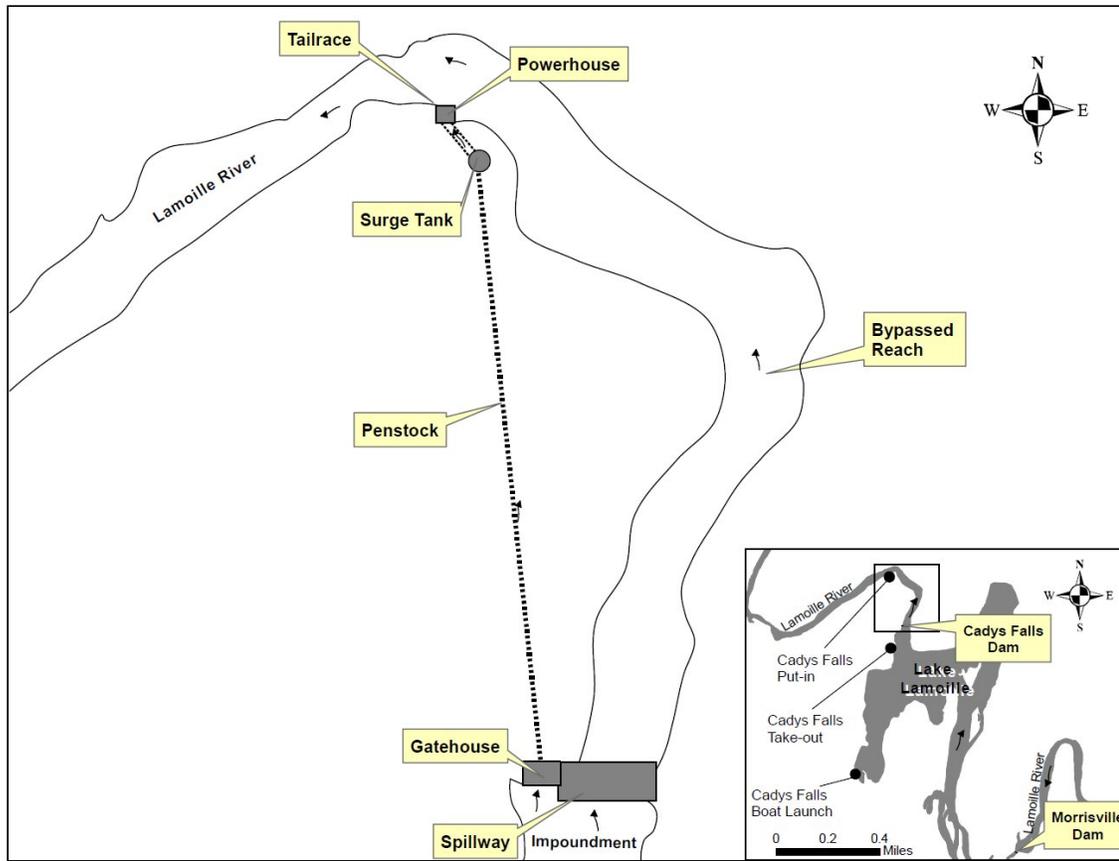


Figure 5. Cadys Falls Development site plan (Source: staff).

2.1.3 Existing Project Operation

Green River

Flashboards are not used at the Green River Development. Inflow to the Green River Development enters the impoundment from the headwaters of Green River. Water from the Green River Reservoir is released to the bypassed reach through the minimum flow valve at the base of the outlet-valve house or through the notch in the spillway. During generation, water is released to the tailrace through the powerhouse.

The Green River Development operates in store-and-release mode where water is stored during high flow events to be used later for generation. During the common loon nesting season (i.e., May 1 to August 1), Morrisville attempts to maintain the reservoir water surface elevation 3 inches below the spillway crest (1,219.75 feet msl). From August 2 through November 30, Morrisville maintains the reservoir between elevations 1,219 feet msl (one foot below the normal maximum water surface elevation) and 1,220 feet msl. After December 1, Morrisville typically drawdowns the reservoir as much as 10 feet (to 1,210 feet msl) and then refills the reservoir to elevation 1,220 feet msl by April 30. Impoundment drawdowns greater than 6 feet below the normal maximum water

surface elevation (1,220 feet msl) occur infrequently and drawdowns 10 feet below the normal maximum water surface elevation are rare.

The current license requires Morrisville to release a year-round minimum flow of 5.5 cubic feet per second (cfs), or inflow (whichever is less), to the bypassed reach. The 5.5-cfs minimum flow is primarily released through the minimum flow valve. To maintain water quality for the trout fishery in the Green River, Morrisville voluntarily limits releases from the Green River powerhouse to 160 cfs from May 1 through October 31, and to 283 cfs from November 1 through April 30.

The Green River Development uses flows between 60 cfs (minimum hydraulic capacity of the powerhouse) and 312 cfs (maximum hydraulic capacity of the powerhouse) to generate electricity. When the impoundment is full (i.e., at elevation 1,220 feet msl), and inflow is greater than 317.5 cfs (the maximum operating capacity of the powerhouse plus the minimum flow), the Green River Development operates at its maximum capacity, 5.5 cfs is released to the bypassed reach through the outlet-valve house, and all remaining flow is released over the spillway into the bypassed reach.

Lake Elmore

Flashboards are not used at the Lake Elmore Development. Inflow to the Lake Elmore Development enters the impoundment from the headwaters of Elmore Pond Brook. Water from the Lake Elmore impoundment is either released over the spillway during normal operations or through the wooden headgates when water levels are below elevation 1,139 feet msl (i.e., the spillway crest). The Lake Elmore Development operates during most of the year in run-of-river mode¹⁴ at an elevation of 1,139 feet msl, except during the annual 2-foot drawdown of the impoundment to an elevation of 1,137 feet msl for a period of 2-4 weeks in the fall to allow shoreline property owners to perform maintenance activities on docks and bulkheads.

The current license does not require the release of a minimum flow at the Lake Elmore Development.

Morrisville

Morrisville maintains two Obermeyer inflatable crest gates on the primary spillway of the Morrisville Development and permanent two foot flashboards on the secondary spillway to maintain a stable impoundment water surface elevation year-round.

¹⁴ Prior to the current license, the Lake Elmore Development was operated in store-and-release mode where water was stored during high flow events for later use in supplementing downstream generation at the Morrisville and Cadys Falls Developments.

Inflow to the Morrisville Development enters from the main stem of the Lamoille River which includes flow from the Green River and Lake Elmore Developments. Water from the Morrisville impoundment is either directed over the spillways or through the headgates to the powerhouse. The Morrisville Development operates in run-of-river mode at or above elevation 631.79 feet msl.

The current license requires Morrisville to release a year-round minimum flow of 12 cfs or, inflow (whichever is less), to the primary bypassed reach. The current license also requires Morrisville to release a year-round minimum flow of 135 cfs, or inflow if less, downstream of the confluence of the tailrace and bypassed reach of the Morrisville Development.

The Morrisville Development uses flows between 30 cfs (minimum hydraulic capacity of the powerhouse) and 522 cfs (maximum hydraulic capacity of the powerhouse) to generate electricity. The Morrisville Development does not operate when inflow is less than 42 cfs (the minimum operating capacity of the powerhouse plus the minimum flow). At flows between 42 and 534 cfs (the minimum and maximum operating capacities of the powerhouse plus the minimum flow), this development operates, and 12 cfs is released through the minimum flow orifice. At flows greater than 534 cfs, this development operates at its maximum capacity, 12 cfs is released through the minimum flow orifice, and all remaining flow is passed over the spillways.

Cadys Falls

Morrisville maintains 3.5-foot flashboards at the Cadys Falls Development that are designed to fail when overtopped by one to two feet. The flashboards typically fail from overtopping due to ice and/or high flows. Flashboard failures at this development typically occur four to six times annually. Any failed flashboards are usually replaced within one to two weeks after they fail, except during the winter when they are replaced within a few months after they fail.

Inflow to the Cadys Falls Development enters the impoundment from the Morrisville Development. Water from the Cadys Falls impoundment is either directed through the headgates to the powerhouse, and/or over the spillway. The Cadys Falls Development operates in run-of-river mode. Morrisville maintains the impoundment water surface elevation at or above 580.39 feet msl (top of the flashboards) when the flashboards are in place, or at or above 576.89 feet msl (spillway crest elevation) if the flashboards have failed.

The current license requires Morrisville to release a year-round minimum flow of 150 cfs or, inflow if less, downstream of the confluence of the Cadys Falls tailrace and the bypassed reach.

The Cadys Falls Development uses flows between 30 cfs (minimum hydraulic

capacity of the powerhouse) and 455 cfs (maximum hydraulic capacity of the powerhouse) to generate electricity. The Cadys Falls Development does not operate when inflow is less than 30 cfs and all flow is passed over the spillway. At flows between 30 and 455 cfs, this development operates, and all flow is routed through the powerhouse for generation. At flows greater than 455cfs, this development operates at its maximum capacity, and all remaining flow is passed over the spillway.

2.1.4 Existing Environmental Measures

Article 25 of the current license¹⁵ requires Morrisville to release a continuous minimum flow of 5.5 cfs in the Green River tailrace, a 135-cfs minimum flow downstream of the confluence of the Morrisville Development tailrace and bypassed reach, and a 150-cfs minimum flow downstream of the confluence of the Cadys Falls Development tailrace and bypassed reach. The September 15, 2011, order amending license¹⁶ requires Morrisville to release a 12-cfs minimum flow, or inflow whichever is less into the Morrisville Development's primary bypassed reach.

2.2 APPLICANTS PROPOSAL

On April 25, 2013, Morrisville filed an application for a new license to operate and maintain the 4.99-MW Morrisville Project. Morrisville does not propose any new generation facilities or capacity at this time.

2.2.1 Proposed Project Facilities

Morrisville proposes to: (1) remove the Lake Elmore Development from the project boundary and permanently set the spillway opening at elevation at 1,139 feet msl;¹⁷ (2) remove a 0.4-acre parcel of land from the project boundary at the Morrisville Development; and (3) develop a river access site at the Green River Development near Garfield Road that includes an access road and day-use parking area, river access trail, and safety signage for whitewater boating.

¹⁵ The current license issued and effective August 28, 1981, (16 FERC ¶62,346), and was amended on November 23, 1984 (29 FERC ¶61,243).

¹⁶ 136 FERC ¶ 62,225

¹⁷ We analyze the environmental effects of removing the Lake Elmore Development from the project, but we do not make a recommendation in this final EA. A decision to remove or not remove the Lake Elmore Development from the project would be included in any license order issued for this project.

2.2.2 Proposed Operations and Environmental Measures

Morrisville proposes to continue to operate the Green River Development in store-and-release mode with a minimum flow release of 5.5 cfs to the Green River. Morrisville proposes to increase the limit on releases from the Green River Development during the May 1 to October 31 period (i.e., the normal maximum elevation) from 160 cfs to 283 cfs;¹⁸ Morrisville would continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode.¹⁹

Morrisville also proposes to: (1) develop a plan to monitor dissolved oxygen (DO) in the tailrace of the Green River Development, and implement measures, if necessary, to prevent DO levels that may be harmful to aquatic resources;²⁰ (2) release a 28-cfs minimum flows into the Morrisville primary bypassed reach; (3) release an 8.5-cfs minimum flow into the Morrisville secondary bypassed reach; (4) release a 54-cfs minimum flow into the Cadys Falls bypassed reach;²¹ (5) continue to release a 135-cfs minimum flow downstream of the confluence of the Morrisville Development tailrace and bypassed reach; (6) continue to release a 150-cfs minimum flow downstream of the

¹⁸ Historically, from May 1 to October 31, Morrisville has voluntarily limited releases to 160 cfs to maintain water quality for the trout fishery in the Green River downstream of the Green River Development.

¹⁹ Morrisville's proposal does not specify impoundment elevations at the Cadys Falls and Morrisville Developments during run-of-river operation; therefore staff assumed that the Morrisville impoundment would be maintained at or above elevation of 631.79 feet msl (i.e., the spillway crest) and the Cadys Falls impoundment would be maintained at or above elevation of 580.89 feet msl when flashboards are installed or at or above 576.89 feet msl when the flashboards have failed.

²⁰ In comments on the EA filed July 24, 2014, Morrisville proposes to adopt the staff-recommended alternative to develop a DO monitoring and improvement plan discussed in the draft EA.

²¹ In comments filed July 24, 2014, Morrisville increased its proposed minimum flows in the Morrisville Development primary bypassed reach from 12 to 28 cfs, It also increased its proposed minimum flows in the Morrisville Development secondary bypassed reach from 4 to 8.5 cfs and in the Cadys Falls Development bypassed reach from 12 to 54 cfs. An attachment to Morrisville's comments (technical memo from Vanasse Hangen Brustlin, Inc. to Vermont ANR, dated June 4, 2014), describes a phased approach for providing minimum flows or possible seasonal flow variations in the Green River. Because this document appears to be part of an ongoing consultation between Morrisville and Vermont ANR, we do not evaluate the phased approach in this EA.

confluence of the Cadys Falls Development tailrace and bypassed reach; (7) provide two 6-hour-long scheduled releases, of up to 283 cfs, for whitewater boating between April 1 and October 31 each year downstream of the Green River Development; (8) provide advance notification to American Whitewater (AW) of the two 6-hour-long scheduled releases and provide short-term public notification (via the internet) when releases at the Green River Development are expected to exceed 160 cfs; (9) continue to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam (1,219.75 feet msl) during common loon nesting season (approximately May 1 to August 1); (10) enhance recreation facilities at the Morrisville Development by installing signage for the parking area downstream of the Morrisville dam, installing trailhead and route signage for the Clark Park walking trail, and repairing fencing at Clark Park; (11) relocate the Cadys Falls portage take-out to the location of the Morrisville portage put-in and Cadys Falls boat launch, and install directional signage along the Morrisville and Cadys Falls portage routes (including both put-ins and take-outs); and (12) develop and implement a Historic Properties Management Plan (HPMP).

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include all of Morrisville's proposed measures except for: (1) the minimum flows proposed for the Morrisville and Cadys Falls bypassed reaches because staff recommends higher flows that would provide more habitat and protection for the existing trout fisheries, and (2) the minimum flows for the Lamoille River downstream of the confluences of the tailraces and bypassed reaches of the Morrisville and Cadys Falls Developments because staff recommends operation of these developments in run-of-river mode which would make these flows unnecessary.²² In addition to the measures proposed by Morrisville, Commission staff recommends the following additional seven measures: (1) release minimum flows of 70 and 12 cfs into the Morrisville primary and secondary bypassed reaches, respectively; (2) release 25 cfs of the 70-cfs minimum flow for the Morrisville primary bypassed reach over the primary spillway crest to improve the visual character of the Morrisville dam; (3) release a 100-cfs minimum flow into the Cadys Falls bypassed reach; (4) develop a plan to monitor dissolved oxygen (DO) in the Green River development tailrace; (4) develop and implement a Whitewater Operation Plan for the Green River Development that includes

²² In this final EA, Commission staff only describes the environmental effects of removing the Lake Elmore Development from the project and do not make a recommendation regarding this proposal. A decision on the removal of the Lake Elmore Development from the project will be addressed in any license order that is issued for the project.

procedures for providing: (a) five annual gradually ramped-up 6-hour-long releases of flows between 140 cfs and 283 cfs, for whitewater boating on the Green River, (b) advance notification to AW and the Vermont Paddlers Club of the five annual releases, and (c) short-term public notification, via the internet, of any releases that would be expected to exceed 140 cfs; (5) an Operation Compliance Monitoring Plan (OCMP); and (6) a Recreation Plan to ensure appropriate enhancement, operation, and maintenance of project recreational facilities.

Proposed and recommended measures are discussed under the appropriate resource sections and summarized in section 5 of the EA.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

We considered several alternatives to the applicant's proposal, but eliminated them from further analysis because they are not reasonable in the circumstances of this case. They are: (1) issuing a non-power license; (2) Federal Government takeover of the project; and (3) retiring the project.

2.4.1 Issuing a Non-power License

A non-power license is a temporary license that the Commission will terminate when it determines that another government agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider issuing a non-power license a realistic alternative to relicensing in this circumstance.

2.4.2 Federal Government Takeover

We do not consider federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence to indicate federal takeover should be recommended by Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.4.3 Retiring the Project

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions.

No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. The power generated by the Morrisville Project is an important resource, and is relied upon to provide clean, renewable energy. This source of power would be lost if the project were retired, and replacement power would need to be found. There also would be significant costs associated with retiring the development's powerhouses and appurtenant facilities. In addition, the impoundments at the Green River, Lake Elmore, Morrisville, and Cadys Falls Developments serve as an important recreational resource in the area. Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate protection, mitigation and enhancement measures.

The second project retirement alternative would involve retaining the dams and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we don't consider removal of the electric generating equipment to be a reasonable alternative.

3.0 ENVIRONMENTAL ANALYSIS

This section includes: (1) a general description of the project vicinity; (2) an explanation of the scope of cumulative effects analysis; and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatic recreation, etc). Historic and current conditions are described under each resource area. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared including an assessment of the effects of the proposed mitigation, protection, and enhancement measures, and any cumulative effects of the proposed action and alternatives. Staff conclusions and recommendations are discussed in section 5.1 of the EA, *Comprehensive Development and Recommended Alternative*.²³

3.1 General Description of the Lamoille River Basin

Lamoille County has an area of approximately 475 square miles. The county is primarily rural and 73 percent of the county is forested. Other land classifications

²³ Unless noted otherwise, the source of our information is the license application (Morrisville, 2013).

include agricultural lands (13 percent), developed areas (4.6 percent), water bodies (6.6 percent), and wetlands (2.6 percent).

The Lamoille River is a major tributary to Lake Champlain and drains a 706 square mile watershed, which is 7.5 percent of Vermont's land area. The Lamoille River flows 84.9 miles in a generally westerly direction from its origin in the Town of Wheelock to Mallett's Bay of Lake Champlain. From its headwaters to the mouth, the Lamoille River descends approximately 1,200 feet in elevation

The project area has average air temperatures in July of 66 degrees Fahrenheit and 13 degrees Fahrenheit in January. The average total snowfall is 108 inches and the average annual total precipitation in Morrisville is 42.4 inches.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR § 1508.7), an action may cause cumulative effects on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and agency and public comments, we determined that water quality has the potential to be cumulatively affected by the continued operation of the project, in combination with other past, present and future activities. Water quality was selected because of potential project effects on dissolved oxygen (DO) and water temperature in the project impoundments and downstream of each development.

3.2.1 Geographic Scope

The geographic scope of the cumulative analysis defines the physical limits or boundaries of the proposed action's effect on the resources. We have identified the scope for water quality to include the Green River, Elmore Pond Brook and the Lamoille River from the confluence of the Green and Lamoille rivers at the town of Wolcott to the town of Jefferson.

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and future actions and their effects on water quality. Based on the potential new license term, the temporal scope looks 30 to 50 years into the future, concentrating

on the effects on the resources from reasonably foreseeable future actions.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the project effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this final EA. Based on this, we have determined that water quality and quantity, aquatic resources, terrestrial resources, recreation, aesthetics, and cultural resources may be affected by the proposed action and alternatives. We have not identified any substantive issues related to geology and soils and socioeconomics associated with the proposed action, and therefore, these resources are not addressed in the final EA. Land use and aesthetics are addressed in the terrestrial and recreation sections. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

3.3.1 Aquatic Resources

3.3.1.1 Affected Environment

Water Quantity

The Morrisville project's four impoundments have a total surface area of approximately 1,118 acres. The Green River Development has the largest impoundment (Green River Reservoir) and is located on the Green River, a tributary to the Lamoille River. Green River Reservoir has a surface area of 653 acres and a normal maximum water surface elevation of 1,220 feet USGS (spillway crest elevation). Green River Reservoir is relatively deep with a maximum depth of 80 feet. The Lake Elmore Development is located on Elmore Brook, a tributary to the Lamoille River. Morrisville historically operated the Lake Elmore Development as a storage reservoir that released flows for hydropower generation at the downstream developments.²⁴ Lake Elmore has a surface area of 300 acres, a normal maximum water surface elevation of 1,139 feet USGS, and a maximum depth of 17 feet. The Morrisville impoundment, located on the Lamoille River, has a surface area of 15 acres and a normal maximum water surface elevation of 631.79 feet USGS. The Cadys Falls impoundment (Lake Lamoille) is

²⁴ Prior to the existing license, the Lake Elmore Development operated in store-and-release mode where water was stored during high flow events for later use in supplementing downstream generation at the Morrisville and Cadys Falls Developments.

located two miles downstream of the Morrisville Development. Lake Lamoille has a surface area of 150 acres, a normal maximum water surface elevation of 580.39 feet USGS, and a maximum depth of 15 feet.

The total drainage area for the project at Cadys Falls is approximately 268 square miles. Table 1 summarizes flow data from the United States Geological Survey (USGS) Gage No. 04292000, located at Johnson, Vermont that has been adjusted based on the size of the drainage area for the project.

Table 1. Estimated average, minimum, and maximum flows (cfs) for the Lamoille River at the Morrisville Project (October 1910 – September 2012).

<i>Month</i>	<i>Maximum</i>	<i>Average</i>	<i>Minimum</i>
Jan	6,870	398	50
Feb	3,900	341	35
Mar	10,700	742	50
Apr	10,800	1,646	160
May	9,930	806	48
Jun	8,480	429	48
Jul	10,000	299	27
Aug	13,400	271	20
Sep	5,180	257	22
Oct	7,040	431	16
Nov	7,480	537	38
Dec	7,030	486	49
<i>Annual</i>	<i>13,400</i>	<i>552</i>	<i>16</i>

Water Quality Standards

Vermont DEC designates waters of the Lamoille River within the project boundary as Class B waters. Class B waters are managed to fully support aquatic biota, wildlife and aquatic habitat, aesthetics, water supply after adequate treatment, irrigation of crops and other agricultural uses, swimming, fishing, boating and other recreational purposes. Numeric standards for Class B waters are presented in Table 2.

With the exception of Lake Elmore, all project waters are also designated as cold water fish habitat. Lake Elmore is designated as warm water fish habitat.

Table 2. Vermont Class B Water Quality Standards.

Water Quality Parameter	Standards
Dissolved Oxygen (DO)	<p><u>Cold Water Fish Habitat</u> - Not less than 7 mg/l and 75% saturation at all times, nor less than 95% saturation during late egg maturation and larval development of salmonids in areas that the Secretary of Vermont ANR determines are salmonids spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold water fish habitat.</p> <p><u>Warm Water Fish Habitat</u> – Not less than 5 mg/L and 60% saturation at all times.</p>
Turbidity	<p><u>Cold Water Fish Habitat</u> - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions</p> <p><u>Warm Water Fish Habitat</u> - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 25 NTU as an annual average under dry weather base-flow conditions.</p>
Temperature	<p><u>Cold Water Fish Habitat</u> – the total increase from the ambient temperature due to all discharges and activities shall not exceed 1.0°F unless authorized by the Secretary of Vermont ANR.</p> <p><u>Warm Water Fish Habitat</u> – the total increase from the ambient temperature due to all discharges and activities shall not exceed the temperature criteria from the tables below:</p>

Lakes, Ponds and Reservoirs not including Riverine impoundments	
Ambient Temperature	Total allowable increase above ambient temperature
Above 60°F	1°F
50°F – 60°F	2°F
Below 50°F	3°F
All other Waters	
Ambient Temperature	Total allowable increase above ambient temperature
Above 66°F	1°F
63°F to 66°F	2°F
59°F to 62°F	3°F
55°F to 58°F	4°F
Below 55°F	5°F

Water Quality

The Lamoille River has multiple designated uses including water supply, hydroelectricity, wastewater assimilation, wildlife habitat and recreation. A significant use of water in the project area is for hydroelectric generation. Of the 65 dams in the Lamoille River watershed, 10 dams are used to generate hydroelectricity or impound water to augment flows for hydroelectric generation. There are six wastewater treatment plants that discharge directly to the Lamoille River including Village of Morrisville's municipal wastewater treatment plant. There are also 62 permitted stormwater discharges to the Lamoille River or tributaries. In addition to wastewater assimilation and hydroelectric generation, water from the Lamoille River is used to support multiple agricultural uses including crop irrigation and animal watering.

Morrisville conducted a water quality survey in 2012 prior to filing the license application. Project waters were monitored for DO and temperature from May through October 2012. The study area included three stations in all four project impoundments (the linear center, thalweg²⁵ and intake²⁶), each tailwater, the Morrisville bypassed reach, and in the Green River downstream of the Green River Dam.

Results of Morrisville's 2012 water quality monitoring study show good water quality in the Morrisville, Cadys Fall and Lake Elmore Developments. All three developments also met water quality standards for Vermont Class B waters for both

²⁵ The thalweg is deepest part of a river channel or lake where water typically flows the fastest.

²⁶ Intake samples were collected from a penstock tap where possible.

warmwater and coldwater fish habitat. DO and temperature were similar throughout the project waters regardless of generation flows at the Morrisville and Cadys Falls Developments. The only exception was some cooling observed in the Lamoille River downstream of the Cadys Falls Development.

Water quality in Green River Reservoir showed thermal stratification at the thalweg and linear center during mid to late May (figures 6 and 7).²⁷ The thermocline became well developed by mid-June and remained developed through mid-October. In the epilimnion, water temperatures reached 25°C during the summer, with DO concentrations never falling below 7.9 mg/L. The thermocline spanned depths of 4-8 meters during early summer and shifted slightly deeper to 5-10 meters during late summer. DO within the thermocline was elevated from late May through late July relative to areas higher and lower in the water column. In the hypolimnion, DO levels began to decrease starting in mid to late June and became progressively lower through the summer. By July 23, 2012, DO concentrations in the hypolimnion declined to 6 mg/L or less and were below 3 – 4 mg/L by late August and early September. The lowest levels of DO (0.88 – 2.12 mg/L) were measured in the hypolimnion in October prior to water column mixing.

²⁷ Lake stratification is a natural condition found on deep lakes where water is separated into three distinct layers based on temperature and density. Higher density cool water is found at the lowest level called the hypolimnion. The uppermost layer with the warmest water is called the epilimnion and the middle layer where a rapid change in temperature is found is called the thermocline.

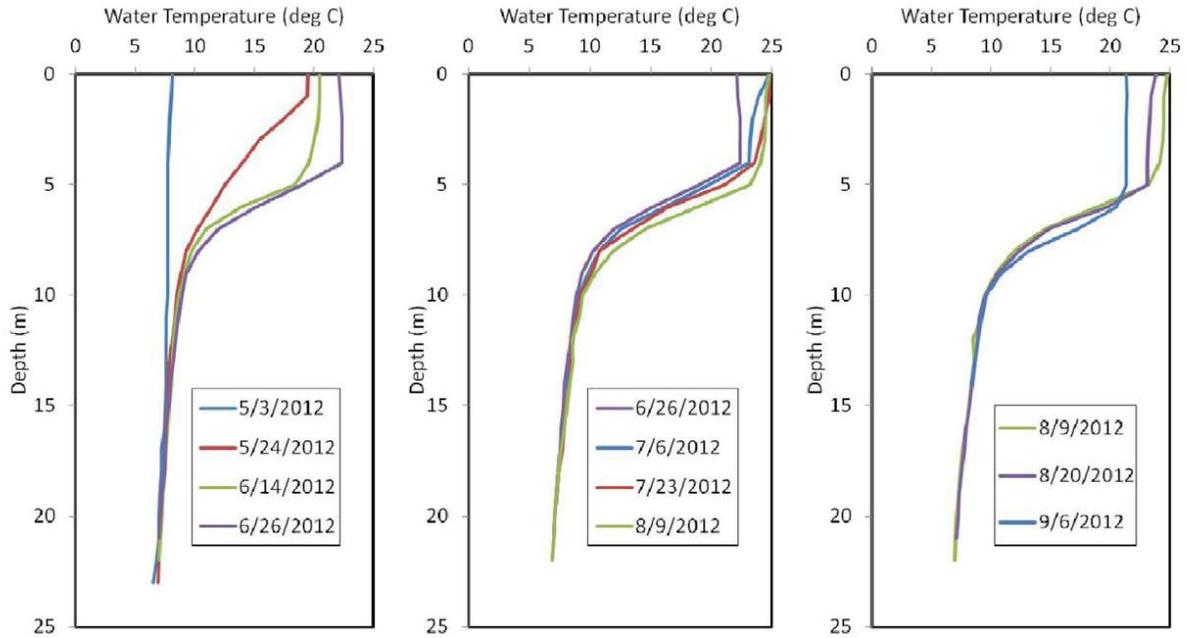


Figure 6. Green River Reservoir Vertical Temperature Profiles (Linear Center)

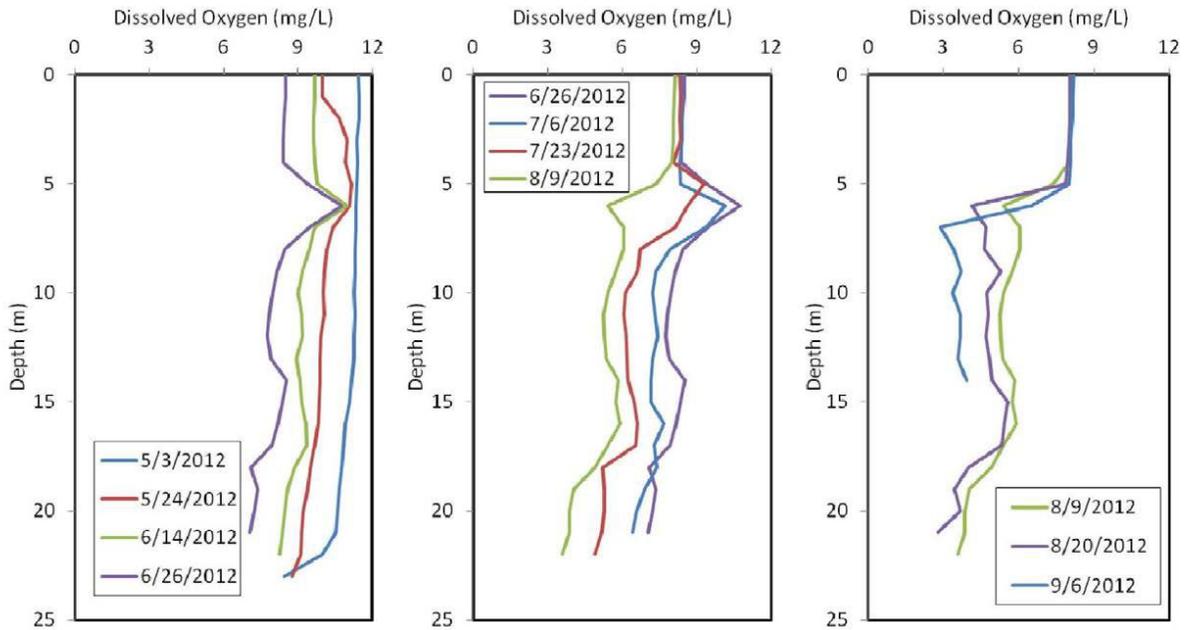


Figure 7. Green River Reservoir Vertical Dissolved Oxygen Profiles (Linear Center)

Fisheries Resources

The project area contains a variety of aquatic habitat and supports populations of both coldwater and warmwater fish species, summarized here from upstream to downstream.

Green River Reservoir is inhabited by self-sustaining populations of smallmouth bass, northern pike, chain pickerel, yellow perch, and brown bullhead. Wild brook trout also occur in the reservoir as a result of naturally reproducing populations in its tributaries. The Green River downstream from the project dam contains naturally reproducing populations of brook trout, rainbow trout, and brown trout. The Green River is also considered by Vermont ANR to be an important nursery area and cold water refuge for populations of trout in the Lamoille River.

Lake Elmore has naturally reproducing populations of largemouth bass, yellow perch, brown bullhead, and northern pike. Elmore Pond Brook has suitable water temperature and substrates to provide spawning and nursery habitat for rainbow, brook, and brown trout populations in the Lamoille River.

The Lamoille River upstream of Morrisville, including the 15-acre Morrisville impoundment, contains both wild and stocked populations of brook trout, brown trout, and rainbow trout. Other abundant species in this reach of the Lamoille River include fallfish, white sucker, and brown bullhead.

The Lamoille River downstream from Morrisville, including the 150-acre Lake Lamoille is dominated by warm water species such as yellow perch, pumpkinseed sunfish, brown bullhead, largemouth and smallmouth bass, rock bass, fallfish, walleye, chain pickerel, and northern pike. Although some wild trout occur in this reach, especially in the vicinity of cold water tributaries, most trout found in this reach are of hatchery origin.

3.3.1.2 Environmental Effects

Green River Mode of Operation

Morrisville proposes to continue to operate the Green River Development in store-and-release mode with a drawdown of 6 to 10 feet from December 1 to April 30, attempt to maintain the elevation 3 inches below the dam crest (1,219.75 feet msl) during the loon nesting season (May 1 to August 1), and maintain the elevation within 1 foot of the dam crest from August 2 to November 30. Morrisville would continue to release a minimum flow of 5.5 cfs, or inflow if less, to the Green River year-round. Morrisville also proposes to release two scheduled whitewater releases of 6-hour duration between April 1 and October 31. To provide these whitewater releases, Morrisville proposes to increase

the maximum allowable flow between May 1 and October 31 from the current 160 cfs limit to a limit of 283 cfs. Morrisville proposes to schedule one of the whitewater releases to coincide with the annual ISO New England summer capability test (occurs between July 1 and September 15).²⁸ During the proposed whitewater releases, flows would range from 126 to 280 cfs and reservoir elevation would be maintained within the same limits as under existing reservoir management procedures.

Interior's 10(j) recommendation 1 would require that Morrisville operate the Green River Development in an instantaneous run-of-river mode, with inflow equal to outflow at all times, and Interior's 10(j) recommendation 3 would require that the reservoir be maintained between 1,219.75 and 1,220.00 feet msl at all times. Vermont ANR recommends the same instantaneous run-of-river operation and reservoir surface elevation as Interior recommends. Interior's 10(j) recommendation 1 for run-of-river operation would allow for exceptions to instantaneous run-of-river operation in emergencies or for short periods as determined by mutual agreement between Morrisville, Interior, and Vermont ANR. Vermont ANR's run-of-river recommendation does not include exceptions; however, the Vermont ANR indicates that its final recommendation is likely to contain language similar to Interior's recommendation.²⁹

Staff Analysis

Reservoir Management

Under the proposed operation of the Green River Reservoir, there would be no change in the amount or availability of aquatic habitat because the timing and magnitude of the annual drawdown would not change. Seventy-eight acres of littoral habitat would be dewatered during the winter at a drawdown of 6 feet and 130 acres would be dewatered with a drawdown of 10 feet. Because the fish community in the reservoir (which appears to be healthy and self-sustaining) is comprised of species that spawn in the spring and summer, it is likely that the winter drawdown does not have any direct adverse effect on fish spawning. The habitat used by the reservoir's fish community would be inundated and available during the spawning and incubation periods. Additionally, fish generally move to deeper water during the winter, so the amount or availability of overwintering habitat is also not likely to be a limiting factor in the Green River Reservoir.

²⁸ ISO New England administers summer capability tests to verify that operators are capable of generating up to their rated generating capacity, which is necessary to test the reliability of the bulk electrical system during periods of peak demand.

²⁹ Personal communication between Jeff Crocker of Vermont ANR and Steve Kartalia, FERC, filed on March 6, 2014.

Under instantaneous run-of-river operation recommended by Vermont ANR and Interior, littoral habitat would not be dewatered during the winter. As a result, near-shore aquatic vegetation beds are likely to stabilize and become healthier over time in response to a stable reservoir level. Aquatic vegetation beds near the shoreline provide fish and other aquatic organisms with habitat for feeding, spawning, and cover. Therefore, as a result of healthier aquatic vegetation beds, fish could experience better littoral habitat during the spring, summer, and fall. This could result in improved fish growth and survival, which in turn could lead to better condition factor, greater spawning success, juvenile recruitment, and healthier fish populations, compared to the fish community under the existing storage mode of operation.

Green River Flow Regime

Under the proposed operation, peaking flows from generation would vary depending on reservoir inflows and the elevation of Green River Reservoir. Generally, flow releases would be between 60 cfs and 312 cfs, which are the development's minimum and maximum hydraulic capacities, respectively. When the reservoir is at elevation 1,220 feet msl and inflow is greater than the maximum hydraulic capacity plus the minimum flow, all flow in excess of 317.5 cfs would pass over the spillway. During the summer, the operating regime typically consists of several hours of generation at 140 cfs, and the release of the 5.5 cfs base flow at all other times. Lower and higher inflows to Green River Reservoir result in generation flows that are closer to the minimum and maximum hydraulic capacities, respectively.

In 2012, Morrisville used the Physical Habitat Simulation (PHABSIM) methodology³⁰ to evaluate habitat conditions brook trout, brown trout, and rainbow trout, longnose sucker and macroinvertebrates at flows of 4, 5.5, 10, 20, 50, 75, 100, 140, 200, and 285 cfs.

Table 3 summarizes the results of the PHABSIM study. The existing and proposed base flow of 5.5 cfs, which is approximately 75 percent of the summer aquatic base flow (ABF),³¹ is lower than the maximum available for all life stages except trout

³⁰ PHABSIM is a model developed by the FWS to evaluate the relationship between flow and habitat. Habitat suitable for a particular species life stage is often expressed in terms of weighted usable area (WUA). WUA is the wetted area of a stream weighted by its suitability for use by aquatic organisms or recreational activity. WUA is usually expressed in units of square feet or square meters of habitat per a specified length of stream.

³¹ ABF is a method of establishing minimum flow standards based on hydrological statistics. The ABF method is based on the assumptions that fish can survive median

fry. Flows greater than 100 cfs, as usually occur during peaking periods, are higher than optimal for all aquatic organisms and life stages considered in the study. Flows in the 50 to 70 cfs range appear to provide the best overall habitat conditions for the range of species and life stages considered.

Table 3. Percentage of the maximum WUA for various flows.

Species/Life Stage	Maximum WUA Flow (cfs)	4 cfs	5.5 cfs	10 cfs	20 cfs	50 cfs	75 cfs	100 cfs	140 cfs	200 cfs	285 cfs
<i>Brook/Brown Trout</i>											
Spawning & Inc.	30	25	43	78	86.5	58	26	17	14	13	10
Early Fry	4	100	80	53	30	36	31	23	11	4	3
Late Fry	10	98	100	100	90	63	48	40	31	24	21
Juvenile	40	40	47	64	87	98	84	66	50	38	31
Adult	70	28	33	46	66	95	100	96	86	69	55
<i>Rainbow Trout</i>											
Spawning & Inc.	90	0	0	1	9	66	99	96	85	53	20
Early Fry	4	100	80	53	30	36	31	23	11	4	3
Late Fry	30	67	77	94	99	73	47	34	22	16	12
Juvenile	60	27	33	48	69	98	99	91	76	53	32
Adult	80	11	15	27	48	87	99	99	87	71	43
<i>Longnose Sucker</i>											
Spawning & Inc.	40	33	42	61	81	99	91	81	65	43	22
<i>Macroinvertebrates</i>											
All	100	3	6	16	40	83	97	100	95	84	68

Adult trout and macroinvertebrate habitat are the habitat categories that are adversely affected the least during high flows and trout fry and trout and sucker spawning and incubation habitat are adversely affected the most during high flows. The three highest flows studied (140, 200, and 285 cfs) are in the range of the proposed whitewater boating flow releases, the annual ISO New England summer capability test, and existing high flow events that result from snow melt or precipitation. Therefore, the effects of any whitewater releases would be similar to the effects of the annual summer capability test or naturally occurring high flow events such as precipitation from thunderstorms in the late summer. Although the WUA data suggest that these high flows reduce the amount of habitat available for most species and life stages of trout, the persistence of the existing populations of all three species of trout in the Green River suggests that the relatively short duration of ongoing high flow events is not affecting the sustainability of these populations.

August flows and that fish reproduction is protected with flows that are equal to the historical median flows during spawning and incubation seasons. The summer ABF is calculated as 0.5 cfs per square mile of drainage area.

Under instantaneous run-of-river operation, recommended by both Interior and Vermont ANR, flows in the Green River below the project dam would equal inflows to the reservoir at all times. The Green River downstream from the 180-foot-long stilling basin would resemble an unregulated river and flows would vary throughout the year over a range typical for a New England river with a drainage area of approximately 15 square miles. Maximum and minimum annual flows under run-of-river operation would likely be similar to those that occur under existing conditions. However, the distribution of flows would change and the frequency of the highest and lowest flows would decrease. There would generally be fewer high flow events in the summer and early fall, compared to the existing and proposed operation. Instead, higher flows would be more likely to occur during periods of snow melt or higher precipitation, such as spring and late fall. Low flows would be higher than the existing base flow of 5.5 cfs during most of the year as well, including during the summers of years with average or higher precipitation. Some benefits of run-of-river operation could include an increase in the abundance and diversity of macroinvertebrates, because the average available wetted area of the stream would increase for these organisms. Additionally, with less frequent high flow events, trout and other fish species could experience fewer disruptions in feeding and spawning behavior, which could result in better growth, survival, and reproduction.

Morrisville's proposal to increase the maximum flow release allowed during the period May 1 to October 31, from 160 cfs to 283 cfs, would not affect water quality or the aquatic habitat in the Green River. Flow releases would be limited when the reservoir surface elevation is below the maximum level of 1,220 feet msl. Therefore, flows could only be withdrawn from the hypolimnion via the penstock rather than released over the spillway and the water released to the Green River would continue to be cold and adequate to support the existing trout population. Additionally, flows of 283 cfs already occur during the annual ISO New England summer capability test, as discussed above, and there is no evidence in the Commission's record that these higher flows are harmful to water quality or the trout fishery. The DO monitoring plan discussed below would document any change to water quality in the Green River from flows greater than 160 cfs.

Green River Tailrace DO

Morrisville proposes to develop a plan to monitor and improve DO in the Green River tailrace, and implement measures, if necessary, to prevent DO levels that may be harmful to aquatic resources. Interior's 10(j) recommendation 6 and Vermont ANR's recommendation would require Morrisville to develop a plan with measures necessary to meet Vermont DO standards in the Green River Development tailrace. The plan would include monitoring to assess the effectiveness of the measures taken to address low DO and an implementation schedule. The plan would be developed in consultation with the resource agencies.

Staff Analysis

Operating the Green River Development in either run-of-river mode or store-and-release mode would affect DO and water temperature in the Green River in a similar manner. The intake withdraws water for power generation from the hypolimnion which is cool with low DO. Water quality monitoring showed that during July and August, water temperature in the tailrace was 14.7 – 15.9 °C cooler than Green River Reservoir surface water. Despite the influence of project operation on water temperature downstream of the dam, all measurements were in compliance with state water quality standards for water temperature.

From late July through early September, DO in the Green River downstream of the Green River dam does not meet state standards. During this period, DO in the tailrace was below Vermont water quality standards (3.65 mg/L) and was an average of 4.79 mg/L lower than surface water DO in the reservoir. Immediately downstream of the dam, DO in the Green River was low and recovered to levels similar to Green River Reservoir surface water within 1.5 to 2 miles downstream of the dam. This effect was more pronounced when higher flows were released from the development for power generation.

A plan with measures to address low DO in the tailrace would directly benefit the Green River downstream of the development. The Green River is an important nursery area for trout and supports naturally reproducing populations of brook trout, rainbow trout, and brown trout. Low DO can harm or stress trout and extremely low levels can be lethal to trout. Low DO affects trout by reducing swimming ability and their feeding and reproductive success. Low DO affects nursery habitat by slowing embryonic development and growth in fry which can lead to increased predation (Carter, 2005).

There are many methods available to increase dissolved oxygen concentrations in hydropower discharges, including aerating reservoir forebay waters with air or oxygen, installing advanced aerating turbine runners, and constructing aeration weirs in the tailrace downstream of the dam (NHA, 2010). Increasing the DO levels of water released from the Green River Development would improve water quality conditions downstream of the dam and enhance habitat for fish and benthic species in the Green River. Monitoring DO after implementing corrective measures would ensure that the measures are successful in enhancing DO in the tailrace and would also identify if further action is necessary to address low DO.

In its comments on the EA, Morrisville proposed to develop a DO monitoring and improvement plan recommended by staff in the draft EA. In its comments, Morrisville contemplates two methods to increase DO in the tailrace: (1) increasing the minimum downstream flow to mechanically aerate the turbine discharge; or (2) turbine aspiration. The results of tailrace DO monitoring would determine the appropriate mitigation

method.

Increasing the minimum flow to mechanically aerate the tailwater below the Green River Development could improve DO levels if there is sufficient amount of structure (rocks or deflectors) and flow to enhance mixing. If increasing the minimum flow does not successfully enhance DO in the discharge, Morrisville is considering turbine aspiration which is also a proven method to enhance DO in oxygen-deficient turbine discharges (EPRI, 2011). Increasing DO in the tailrace would directly benefit aquatic resources in the Green River below the dam by providing additional habitat in late summer and early fall that was previously unavailable due to poor water quality. Monitoring after the implementation of an appropriate mitigation measure would ensure that the measure effectively increases DO in oxygen-deficient waters.

Lake Elmore Mode of Operation

Morrisville proposes to remove the Lake Elmore Development from the project. Morrisville currently operates the Lake Elmore Development in run-of-river mode, except when it conducts an annual 2-foot drawdown for the purpose of allowing shoreline homeowners to perform maintenance on docks. This drawdown usually lasts between 2 and 4 weeks and occurs between mid-September and mid-October. Morrisville proposes to permanently set the spillway to an elevation of 1,139 feet msl (spillway crest elevation) and discontinue the annual fall drawdown.

Interior's 10(j) recommendation 1 would require Morrisville to operate the Lake Elmore Development in an instantaneous run-of-river mode at all times. Interior's 10(j) recommendation 4 would require that Lake Elmore be maintained at a spillway elevation of 1,139 feet msl and that all flows be spilled into Elmore Pond Brook via the dam crest spillway. Vermont ANR recommends the same instantaneous run-of-river operation and method of releasing the flows into Elmore Pond Brook as Interior recommends, but Vermont ANR's recommendation does not specify a Lake Elmore surface elevation.

Staff Analysis

Lake Elmore Management

The effects on aquatic resources from removing the Lake Elmore Development from the project and operating the development in instantaneous run-of-river mode would be the same. Fluctuations of the impoundment surface elevation would be limited to what occurs naturally due to high flow events, in the same way that a natural lake, formed and controlled by a natural hydraulic control, would fluctuate to some degree during high flow events.

Lake Elmore's fish community is comprised of species that spawn in the spring

and summer; therefore, eliminating the fall drawdown is not likely to have any direct effects on fish spawning. However, as discussed above for the Green River Reservoir management, stable water levels can improve the health of aquatic vegetation beds. Aquatic vegetation beds near the shoreline provide fish and other aquatic organisms with habitat for feeding, spawning, and cover. As a result of healthier vegetation beds, which could provide better feeding and cover habitat, fish could experience better growth and survival, which in turn could lead to better condition factor, greater spawning success, and healthier fish populations. The fall drawdown of Lake Elmore typically only lasts a few weeks and it occurs during the end of the growing season; therefore, the indirect benefits of protecting near-shore aquatic vegetation beds from dewatering are likely to be minor.

Elmore Pond Brook Flow Regime

Under the existing operation of Lake Elmore, flows to Elmore Pond Brook equal inflows to Lake Elmore at all times, except during the fall drawdown. During the fall drawdown, outflows exceed inflows for a short period while the lake is lowered and then outflows are reduced to approximately 80 percent of inflows to Lake Elmore as the lake is refilled.

The fall drawdown typically overlaps at least part of the brook and brown trout spawning season. Eliminating the fall drawdown, would restore flows in Elmore Pond Brook to a natural pattern during this period. A natural flow regime may be slightly less disruptive to brook trout spawning than the existing fall drawdown and refill. As a result, trout may spawn more successfully and the brook and brown trout populations of Elmore Pond Brook and the Lamoille River could increase.

Mode of Operation at Morrisville and Cadys Falls Developments

Morrisville proposes to continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode. Morrisville also proposes to continue to provide minimum flows of 135 cfs downstream of the confluence of the Morrisville tailrace and bypassed reaches and 150 cfs downstream of the confluence of the Cadys Falls tailrace and bypassed reach, or inflows if less. Morrisville states that flashboard failure should be considered an operating emergency beyond its control for the purpose of determining compliance with run-of-river operation. Morrisville has not described its procedures for flashboard replacement in detail and the agencies have not specifically commented on the subject. Interior's 10(j) recommendation 1 would require Morrisville to operate these two developments in an instantaneous run-of-river mode, except in emergencies or for short periods as determined by mutual agreement between Morrisville, Interior, and Vermont ANR. Vermont ANR's run-of-river recommendation does not include exceptions; however, the Vermont ANR indicates that its final recommendation is likely

to contain language similar to Interior's recommendation.³²

Staff Analysis

Because the proposed and recommended modes of operation at these two developments are the same as existing operation, there would be no effects to the fish community or aquatic habitat in the two impoundments or the Lamoille River downstream of the two tailraces. Aquatic resources would continue to benefit from stable impoundment levels (except during flashboard failures) and unregulated flows downstream of the tailraces.

The Morrisville Development has an automatic crest control system on the primary spillway and 2-foot-high permanent wooden flashboards on the secondary spillway. The Cadys Falls Development has 3.5-foot-high wooden flashboards on the spillway that fail 4 to 6 times per year when water levels rise 12 to 18 inches above the top of the boards. The flashboards are typically replaced within 1 to 2 weeks, except during winter when they may be down for a period of months.

Between the time flashboards fail and are replaced, some littoral habitat would be dewatered in the impoundments. The primary spawning season for fish occurring in these two impoundments is from late spring through early summer; therefore, this is the period of the year when flashboard failure could have the greatest adverse effect on fish. If flashboards fail shortly before, during, or shortly after the spawning season, fish may abandon nests, or eggs and fry may become desiccated. Because high flow events occur most frequently between late fall and mid-spring, most flashboard failures probably do not adversely affect fish spawning.

To minimize the adverse effects of flashboard failures on fish spawning, protocols for replacing the flashboards could be developed as part of the Operation Compliance Monitoring Plan (OCMP) discussed below.

It is not clear why Morrisville's proposed minimum flows downstream of the confluences of the bypassed reaches and tailraces are needed if the developments are operated in run-of-river mode. Under any inflow scenario, the minimum flows in the bypassed reaches would need to be released first, and all remaining flows could be used for generation or additional releases into the bypassed reaches. Therefore, the existing and proposed minimum flows downstream of the confluences of the developments' tailraces and bypassed reaches would provide no environmental protection and appear to be unnecessary.

³² Personal communication between Jeff Crocker of Vermont ANR and Steve Kartalia, FERC, filed on March 6, 2014.

Morrisville Bypassed Reach Flows

The existing minimum flow in the 380-foot-long primary bypassed reach is 12 cfs, which Morrisville proposes to increase to 28 cfs. Additionally, Morrisville proposes to increase the minimum flow in the 900-foot-long secondary bypassed reach from leakage (estimated to be 1 cfs) to 8.5 cfs. Interior's 10(j) recommendation 2 and Vermont ANR's recommendation would require Morrisville to release minimum flows of 70 cfs into the primary bypassed reach and 12 cfs into secondary bypassed reach.

Staff Analysis

The Lamoille River in the vicinity of the Morrisville Development is a popular trout fishery. Vermont ANR's goals for the reach are to enhance wild trout production by protecting and enhancing aquatic habitat and water quality in the tributaries and mainstem, including the Morrisville Development's bypassed reaches. Vermont ANR has specifically identified the primary and secondary bypassed reaches as sites where improvements to trout habitat and water quality can be achieved.

In 2012, Morrisville conducted a study of aquatic habitat in the Morrisville primary and secondary bypassed reaches using a flow demonstration assessment methodology.³³ Flows assessed in the primary bypassed reach included 4.5, 21, 59, and 91 cfs. Flows assessed in the secondary bypassed reach included 1, 4.1, 8.5, and 15.3 cfs. Habitat was assessed for juvenile and adult life stages of brook, brown, and rainbow trout.

In the primary bypassed reach, the amount of suitable habitat increased with flow at all flows observed (figure 8), except for brown and brook trout juveniles, which peaked at 59 cfs and was relatively stable over the range of flows, with about 75 to 90 percent of the habitat being judged suitable. The shape of the other flow versus habitat curves suggest that flows above 91 cfs would probably continue to increase the amount for adult trout of all species, but higher flows were not studied. For both rainbow trout life stages and brook and brown trout adults, substantial gains in habitat resulted from higher flows. At the existing minimum flow of 12 cfs, about 35-50 percent of the habitat for most species and life states was judged to be suitable. At Morrisville's proposed minimum flow of 28 cfs, the amount of habitat judged to be suitable increases to about 52 to 72 percent. At flows of 59 cfs and 91 cfs, the amount of habitat judged to be suitable

³³ The flow demonstration method evaluates the relationship of various flow releases with the aquatic habitat requirements of target species based on the consensus and professional judgment of biologists who observe a given stream reach over a range of flows.

increased to about 60-80 percent and 75 to 90 percent, respectively.

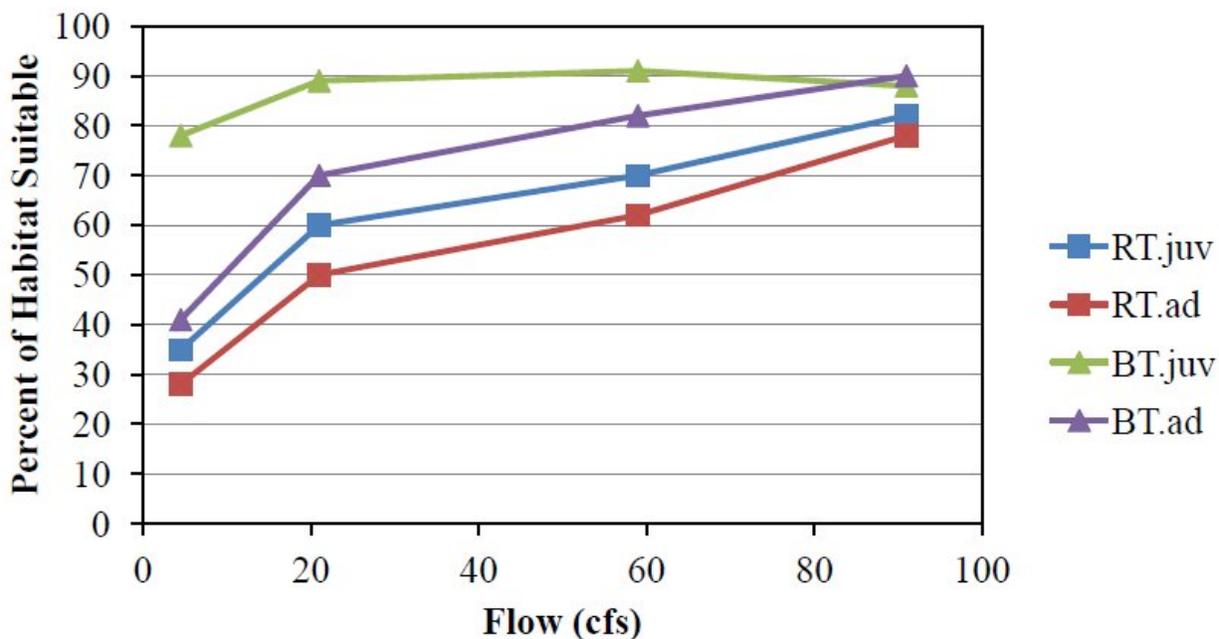


Figure 8. Percent of available suitable habitat at various flows in the Morrisville primary bypassed reach. BT = brook and brown trout, RT = rainbow trout, juv = juvenile, and ad = adult.

In the secondary bypassed reach, two sections were evaluated. The upper section is relatively wide, shallow, and has a low gradient. The lower section is dominated by bedrock and boulder substrate and has a narrow wetted width and high gradient. In the upper section, the amount and suitability of habitat increased with flow at all flows observed (Figure 9). Less than 5 percent of the habitat was judged to be suitable at the existing leakage flow. At 4.1, 8.5 (Morrisville's proposed minimum flow), and 15.3 cfs, the amount of habitat that was judged to be suitable for adult trout was identical for all 3 species and was about 5, 10, and 30 percent, respectively. For juveniles of all 3 species, the amount of habitat that was judged to be suitable at 4.1 and 8.5 cfs was about 30-40 percent and increased to about 60 percent at 15.3 cfs. The agency-recommended flow of 12 cfs would result in about 50 percent of the habitat being suitable for juveniles and about 20 percent of the habitat being suitable for adults.

In the lower section, the amount of habitat for all life stages peaked at 4.1 cfs before declining at the two highest flows observed (Figure 10). At a flow of 4.1 cfs about 70-75 percent habitat would be suitable for all species and life stages.

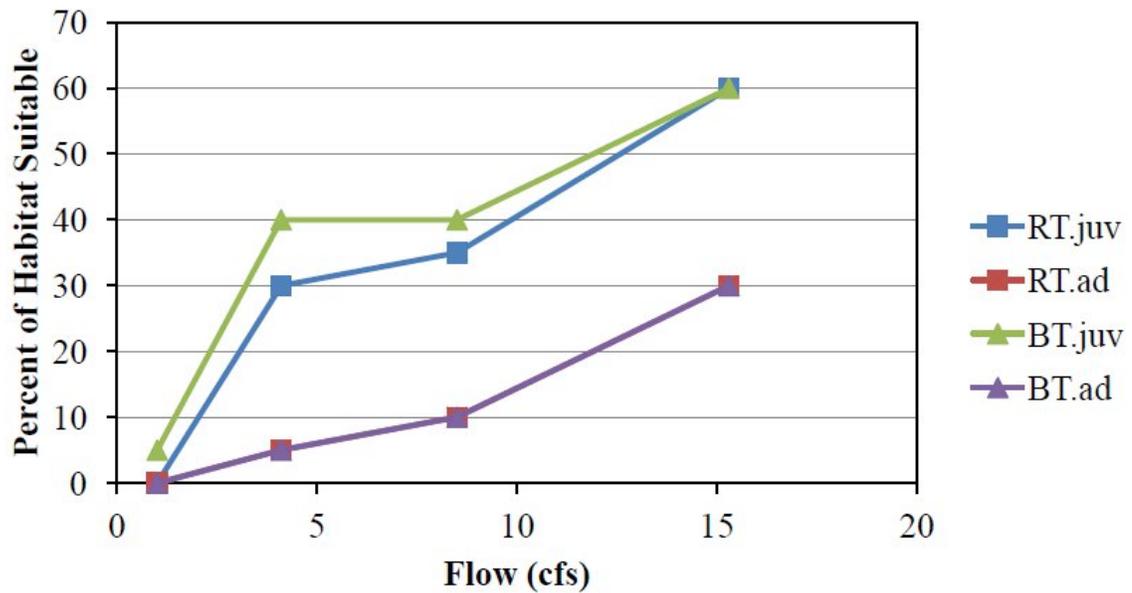


Figure 9. Percent of habitat that is suitable at various flows in the upper section of the Morrisville secondary bypassed reach. BT = brook and brown trout, RT = rainbow trout, juv = juvenile, and ad = adult.

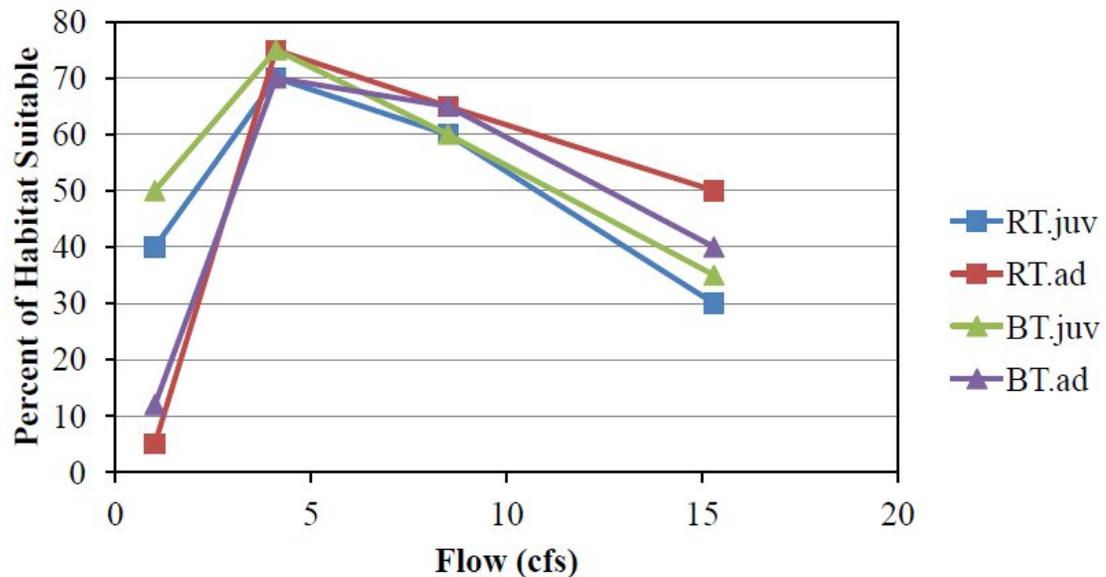


Figure 10. Percent of habitat that is suitable at various flows in the lower section of the Morrisville secondary bypassed reach. BT = brook and brown trout, RT = rainbow trout, juv = juvenile, and ad = adult.

The agencies often use the summer ABF to set minimum flows for the protection of fish and other aquatic resources. As discussed above, the summer ABF is calculated at

0.5 cfs per square mile of drainage area. Accordingly, the summer ABF at the Morrisville Development is 120 cfs based on the drainage area of 240 square miles. The existing flows of 12 cfs in the primary bypassed reach and 1 cfs leakage in the secondary bypassed reach (13 cfs total) is about 11 percent of the summer ABF. The sum of the proposed minimum flows (28 cfs plus 8.5 cfs = 36.5 cfs) is about 30 percent of the summer ABF. The sum of the agency recommended minimum flows (70 cfs plus 12 cfs = 82 cfs), is about 68 percent of the summer ABF. The sum of the highest flows observed (91 cfs plus 15.3 cfs = 106 cfs) is about 88 percent of the summer ABF.

Cadys Falls Bypassed Reach Flows

Morrisville proposes to increase the minimum flow in the 1,690-foot-long Cadys Falls bypassed reach from leakage (estimated to be 5.5 cfs) to 54 cfs year-round. Vermont ANR recommends a minimum bypassed reach flow of 100 cfs, or inflow, whichever is less. Interior's 10(j) recommendation 2 would require Morrisville to release a minimum flow to the bypassed reach of 98 cfs, or inflow, whichever is less.

Staff Analysis

The Lamoille River in the vicinity of the Cadys Falls Development is a popular trout fishery. Vermont ANR's goals for the reach are to enhance wild trout production by protecting and enhancing aquatic habitat and water quality in the tributaries and mainstem, including the Cadys Falls bypassed reach. Vermont ANR has specifically identified the bypassed reach as a site where improvements to trout habitat and water quality can be achieved.

In 2012, Morrisville conducted a study of aquatic habitat in the Cadys Falls bypassed reach using the PHABSIM method. Flows assessed included 48, 67, 98, 139, and 163 cfs. The existing leakage flow of 5.5 cfs was not in the range of flows studied. Habitat was assessed for juvenile and adult life stages of brook, brown, and rainbow trout, as well as macroinvertebrates.

WUA increased with flow at each flow evaluated, at all transects, for all species and life stages evaluated, with the exception of brook and brown trout juveniles at transect 1 (CF-1), which peaked at 98 cfs and declined slightly at flows of 139 and 163 cfs. (table 4).

Table 4. Percent of maximum WUA available at various flows in the Cadys Falls bypassed reach.

Species/Life Stage	48 cfs			67 cfs			98 cfs			139 cfs			163 cfs		
	CF-1	CF-2	CF-3	CF-1	CF-2	CF-3	CF-1	CF-2	CF-3	CF-1	CF-2	CF-3	CF-1	CF-2	CF-3
Brook/Brown Trout Juvenile	41%	62%	67%	84%	69%	64%	100%	77%	84%	94%	88%	95%	96%	100%	100%
Brook/Brown Trout Adult	37%	40%	59%	73%	61%	61%	91%	78%	78%	95%	89%	92%	100%	100%	100%
Rainbow Trout Juvenile	41%	41%	57%	79%	69%	61%	96%	90%	79%	99%	92%	92%	100%	100%	100%
Rainbow Trout Adult	26%	18%	50%	58%	69%	53%	80%	88%	73%	93%	91%	92%	100%	100%	100%
Macroinvertebrate	39%	27%	48%	65%	59%	57%	86%	89%	72%	97%	99%	94%	100%	100%	100%

As summarized above in table 4, the percentage of maximum WUA at 48 (similar to Morrisville's proposed minimum flow) and 67 cfs is quite a bit lower than the percentage provide by 98 cfs, and flows higher than 98 cfs (139 cfs and 163 cfs) provide some additional habitat. Morrisville's proposed minimum flow of 54 cfs would provide about 67 percent of maximum WUA at transect 3 for juvenile brown and brook trout, but substantially less for the other transects, species, and life stages. A flow of 98 cfs (Interior's 10(j) recommendation 2) would provide at least 72 percent of the maximum WUA for any life stage or species at any of the transects included in the study, and over 80 percent for most species and life stages.³⁴

The agencies often use the summer ABF to set minimum flows for the protection of fish and other aquatic resources. The summer ABF is calculated at 0.5 cfs per square mile of drainage area. Accordingly, the summer ABF at the Cadys Falls Development is 134 cfs based on the drainage area of 268 square miles. The existing leakage flow of 5.5 cfs is about 4 percent of the summer ABF. The proposed minimum flow of 54 cfs is about 40 percent of the summer ABF flow. Interior's recommended flow is about 73 percent of the summer ABF.

Operation Compliance Monitoring

Morrisville does not propose any specific project operation compliance monitoring procedures. Vermont ANR recommends a plan for monitoring project flows and impoundment elevations. Interior's 10(j) recommendation 4 would require a plan for monitoring and reporting compliance with run-of-river operation at all the developments and bypassed reach minimum flow requirements at the Morrisville and Cadys Falls Developments.

³⁴ Interior's recommended flow of 98 is indistinguishable from Vermont ANR's recommended flow of 100 cfs. Therefore, we consider them the same for the purpose of this analysis.

Staff Analysis

An operation compliance monitoring plan (OCMP) would help the agencies and Commission verify that the project is operating in run-of-river mode, maintaining required impoundment elevations, and providing minimum flows. However, Interior and Vermont ANR did not specify that the plan include an impoundment refill procedure or a detailed description of the protocols the applicant would implement during flashboard failures. Furthermore, if minimum aesthetic flows are required in any license issued for the project (as recommended by Vermont ANR and discussed in section 3.3.4 Aesthetic Resources), then this plan could also include the procedures and specific release location for providing the flow. Development of an OCMP for the project, including impoundment refill procedures, flashboard replacement protocols, and procedures for releasing aesthetic flows would provide the Commission with a means to verify compliance with all operational requirements and may prevent possible misunderstandings of project operation and reduce the likelihood of complaints regarding project operation being filed with the Commission.

3.3.1.3 Cumulative Effects

The Morrisville Project, in combination with the other hydroelectric projects located on the Lamoille River, has the potential to cumulatively affect aquatic resources. The adverse effects that can occur from multiple hydroelectric developments within a river basin include disruption of the natural hydrograph from peaking operations, reduced flows and habitat quality in bypassed reaches, fish mortality from turbine passage, and blockage of fish movements. Providing increased flows in the bypassed reaches and limiting impoundment fluctuations by operating some or all of the developments in run-of-river mode would collectively benefit aquatic resources in the Lamoille River.

As discussed above, operation of the Green River Development reduces DO levels in the Green River downstream of the dam in the late summer and early fall. Any potential DO reduction downstream of this development could contribute to cumulative effects on water quality in the Green River and subsequently the Lamoille River, as the river is already affected by urban, agricultural and industrial development, navigation, and other uses. However, such potential project effects could be mitigated by developing a plan to implement corrective measures and monitor DO to ensure that releases from the Green River Reservoir do not contribute to DO concentrations that harm or stress aquatic resources.

A DO monitoring plan that includes implementation of enhancement measures and subsequent monitoring of the effectiveness of DO improvement measures would minimize any adverse effects on water quality and aquatic resources in the Green River downstream of the Green River Dam.

3.3.1.4.1 Unavoidable Adverse Effects

Unavoidable adverse impacts would include some entrainment mortality that would persist with the continued operation of the Morrisville Project. However, there is no indication that any losses associated with entrainment have had a significant effect on fishery resources or fish populations within the project area.

3.3.2 Terrestrial Resources

3.3.2.1 Affected Environment

Upland Vegetation

All four project developments are located in the Northeastern Highland ecoregion. The primary upland habitat in the project vicinity is northern hardwood forest, which contains the northernmost deciduous forests in eastern North America. Common tree species include American beech (*Fagus grandifolia*), eastern hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), and yellow birch (*Betula alleghaniensis*). Common understory species include hobblebush (*Viburnum alnifolium*) and striped maple (*Acer pensylvanicum*).

Wetlands and Littoral Vegetation

Green River Development

The Green River Reservoir is deep with a steep shoreline and relatively small littoral zone. The littoral zone primarily consists of large particle size substrate (i.e., sand, gravel, cobble, and bedrock) and sparse to moderate aquatic vegetation. The reservoir contains pockets of palustrine scrub-shrub and emergent wetlands near its northern edge where the Green River enters the reservoir. These wetlands consist of woody, deciduous vegetation less than 6 meters tall and herbaceous macrophytes.

The Green River Wetland Study conducted by Morrisville in 2012 identified approximately 27 acres of emergent marsh, sedge meadow, and alder swamp wetlands along the 1.25-mile section of the Green River immediately downstream of the Green River Development. The shallow emergent marsh community is dominated by herbaceous species, including common bluejoint grass (*Calamagrostis canadensis*), common joe-pye weed (*Eupatorium maculatum*), common tussock sedge (*Carex stricta*), mannagrass (*Glyceria spp.*), and rough bedstraw (*Galium asprellum*). The sedge meadow community consists of plant species similar to the shallow emergent marshes; however, it is dominated by sedge species. The alder swamp community consists of a dense canopy of speckled alder (*Alnus incana*) and other woody species, including willow (*Salix spp.*) and meadowsweet (*Spiraea alba*). The Green River Wetland Study

also identified rare populations of muskflower (*Mimulus moschatus*), common water-crowfoot (*Ranunculus aquatilis var. diffuses*), and Hayden's sedge (*Carex haydenii*) downstream of the Green River Development.

Lake Elmore Development

Lake Elmore is shallow with a relatively large littoral zone. The littoral zone primarily consists of silt and clay substrate with dense submergent macrophyte growth and some floating macrophyte growth. Littoral habitat is fragmented by residential development and docks on the immediate shoreline. The southern edge of Lake Elmore consists of palustrine emergent and scrub-shrub wetlands where Elmore Brook enters the lake. The western edge of Lake Elmore includes a small pocket of palustrine forested wetlands dominated by broad-leaved deciduous trees.

Morrisville and Cadys Falls Developments

The Lamoille River and Lake Lamoille primarily consist of pockets of palustrine emergent and scrub-shrub wetlands in the vicinity of the Morrisville and Cadys Falls Developments.

Wildlife

Birds, mammals, and amphibians and reptiles found in or near the project area are presented in tables 5, 6, and 7 respectively.

Table 5. Birds found in or near the project area.

Common name	Scientific name
American Bittern	<i>Botaurus lentiginosus</i>
American Kestrel	<i>Falco sparverius</i>
Barred Owl	<i>Strix varia</i>
Black-Capped Chickadee	<i>Poecile atricapillus</i>
Black-Throated Blue Warbler	<i>Dendroica caerulescens</i>
Broad-Winged Hawk	<i>Buteo platypterus</i>
Canada Goose	<i>Branta Canadensis</i>
Common Loon	<i>Gavia immer</i>
Common Merganser	<i>Mergus merganser</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Downy Woodpecker	<i>Picoides pubescens</i>

Common name	Scientific name
Great Blue Heron	<i>Ardea Herodias</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Mallard	<i>Anas platyrhynchos</i>
Merlin	<i>Falco columbarius</i>
Northern Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>
Northern Goshawk	<i>Accipiter gentilis</i>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Red-Breasted Nuthatch	<i>Sitta Canadensis</i>
Red-Eyed Vireo	<i>Vireo olivaceus</i>
Red-Tailed Hawk	<i>Buteo jamaicensis</i>
Red-Winged Blackbird	<i>Agelaius phoeniceus</i>
Rose-Breasted Grosbeak	<i>Pheucticus lucovicianus</i>
Sharp-Shinned Hawk	<i>Accipiter straitus</i>
Spotted Sandpiper	<i>Actitis macularia</i>
Veery	<i>Catharus fuscescens</i>
Warbling Vireo	<i>Vireo gilvus</i>
Wood Duck	<i>Aix sponsa</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Yellow Warbler	<i>Dendroica petchia</i>
Yellow-Throated Vireo	<i>Vireo flavifrons</i>

Table 6. Mammals found in or near the project area.

Common name	Scientific name
Beaver	<i>Castor canadensis</i>
Black Bear	<i>Ursus americanus</i>
Eastern Chipmunk	<i>Tamias striatus</i>
Eastern Coyote	<i>Canis latrans</i>
Fisher	<i>Martes pennant</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Gray Squirrel	<i>Sciurus carolinensis</i>
Hairy-Tailed Mole	<i>Parascalops breweri</i>
Moose	<i>Alces alces</i>
Muskrat	<i>Ondatra zibethicus</i>
Northern Short-Tailed Shrew	<i>Blarina brevicauda</i>
Porcupine	<i>Erethizon dorsatum</i>
Raccoon	<i>Procyon lotor</i>

Common name	Scientific name
Red Fox	<i>Vulpes vulpes</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>
River Otter	<i>Lutra canadensis</i>
Shrew	<i>Sorex spp.</i>
Southern Red-Backed Vole	<i>Clethrionomys gapperi</i>
Snowshoe Hare	<i>Lepus americanus</i>
Striped Skunk	<i>Mephitis mephitis</i>
White-Footed Mouse	<i>Peromyscus leucopus</i>
White-Tailed Deer	<i>Odocoileus virginianus</i>

Table 7. Amphibians and reptiles found in or near the project area.

Common name	Scientific name
American Toad	<i>Bufo americanus</i>
American Bullfrog	<i>Rana catesbeiana</i>
Common Garter Snake	<i>Thamnophis sirtalis</i>
Eastern Newt	<i>Notophthalmus viridescens</i>
Eastern Red-Backed Salamander	<i>Plethodon cinereus</i>
Gray Tree Frog	<i>Hyla versicolor</i>
Green Frog	<i>Rana clamitans</i>
Mink Frog	<i>Lithobates septentrionalis</i>
Northern Dusky Salamander	<i>Desmognathus fuscus</i>
Northern Leopard Frog	<i>Rana pipiens</i>
Northern Two-Lined Salamander	<i>Eurycea bislineata</i>
Painted Turtle	<i>Chrysemys picta</i>
Pickerel Frog	<i>Rana palustris</i>
Red-Bellied Snake	<i>Storeria occipitomaculata</i>
Snapping Turtle	<i>Chelydra serpentine</i>
Spotted Salamander	<i>Ambystoma maculatum</i>
Spring Peeper	<i>Pseudacris crucifer</i>
Spring Salamander	<i>Gyrinophilus porphyriticus</i>
Wood Frog	<i>Rana sylvatica</i>
Wood Turtle	<i>Glyptemys insculpta</i>

Loons

The common loon (*Gavia immer*) is a migratory bird with low fecundity that nests on lakes and large ponds in northern North America. Common loons have great difficulty walking on land and must nest right at the water's edge where their

reproductive success is susceptible to water level changes. The Green River Reservoir generally supports two territorial loon pairs (i.e., one pair on the northwest side of the reservoir and one pair on the southeast side of the reservoir) during nesting season. However, a third territorial pair was identified on the reservoir in 2013 (Hanson and Buck, 2014).

3.3.2.2 Environmental Effects

Green River Development

Morrisville proposes to continue to operate the Green River Development with a maximum drawdown of 1 foot from May through November and 6 to 10 feet from December through April. In cooperation with the Vermont Center for Ecostudies, Vermont Loon Recovery Program (VLRP), Morrisville has stabilized the Green River Reservoir during loon nesting season since 2003 (Hanson, et al, 2008).³⁵ Morrisville proposes to continue to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam (i.e., 1,219.75 feet msl) during the loon nesting season (approximately May 1 to August 1). Morrisville proposes to continue to communicate with the VLRP on an annual basis to determine when the loon nesting season on the Green River Reservoir begins and ends. Morrisville also proposes to provide two 6-hour-long scheduled releases between April 1 and October 31 for whitewater boating on the Green River.

Interior's 10(j) recommendation 1 and Vermont ANR's recommendation would require Morrisville to operate the Green River Development in an instantaneous run-of-river mode. Interior's 10(j) recommendation 3 and Vermont ANR's recommendation would require the elevation of the Green River Reservoir to be maintained between 1219.75 and 1220 feet msl at all times. Interior's 10(j) recommendation for run-of-river operation would allow for exceptions in emergencies or for short periods with mutual agreement of Morrisville, Interior, and Vermont ANR. Vermont ANR's run-of-river recommendation does not include exceptions; however, Vermont ANR indicates that its final recommendation is likely to contain exceptions similar to Interior's recommendation.

AW and VPC recommend that Morrisville annually provide 8 to 10 scheduled whitewater flow releases of at least 140 cfs at the Green River Development. In comments on the draft EA, AW and VPC revised their recommendation for Morrisville to annually provide 7 to 8 scheduled whitewater flow releases during the spring, summer, and fall at the Green River Development.

³⁵ This is not required in the existing license.

*Staff Analysis***Wetlands and Littoral Vegetation**

The current composition of wetlands downstream of the Green River Development is a result of existing operations. The Green River Wetland Study determined that this wetlands complex supports diverse plant communities that consist of approximately 91 species, including populations of three rare plant species. The study also determined that these wetlands rated highly for a number of functions and values, including water storage capability, wildlife habitat, and erosion control. Continuing existing store-and-release operations at the Green River Development would promote the stability of these existing plant communities that are adapted to this hydraulic regime.

Impoundment fluctuations can prevent the establishment of wetlands and littoral vegetation by dewatering soils. The Aquatic Resource Assessment conducted in 2011 indicates that approximately 78 acres of the Green River Reservoir littoral zone is dewatered under a 6-foot winter drawdown and approximately 130 acres under a 10-foot winter drawdown. Morrisville's proposed operations would not affect the existing distribution and species composition of littoral vegetation in the reservoir, because the timing and magnitude of drawdowns would not change; however, continuing the winter drawdown could prevent the establishment of some littoral emergent and submerged vegetation.

Under instantaneous run-of-river operation, there would be no winter drawdown at the Green River Reservoir and littoral vegetation would likely expand. Changes in reservoir elevation, wave energy, and bottom freezing could also affect the distribution and species composition of littoral vegetation and wetland plant communities.

Loons

Loon reproductive success can be adversely affected by reservoir fluctuations.³⁶ The existing license allows Morrisville to operate the Green River Development with a maximum drawdown of 1 foot from May through November; however, Morrisville has voluntarily stabilized the Green River Reservoir during the loon nesting season since 2003. The overall loon productivity at the Green River Reservoir when Morrisville stabilized reservoir levels from 2005 through 2013 was approximately 0.76 chicks

³⁶ The FWS 2007 Status Assessment and Conservation Plan for the Common Loon in North America indicates that the rate of loon reproductive success is best estimated by the number of chicks fledged per territorial pair (Evers, 2007).

fledged per territorial pair (Hanson, et al, 2008; Hanson and Buck, 2013, 2014).³⁷ This is higher than the average overall loon productivity in North America of 0.53 chicks per territorial pair and the estimated overall loon productivity necessary to support a stable loon breeding population in North America of 0.48 chicks per territorial pair (Evers, 2007). Morrisville's proposal to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam would continue to stabilize reservoir levels and protect loons during the nesting season.

Interior and Vermont ANR's recommendations would require Morrisville to operate the Green River Development in run-of-river mode and maintain the reservoir at an elevation between 1,219.75 and 1,220 feet msl. Run-of-river operation would also maintain a stable reservoir elevation during loon nesting; therefore, it would not affect the reproductive success of loons on the Green River Reservoir.

Morrisville proposes, and AW and VPC recommend, whitewater flow releases at the Green River Development that could lower the reservoir during the loon nesting season. Specifically, Morrisville proposes to annually provide two 6-hour-long whitewater boating releases (up to 283 cfs) that could occur during the loon nesting. In addition, AW and VPC recommend that Morrisville annually provide a 1-day release during the loon nesting season. For reservoirs that have the ability to control water levels, loon nests are most successful when water levels do not increase more than 6 inches or decrease more than 12 inches during any 28-day period within the peak nesting season (Fair, 1979). Operating the Green River Development at maximum capacity (283 cfs) would lower the reservoir approximately 3 inches during a 6-hour whitewater release with no rainfall (0.5 inches per hour). This reservoir fluctuation would be significantly less than the recommended 12-inch limit on reservoir drawdowns during a 28-day period; therefore, the proposed and recommended whitewater releases would be unlikely to affect loon nesting success on the Green River Reservoir.

Lake Elmore Development

Morrisville operates the Lake Elmore Development in run-of-river mode, with the exception of an annual 2-foot drawdown during a 2- to 4-week period between mid-September and mid-October. Morrisville proposes to remove the Lake Elmore Development from the project and discontinue the annual fall drawdown.

Interior's 10(j) recommendation 1 and Vermont ANR's recommendation would require Morrisville to operate the Lake Elmore Development in an instantaneous run-of-

³⁷ The VLRP has used additional loon management tools to increase reproductive success at the Green River Reservoir, including nest warning signs and artificial nesting platforms.

river mode at all times. Interior's 10(j) recommendation 4 would require Morrisville to maintain Lake Elmore at a surface elevation of 1,139 feet msl and spill all flows into Elmore Pond Brook via the dam crest spillway.

Staff Analysis

Reservoir drawdowns can affect the distribution and species composition of wetlands and littoral vegetation; however, the Lake Elmore drawdown is of a relatively short duration and occurs near the end of the growing season. Therefore, the elimination of the 2-foot fall drawdown would have a minor effect on wetlands and littoral vegetation in Lake Elmore.

3.3.2.3 Unavoidable adverse impacts

None.

3.3.3 Land Use and Recreation

3.3.3.1 Affected Environment

Land Use

Land use in the vicinity of the project consists mainly of undeveloped lands, including forests and some agricultural areas, as well as small percentages of commercial and residential development. The project is located entirely within Lamoille County, Vermont, which has a total area of approximately 475 square miles. Privately-owned lands in the project area are regulated by the Lamoille County Planning Commission or other municipal zoning regulations and ordinances. The Lamoille County Regional Plan designates future land use for lands surrounding the Green River Development as natural areas, lands surrounding the Lake Elmore Development as natural areas and mixed use, lands surrounding the Morrisville Development and the upper portion of the Cadys Falls Development as urban, and designates the lower portion of the Cadys Falls Development as mixed use. In addition to the project-related facilities and public access areas at the Lake Elmore Development described below, much of Lake Elmore's shoreline is developed with private properties. Most of the private properties are small New-England-style cottages with private docks that provide direct access to the Lake Elmore impoundment.

According to the Exhibit G drawings filed on April 25, 2013, Morrisville owns approximately 1,086 acres of land within the project boundary across all four developments. Lands within the project boundary are primarily forested or developed, with the developed portions comprising lands immediately surrounding the Green River, Lake Elmore, Morrisville, and Cadys Falls dams. Aside from recreational activities,

project operation and maintenance are the primary activities that occur on project lands. No federal lands exist within or adjacent to the proposed project boundary.

Regional Recreation

The project is located within the popular Stowe/Smuggler's Notch northern Green Mountain Range region of Vermont, known for downhill and cross-country skiing in the winter and hiking throughout every season. Opportunities for boating, fishing, camping, scenic driving, hunting, and trapping are also available throughout the project area and region. Notable public lands and recreation opportunities in the project vicinity include Mount Mansfield State Forest, the Long Trail, and Putnam State Forest.

Mount Mansfield State Forest, home to Vermont's highest peak at 4,393 feet, is located approximately 10 miles southwest of the Cadys Falls Development and managed by Vermont ANR's Department of Forest, Parks and Recreation (Vermont FPR). This 42,448-acre forest offers several multi-use trail networks, ski areas, and opportunities for hunting, fishing, and camping throughout several state parks. The Long Trail, America's oldest long-distance trail, passes through the project area within Mount Mansfield State Forest. The 273-mile trail is managed by the Green Mountain Club and spans the entire south-to-north length of Vermont, from Williamstown, Massachusetts to the Canadian border. The Long Trail was completed in 1930 and served as the inspiration for the Appalachian National Scenic Trail with which it shares 100 miles along the southern portion (Green Mountain Club, 2014). Putnam State Forest, also managed by Vermont FPR, is located approximately 4 miles south of the Lake Elmore Development. This 13,470-acre forest includes a developed campground and a popular hiking trail system.

Existing Project Recreational Facilities

Morrisville currently owns and maintains designated recreational facilities at all four developments, as described below. These facilities are located inside the project boundary, with the exception of two recreation facilities at the Green River Development, and provide opportunities for boating, fishing, hunting, trapping, walking, picnicking, and sightseeing. The recreation season typically begins on Memorial Day and extends through Labor Day. The existing facilities are available throughout the recreation season depending on weather conditions.

Green River Development

A small 0.2-acre scenic overlook is located just east of the Green River dam and can be accessed via a footpath from Green River Dam Road. The overlook is located within the project boundary and does not include any formal amenities. Additionally, 86 acres of land owned by Morrisville, consisting of two separate parcels, is open to the public for hunting and trapping, but no formal amenities are offered. One 53-acre parcel

is located within the project boundary south of the dam and includes lands around the substation as well as a 100-foot transmission line right-of-way. A second 33-acre parcel is located in the vicinity of the Green River Dike and is not currently included in the project boundary. An angling access site, also located outside of the proposed project boundary, is located at the Green River Dike on the eastern end of the Green River impoundment. A small parking area off of Garfield Road provides access to the site via a footpath.

Lake Elmore Development

A small day use area adjacent to the gate house and within the project boundary provides fishing access to the Lake Elmore impoundment and Elmore Pond Brook at the spillway. The site includes a small gravel parking lot that can accommodate about two vehicles and no other formal amenities. Additionally, Morrisville has historically lowered the Lake Elmore impoundment approximately two feet for about one month during the fall each year at the request of the Lake Elmore Resident Association. The voluntary seasonal 2-foot drawdown provides an opportunity for private property owners, whose property abuts the project boundary, to perform maintenance on their private docks.

Morrisville Development

Clark Park is located on the western shoreline, or river-right,³⁸ adjacent to the Morrisville dam within the project boundary. The park includes a walking trail and a small parking lot next to the powerhouse that can accommodate approximately three vehicles. The walking trail provides angler access to the river downstream of the confluence of the tailrace and the primary bypassed reach. Access to the Morrisville primary bypassed reach is available from another parking area and access trail located on the river-left shoreline about 550 feet downstream of the dam within the project boundary. This parking area can accommodate approximately 11 vehicles. The Morrisville Development portage take-out is located approximately 2,110 feet upstream of the dam and the portage route travels approximately one mile across town roads to the put-in located at the Cadys Falls boat launch on the Cadys Falls impoundment.

Cadys Falls Development

The Cadys Falls impoundment, or Lake Lamoille, can be accessed from the Cadys Falls boat launch located approximately 2,700 feet upstream of the dam on the southern end of the impoundment within the project boundary. The single-lane gravel boat launch

³⁸ River-right refers to the right side of the river when the viewer is looking downstream. River-left refers to the left side of the river when looking downstream.

occupies about 75 feet of shoreline and includes a small roadside parking area that can accommodate approximately three vehicles. As mentioned above, the launch also serves as the put-in for the Morrisville Development portage route. The existing Cadys Falls portage take-out is located on the river-left shoreline approximately 500 feet upstream of the dam. The portage route travels approximately 2,200 feet across a wooded area and town roads to the put-in on the river-left shoreline about 1,500 feet downstream of the dam. A roadside parking area is located adjacent to the put-in that can accommodate about eight vehicles.

Additional (Non-Project) Existing Recreational Facilities

In addition to the existing project-related recreational facilities discussed above, several other recreational facilities and opportunities are available within the immediate project vicinity. The facilities are owned and maintained by different municipal entities, as described below.

Green River Reservoir State Park

The 5,503-acre Green River Reservoir State Park, managed by Vermont FPR, surrounds the Green River Development's 653-acre impoundment and abuts project lands around the dam, tailwater area, and access road. The park can be accessed from Green River Dam Road at its southern end and offers opportunities for boating, fishing, camping, picnicking, and swimming. The park includes a ranger contact station, information kiosk, three gravel parking areas that can accommodate a total of 67 vehicles plus 3 vehicles with trailers, two hand-carry boat launches, 34 remote overnight campsites, and five day-use sites with water access. The park is typically open from Memorial Day to Columbus Day and public access is limited by a first-come-first-serve basis whereby visitor access is no longer granted once the three parking areas reach capacity. About 19 miles of the Green River Reservoir shoreline are available to recreationists at the park, making it one of the longest stretches of undeveloped shorelines in Vermont. The park is designated as a "quiet lake" under Vermont's Use of Public Waters Rules. Accordingly, only human-powered boats and vessels equipped with electric motors up to 5 horsepower are allowed. The park's two hand-carry boat launches are located near the ranger contact station and information kiosk. One of the launches is compliant with the standards set forth under the Americans with Disabilities Act (ADA) and has two ADA-compliant parking spaces. The 34 remote campsites are only accessible by water and each has designated maximum site occupancies, from 3 to 12 people, depending on the sites' location and characteristics. Each campsite includes a fire ring and access to a composting toilet and some sites are closed seasonally to allow for rehabilitation from overuse (Vermont FPR, 2009).

Green River Whitewater Boating

The 4.35-mile stretch of the Green River from the dam to its confluence with the Lamoille River offers a range of whitewater boating opportunities unique to the region. The milder upper reach has a 150-foot vertical drop in elevation over 1.6 miles that offers a scenic float with several sections of Class I and II rapids from the dam to Garfield Road, which crosses the river and meets Green River Dam Road about 1.6 miles downstream of the dam. The more popular lower reach of the Green River, from Garfield Road to its confluence with the Lamoille River, has a 400-foot vertical drop in elevation over 2.75 miles and contains numerous sections of Class III, IV, and V rapids. The scenic lower reach flows through a deeply wooded area with several gorges, falls, and drops and provides a more advanced whitewater boating experience. Local whitewater boaters enjoy the full length of Green River from the dam to the confluence with the Lamoille River, but it is particularly known for the more challenging lower reach. Morrisville is required to release a minimum flow of 5.5 cfs to the Green River under the current license and does not currently provide scheduled whitewater releases. However, Morrisville typically provides short-term notice to American Whitewater (AW) of upcoming releases on a voluntary and ad hoc basis.³⁹ Morrisville allows public access to the river from project lands but does not currently maintain any formal access sites along this stretch of the river. Boaters typically access the river just below a culvert where Garfield Road crosses the Green River and take out at the Vermont Route 15 Bridge or continue to the Lamoille River and paddle about 1.7 miles west from the confluence to an angler access site managed by Vermont Fish and Wildlife Department (Vermont FWD).

Morrisville conducted a whitewater boating study at the Green River Development in collaboration with AW and the Vermont Paddlers Club (VPC) during the 2011 study season. The objectives of the study were to assess whitewater boating opportunities on the Green River provided by various flow releases, determine an acceptable range of whitewater flows (minimum, standard, and high-challenge flows), and quantify the number of days current project operation allows for whitewater boating opportunities. The 2.75-mile lower reach was the focus of the study, but it was estimated that all flows evaluated during the study provided adequate paddling opportunities on the 1.6-mile upper reach.

A total of 26 paddlers participated in a two-day event in October 2011 consisting of four different runs at different flow releases (approximately 105, 140, 186, and 280 cfs) during the morning and afternoon each day. Hard shell kayaks were used by about 90% of the participants at the first three flows and 100% of participants used hard shell kayaks during the 280-cfs run. Other vessels used during the study included one inflatable kayak, one open canoe with flotation, and one closed-deck canoe. The participants completed “Single Flow Evaluation” forms after each run in addition to

³⁹ <http://www.americanwhitewater.org/content/River/detail/id/10354/>.

“Comparative Flow Evaluation” forms after all the runs were completed to summarize each paddler’s experiences and flow recommendations. To supplement this data, Morrisville coordinated another one-day event with VPC in November 2011 where participants evaluated runs at flow releases of approximately 140, 227, and 270 cfs.

The “Single Flow Evaluation” forms indicated that all of the evaluated runs received an acceptable rating, but the 105-cfs release was notably rated 33% lower than the next flow release increment of 140 cfs. The 280-cfs runs were rated the highest overall, followed by the 186-cfs release. The “Comparative Flow Evaluation” forms identified 128 cfs as the average acceptable minimum flow, 222 cfs as the average optimal flow for a standard run, and 280 cfs as the average optimal flow for a high-challenge run. The comparative flow evaluation forms also indicated that a flow of 218 cfs was the average preferred flow for the reach across all participants. The participants rated the whitewater boating experience on the Green River, length of the reach, and aesthetic value of the reach as “above average” when compared to other rivers in the region. The study found that in 2011, Morrisville generated power at or above the identified 128-cfs minimum whitewater flow on a total of 15 days for a sum of 216 hours during normal project operations. Eight of these days occurred during April and May, collectively, while a total of three days occurred in October. The remaining four days occurred once in January, June, November, and December.

Lake Elmore State Park

Lake Elmore State Park, also managed by Vermont FPR, abuts the northern portion of the Lake Elmore Development about 1,000 feet east of Lake Elmore dam. The 940-acre park offers several hiking trails with access to Elmore Mountain and its historic fire tower, as well as a 60-site campground with restroom and shower facilities. The park also offers a day-use area that provides access to the Lake Elmore impoundment. The day-use area includes a large parking area, a 525-foot-long sandy beach, picnic area, cooking grills, an open-air pavilion, and a beach house with a community room, concession stand, restrooms, and boat rentals. The park is typically open from Memorial Day to Columbus Day and the pavilion and beach house are available to rent for special events (Vermont FPR, 2009a).

Morrisville Park

The Town of Morrisville owns and operates a park that occupies the oxbow land just upstream of the Morrisville dam. The park includes open space, a skate park, shoreline walking trail, community garden, and a parking lot that can accommodate about 45 vehicles. The take-out and about 530 feet of the Morrisville Development portage route is located along the western shoreline of the park.

Lamoille Valley Rail Trail

The Vermont Association of Snow Travelers and the Lamoille Valley Rail Trail Committee jointly manage the Lamoille Valley Rail Trail, a nearly 100-mile recently converted recreation trail that traverses the path of the former state-owned Lamoille Valley Railroad. The trail originates northwest of the project in Swanton, Vermont and travels southeastwardly through 15 communities to its terminus in St. Johnsbury, Vermont. Recreationists can hike, bike, horseback ride, snowshoe, mush, snowmobile, and cross-country ski along the four-season rail trail. The rail trail intersects the project at milepost 48.9 in Morrisville, historically the most important shipping point on the rail line. The trail briefly overlaps about 535 feet of the Morrisville Development portage route where it crosses the Lamoille River on a bridge just upstream of the Morrisville Development's boat barrier. From there, the trail continues eastward through the project area along the south side of the Lamoille River (Lamoille Valley Rail Trail, 2013).

Additional Public Access Sites

Vermont FWD and the Town of Elmore own and maintain three public access sites in the immediate project vicinity. At the southern end of the Lake Elmore Development, Vermont FWD manages a boat launch that provides additional public access to the Lake Elmore impoundment. The facility includes a single-lane concrete ramp and a gravel parking area that can accommodate approximately 20 vehicles with trailers. The Town of Elmore also operates and maintains a day use area immediately adjacent to the Lake Elmore dam. This facility includes two picnic tables, a bench, and a parking area that can accommodate about 7 vehicles. As mentioned above, Vermont FWD manages an angler access site that provides access to Lamoille River between the Green River and Morrisville Developments approximately 1.7 miles downstream of the confluence of the Green and Lamoille Rivers. The site offers an information board and a small gravel parking lot off of Vermont Route 15.

Recreational Use at the Project Developments

Morrisville conducted a recreation inventory study at the project during the 2011 study season. Results of the study indicate that shoreline fishing and non-motorized boating are the primary activities for recreationists throughout the project developments; however, use of project recreation facilities was not actually observed during the study. Based on data from the project's most recent FERC Form 80 filed in 2009,⁴⁰ the small day use area at the Lake Elmore Development received the most annual use of the four

⁴⁰ The FERC Form 80 is a recreational monitoring program that requires licensees to collect data on annual use and capacity of project recreational facilities and file a report summarizing the data every six years.

developments with 551 observed recreation days.⁴¹ The 2009 FERC Form 80 reported 416 recreation days for the Green River Development, with the scenic overlook and the 86 acres of land available for hunting observed at 20% and 25% use capacity, respectively. The Morrisville and Cadys Falls Developments were reported to receive the least use with 335 collective recreation days, and the Cadys Falls boat launch was observed at 10% use capacity. Both the 2011 recreation study and the 2009 FERC Form 80 indicate that all project recreation facilities are currently used significantly below capacity.

As discussed above, Morrisville conducted a whitewater boating study at the Green River Development during the 2011 study season. The study indicated that about 30 to 40 whitewater boaters, primarily local, boat the Green River each year when notified by Morrisville and/or AW of immediate upcoming releases. The study also estimated that if Morrisville were to provide scheduled annual releases and advance notice of the releases, the Green River could attract anywhere from 80 to 150 whitewater boaters annually.

3.3.3.2 Environmental Effects

Proposed and recommended recreational measures are described below.

Green River Development

In addition to continuing to maintain the scenic overlook, the open 86 acres of land, and the angling access site at the Green River Development, Morrisville proposes to construct a river access site at the intersection of Garfield Road and Green River Dam Road for whitewater boating access to the lower reach of the Green River. The site would include a day-use parking area and access road, river access trail, and safety signage. The parking area's access road would extend approximately 230 feet across an existing 12-foot-wide informal road, from the east side of Garfield Road to an old borrow pit area. The parking area would be located at the old borrow pit area and accommodate about 10 vehicles within a 50-foot by 75-foot space. Construction activities for the access road and parking area would include minor brush trimming and grading, and Morrisville would install a culvert at the entrance of the access road from Garfield Road to accommodate storm flows.

Morrisville also proposes to annually provide two scheduled 6-hour releases, up to 283 cfs, between April 1 and October 31 for whitewater boating on the Green River. One of the two proposed releases would coincide with the annual ISO New England summer

⁴¹ A recreation day is defined as one visit to a recreation site by an individual in a 24 hour period.

capability test (required between July 1 and September 15). Morrisville also proposes to provide advance notification to AW for the two scheduled release dates, and post short-term public notification on www.mwlv.com when releases above 160 cfs are expected at the Green River Development.

On January 2, 2014, AW and VPC jointly filed a motion to intervene and recommended several measures for whitewater boating at the Green River Development. AW and VPC also filed letters on February 3, 2014 with more information to supplement the recommendations in the January 2, 2014, letter. AW and VPC recommend that Morrisville annually provide 8 to 10 scheduled flow releases at the Green River Development of at least 140 cfs, but preferably at higher flows that would provide standard or high-challenge runs. Specifically, AW and VPC recommend that the planned annual releases be provided over the following schedule: (1) one or two 2-day weekend releases in April; (2) two 1-day releases in May; (3) one 1-day release in August during the ISO New England summer capability test; (4) one 2-day release in October; and (5) one release when the Green River impoundment is lowered in the winter. AW and VPC also recommend that Morrisville provide advance notification of the 8 to 10 scheduled releases to both AW and VPC and provide short-term notification on Morrisville's website when flows are expected to be above 128 cfs, including flow and duration estimates of the anticipated releases. In comments on the draft EA, AW and VPC revised their recommendation for Morrisville to annually provide a total of 7 to 8 scheduled flow releases during the spring, summer, and fall for whitewater boating on the Green River.

In comments on the draft EA, MDTU expressed support for whitewater releases on the Green River if run-of-river operation would not significantly improve the Green River fishery. MDTU also recommended that any potential recreational releases be done at a gradual ramp-up rate to protect public safety and habitat. The LRRA and FGGR filed comments on the draft EA stating opposition to AW and VPC's recommendations for whitewater releases on the Green River.

Lake Elmore Development

Morrisville proposes to operate the Lake Elmore Development in an instantaneous run-of-river mode and maintain a water surface elevation of 1,139 feet msl. Morrisville also proposes to remove the Lake Elmore Development from the project boundary.

Morrisville and Cadys Falls Developments

Morrisville proposes to designate and install signage at the parking area downstream of the Morrisville dam, install trailhead and route signage for the Clark Park walking trail, and repair fencing at Clark Park. Morrisville also proposes to install signage at the portage take-out and put-in locations and install directional signage along the Morrisville Development portage route.

Morrisville proposes to relocate the Cadys Falls Development portage take-out to the same location as the Morrisville Development portage put-in and Cadys Falls boat launch. Morrisville also proposes to install signage at the Cadys Falls take-out and put-in locations and install directional signage along the Cadys Falls Development portage route.

Staff Analysis

Green River Development

Morrisville's proposal to continue to maintain the scenic overlook, the 86 acres of land available for public access, and the angling access site at the Green River Development would ensure continued public access to existing project recreational facilities and lands at the Green River Development. Constructing a new river access site at the intersection of Garfield Road and Green River Dam Road for whitewater boating access downstream of the dam would enhance user experience at the Green River Development by providing designated and safe access to the river for whitewater boating.

Morrisville, AW, and VPC have all identified the Green River as a quality and unique whitewater boating resource in the project area. Whitewater boating has the potential to have a positive economic impact on the local communities. The likelihood of attracting a significant amount of boaters to the Green River each year is largely dependent on the ability to schedule a reasonable number of annual releases and establish adequate notification procedures. Annually-scheduled releases allow boaters to plan trips in advance for preferred whitewater flows and generally encourage greater use of the resource thereby increasing the potential for positive local economic impact.

Morrisville's proposal to provide two scheduled 6-hour releases, up to 283 cfs, between April 1 and October 31 for whitewater boating annually on the Green River would provide two planned opportunities for standard to high-challenge whitewater boating each year that are not provided under existing operations. AW and VPC's recommended 8 to 10 annually scheduled whitewater releases would provide multiple opportunities for standard and high-challenge whitewater boating every year that are not provided under existing conditions.

A review of historic Green River flow data from 1915 to 1932 (excluding 4 incomplete water years from this timespan) indicates that under the historic natural flow regime, an average of about 18 days occurred annually in which flows exceeded the average acceptable minimum whitewater flow (i.e., 128 cfs). In terms of current project operations, the whitewater boating study found that Morrisville released flows exceeding 128 cfs on 15 days for a total of 216 hours in 2011. Morrisville's proposal for two releases would increase the availability of scheduled releases, but it would provide

significantly fewer opportunities than AW and VPC's recommendation. However, AW and VPC's recommendation for 7 to 8 scheduled releases could potentially conflict with other recreational uses. The Green River is also used by anglers for its unique trout fishery (discussed above in section 3.3.1, *Aquatic Resources*) and due to the narrow width of the river, whitewater boating flows (i.e., between 128 cfs and 283 cfs) would likely limit angler access and the ability to effectively fish the Green River when these flows are being released. Numerous whitewater boating releases that would generally be targeting weekends could substantially reduce the number of weekends when the Green River could be fished during the late spring, summer, and early fall period.

Morrisville's proposal and AW and VPC's recommendation that Morrisville provide advance notification of scheduled releases would ensure that the regional and local boating communities are directly notified of these events. As indicated in the whitewater boating study and noted above, local boaters account for the majority of Green River boaters (about 30 to 40 individuals). Additionally, the study estimated that if Morrisville were to provide advance notice of scheduled annual releases, the Green River could attract anywhere from 80 to 150 whitewater boaters annually. Providing advance notice to VPC would allow local boaters to plan for scheduled flows, while advance notice to AW would encourage increased use of the Green River from regional boaters by providing them with adequate time to plan trips.

Morrisville's proposal to post short-term public notification on www.mwlv.com when releases above 160 cfs are expected would improve awareness of frequently available standard run flows. AW and VPC's recommendation that Morrisville provide short-term notification when flows above 128 cfs are expected (including flow and duration estimates) would alert boaters each time the Green River would be at and above the average acceptable minimum whitewater flow and for how long. Although 128 cfs was calculated as the average acceptable minimum flow in the whitewater study results, it is important to note that a 140-cfs flow was listed as the lowest desired flow.⁴²

Both Morrisville's proposal and AW and VPC's recommendation would provide planned whitewater boating events at the Green River that have not historically been available at the project. However, scheduling five annual 6-hour whitewater boating releases, between 140 cfs and 283 cfs, distributed over three seasons (Spring, Summer, and Fall) would substantially improve whitewater boating opportunities more than just two scheduled days per year, as proposed by Morrisville, and be less likely to significantly reduce the number of angler days per year and impact angler use at the Green River than the 7 to 8 scheduled days proposed by AW and VPC. Providing

⁴² 140 cfs was the lowest desired flow across three categories in the Comparative Flow Evaluation forms, including: (1) preferred flow for the run; (2) optimal flow for a standard run; and (3) flow level if Morrisville only released one flow.

advance notification of scheduled whitewater releases to both AW and VPC, and any other interested party, would ensure that regional and local boaters have adequate notice to plan trips and participate in scheduled releases. Adequate notice to both user groups could also potentially increase boating use at the Green River and generate an economic benefit in the project vicinity. Providing short-term notification on the internet when releases above 140 cfs are expected (including flow and duration estimates) would allow local boaters to capitalize on frequently available preferred flows for both minimum and standard runs during normal project operations but outside of scheduled events. Developing a plan to provide five scheduled annual releases and establish suitable notification procedures in consultation with AW, VPC, and any other interested parties would ensure that adequate whitewater boating opportunities are available on the Green River throughout the term of any license.

MDTU's recommendation to gradually ramp-up the scheduled annual whitewater releases would protect anglers along the Green River, especially anglers who may not be aware of the scheduled higher flows and who would be caught by surprise by rapidly rising waters. Ramping rates would give anglers ample time to move out of the deeper parts of the river before the full recreation release reached them.

Ramping rates are sometimes recommended to reduce the risk of fish or aquatic invertebrates getting stranded as flows are reduced from high levels. There is no evidence that stranding of aquatic organisms is a problem at the Green River Development. In this case, MDTU's recommendation is for ramping rates as flows increase which is unlikely to have any effect on aquatic resources.

Lake Elmore Development

Operating the Lake Elmore Development in an instantaneous run-of-river mode, maintaining a water surface elevation of 1,139 feet msl, and removing the development from the project boundary would not likely impact recreation opportunities at Lake Elmore. Historically, Morrisville voluntarily lowers the Lake Elmore impoundment approximately two feet for about one month during the fall each year at the request of the Lake Elmore Resident Association. The seasonal 2-foot drawdown provides an opportunity for private property owners, whose property abuts the project boundary, to perform maintenance on their private docks. While this cooperative agreement might be convenient, it is possible that private property owners might still be able to perform maintenance on their docks without the annual 2-foot drawdown. Additionally, Morrisville could also opt to continue this cooperative agreement if the development was removed from the project.

All project recreational facilities are historically and currently used significantly below capacity, including the angler access area at Lake Elmore currently managed by Morrisville. Low use of project facilities is most likely attributable to other recreation

opportunities available at popular municipal parks and facilities in the immediate project vicinity. Three parks and facilities (the Town of Elmore day-use area, Vermont FWD boat launch, and Lake Elmore State Park) provide access to Lake Elmore. It is reasonable to assume that the Town of Elmore, Vermont FWD, and Vermont FPR will continue to operate these facilities; therefore, it is likely that public access would continue to be available even if the Lake Elmore Development is not a part of the licensed project.

Morrisville and Cadys Falls Developments

Morrisville's proposed recreation measures at the Morrisville and Cadys Falls Developments would ensure continued public access to existing project recreational facilities and lands within the project boundary. Installing parking area and walking trail signage at Clark Park, as proposed by Morrisville, would guide anglers and hikers to project recreation facilities while conducting the proposed fence repairs at Clark Park would safely restrict public access to prohibited areas at the Morrisville Development. Relocating the Cadys Falls Development take-out to the Morrisville Development put-in and installing directional signage along the Morrisville and Cadys Falls Developments' portage routes, as proposed by Morrisville, would improve public access to the Lamoille River upstream and downstream of both developments and allow through-boaters to easily circumvent the dam structures. Installing signage indicating the take-outs, put-ins, and trail routes would discourage boaters from creating their own landings and launches and could improve boater safety along the trails.

3.3.3.3 Unavoidable Adverse Effects

None.

3.3.4 Aesthetics

3.3.4.1 Affected Environment

The project is located in the Lamoille River Valley Region, considered the heart of scenic northern Vermont. The Lamoille River originates about 25 miles northeast of the project at Horse Pond in Vermont's renowned "Northeast Kingdom." The river flows through scenic rural and forested lands, including project waters at the Morrisville and Cadys Falls Developments, before joining Lake Champlain about 47 miles east of the project.

The Lamoille River is not designated as a National Wild and Scenic River. However, several sections of the river upstream and downstream of the project are listed on the National Park Service's National Rivers Inventory (NRI). Immediately downstream of the project, a 13-mile section from Cadys Falls dam to Jeffersonville,

Vermont is recognized on the NRI for its outstanding geologic and cultural resources. A total of seven covered bridges span this recognized corridor that also features a natural bridge, a 300-foot bluff, and Ithiel Falls gorge. Just downstream of the previous reach, a 10-mile section from Jeffersonville to Fairfax, Vermont is also recognized on the NRI for its botanic and scenic values.

The Lamoille River and Morrisville dam are among the dominant features of Morrystown, Vermont. The primary spillway of the Morrisville dam can be viewed from project recreational facilities and A-Street and B-Street, two side roads of Vermont Route 100. Route 100 serves as the state's main south-to-north artery that provides access to many of the region's popular tourist and recreational destinations. An 8-mile section of Route 100 located south of the project is officially designated as one of Vermont's scenic byways, or the "Green Mountain Byway." In the project area, the Lamoille River can be viewed from multiple town roads, municipally-managed public access areas, Route 100, and Route 15. Route 15, which intersects with Route 100 just north of the Morrisville Development, is another a major state route that follows the Lamoille River from east-to-west in the project vicinity.

The Lamoille River is designated by the Vermont DEC as Class B waters in the Vermont Water Quality Standards (Standards). "Good" aesthetic value is a management objective for Class B waters in Vermont, and section 3-04(B) of the Standards establishes that Class B waters shall be of a quality that consistently exhibits "good" aesthetic value with respect to water character, flows, water level, and bed and channel characteristics.

Morrisville conducted separate field-based aesthetic flow assessments at the Morrisville and Cadys Falls Developments on different days during the 2012 study season to assess the potential effects of project operations on aesthetic resources. Assessment teams, consisting of Morrisville representatives and Vermont ANR staff, observed multiple pre-determined target flows (released from each spillway) from multiple pre-determined vantage points and evaluated the adequacy of the demonstration flows in satisfying aesthetic standards for Vermont's Class B waters.

At Morrisville, the assessment team found consensus that:

- (a) Leakage, measured as 5.5 cfs total flow between the primary and secondary bypassed reaches, provided "poor" aesthetic value at all three vantage points;
- (b) A 25-cfs total flow (one-inch spill) released over the primary spillway, provided "good" aesthetic value at one vantage point and "fair" aesthetic value at the other two vantage points;
- (c) A 68-cfs total flow release provided "good to excellent" aesthetic value at one vantage point and "good" aesthetic value at the other two vantage points; and

- (d) A 106-cfs total flow release, provided “excellent” aesthetic value at one vantage point and “good to excellent” aesthetic value at the other two vantage points.

At Cadys Falls, the assessment team found consensus that:

- (a) A 27.5-27.9-cfs flow (one-inch spill) released over the spillway, provided “poor/fair” to “fair” aesthetic value, depending on the vantage point.
- (b) A 76.8-78.4-cfs flow release, provided “fair/good” to “good” aesthetic value, depending on the vantage point; and
- (c) A 131.7-134.8-cfs flow release, provided “good” to “good/excellent” aesthetic value, depending on the vantage point.

3.3.4.2 Environmental Effects

Morrisville proposes to release minimum flows of 12 cfs and 4 cfs into the Morrisville Development’s primary and secondary bypassed reaches, respectively. Morrisville also proposes to release a minimum flow of 12 cfs into the Cadys Falls Development bypassed reach. However, Morrisville does not propose any aesthetic flows for the project.

On December 27, 2013, Vermont ANR filed a motion to intervene and recommended several measures for aesthetics at the Morrisville and Cadys Falls Developments. Vermont ANR recommends that Morrisville release at least one inch of water (approximately 25 cfs) over the Morrisville primary spillway crest for aesthetics. This release would also serve to provide a portion of Vermont ANR’s recommended 70-cfs minimum primary bypassed reach flow at the Morrisville Development. Vermont ANR also recommends that Morrisville release at least one inch of water (approximately 27.7 cfs) over the Cadys Falls dam crest for aesthetics. This release would also serve to provide a portion of Vermont ANR’s recommended 100-cfs minimum bypassed reach flow at the Cadys Falls Development.

Staff Analysis

The results of the aesthetic flow assessments indicate that spilling one inch of water over the Morrisville primary spillway provides a “good” aesthetic value at the vantage point in view of the primary spillway. The assessments also estimated that releasing one inch of water over the Cadys Falls dam crest provides a “poor/fair” to “fair” aesthetic value. As discussed above, the Morrisville dam is a dominant feature of Morristown. While the Morrisville primary spillway can be viewed from project recreational facilities and two roads with immediate access from the heavily-travelled

Vermont Route 100, the Cadys Falls dam is only visible from project waters just below the dam. A densely wooded area upstream and downstream of the dam on river-left obstructs the view of the dam crest from Cadys Falls Road, a town road that parallels the river-left shoreline. Releasing at least one inch of water over the Morrisville primary spillway, as recommended by Vermont ANR, would maintain the visual character of the dam, which is a visible and accessible town feature. Releasing at least one inch of water over the Cadys Falls dam crest, as recommended by Vermont ANR, could somewhat maintain the visual aesthetics of the dam but because this dam is not generally visible to the public, it may not have a significant benefit.

3.3.4.3 Unavoidable Adverse Effects

None.

3.3.5 Cultural Resources

3.3.5.1 Affected Environment

Area of Potential Effect

The Advisory Council on Historic Preservation defines an area of potential effect (APE) as the geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE for the Morrisville Project includes: (a) all lands and facilities enclosed by the project boundary, and (b) lands or properties outside of the project boundary within a one-mile radius where existing project operations or future project-related development could affect cultural resources.

Regional History

Archeological evidence suggests that small groups of travelling Paleo-Indian hunter-gatherers first occupied the project area about 12,000 years ago after the recession of the Laurentide Ice Sheet. Present-day Vermont was dominated by a wide variety of environments throughout the Paleo-Indian period (about 10,000 to 12,000 years ago). In the beginning of this period, the landscape consisted of barren tundra which slowly transformed to park tundra of spruce, fir, and birch which was home to extinct cold-adapted species such as mastodons and woolly mammoths. The Paleo-Indian people were known for their fluted spear point presumably used to hunt caribou and large game species. The lanceolated spear points are characterized by long, groove-like scars on both sides. Although less than 30 archaeological sites have been reported in Vermont, it is known that the rocks used to make Paleo-Indian tools came from the present-day New York, Maine, and Pennsylvania regions. Further evidence indicates that during the late Paleo-Indian period, fluted spear points were replaced by smaller, unfluted points. A

notable late Paleo-Indian period site is located about 40 miles northwest of the project in Franklin County, Vermont, adjacent to Lamoille County.

Different cultural materials and plant and animal remains found by archeologists mark the transition from the Paleo-Indian period to the Archaic period (about 3,000 to 10,000 years ago). The biological environment during the Archaic period has been documented as gradually becoming similar to the landscape occupied by Vermont's first European colonists in the 1600s. Documented Archaic sites are located in areas with familiar landscapes to the project area such as the Champlain Valley along the Walloomsac River in southwestern Vermont. These sites tend to be small campsites with evidence of tools made from local rocks often stylistically similar to tools found in the present-day New York region. An important Archaic period site is located approximately 50 miles northwest of the project in Swanton, Vermont.

Intensified land use expanded throughout the Northeast during the late Archaic period as evidenced by a dramatic increase in archeological sites found in a much wider geographic array. The end of the Archaic period and beginning of the Woodland period (about 1,000 to 3,000 years ago) is marked by several major changes in material culture. The early Woodland period in Vermont is mainly documented by rich cultural materials from cemetery sites. During this time, larger long-term camps may have been established in resource-rich areas of the region, including major rivers, allowing settlements to progressively practice agriculture and develop ceramics. A well-known Woodland period site is located about 40 miles west of the project in Winooski, Vermont.

The arrival of European settlers in the late 1700s, and their rapid geographic expansion, triggered a period of tremendous social turmoil and territorial change across the region. Europeans introduced foreign diseases that triggered an overall population decline for Native Americans, and Native American camps gradually retreated upland to avoid Europeans. In Vermont, colonial expansion and settlement was initiated by Samuel de Champlain's arrival in 1609. In the 17th and 18th centuries, colonial political structures controlled the flow of material goods between England and the colonies of the New World. The modern history of Vermont is attributed to advancements in industry and transportation beginning in the 18th century. Ferries and canals served as the region's preferred mode of transportation until the advent of railways in the 19th century.

The Village of Morrisville was chartered in 1781 as a 6-mile square tract of 23,040 acres. Morrisville's first settler, Jacob Walker, built a house at the town's geographic midpoint known as Morrystown Center around 1790. Early settlers to Morrisville interacted with the St. Francis Indians who inhabited lands along the Lamoille River near Cadys Falls. Accounts from late 18th century settlers indicate that the St. Francis Indians fished at the falls and used nearby lands as meeting grounds. Scouts for George Washington's army reportedly met with Indian representatives here and were rewarded for their services with a pension by directive of Washington.

Morristown Corners, located north of Cadys Falls on the Lamoille River, served as the town's main business center in the early 19th century. However, when LaPorte Road was routed to Morrisville from Stowe in the 1830s, commerce was diverted from Morristown Corners to the Village of Morrisville. The well-travelled LaPorte Road triggered the development of taverns and other businesses in Morrisville by the 1850s and into the 20th century. In 1931, portions of LaPorte Road were procured by the Vermont Highway Commission and converted into the present-day Vermont Route 100. Morrisville continued at a moderate growth rate until the 1930s when Route 100 was first paved.

Due to their historical presence and use, Commission staff contacted three Indian tribes (The Saint Regis Mohawk Tribe, Penobscot Indian Nation, and Stockbridge-Munsee of the Mohican Nation) to determine their interest in the proposed project by letters issued March 11, 2010. No responses were filed. These tribes are federally-recognized in New York, Maine, and Wisconsin, respectively. There are no federally-recognized tribes in Vermont.

Archeological Resources

Morrisville retained the University of Vermont's Consulting Archaeology Program (UVM) to conduct an archaeological resources assessment to identify all areas within the project APE with the potential to contain pre-contact Native American and Euro-American historic archeological sites, and inform the need for archaeological surveys. The assessment consisted of a desktop review of available Vermont SHPO reference materials and resources. Resources included National Register of Historic Places (National Register) files, a Historic Sites and Structures Survey, and United States Geological Survey (USGS) master archeological maps that accompany the state of Vermont's Archeological Inventory, relevant town histories and 19th century maps, Morrisville's internal historic archives, and the Vermont SHPO's paper-based and computer-based predictive models. To supplement the desktop review, a field inspection was conducted of accessible project features on March 22, 2013. The completed assessment was filed separately on April 23, 2013, and on April 25, 2013, with Morrisville's final license application.

Although there are no archaeological sites listed on the National Register in the project vicinity, the Vermont SHPO's Guidelines for Conducting Archaeology in Vermont indicates that the project area is archaeologically sensitive by virtue of its proximity to water, terraced landforms, and generally level topography. The archaeological resources assessment indicated that significant portions of the margins of three of the four developments (Green River, Lake Elmore, and Cadys Falls) are archaeologically sensitive, particularly margins at the three developments' impoundments. UVM recommended that a Phase I Site Identification Survey of archaeologically sensitive shoreline portions at each impoundment area be conducted, in

consultation with the Vermont SHPO, to assess erosion and potential effects of the project on potentially significant archaeological resources.

Historic Properties

Morrisville also retained UVM to conduct a historic resources assessment to identify historic resources in or eligible for listing in the National Register within the project APE and evaluate potential impacts of the project on identified historic resources. The assessment consisted of a desktop review of historic photograph and postcard collections, historic maps, National Register files, the Vermont SHPO's Historic Sites and Structures Surveys, and Morrisville's internal historic archives. To supplement the desktop review, a field inspection was conducted of project facilities on March 22, 2013. The completed assessment was filed separately on April 23, 2013, and on April 25, 2013, with Morrisville's final license application. A revised version of the assessment was filed by the Vermont SHPO on August 28, 2014.

Green River Development

Historically, about five lumber mills operated along the Green River until the early 1900s. Swift Mill, the largest of the lumber mills, was located in Garfield, Vermont and last operated by the Morrisville Lumber and Power Company. Around 1912, Swift Mill was demolished in a fire and Morrisville Lumber and Power Company sold their land and power rights to the Curtis Brothers of New Jersey (Curtis Brothers) in 1915. The Curtis Brothers also acquired the Farnham Mill which included 175 acres of land and the deep gorge downstream of the mill, now the site of the existing Green River dam. The Curtis Brothers then purchased the land between the existing Green River dam and Garfield in addition to the penstock and diversion rights along the Green River below Garfield. Various other land acquisitions were made before the entire Green River Development lands were sold to Peoples Hydro Electric Vermont Corporation (Peoples Hydro) in 1928. Peoples Hydro later became, in part, Green Mountain Power Corporation from which the Village of Morrisville purchased the subject lands and C.T. Morrill Estate in 1945. The existing Green River dam was constructed in 1946 and 1947 as a water storage facility and did not become an electric generating facility until the powerhouse was constructed in the 1980s. According to the revised historic resources assessment, although the generating facility is not considered historically significant because it was built within the last 50 years, the concrete arch dam is considered a significant historic resource and eligible for inclusion on the National Register under Criterion C.

Lake Elmore Development

It is estimated that up to 20 lumber mills historically operated in the vicinity of the existing Lake Elmore Development. By 1920, only two mills, owned by Stowe Lumber Company and Beck and Stafford, operated along the lake and adjoining streams. In

1922, the Village of Morrisville purchased the rights to Lake Elmore from Beck and Stafford and installed a 4-foot-high dam, raising the water level two feet above its historic level. In 1943 the original dam was replaced and other facilities were added.

The Lake Elmore Development was also originally constructed as a water storage facility. According to the historic resources assessment, the facilities associated with the Lake Elmore Development are not considered significant historic resources and therefore are not likely eligible for inclusion on the National Register. Several historic camps located along the shoreline of Lake Elmore, ranging in age from the 1850s to 1930s, are listed on state of Vermont's Historic Sites and Structures Survey. Many of these historic camps are likely to be eligible for listing in the National Register. Additionally, Lake Elmore State Park was listed in the National Register in 2002. The park was established in 1936, is located adjacent to the Lake Elmore Development, and provides public access to the Lake Elmore impoundment.

Morrisville Development

The existing location of the Morrisville Development has been used by industries since 1795, four years after the original settlers arrived in Morristown. In the early 20th century, the site was owned by the Slayton Company who operated a grist mill and private power plant that was connected to the municipal transmission system. In 1920, the Village of Morrisville built a small plant and rehabilitated the Morrisville dam. A powerhouse was later built in 1924, and the development first went online in 1925. The dam and facilities were rehabilitated during the summer of 1928 after experiencing flood damage in 1927.

The Morrisville Historic District, located adjacent to the Morrisville Development, was listed in the National Register in 1983. The site of the historic Safford Grist Mill, located at the eastern end of the Morrisville Development, is a significant contributing resource to the Morrisville Historic District.⁴³ The structures and buildings of the Morrisville Development, located along the western boundary of the Morrisville Historic District, are also considered significant historic resources. Because a dam has been located at or near the Morrisville Development location since at least 1887, the historic

⁴³ On November 4, 2014, Morrisville filed an application to amend its license by proposing to remove the Grist Mill and associated property. The Commission's Office of Energy Projects' Division of Hydropower Administration and Compliance (DHAC) issued an additional information request (AIR) on December 15, 2014, seeking clarity and further details regarding Morrisville's proposal. Therefore, because additional information is needed to evaluate Morrisville's proposal, staff does not evaluate the effects of this proposal in this EA.

resources assessment indicated that the Morrisville Development is likely eligible for listing on the National Register.

Cadys Falls Development

In 1894, the Village of Morrisville acquired the land and water rights at Cadys Falls and constructed the original facilities. The original log dam was replaced with a concrete gravity type dam with an intake structure in 1906, and the powerhouse was rehabilitated in 1900 and 1906. Several more renovation and update efforts were conducted at the Cadys Falls Development between 1914 and 1946. Unlike the Morrisville Development, the Cadys Falls Development only received minor flood damage in 1927.

The Cadys Falls Development was listed in the state of Vermont's Historic Sites and Structures Survey in 1982 for its relatively early, and little changed, representation of electrical power generation. Since being added to Vermont's Historic Sites and Structures Survey in 1982, the development has maintained its integrity of location, design, setting, materials, workmanship, feeling, and association. Therefore, the historic resources assessment indicated that the Cadys Falls Development is also likely to be eligible for listing in the National Register.

3.3.5.2 Environmental Effects

On June 22, 2010, the Commission designated Morrisville, Vermont as a non-federal representative for section 106 consultation responsibilities under the NHPA. Pursuant to section 106, and as the Commission's designated non-federal representative, Morrisville consulted with the Vermont Department of Historic Preservation (Vermont SHPO) and contacted affected Indian tribes to locate, determine National Register eligibility, and assess potential adverse effects to historic properties associated with the project.

Prior to the draft EA, the Vermont SHPO had not filed comments on the two cultural resource studies or the final license application, nor filed determinations of the effects of the project upon historic properties in or eligible for inclusion in the National Register. In comments on the draft EA on July 25, 2014, the Vermont SHPO indicated that the project would have "no effect" at the Green River, Lake Elmore, and Morrisville developments, and "no adverse effect" at the Cadys Falls Development. The Vermont SHPO also indicated that there is currently insufficient evidence to conclude that the project would have "no adverse effect" on significant archaeological resources within the project's APE. Morrisville proposes to develop a Historic Properties Management Plan (HPMP), in consultation with the Vermont SHPO, that provides measures for the protection and management of historic properties within the project's APE. In its license application, Morrisville proposed to file a draft HPMP with the Commission by October

1, 2013; however, a draft HPMP has not yet been filed with the Commission. In comments on the draft EA, the Vermont SHPO supported the development of an HPMP and recommended it be developed as soon as possible. Specifically, the Vermont SHPO recommended an HPMP that includes further archaeological studies within the project's APE, measures to identify and evaluate all historic properties within the project's APE, and mechanisms for management of such properties, including mitigation plans and consultation procedures.

Staff Analysis

Relicensing the project is not likely to have an adverse effect on the identified historic resources because the proposed project would not involve significant changes in operation or new construction. At this time, there is no evidence to suggest that proposed project operations would contribute to shoreline erosion at archeological sensitive areas at the project. Further, the Green River, Morrisville and Cadys Falls Developments would be operated similarly to the existing license; therefore, relicensing the project would not likely have an adverse effect on these historic properties that are eligible or potentially eligible for listing in the National Register. In order to mitigate any potential adverse effects of project operations and any future modification or activities that could potentially affect cultural resources at the project, an HPMP could be developed and implemented, as proposed by Morrisville and recommended by the Vermont SHPO.

An HPMP for the project should describe, at a minimum, procedures for identifying the significance of historic properties that may be affected by project maintenance and operation and/or public access within the APE, how potential effects to historic properties are considered, goals for the preservation of historic properties, guidelines for routine maintenance and operation activities as they relate to historic properties, and protocol for consultation with the Vermont SHPO. An HPMP would provide a mechanism for the protection and management of known historic properties within the project's APE, ensure that appropriate consultation occurs prior to any future activity that may affect the historic features of the project, and address any inadvertent discoveries resulting from other activities involving project operation and maintenance for the term of any new license.

3.3.5.3 Unavoidable Adverse Effects

None.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Morrisville Project's use of the Green River, Elmore Pond Brook, and Lamoille River for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Under

the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,⁴⁴ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e. for operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 8 summarizes the assumptions and economic information we use in our analysis. This information was either provided by Morrisville in the license application or estimated by staff. We find that the values provided by Morrisville are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated or past investment costs owed on the project); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal operation and maintenance cost; and administrative fees.

Table 8. Staff parameters for economic analysis of the Morrisville Hydroelectric Project (Source: Morrisville and Staff).

Parameters	Values	Sources
Period of analysis	30 years	Staff

⁴⁴ See *Mead Corporation, Publishing Paper Division*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel is the largest component of the cost of electricity.

Parameters	Values	Sources
Term of financing	20 years	Staff
Escalation rate	0 percent	Staff
Federal income tax	0 percent	Staff
State and local income tax	0 percent	Staff
Taxes	\$14,991	License Application
Remaining Debt ^a	\$642,308	License Application
Relicensing cost ^b	\$457,938	License Application
Future major capital cost ^c	\$30,529	License Application
Operation and maintenance ^d	\$149,332	License Application
Energy value	\$44/MWh	License Application
Capacity value ^e	\$89.44/KW-year	License Application
Interest rate ^f	6.47 percent	License Application
Discount Rate ^g	6.47 percent	Staff

^a Based on past investment costs owed on the project.

^b Based on the administrative, legal/study, and other expenses to date in 2014 dollars.

^c Based on the capital cost of Morrisville proposed recreational enhancements.

^d Annual operation and maintenance assumes the annual cost of insurance, administration cost, overhead expenses, and existing environmental measures.

^e Staff utilized a capacity based on an annual payment of \$92,220 to Morrisville for self-supply and season capacity. The value would be \$89.44/kilowatt-year, with an equivalent dependable capacity of 1.03 MW as stated in the license application.

^f Based on the weighted average of Morrisville's cost of capital to fulfill any proposed license measures and additional environmental protection, enhancement and mitigation measures included in a license for the project as part of this proceeding.

^g Staff used a discount rate equal to the cost of capital (see footnote f above).

4.2 COMPARISON OF ALTERNATIVES

Table 9 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no-action, the applicant's proposal, and the staff alternative.

Table 9. Summary of the annual cost of alternative power and annual project cost for the three alternatives for the Morrisville Hydroelectric Project (Source: Staff).

	No Action	Morrisville's Proposal	Staff Alternative
Installed capacity (MW)	4.99	4.99	4.99
Annual generation (MWh)	13,000 ^a	11,640	9,777
Annual power value ^b (\$ and \$/MWh)	\$664,200 51.09	\$594,700 51.09	\$499,500 51.09
Annual project cost (\$ and \$/MWh)	\$248,300 19.10	\$333,100 28.62	\$276,100 28.26
Difference between the cost of alternative power and project cost (\$ and \$/MWh)	\$415,900 31.99	\$261,600 22.47	\$223,400 22.85

^a The Annual generation is based on Morrisville's estimated current annual generation in which accounts for any lost generation associated with existing minimum flow requirements and leakage.

^b The power value includes the energy rate of \$44/MWh and the dependable capacity rate of \$89.44/kilowatt-year.

4.2.1 No-Action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project would have an installed capacity of 4.99 MW, and generate an average of 13,000 MWh of electricity annually. The average annual cost of alternative power would be \$664,200, or about \$51.09/MWh. The average annual project cost would be \$248,300, or about \$19.10/MWh. Overall, the project would produce power at a cost which is \$415,900, or \$31.99/MWh, less than the cost of alternative power.

4.2.2 Proposed Action

Morrisville proposes to: (1) continue to operate the Green River Development in store-and-release mode with a 5.5 cfs minimum flow release to the bypassed reach of the Green River; (2) increase the limit on releases from the Green River Development during the May 1 to October 31 period (i.e., the normal maximum elevation) from 160 cfs to 283; (3) continue to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam (1,219.75 feet msl) during common loon nesting season (approximately May 1 to August 1); (4) continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode; (5) Release a 28-cfs minimum flows into the Morrisville primary bypassed reach; (6) release a 8.5-cfs minimum flow into the Morrisville secondary bypassed reach; (7) release a 54-cfs minimum flow into the Cadys Falls bypassed reach; (8) continue to release a 135-cfs minimum flow downstream of the confluence of the Morrisville Development tailrace and bypassed reach; and (9) continue to release a 150-cfs minimum flow downstream of the confluence of the Cadys Falls Development tailrace and bypassed reach.

In addition to the above proposed project operation, Morrisville proposes to: (1) develop a plan to monitor dissolved oxygen (DO) in the Green River development tailrace, and implement measures, if necessary, to prevent DO levels that may be harmful to aquatic resources; (2) remove the Lake Elmore Development from the project and permanently set the spillway opening at elevation 1,139 feet msl; (3) remove a 0.4-acre parcel of land from the project boundary at the Morrisville Development; (4) provide two 6-hour-long releases of up to 283 cfs for whitewater boating between April 1 and October 31 each year downstream of the Green River Development; (5) provide advance notification to American Whitewater (AW) of the two 6-hour-long scheduled releases and provide short-term public notification (via the internet) when releases at the Green River Development are expected to exceed 160 cfs; (6) develop a river access site at the Green River Development near Garfield Road that includes an access road and day-use parking area, river access trail, and safety signage for whitewater boating; (7) enhance recreation facilities at the Morrisville Development by installing signage for the parking area downstream of the Morrisville dam, installing trailhead and route signage for the Clark Park walking trail, and repairing fencing at Clark Park; (8) relocate the Cadys Falls portage take-out to the location of the Morrisville portage put-in and Cadys Falls boat launch, and install directional signage along the Morrisville and Cadys Falls portage routes (including both put-ins and take-outs); and (9) develop and implement a Historic Properties Management Plan (HPMP).

The project would have a total capacity of 4.99 MW and an average annual generation of 11,640 MWh. As proposed by Morrisville, the average annual cost of alternative power would be \$594,700, or about \$51.09/MWh. The average annual project cost would be \$333,100, or about \$28.62/MWh. Overall, the project would produce power at a cost which is \$261,600, or \$22.47/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

Table 10 shows the staff recommended additions and modifications to Morrisville's proposed environmental protection and enhancement measures and the estimated cost of each. Based on a total installed capacity of 4.99 MW and an average annual generation of 9,777 MWh, the cost of alternative power would be \$499,500, or about \$51.09/MWh. The average annual project cost would be \$276,100, or about \$28.24/MWh. Overall, the project would produce power at a cost which is \$223,400, or \$22.85/MWh, less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 10 gives the cost of each of the environmental enhancement measures considered in our analysis for each development. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 10. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Morrisville Hydroelectric Project (Source: Morrisville and Staff).

Measures	Entity	Capital cost	Annual cost ^a	Levelized annual cost ^b
Aquatic Resources				
Continue to operate the Green river Development in store-and-release mode	Morrisville, Staff	\$0	\$0	\$0
Operate the Green River Development in run-of-river mode and maintain the reservoir elevation between 1,219.75 and 1,220 feet msl	Vermont ANR, Interior	\$0	\$22,000 ^c	\$22,000
Continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode	Morrisville, Staff, Vermont ANR, Interior	\$0	\$0	\$0

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Operate the Lake Elmore Development in run-of-river mode and maintain the Lake Elmore impoundment water surface elevation at 1,139 feet msl	Vermont ANR, Interior	\$0	\$0 ^d	\$0
Limit downstream releases from the Green River Development to 283 cfs from May 1 through October 31 (instead of existing 160 cfs limit) when the impoundment water surface elevation level is below the normal maximum level of 1,220 feet msl	Morrisville, Staff	\$0	\$0	\$0
Continue to release a year-round 5.5-cfs minimum flow in the Green river bypassed reach	Morrisville, Staff	\$0	\$0	\$0
Continue to release a year-round 135-cfs minimum flow, or inflow if less, downstream of the confluences of the tailrace and bypassed reaches of the Morrisville Development.	Morrisville	\$0	\$0	\$0
Continue to release a year-round 150-cfs minimum flow, or inflow if less, downstream of the confluence of the tailrace and bypassed reach of the Cadys Falls Development.	Morrisville	\$0	\$0	\$0

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Release a year-round 28-cfs minimum flow in the Morrisville primary bypassed reach	Morrisville	\$0	\$14,890 ^e	\$14,890
Release a year-round 70-cfs minimum flow in the Morrisville primary bypassed reach	Vermont ANR, Interior, Staff	\$0	\$53,960 ^f	\$53,960
Release a year-round 8.5-cfs minimum flow in the Morrisville secondary bypassed reach	Morrisville	\$0	\$6,980 ^g	\$6,980
Release a year-round 12-cfs minimum flow of 12 cfs in the Morrisville secondary bypassed reach	Vermont ANR, Interior, Staff	\$0	\$10,230 ^h	\$10,230
Release a year-round 54-cfs minimum flow in the Cadys Falls bypassed reach	Morrisville	\$0	\$37,390 ⁱ	\$37,390
Release a year-round 100-cfs minimum flow in the Cadys Falls bypassed reach	Vermont ANR, Staff	\$0	\$72,850 ^j	\$72,850
Release a year-round 98-cfs minimum flow into the Cadys Falls bypassed reach	Interior, Staff	\$0	\$71,310 ^k	\$71,310
Develop and Implement an Operation Compliance Monitoring Plan	VANR, Staff, Interior	\$4,000	\$0	\$310

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Develop and implement a plan for mitigating and monitoring DO in the Green River Development tailrace	Vermont ANR, Interior, staff, Morrisville	\$204,000 ¹	\$4,000	\$19,570
Terrestrial Resources				
Continue to maintain the Green River Reservoir 3 inches below the spillway crest during loon nesting season	Morrisville, Staff	\$0	\$0	\$0
Recreation , Land Use, and Aesthetic Resources				
Remove the Lake Elmore Development from the project and permanently set the spillway elevation at 1,139 feet msl	Morrisville	\$0	(\$1,000) ^m	(\$1,000)
Remove a 0.4-acre parcel of land from the project boundary at the Morrisville Development	Morrisville, Staff	\$0	\$0	\$0
Annually provide two scheduled gradually ramped-up 6-hour releases, up to 283 cfs, between April 1 and October 31 for whitewater boating on the Green River	Morrisville	\$0	\$530 ⁿ	\$530
Annually provide between 7-8 scheduled flow releases of at least 140 cfs for whitewater boating on the	AW and VPC	\$0	\$2,160 ^o	\$2,160

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Green River				
Provide advance notification to AW of scheduled whitewater boating releases at the Green River Development	Morrisville, Staff, AW, VPC	\$0	\$0	\$0
Provide short-term notification of anticipated flow releases above 160 cfs at the Green River Development on Morrisville's website	Morrisville	\$0	\$0	\$0
Provide short-term notification of anticipated flow releases above 128 cfs at the Green River Development on Morrisville's website	AW and VPC	\$0	\$0	\$0
Develop and implement a Whitewater Operation Plan for the Green River Development that includes procedures for providing: (1) five annually scheduled 6-hour releases, between 140 cfs and 283 cfs, for whitewater boating on the Green River, (2) advance notification to AW and VPC of the five annual scheduled releases, and (3) short-term public notification at www.mwlv.com for expected releases above 140 cfs	Staff	\$8,000	\$1,320 ^{op}	\$1,930

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
Develop a river access site at Garfield Road with signage for whitewater boating below the dam at the Green River Development	Morrisville, Staff	\$17,300	\$1,780	\$3,100
Designate and install signage for the parking area downstream of the Morrisville dam, install trailhead and route signage for the Clark Park walking trail, and repair fencing at Clark Park at the Morrisville Development	Morrisville, Staff	\$7,123	\$810	\$1,358
Relocate the Cadys Falls portage take-out to the same location as the Morrisville portage put-in and Cadys Falls boat launch, and install directional signage along the Morrisville and Cadys Falls portage routes (including both put-ins and take-outs)	Morrisville, Staff	\$6,106	\$1,270	\$1,740
Develop a Recreation Plan that includes: (1) procedures for constructing, enhancing, operating, and maintaining new and existing project facilities within the project boundary; (2) provisions to limit erosion and sedimentation during construction and enhancement activities; and (3) plans for installing signage at all project	Staff	\$4,000	\$0	\$310

Measures	Entity	Capital cost	Annual cost^a	Levelized annual cost^b
facilities				
Maintain at least 1-inch of spill over the Morrisville primary spillway at all times for aesthetics	Vermont ANR, Staff	\$0	\$12,560 ^q	\$12,560
Maintain at least 1-inch of spill over the Cadys Falls spillway at all times for aesthetics	Vermont ANR	\$0	\$16,960 ^r	\$16,960
Cultural Resources				
Develop and implement an HPMP	Morrisville, Staff	\$10,000	\$0	\$760

^a Annual costs typically include operational and maintenance costs and any other costs which occur on a yearly basis.

^b All capital and annual costs are converted to equal annual costs over a 30-year period to give a uniform basis for comparing all costs.

^c Based on Morrisville's estimated average annual energy loss (500 MWh) to operate the Green River Development in run-of-river mode.

^d Based on Morrisville's estimated average annual energy loss (~0 MWh) to operate the Lake Elmore Development in run-of-river mode.

^e Based on staff's estimated average annual energy loss (338 MWh) associated with releasing 16 cfs in addition to the existing 12-cfs year-round minimum flow in the Morrisville primary bypassed reach.

^f Based on staff's estimated average annual energy loss (1,226 MWh) associated with releasing 58 cfs in addition to the existing 12-cfs year-round minimum flow in the Morrisville primary bypassed reach.

^g Based on staff's estimated average annual energy loss (159 MWh) associated with releasing 7.5 cfs in addition to the existing 1 cfs of leakage in the Morrisville secondary bypassed reach.

^h Based on staff's estimated average annual energy loss (233 MWh) associated with releasing 11 cfs in addition to the to the existing 1 cfs of leakage in the Morrisville secondary bypassed reach.

ⁱ Based on staff's estimated average annual energy loss (850 MWh) associated with releasing 48.5cfs in addition to the existing 5.5 cfs of leakage in the Cadys Falls bypassed reach.

^j Based on staff's estimated average annual energy loss (1,621MWh) associated with releasing 94.5 cfs in addition to the existing 5.5 cfs of leakage in the Cadys Falls bypassed reach.

^k Based on staff's estimated average annual energy loss (1,717 MWh) associated with releasing 92.5 cfs in addition to the existing 5.5 cfs of leakage in the Cadys Falls bypassed reach.

^l Based on staff's estimated capital cost to develop a monitoring plan and install mitigation equipment, such as turbine aerators.

^m Based on Morrisville's estimated savings in operational and maintenance costs from removing the Lake Elmore Development from the project.

ⁿ Based on staff's estimated average annual energy loss (12 MWh) associated with providing two scheduled 6-hour releases from Green River Development. Average annual energy loss was estimated as increased spill that would occur at the Cadys Falls and Morrisville Developments based on average monthly flows in the Lamoille River and releasing the average preferred whitewater boating flow of 218 cfs from the Green River Development.

^o Based on staff's estimated average annual energy loss (49 MWh) associated with providing 8-10 scheduled 6-hour releases from Green River Development.

^p Based on staff's estimated average annual energy loss (30 MWh) associated with providing 5 scheduled 6-hour releases from Green River Development.

^q This cost would be included in the \$53,960 cost of staff's recommendation to release a year-round minimum flow of 70 cfs in the Morrisville primary bypassed reach.

^r This cost would be included in the \$72,850 cost of staff's recommendation to release a year-round minimum flow of 100 cfs in the Cadys Falls bypassed reach.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Section 4(e) and 10(a) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The section contains the basis for, and a summary of, our recommendations for relicensing the Morrisville Hydroelectric Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and economic effects of the project and its alternatives, we selected the proposed project with staff-recommended modifications as the preferred alternative. We recommend this alternative because: (1) issuing a new license for the project would allow Morrisville to continue to operate the project and provide a beneficial and dependable source of electric energy; (2) the 4.99 MW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance fishery resources and would improve public recreation opportunities at the project.

In the following section, we make recommendations as to which environmental measures proposed by Morrisville or recommended by agencies or other entities should be included in any new license issued for the project. In addition to Morrisville's proposed environmental measures, we discuss additional staff-recommended environmental measures to be included in any new license issued for the project in the following section. These measures are presented as draft license articles in Appendix A.

5.1.1 Measures Proposed by Morrisville

Based on our environmental analysis of Morrisville's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by Morrisville would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project.

- Continue to operate the Green River Development in store-and-release mode;
- Continue to release a 5.5-cfs minimum flow to the bypassed reach of the Green River Development;
- Develop a plan to monitor DO in the Green River development tailrace, and implement measures, if necessary, to prevent DO levels that may be harmful to aquatic resources;
- Continue to operate the Morrisville and Cadys Falls Developments in run-of-river mode;
- Remove a 0.4-acre parcel of land from the project boundary at the Morrisville Development;
- Continue to attempt to maintain the Green River Reservoir 3 inches below the crest of the dam (i.e., 1,219.75 feet msl) during common loon nesting season (approximately May 1 to August 1);
- Develop a river access site at the Green River Development near Garfield Road that includes an access road and day-use parking area, river access trail, and safety signage for whitewater boating;
- Enhance recreation facilities at the Morrisville Development by installing signage for the parking area downstream of the Morrisville dam, installing trailhead and route signage for the Clark Park walking trail, and repairing fencing at Clark Park;
- Relocate the Cadys Falls portage take-out to the location of the Morrisville portage put-in and Cadys Falls boat launch, and install directional signage along the Morrisville and Cadys Falls portage routes (including both put-ins and take-outs); and
- Develop and implement an HPMP.

In its license application, Morrisville proposed to remove the Lake Elmore Development from the project. The environmental effects of removal of the Lake Elmore Development from the project are analyzed in section 3 of this final EA. A decision on the proposal to remove the Lake Elmore Development from the project will be addressed in any order issued for this proceeding.

5.1.2 Additional Measures Recommended by Staff

Minimum Flow in Morrisville Bypassed Reach

Morrisville proposes to increase the minimum flow from 12 cfs to 28 cfs in the primary bypassed reach and to increase the minimum flow in the secondary bypassed reach from leakage (estimated to be 1 cfs) to 8.5 cfs. Interior's 10(j) recommendation 2 and Vermont ANR's recommendation would require Morrisville to release minimum flows of 70 cfs and 12 cfs into the primary and secondary bypassed reaches, respectively.

To understand the relationship between flow and aquatic habitat, Morrisville conducted a flow demonstration study of the primary and secondary bypassed reaches. In the primary bypassed reach, Morrisville's flow study showed that for all observed flows, the amount of suitable habitat increased with flow except for brown and brook trout juveniles. Habitat for brown and brook trout juveniles peaked at 59 cfs and was relatively stable over the range of flows. At flows of 59 cfs and 91 cfs, the amount of habitat judged to be suitable increased to about 60-80 percent and 75 to 90 percent of the available habitat, respectively.

In the secondary bypassed reach, two sections were evaluated. In the upper section, the amount and suitability of habitat increased with flow at all observed flows. Less than 5 percent of the habitat was judged to be suitable at the existing leakage flow of 1 cfs. At 4.1, 8.5, and 15.3 cfs, the amount of habitat that was suitable for adult trout of all 3 species (i.e., brook, brown, and rainbow) was about 5, 10, and 30 percent, respectively. For juveniles of all 3 trout species, about 30-40 percent of all available habitat was suitable at 4.1 and 8.5 cfs and increased to about 60 percent of all available habitat at 15.3 cfs. The agency-recommended flow of 12 cfs would result in about 50 percent of the available habitat being suitable for juvenile trout and about 20 percent of the available habitat being suitable for adult trout. In the lower section, the amount of habitat for all life stages of trout peaked at 4.1 cfs (70-75 percent of available habitat would be suitable) before declining at the two highest flows observed, because the steep gradient and narrow channel of the lower section made velocities too high for most species and life stages.

The existing flows of 12 cfs in the primary bypassed reach and 1 cfs leakage in the secondary bypassed reach (13 cfs total) is about 11 percent of the summer ABF. The sum of the proposed minimum flows (28 cfs plus 8.5 cfs = 36.5 cfs) is about 30 percent of the summer ABF. The sum of the agency recommended minimum flows (70 cfs plus 12 cfs = 82 cfs), is about 68 percent of the summer ABF. The sum of the highest flows observed (91 cfs plus 15.3 cfs = 106 cfs) is about 88 percent of the summer ABF.

The agency-recommended minimum flows of 70 and 12 cfs in the primary and secondary bypassed reaches, respectively, would provide substantially more aquatic

habitat than the existing or proposed minimum flows and we conclude that they would be worth the estimated annual cost of \$53,960. We recommend including these minimum flows in any license issued for the project.

Aesthetic Flow at Morrisville Dam

Morrisville does not propose a minimum aesthetic flow for the Morrisville bypassed reaches; however, Vermont ANR recommends that Morrisville release at least one inch of water (approximately 25 cfs) over the Morrisville Development primary spillway crest for aesthetics. This release would also serve to provide a portion of Vermont ANR's recommended 70-cfs bypassed reach minimum flow at the Morrisville Development. Morrisville conducted an aesthetic flow study that indicates that releasing about one inch of water over the Morrisville primary spillway provides a "good" aesthetic value at the B-Street vantage point of the Morrisville primary spillway. Morrisville dam is a predominate feature in Morristown and the Morrisville primary spillway can be viewed from several project recreational facilities and two roads with immediate access from the heavily-travelled Vermont Route 100. Releasing at least one inch of water over the Morrisville primary spillway would maintain the visual character of the dam while the total minimum flow released to the primary bypassed reach (spillage plus releases via other means) would maintain the aesthetic value of the channel. Releasing an approximate 25-cfs portion of the recommended 70-cfs primary bypassed reach minimum flow over the Morrisville primary spillway to achieve the one-inch spill would have no additional cost compared to releasing the flow solely for the purpose of enhancing aquatic habitat, and we recommend this measure for any license issued for the project.

Minimum Flow in the Cadys Falls Bypassed Reach

Morrisville proposes to increase the minimum flow in the Cadys Falls bypassed reach from leakage (estimated to be 5.5 cfs) to 54 cfs year-round. Vermont ANR recommends a minimum bypassed reach flow of 100 cfs, or inflow, whichever is less. Interior's 10(j) recommendation 2 would require Morrisville to release a minimum flow to the bypassed reach of 98 cfs, or inflow, whichever is less.

To understand the relationship between flow and aquatic habitat, Morrisville conducted a PHABSIM study of the Cadys Falls bypassed reach. Flows assessed included 48, 67, 98, 139, and 163 cfs. The existing leakage flow of 5.5 cfs was not in the range of flows studied. Habitat was assessed for juvenile and adult life stages of brook, brown, and rainbow trout, as well as macroinvertebrates.

WUA increased with flow at each flow evaluated, at all transects, for all species and life stages evaluated, with the exception of brook and brown trout juveniles at one of the three transects, which peaked at 98 cfs and declined slightly at flows of 139 and 163

cfs. The percentage of maximum WUA at 48 (similar to Morrisville's proposed minimum flow) and 67 cfs is quite a bit lower than the percentage provide by 98 cfs, and flows higher than 98 cfs (139 cfs and 163 cfs) provide some additional habitat. . Morrisville's proposed minimum flow of 54 cfs would provide about 67 percent of maximum WUA at one of the transects for juvenile brown and brook trout, but substantially less for the other transects, species, and life stages. A flow of 98 cfs (Interior's 10(j) recommendation 2 which is essentially the same as Vermont ANR's recommended flow of 100 cfs) would provide at least 72 percent of the maximum WUA for any life stage or species, at all three transects included in the study, and over 80 percent for most species and life stages.

The existing leakage flow of 5.5 cfs is about 4 percent of the summer ABF. The proposed minimum flow of 54 cfs is about 40 percent of the summer ABF flow. Interior's and Vermont ANR's recommended flows are equal to about 73-74 percent of the summer ABF.

The agency-recommended minimum flows of 98 or 100 cfs in the bypassed reach would provide substantially more aquatic habitat than the existing or proposed minimum flows and we conclude that they would be worth the estimated annual cost of \$71,310. We recommend including a minimum flow of 100 cfs in any license issued for the project.

Operation Compliance Monitoring Plan

Morrisville does not propose any specific project operation compliance monitoring procedures. Vermont ANR recommends a plan for monitoring project flows and reservoir levels. Interior's 10(j) recommendation 4 would require a plan for monitoring and reporting compliance with run-of-river operation at all the developments and bypassed reach minimum flow requirements at the Morrisville and Cadys Falls Developments.

An operation compliance monitoring plan (OCMP), which is required in many Commission licenses, would accomplish the goals of the measures recommended by the agencies. An OCMP would help the agencies and Commission verify that the project is operating in run-of-river mode and complying with required minimum flow releases in the bypassed reaches and impoundment elevation limits. Additionally, the plan should provide a detailed description of the protocols Morrisville would implement during flashboard failures and impoundment refilling. This plan should also include the procedures for: (1) ensuring compliance with the one-inch minimum aesthetic flow over the Morrisville primary spillway, (2) maintaining the Green River Reservoir 3 inches below the crest of the dam during common loon nesting season, and (3) determining when the loon nesting season on the Green River Reservoir begins and ends in consultation with VLRP. A detailed description of the equipment and procedures

necessary to maintain, monitor, and report compliance would prevent possible misunderstandings of project operation and reduce the likelihood of complaints regarding project operation being filed with the Commission. Developing and implementing this plan would be worth the estimated annual cost of \$310.

Recreation Plan

Morrisville's proposed recreation measures would ensure continued public access to existing and new project recreational facilities at the Green River,⁴⁵ Morrisville, and Cadys Falls Developments. Specifically, constructing a new river access site to the Green River off of Garfield Road would improve whitewater boating opportunities and user experience at the Green River Development by providing designated and safe river access. The proposed enhancements to existing facilities at the Morrisville and Cadys Falls Developments would improve existing recreation opportunities at the two developments. Installing parking area and walking trail signage at Clark Park would guide anglers and hikers to project recreation facilities, and repairing the fence at Clark Park would safely restrict public access to prohibited areas at the Morrisville Development. Relocating the Cadys Falls Development take-out to the Morrisville Development put-in and installing directional signage along the Morrisville and Cadys Falls Developments' portage routes would improve public access to the Lamoille River upstream and downstream of both developments and allow through-boaters to easily circumvent the dam structures. Installing signage indicating the take-outs, put-ins, and trail routes would discourage boaters from creating new landings and launches and could improve boater safety along the trails.

While Morrisville's proposed recreation measures would ensure continued public access and improve recreation opportunities at the project, Morrisville's proposals lack detail and do not include any operation and maintenance measures for the existing and new project facilities. Therefore, we recommend that Morrisville develop and implement a recreation plan that includes procedures for construction and enhancement of all new and existing project facilities within the project boundary, provisions to limit erosion and sedimentation during construction and enhancement activities, plans for installing signage at project facilities, and provisions for operating and maintaining all project facilities throughout the term of any license. Developing and implementing a recreation

⁴⁵ Morrisville proposes to continue to maintain the existing 86 acres of land available for public access and angling access site at the Green River Development; however, the proposed project boundary does not include 33 acres of the publically accessible lands or the angling access site, both located in the vicinity of the Green River Dike. To ensure appropriate operation and maintenance of project facilities throughout the term of any new license, the project boundary would need to enclose all project facilities, including these two facilities (see draft article 006).

plan would have an estimated annual cost of \$6,510 and we recommend that this measure be included in any new license issued for the project (see draft article 006).

Whitewater Operation Plan

Morrisville, American Whitewater (AW), and Vermont Paddlers Club (VPC) have all identified the Green River as a quality and unique whitewater boating resource in the project area. Whitewater boating has the potential to have a positive economic impact on the local communities. The likelihood of attracting a significant amount of boaters to the Green River each year is largely dependent on the ability to schedule a reasonable number of annual releases and establish adequate notification procedures. Annually-scheduled releases allow boaters to plan trips in advance for preferred whitewater flows and generally encourage greater use of the resource thereby increasing the potential for positive local economic impact.

Morrisville's proposal to provide two scheduled 6-hour releases, up to 283 cfs, between April 1 and October 31 for whitewater boating annually on the Green River would provide two planned opportunities for standard to high-challenge whitewater boating each year that are not provided under existing operations. AW and VPC's recommended 7 to 8 annually scheduled whitewater releases would provide multiple opportunities for standard and high-challenge whitewater boating every year that are not provided under existing conditions.

A review of historic Green River flow data from 1915 to 1932 (excluding 4 incomplete water years from this timespan) indicates that under the historic natural flow regime, an average of about 18 days occurred annually in which flows exceeded the average acceptable minimum whitewater flow (i.e., 128 cfs). In terms of current project operations, the whitewater boating study found that Morrisville released flows exceeding 128 cfs on 15 days for a total of 216 hours in 2011. Morrisville's proposal for two releases would increase the availability of scheduled releases, but it would provide significantly fewer opportunities than AW and VPC's recommendation. However, AW and VPC's recommendation for 7 to 8 scheduled releases could potentially conflict with other recreational uses. The Green River is also used by anglers for its unique trout fishery and due to the narrow width of the river, whitewater boating flows (i.e., between 128 cfs and 283 cfs) would likely limit angler access and the ability to effectively fish the Green River when these flows are being released. Numerous whitewater boating releases that would generally be targeting weekends could substantially reduce the number of weekends when the Green River could be fished during the late spring, summer, and early fall period.

Morrisville's proposal and AW and VPC's recommendation that Morrisville provide advance notification of scheduled releases would ensure that the regional and local boating communities are directly notified of these events. As indicated in the

whitewater boating study and noted above, local boaters account for the majority of Green River boaters (about 30 to 40 individuals). Additionally, the study estimated that that if Morrisville were to provide advance notice of scheduled annual releases, the Green River could attract anywhere from 80 to 150 whitewater boaters annually. Providing advance notice to VPC would allow local boaters to plan for scheduled flows, while advance notice to AW would encourage increased use of the Green River from regional boaters by providing them with adequate time to plan trips.

Morrisville's proposal to post short-term public notification on www.mwlv.com when releases above 160 cfs are expected would improve awareness of frequently available standard run flows. AW and VPC's recommendation that Morrisville provide short-term notification when flows above 128 cfs are expected (including flow and duration estimates) would alert boaters each time the Green River would be at and above the average acceptable minimum whitewater flow and for how long. Although 128 cfs was calculated as the average acceptable minimum flow in the whitewater study results, it is important to note that a 140-cfs flow was listed as the lowest desired flow.⁴⁶

Both Morrisville's proposal and AW and VPC's recommendation would provide planned whitewater boating events at the Green River that have not historically been available at the project. However, scheduling seven annual 6-hour whitewater boating releases, between 140 cfs and 283 cfs, distributed over three seasons (Spring, Summer, and Fall) would substantially improve whitewater boating opportunities more than just two scheduled days per year, as proposed by Morrisville, and be less likely to significantly reduce the number of angler days per year and impact angler use at the Green River than 8 to 10 scheduled days originally proposed by AW and VPC. Providing advance notification of scheduled whitewater releases to both AW and VPC, and any other interested party, would ensure that regional and local boaters have adequate notice to plan trips and participate in scheduled releases. Adequate notice to both user groups could also potentially increase boating use at the Green River and generate an economic benefit in the project vicinity. Providing short-term notification on the internet when releases above 140 cfs are expected (including flow and duration estimates) would allow local boaters to capitalize on frequently available preferred flows for both minimum and standard runs during normal project operations but outside of scheduled events. Developing a plan to provide seven scheduled annual releases and establish suitable notification procedures in consultation with AW, VPC, and any other interested parties would ensure that adequate whitewater boating opportunities are available on the Green River throughout the term of any license.

⁴⁶ 140 cfs was the lowest desired flow across three categories in the Comparative Flow Evaluation forms, including: (1) preferred flow for the run; (2) optimal flow for a standard run; and (3) flow level if Morrisville only released one flow.

MDTU's recommendation to gradually ramp-up the scheduled annual whitewater releases would protect anglers along the Green River, especially anglers who may not be aware of the scheduled higher flows and who would be caught by surprise by rapidly rising waters. Ramping rates would give anglers ample time to move out of the deeper parts of the river before the full recreational release reached them.

Therefore, we recommend that Morrisville develop, in consultation with AW, VPC, LRRRA, MDTU, Vermont ANR, and Vermont ANR's Department of Forests, Parks, and Recreation, a Whitewater Operation Plan that establishes five annual scheduled 6-hour releases, between 140 cfs and 283 cfs, for whitewater boating on the Green River, including procedures for gradually ramping up flows. The five releases should be scheduled as follows: (1) one 2-day weekend scheduled release in April; (2) one scheduled release during the annual ISO New England mandated summer capability test (required between July 1 and September 15); and (3) one 2-day weekend scheduled release in October. The plan should also describe procedures for providing advance notification to AW, VPC, and any other interested party of the five annual scheduled releases, as well as short-term public notification at www.mwlvvt.com for expected releases above 140 cfs at the Green River Development. Developing and implementing a Whitewater Operation Plan would have an estimated annual cost of \$1,320 and we recommend that this measure be included in any new license issued for the project.

5.1.3 Measures Not Recommended by Staff

Green River Run of River Operation

Morrisville proposes to continue to operate the Green River Development in a peaking mode with a drawdown of 6 to 10 feet from December 1 to April 30, maintain the elevation within 3 inches of the dam crest during the loon nesting season (May 1 to August 1), and maintain the elevation within 1 foot of the dam crest during the summer months (August 2 to November 30). Morrisville would continue to release a minimum flow of 5.5 cfs, or inflow if less, to the Green River year-round. Morrisville also proposes to release two scheduled whitewater releases of 6-hour duration between April 1 and October 31. To provide these whitewater releases, Morrisville proposes to increase the maximum allowable flow between May 1 and October 31 from the current 160 cfs limit to a limit of 283 cfs. Morrisville proposes to schedule one of the whitewater releases to coincide with the annual ISO New England summer capability test (required between July 1 and September 15). During these whitewater releases, flows would range from 126 to 280 cfs and reservoir elevation would be maintained within the same limits as under existing reservoir management procedures. Interior and Vermont ANR recommend instantaneous run-of-river operation and that the reservoir be maintained in the range of 1,219.75 and 1,220.0 feet msl.

Staff analysis shows that there may be some minor benefits to aquatic and terrestrial resources by operating the project in run-of-river mode. Littoral vegetation may expand, which could improve fish survival, condition, and populations of fish that use the littoral vegetation for foraging and cover habitat. In the Green River, run-of-river operation may lead to healthier macroinvertebrate populations and fewer disruptions to fish feeding and spawning behavior than occur under the existing store-and-release mode of operation. Run-of-river operation would provide no benefit to water quality in the Green River because the reservoir would continue to stratify and the development would still occasionally release water that is below state DO standards and could be harmful to aquatic resources.

However, the existing fish communities in the reservoir and the Green River are healthy and self-sustaining when it has been operated as proposed by Morrisville. Continuing to operate the Green River Development in store-and-release mode would maintain the existing healthy fisheries. Any fluctuations that occur would not disrupt spawning or rearing habitat because the fish species in the Green River Reservoir spawn in the late spring or summer.

Loons have had nesting success on the Green River Reservoir under existing operation which are the same as Morrisville's proposal to continue to maintain the Green River Reservoir 3 inches below the crest of the dam during the annual nesting season. Run-of-river operation would also maintain a stable reservoir elevation during loon nesting season, but it would not likely improve the reproductive success of loons on the Green River Reservoir.

Because operating the project in run-of-river mode would cost about \$22,000 annually, and there do not appear to be any significant benefits or need for changes to protect existing resources, we conclude that operating in run-of-river mode is not worth the cost and do not recommend that run of river operation be required in any license issued for the project.

Cadys Falls Aesthetic Flow

Morrisville proposes to release a 12-cfs minimum flow into the Cadys Falls bypassed reach; however, Morrisville does not propose an aesthetic flow. Vermont ANR recommends that Morrisville release at least one inch of water (approximately 27.7 cfs) over the Cadys Falls dam crest for aesthetics as part of their recommended 98-cfs minimum bypassed reach flow at the Cadys Falls Development.

The results of the aesthetic flow assessment indicate that releasing about one inch of water over the Cadys Falls dam crest provides a "poor/fair" to "fair" aesthetic value. The Cadys Falls dam is only visible from project waters immediately downstream of the dam. A densely wooded area upstream and downstream of the dam on river-left

obstructs the view of the dam crest from Cadys Falls Road, a town road that parallels the river-left shoreline. Releasing at least one inch of water over the Cadys Falls dam crest, as recommended by Vermont ANR, could somewhat maintain the visual aesthetics of the dam; however, the dam crest would not typically be viewed by any persons other than the project's maintenance staff. Vermont ANR's recommended 100-cfs Cadys Falls bypassed reach minimum flow would however maintain the aesthetic value of the bypassed reach channel and downstream area that can be viewed from other vantage points along Cadys Falls Road and the development's portage put-in. Because Vermont ANR's recommendation for at least one inch of water to be released over the Cadys Falls dam crest does not appear to provide a significant aesthetic value and spillage at the dam would not typically be viewed by the public, we do not recommend including it in any license issued for the project.

5.1.4 Conclusion

Based on our review of the agency and public comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Morrisville Hydroelectric Project, as proposed by Morrisville with the additional staff-recommended measures, would be best adapted to a plan for improving or developing the Lamoille River.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse impacts would include some entrainment mortality that would persist with the continued operation of the Morrisville Project. However, there is no indication that any losses associated with entrainment have had a significant effect on fishery resources or fish populations within the project area.

5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission finds that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

In response to our REA notice, Interior filed six section 10(j) recommendations for the Morrisville Hydroelectric Project on December 31, 2013. Of the 6

recommendations, all of which we consider to be within the scope of section 10(j), we recommend adopting 4 and do not recommend adopting 2. We discuss the reasons for not including those recommendations in section 5.1, Comprehensive Development and Recommended Alternative. Table 11 indicates the basis for our preliminary determinations concerning measures that we consider inconsistent with section 10(j). Staff notified Interior of its preliminary determination of inconsistency by letter dated June 25, 2014. Interior notified staff that it did not want to schedule a meeting to try to resolve the preliminary determination of inconsistencies with respect to their 10(j) recommendations 1 and 3.⁴⁷

Table 11. Fish and Wildlife Agency Recommendations for the Morrisville Hydroelectric Project. A number in parenthesis denotes that the measure would result in an increase of the project's power value, instead of an annual cost.

Recommendation	Agency	Within the scope of section 10(j)	Annual Cost	Recommend Adopting?
(1) Operate the Morrisville, Cadys Falls, Green River, and Lake Elmore Developments in run-of-river mode	Interior	Yes	\$22,000	Yes, for Lake Elmore, Morrisville, and Cadys Falls. No, for Green River
(2) Release continuous minimum flows of 70 cfs and 12 cfs, respectively, into the Morrisville primary and secondary bypassed reaches; and 98 cfs into the Cadys Falls	Interior	Yes	\$64,190	Yes

⁴⁷ See email from Melissa Grader (Interior) to Steve Kartalia (FERC), filed on September 3, 2014.

Recommendation	Agency	Within the scope of section 10(j)	Annual Cost	Recommend Adopting?
bypassed reach.				
(3) Maintain the Green River Reservoir elevation between 1,219.75 and 1,220 feet msl	Interior	Yes	\$22,000	No
(4) Maintain the Lake Elmore impoundment elevation at 1,139 feet msl, and pass all flows via the dam crest spillway into Elmore Pond Brook	Interior	Yes	\$0	Yes
(5) Prepare, within 6 months of the effective date of the license, a plan for monitoring run-of-river operation and bypassed reach flows.	Interior	Yes	\$310	Yes
(6) Prepare, within 6 months of the effective date of the license, a plan to monitor DO in the Green River tailrace and implement necessary	Interior	Yes	\$19,570	Yes

Recommendation	Agency	Within the scope of section 10(j)	Annual Cost	Recommend Adopting?
measures to meet DO standards				

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA, 16 U.S.C., § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 12 qualifying comprehensive plans that are applicable to the Morrisville Hydroelectric Project, located in Vermont.⁴⁸ No inconsistencies were found.

6.0 FINDING OF NO SIGNIFICANT IMPACT

⁴⁸ (1) Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). Report No. 36. April 2000. (2) National Park Service. The nationwide rivers inventory. Department of the Interior, Washington, D.C. 1993. (3) U.S. Fish and Wildlife Service. No date. Fisheries USA: The recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. (4) Vermont Agency of Environmental Conservation. 1986. Vermont Rivers Study. Waterbury, Vermont. (5) Vermont Agency of Natural Resources. 1988. Hydropower in Vermont: an assessment of environmental problems and opportunities. Waterbury, Vermont. May 1988. (6) Vermont Agency of Natural Resources. 1988. Wetlands component of the 1988 Vermont recreation plan. Waterbury, Vermont. July 1988. (7) Vermont Agency of Natural Resources. 1986. The waterfalls, cascades, and gorges of Vermont. Waterbury, Vermont. May 1986. (8) Vermont Agency of Natural Resources. 2005. Vermont's wildlife action plan. Waterbury, Vermont. November 2005. (9) Vermont Department of Environmental Conservation. 2009. Lamoille River Basin water quality management plan. Waterbury, Vermont. February 2009. (10) Vermont Department of Environmental Conservation. 2009. Water quality management plan for the northern Lake Champlain direct drainages. Waterbury, Vermont. February 2009. (11) Vermont Department of Fish and Wildlife. 1993. The Vermont plan for brook, brown, and rainbow trout. Waterbury, Vermont. September 1993. (12) Vermont Department of Forests, Parks and Recreation. Vermont State Comprehensive Outdoor Recreation Plan (SCORP): 2005-2009. Waterbury, Vermont. July 2005.

If the Morrisville Hydroelectric Project is issued a new license as proposed with the additional staff-recommended measures, the project would continue to operate while providing enhancements to aquatic resources, recreation facilities and opportunities, aesthetics, and protection of cultural and historic resources in the project area.

Based on our independent analysis, we find that the issuance of a new license for the Morrisville Hydroelectric Project, with our recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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8.0 LIST OF PREPARERS

John Baummer – Water Quality (Fisheries Biologist; M.S., Environmental Science; BS. Biology).

Brandon Cherry – Terrestrial Resources (Environmental Policy and Natural Resource Management, M.P.A.).

Samantha Davidson – Recreation & Land Use, Aesthetics, and Cultural Resources (Outdoor Recreation Planner; B.S., Recreation Resources)

Steve Kartalia – Coordinator and Aquatic Resources (Fisheries Biologist; M.S., Fisheries Biology; B.S., Biology)

Michael Watts – Need for Power and Developmental Analysis (Civil Engineer; B.S., Civil Engineering).

APPENDIX A

LICENSE CONDITIONS RECOMMENDED BY STAFF

We anticipate that the Vermont ANR will include conditions requiring run-of-river operation at the Lake Elmore, Morrisville, and Cadys Falls Developments, minimum bypassed reach flows at the Morrisville and Cadys Falls Developments, a minimum flow and water level monitoring and compliance plan that includes all four developments, and a Green River tailrace DO monitoring plan in any 401 water quality certification that they issue. Therefore, because no articles would be necessary for these mandatory conditions in any license that may be issued for the Morrisville Hydroelectric Project, draft 400 series articles for these measures are not provided below.

We recommend including the following license articles for any license issued for the project:

Article 001. *Administrative Annual Charges.* The licensee must pay the United States annual charges, as determined in accordance with the provisions of the Commission's regulations in effect from time to time, to reimburse the United States for the cost of administration of Part 1 of the Federal Power Act. The authorized installed capacity for that purpose is 4.99 megawatts.

Article 002. *Exhibit F Drawings.* Within 45 days of the effective date of this license, the licensee shall file the approved exhibit drawings in aperture card and electronic file formats.

(a) Three sets of the approved exhibit drawings must be reproduced on silver or gelatin 35mm microfilm. All microfilm must be mounted on type D (3-1/4" X 7-3/8") aperture cards. Prior to microfilming, the FERC Project-Drawing Number (i.e., P-2629-1001 through P-2629-1019) must be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number must be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (i.e., F-1, etc.), Drawing Title, and date of this license must be typed on the upper left corner of each aperture card.

Two of the sets of aperture cards must be filed with the Secretary of the Commission, ATTN: OEP/DHAC. The third set must be filed with the Commission's Division of Dam Safety and Inspections (D2SI) New York Regional Office.

(b) The licensee must file two separate sets of exhibit drawings in electronic raster format with the Secretary of the Commission, ATTN: OEP/DHAC. A third set must be filed with the D2SI New York Regional Office. Exhibit F drawings must be identified as Critical Energy Infrastructure Information (CEII) material under 18 C.F.R. § 388.113(c)

(2013). Each drawing must be a separate electronic file, and the file name must include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this license, and file extension in the following format [P-2629-1001, F-1, Description, MM-DD-YYYY.TIF]. Electronic drawings must meet the following format specification:

IMAGERY – black & white raster file
 FILE TYPE – Tagged Image File Format (TIFF), CCITT Group 4
 RESOLUTION – 300 dpi desired (200 dpi min)
 DRAWING SIZE FORMAT – 24” X 36” (min), 28” X 40” (max)
 FILE SIZE – less than 1 MB desired

Article 003. Exhibit G Drawings. Within 90 days of the effective date of the license, the licensee must file, for Commission approval, a report and revised Exhibit G drawings that propose to bring into the project boundary all licensed project facilities, including the existing 33-acre parcel available to the public for hunting and trapping at the Green River Development and the existing angling access site in the vicinity of Green River Dike. The Exhibit G drawings must comply with sections 4.39 and 4.41 of the Commission’s regulations.

Article 004. Operation of the Green River Development. The licensee must operate the Green River Development as follows:

- (a) maintain the water surface elevation of Green River Reservoir between 1,210 feet above mean sea level (msl) and 1,220 feet msl at all times,
- (b) maintain the water surface elevation of Green River Reservoir between 1,219.75 feet msl and 1,220 feet msl from May 1 to August 1,
- (c) maintain the water surface elevation of Green River Reservoir between 1,219.0 feet msl and 1,220 feet msl from August 2 to November 30,
- (d) release a minimum flow of 5.5 cfs, or inflow (whichever is less), from the Green River Development outlet valve house at all times, and
- (e) maintain total releases from the Green River Development at 283 cubic feet per second or less from May 1 to October 31 when the water surface of Green River Reservoir is below elevation 1,220 feet msl.

If operation of the Green River Development deviates from the operation specified in this article, the licensee must notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 005. Reservation of Authority to Prescribe Fishways. Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power

Act.

Article 006. Recreation Plan. Within six months of the effective date of this license, the licensee must file a recreation plan for Commission approval. The plan must include, but not necessarily be limited to, the following: (1) plans for constructing and enhancing new and existing project facilities within the project boundary, including the: (a) Green River Development's new Garfield Road river access site; (b) Morrisville Development's portage route (from take-out to put-in) improvements, parking area designation, Clark Park walking trail improvements and fence repairs; and (c) Cadys Falls Development's portage route (from take-out to put-in) improvements; (2) provisions to limit erosion and sedimentation during construction and enhancement activities; (3) plans for installing signage at all project facilities; and (4) a provision to operate and maintain all the facilities over the term of any new license.

The licensee must prepare the plan after consultation with the Vermont Department of Forest, Parks and Recreation (Vermont FPR). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to Vermont FPR, and specific descriptions of how Vermont FPR's comments are accommodated by the plan. The licensee must allow for a minimum of 30 days for Vermont FPR to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan according to the approved schedule, including any changes required by the Commission.

Article 007. Whitewater Operation Plan. Within six months of the effective date of the license, the licensee must file with the Commission, for approval, a Whitewater Operation Plan that describes procedures for scheduled and anticipated whitewater releases on the Green River at the Green River Development. The plan must establish five annual scheduled 6-hour releases, between 140 cfs and 283 cfs, for whitewater boating on the Green River downstream of the dam. The five planned releases must be scheduled annually, in consultation with American Whitewater (AW) and Vermont Paddlers Club (VPC), as follows: (1) One 2-day weekend scheduled release in April; (2) one scheduled release during the annual ISO New England mandated summer capability test (required between July 1 and September 15); and (3) one 2-day weekend scheduled release in October. The plan must also describe procedures for gradually ramping up whitewater flows, providing advance notification to AW and VPC of the five annual scheduled releases, and providing short-term public notification at www.mwlv.com for releases in excess of 140 cfs at the Green River Development.

The licensee must prepare the plan after consultation with AW, VPC, Lamoille River Anglers Association, MadDog Chapter of Vermont Trout Unlimited, Vermont Agency of Natural Resources (Vermont ANR), and Vermont ANR's Department of Forest, Parks and Recreation (collectively, whitewater parties). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the whitewater parties, and specific descriptions of how the whitewater parties' comments are accommodated by the plan. The licensee must allow for a minimum of 30 days for the whitewater parties to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan according to the approved schedule, including any changes required by the Commission.

Article 008. Historic Properties Management Plan. Within six months of the effective date of this license, the licensee must file with the Commission, for approval, an Historic Properties Management Plan (HPMP) that provides measures for the protection and management of historic properties within the project's area of potential effects (APE). The HPMP must include, but not necessarily be limited to, the following: (1) a process for identifying the nature and significance of historic properties that may be affected by project maintenance and operation and/or public access within the APE; (2) a decision-making process for considering potential effects to historic properties; (3) goals for the preservation of historic properties; (4) guidelines for routine maintenance and operation activities as they relate to historic properties; and (5) procedures for consulting with the Vermont Department of Historic Preservation (Vermont SHPO).

The licensee must prepare the HPMP after consultation with the Vermont SHPO. The licensee must include with the HPMP documentation of consultation, copies of comments and recommendations on the draft and final versions of the HPMP after it has been prepared and provided to Vermont SHPO, and specific descriptions of how the Vermont SHPO's comments are accommodated by the HPMP. The licensee must allow for a minimum of 30 days for Vermont SHPO to comment and to make recommendations before filing the final HPMP with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons based on project-specific information.

The Commission reserves the right to require changes to the HPMP. Implementation of the HPMP must not begin until the licensee is notified by the Commission that the HPMP is approved. Upon Commission approval, the licensee must

implement the HPMP according to the approved schedule, including any changes required by the Commission.

Article 009. Use and Occupancy. (a) In accordance with the provisions of this article, the licensee must have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee must also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee must take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee must require multiple use and occupancy of facilities for access to project lands or waters. The licensee must also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee must: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing

this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee must file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee must consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee must determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed must not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee must take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee must not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project must be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article must not apply to any part of the public lands and reservations of the United States included within the project boundary.

APPENDIX B
STAFF RESPONSES TO COMMENTS ON THE DRAFT ENVIRONMENTAL
ASSESSMENT

The Commission staff issued its draft EA for the relicensing of the Morrisville Project on June 25, 2014. Staff requested comments on the draft EA be filed within 30 days from the issuance date, or by July 25, 2014. The following entities filed comments pertaining to the draft EA.

<u>Commenting entity</u>	<u>Date filed</u>
American Whitewater (AW)	July 10, 2014
Lamoille River Anglers Association (LRAA)	July 16, 2014
MadDog Chapter of Vermont Trout Unlimited (MDTU)	July 23, 2014
Vermont Agency of Natural Resources (Vermont ANR)	July 24, 2014
Village of Morrisville (Morrisville)	July 24, 2014
Eric Nuse	July 24, 2014
Friends of Green River Reservoir (FGRR)	July 24, 2014
Vermont State Historic Preservation Officer (SHPO)	July 25, 2014

Below, we summarize the substantive comments, provide responses to those comments, and explain how we modified the text of the draft EA, as appropriate, to address the comments. Changes addressing editorial comments were made to the final EA, but are not discussed below. The comments are grouped by topic for convenience.

Project Operation

Comment: Morrisville states that additional adverse effects of changing the operation of the Green River Development to run-of-river mode, as recommended by Vermont ANR and Interior, would include loss of downstream flood protection and an increase in spillage at the dam, which Morrisville contends was not designed for frequent or continuous spillage.

Response: Morrisville does not provide additional information for staff to evaluate in this final EA regarding downstream flood protection and the potential risk of increased spillage; however, we note that under either run-of-river or store-and-release operation, the Green River Development would continue to be subject to regular

inspections and oversight by the Commission's Office of Energy Projects' Division of Dam Safety and Inspections.

Comment: Vermont ANR and the LRRRA disagree with the staff recommendation to continue operating the Green River Development in a store-and-release mode. Vermont ANR explains, to support its recommendation for run-of-river operation at the Green River Development, that the existing mode of operation results in Green River base flows that are too low for optimal aquatic habitat, peaking flows that are too high for optimal aquatic habitat, and adverse effects on near-shore habitat in the reservoir due to winter drawdowns. Vermont ANR summarizes the results of the instream flow habitat study and concludes that the staff recommendation is not supported by the results of the flow study.

Response: Our analysis in the draft and final EA indicates that operating the Green River Development in a run-of-river mode would likely improve aquatic habitat in the Green River and near-shore habitat in the reservoir, compared to conditions under the existing store-and-release mode. However, because the existing fisheries in the Green River and reservoir are healthy and self-sustaining and run-of-river operation would eliminate the ability to release recreational whitewater boating flows and result in lost generation, staff conclude that the best comprehensive development for the Green River would be achieved by continuing the existing store-and-release operation and developing and implementing a whitewater operation plan to provide additional recreational opportunities on the Green River.

Comment: The FGRR and Eric Nuse support making the current reservoir draw down restrictions mandatory for the loon nesting season, the summer recreation period, and the winter.

Response: Under the staff-recommended alternative, Morrisville would continue the store-and-release mode of operation at the Green River Development and the drawdown limits would become requirements of the license.

Comment: The FGRR and Eric Nuse state that they support finding a balance between enhancing fish reproduction and survival in the Green River with the need to generate electricity.

Response: The Commission is required, under section 10(a) of the FPA, to attempt to balance environmental resources, such as fisheries resources, with developmental resources (i.e., power generation).

Comment: FGGR and Eric Nuse state that they support the Vermont “ANR position on not allowing any intentional scheduled discharges for the purpose of recreational kayaking on the Garfield to Lamoille River section of the Green River.”

Response: Vermont ANR recommends “instantaneous” run-of-river operation, which would preclude providing whitewater boating releases to the Garfield to Lamoille River section of the Green River, unless the Vermont ANR’s certification condition includes exceptions.

Aquatic Resources

Comment: Morrisville revised its proposed minimum flows to 28 cfs in the Morrisville Development primary bypassed reach and 8.5 cfs in the Morrisville Development secondary bypassed reach. Morrisville has also revised its proposed minimum flow in the Cadys Falls bypassed reach to 54 cfs.

Response: We have revised appropriate sections of the EA to reflect Morrisville’s new proposed minimum flows and have included an analysis of its new proposed flows.

Comment: Vermont ANR states that the Vermont Water Resources Board no longer establishes state water quality standards and that the rule-making authority for water quality standards was transferred to Vermont DEC in 2011.

Response: We revised sections 3.3.1.1 and 3.3.4.1 to indicate that Vermont DEC establishes state water quality standards.

Comment: Morrisville states that it will develop and implement a plan to improve and monitor DO in the Green River Development tailrace as recommended by Interior, Vermont ANR, and Commission staff. Morrisville proposes to improve DO in the tailrace by either increasing the minimum downstream flow to mechanically aerate tailwaters or possibly installing turbine aspiration. The selected mitigation measure would be based on initial monitoring results. FGRR and Eric Nuse support this proposal.

Response: We revised the EA to include this information. The analysis of Morrisville’s proposal is found in section 3.3.1.2.

Land Use and Recreation Resources

Comment: AW and VPC expressed support for the staff recommendation for Morrisville to develop a whitewater operation plan that would, in part, establish five annually scheduled whitewater releases on the Green River. However, AW and VPC requested that the plan include two to three additional scheduled releases for a total of 7

to 8 annual whitewater releases. Specifically, AW and VPC requested one additional spring release between May 1 and August 1, one additional summer release between August 1 and September 15 “if sufficient water is available”, and one additional fall release in November.

Response: Staff has revised appropriate sections of the final EA to include AW and VPC’s revised recommendation. However, staff has not changed its analysis or recommendation because AW and VPC have not provided any new information since issuance of the draft EA.

Comment: AW and VPC requested flexibility in scheduling annual release dates and establishing specific notification methods, flow measurement, flow levels, and flow durations to be included in the whitewater operations plan.

Response: Flexibility in scheduling annual release dates and establishing specific notification methods would be established during development of the whitewater operations plan that would be required by Article 007 included in Appendix A of the draft and final EA.

Comment: MDTU expressed support for whitewater releases on the Green River in the absence of definitive scientific evidence that true run-of-river operation at the Green River Development would significantly improve the Green River fishery.

Response: Our analysis in section 3.3.1.2 of the EA evaluates both the applicant proposed store-and-release and agency recommended run-of-river modes of operation for the Green River Development. Our analysis suggests that, although run-of-river operation would likely improve aquatic habitat on the Green River, continuing to operate the development in a store-and-release mode would allow whitewater releases while maintaining the existing self-sustaining trout fishery in the Green River and aquatic resources in the Green River reservoir.

Comment: MDTU requested that any whitewater releases be made at a gradual ramp-up rate over several hours, as opposed to instantaneous releases, to protect downstream habitat and allow for a margin of public safety.

Response: We have revised sections 3.3.3 and 5.1.2 of the EA to evaluate the effects of ramping whitewater flow releases on downstream habitat and public safety (i.e., wading anglers). We have revised section 5.1.2 of the EA and Article 007 includes a ramping rate that would protect wading anglers as part of the whitewater operation plan.

Comment: The LRAA, FGGR, and Eric Nuse expressed opposition to scheduled whitewater releases on the Green River.

Response: Staff has revised section 3.3.3.2 of the EA to include this information.

Comment: Morrisville clarified the location of the 86 acres available to the public for hunting and trapping at the Green River Development.

Response: Staff has revised sections 3.3.3 and 5.1 of the EA to include this information.

Aesthetic Resources

Comment: Morrisville stated that releasing at least one inch of water (approximately 25 cfs) over the Morrisville primary spillway crest for aesthetics could create significant operational challenges. Morrisville also stated that any modification to project operations to achieve the aesthetic spill would not be worthwhile because limited people would experience the benefit due to anticipated decreased traffic flow on Vermont Route 100 after the completion of a highway bypass project.

Response: Morrisville did not specify any operational challenges that would prevent it from releasing a 1-inch flow over the Morrisville primary spillway. The Morrisville primary spillway includes two 108-foot-long, 4-foot-high Obermeyer inflatable crest gates with an automatic crest control system that could be lowered to release the recommended aesthetic flow. Our analysis in section 3.3.4 of the EA suggests that releasing an aesthetic flow over the primary spillway would maintain the visual character of the dam, which is a feature that can be viewed from project recreational facilities and two roads off of Vermont Route 100. The primary spillway would continue to be visible from these vantage points regardless of added transportation infrastructure in the area.

Comment: Vermont ANR indicated that the aesthetic flow assessment conducted at the Cadys Falls Development addressed aesthetics of spillage over the dam crest and based on this information, Vermont ANR continues to recommend that Morrisville be required to release at least one inch of spill over the Cadys Falls dam crest for aesthetics.

Response: Our analysis in section 3.3.4 of the EA indicates that the Cadys Falls dam is only visible from project waters downstream of the dam. A densely wooded area upstream and downstream of the dam on river-left obstructs the view of the dam crest from the most likely viewing locations along Cadys Falls Road (a town road that parallels the river-left shoreline). Therefore, aesthetic spillway releases at this development would have little, if any, benefit.

Cultural Resources

Comment: The Vermont SHPO indicated that section 3.3.5 of the draft EA referenced the historic resources assessment dated March 2013, included in Morrisville's final license application filed on April 25, 2013, but not the revised version of the historic resources assessment dated June 2013 (filed by the Vermont SHPO on August 28, 2014). The Vermont SHPO noted that the revised June 2013 historic resources assessment identified the concrete arch dam at the Green River Development as historically significant and individually eligible for inclusion on the National Register of Historic Places (National Register) under Criterion C.

Response: Staff has revised section 3.3.5 of the EA to update the historic significance and National Register eligibility of the Green River dam.

Comment: The Vermont SHPO indicated support for the development and implementation of a comprehensive Historic Properties Management Plan (HPMP) and filing of the HPMP for Commission approval earlier than six months from the effective date of any license issued for the project.

Response: Staff has revised section 3.3.5 of the EA to include the Vermont SHPO's recommendation for an HPMP.

Comment: The Vermont SHPO determined that the project would have "no effect" at the Green River, Lake Elmore, and Morrisville developments, and "no adverse effect" at the Cadys Falls Development. The Vermont SHPO also indicated that there is currently insufficient evidence to conclude that the project would have "no adverse effect" on significant archaeological resources within the project's Area of Potential Effect (APE), and that further archaeological studies should be included within a comprehensive HPMP.

Response: Staff has revised sections 1.3.5 and 3.3.5 of the EA to include the Vermont SHPO's determination of effects of the project on historic properties and archeological resources within the project's APE.

Comment: The Vermont SHPO stated support for removing the Safford Grist Mill Building and associated property, located on the east side of the Morrisville dam, from the project boundary.

Response: On November 4, 2014, Morrisville filed an application to amend its license by proposing to remove the Grist Mill and associated property. The Commission's Office of Energy Projects' Division of Hydropower Administration and Compliance (DHAC) issued an additional information request (AIR) on December 15, 2014, seeking clarity and further details regarding Morrisville's proposal. Therefore, because additional information is needed to evaluate Morrisville's proposal, staff does not evaluate the effects of this proposal in this EA.

Document Content(s)

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