DEPARTMENT OF ENVIRONMENTAL CONSERVATION LEGISLATIVE REPORT

Green River Reservoir Dam and Dike Study

Year: 2025

Date reported: August 29, 2025

Authorizing statute: 2022 Acts and Resolves, No. 83, Section 46, amended in 2024 Acts and Resolves No. 121, Section 24, amended in 2025 Acts and Resolves No. 319, Section 18

Committees: House Committees on Environment and Energy and on Appropriations and the Senate Committee on Natural Resources and Energy and on Appropriations

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Executive Summary

The Agency of Natural Resources (ANR) contracted with Geotechnical Engineers, Inc. (GEI) to perform a study of capital and ongoing operations and maintenance costs for the Green River Reservoir Dam and Dike located in Hyde Park. This study was commissioned to evaluate the benefits and liabilities were the State to assume ownership of the dam and dike as further described below. GEI subcontracted with Harvey Economics (HE) and Hydro Consulting & Maintenance Services (HCMS) to assist with specialized scope items. The study was managed by the Department of Environmental Conservation (DEC) Dam Safety Program (DSP). This report summarizes the findings of the study and is written in a manner which aims to comply with Federal Energy Regulatory Commission (FERC) Controlled Unclassified Information and Critical Energy Infrastructure Information (CUI/CEII) policies, consistent with the non-disclosure agreement (NDA) study participants were required to sign.

The dam and dike are currently owned by Morrisville Water and Light Department (MW&L), a small not-for-profit municipal utility serving a little over 4,000 electric customers in Lamoille County. The dam and dike are currently used by MW&L to generate hydroelectricity as part of the FERC licensed Morrisville Hydroelectric Project No. 2629. MW&L contributed $42,150 towards the study and assisted by providing access to their facility, file records, as well as attending various meetings to answer questions and contribute institutional knowledge.

The dam is a concrete arch approximately 360 feet long and 105 feet tall which spans between two steep bedrock slopes. The dike is an earthen embankment constructed on top of glacial till approximately 200 feet long and 20 feet tall. The dam and dike were constructed by MW&L in 1947 with the original purpose of storing and releasing water for power generation at downstream hydroelectric dams along the Lamoille River. The power plant was added to the Green River facility in 1983.

Together, the dam and dike form Green River Reservoir, a waterbody considered to be an important resource and landmark feature of the area. In 1999, with help from the Friends of the Green River

Reservoir (FGRR), approximately 5,500 acres of land were purchased from MW&L by The Nature Conservancy (TNC) who transferred the land to the Department of Forests, Parks and Recreation (FPR), establishing Green River Reservoir State Park. The 653-acre reservoir includes approximately 19 miles of undeveloped shoreline offering a unique low impact recreation experience including fishing, paddling, kayaking, and remote camping in a largely wild and undeveloped area. FPR assisted with the study by attending various meetings to answer questions and contribute institutional knowledge of the State Park.

In 2010, the Morrisville Hydroelectric Project (multi-dam project including Cadys Falls, Morrisville, Green River, and Lake Elmore) was required to go through a FERC relicensing process which resulted in ANR issuing a Section 401 Water Quality Certification ("401 WQC") for the Green River hydro-facility. The 401 WQC governs how the facility can be operated in accordance with the Federal Clean Water Act. MW&L evaluated operating the facility under the new 401 WQC and determined doing so would result in a financial loss and an unfair economic burden being placed on their rate payers. This finding led to the MW&L board of trustees writing a letter to the Governor's Office asking the State to consider purchasing the Green River facility. In order to engage in any such discussion, it is imperative for the State to have a comprehensive understanding of the current condition of the dam and dike and the costs and benefits that would likely accrue with ownership, which resulted in this study being performed.

The study included the following core elements:

- review of existing records,
- data collection and field inspection,
- screening level engineering analyses and dam safety risk assessment,
- alternatives development,
- short and long-term benefits and costs evaluation.

The study evaluated the following alternatives for the State to consider were the State to assume ownership of the dam:

1. No Investment
2. Dam Removal
3. Maintain Dam and Generate Power
    a. "Minimum Requirements" Option
    b. "Best Practices" Option
4. Maintain Dam and Decommission Power
    a. "Minimum Requirements" Option
    b. "Best Practices" Option

The study was scoped to provide relevant information for the reader to make their own informed opinion. The study does not recommend a preferred alternative or provide a monetary valuation of the infrastructure or lands that would likely be acquired were ownership of the Green River facility transferred to the State.

Key Findings and Understandings

Overview

- This report serves as a CEII/CUI complaint document that summarizes over 12 separate reports developed by GEI documenting their work performed as part of the study. References are listed on pages 22 to 23.
- Tables comparing the alternatives from monetary and non-monetary perspectives are provided on pages 8 to 14.
- Figures showing the location of the dam and dike, property ownership maps, and photographs of the dam and dike are provided on pages 15 to 21.

General

- The dam is considered a high hazard potential structure because in the event of failure, it is likely to cause loss of life. The dike is considered a significant hazard potential structure because in the event of failure, it is likely to cause economic damage to downstream property but is unlikely to cause loss of life. The hazard potential classification of the dam and dike govern the engineering standards which they are held to. Accordingly, the dam is held to higher standards, and the study places more emphasis on evaluating the dam.
- The dam and dike are currently regulated by FERC because they are part of a facility used to generate hydropower. The dam and dike currently fall under the license for the Morrisville Hydroelectric Project No. 2629, which includes additional dams owned and operated by MW&L.
- The Section 401 WQC, which governs how MW&L can operate the Green River facility in accordance with the Federal Clean Water Act, was issued by ANR in 2016 as part of a relicensing process which commenced in 2010.
- MW&L evaluated operating the dam under the 401 WQC and concluded that it would result in financial loss and an unfair burden being placed on their ratepayers.
- MW&L has been unsuccessful in litigation to change the conditions of the 401 WQC or in petitioning to waive various requirements of the 401 WQC.
- On March 12, 2024, MW&L filed their intent to surrender their FERC license to generate electricity at Green River Reservoir. The license will remain in place until MW&L completes the FERC decommissioning process. If completed, the dam and dike would then become regulated by the DSP instead of FERC.
- MW&L no longer has a financial incentive to own the Green River facility and is interested in transferring ownership to the State since the dam and dike form the reservoir which is integral to the State Park.

Review of Existing Records

- FERC requires licensees to maintain detailed facility records which periodically get reviewed and updated. These records were obtained and reviewed as part of the study. Review of the existing records helped inform the scope of the study.

    - Some information was unavailable resulting in data collection efforts described below.
    - Some engineering analyses had already been performed by MW&L and could be reviewed and updated.
    - Other analyses were not available and had to be performed.
- It was found that FERC had requested MW&L perform an updated stability analysis of the concrete arch dam under the new winter reservoir level required by the 401 WQC. Previously, MW&L was allowed to lower the reservoir by up to 10 feet during the winter. The 401 WQC reduced this maximum drawdown to 1.5 feet, which places the design ice loading higher up on the arch dam. An updated stability analysis of the ice loading was included in this study to address this concern.

Data Collection and Field Inspection

- The following data collection efforts were performed:
    - Bathymetric survey to determine depth of water and sediment in front of the dam.
    - Drone LiDAR survey to create a 3D representation of the dam for stability analyses and develop a detailed topographic surface for the evaluation of alternatives.
    - Geologic mapping of rock at the dam abutments to inform stability analyses.
    - Concrete sampling/testing to determine the strength of the concrete comprising the dam.
    - Rock sampling and testing to determine the strength of the bedrock supporting the dam.
- Testing of concrete samples showed that the compressive strength of the concrete exceeds the requirement of the original design specifications.
- Testing of rock samples showed the compressive strength of the rock is higher than the concrete.
- Field inspection of the dam, dike, and power plant identified several deficiencies which will need to be addressed. However, none of the identified deficiencies were determined to be critical such that they warrant immediate action or temporary risk reduction measures.
- Signs of Alkali-Silica-Reaction (ASR) were noted on the concrete arch dam during the field inspection. ASR is a chemical reaction between the aggregate and cement used in the concrete mix. The chemical reaction causes thermal expansion which can result in cracking and accelerated concrete deterioration.
    - Testing of the concrete samples confirmed the presence of the ASR, but it was determined not advanced enough to affect dam stability.
    - Enhanced monitoring is recommended for early detection of issues related to ASR.
- The dam and dike are in locations which make them challenging to access and maintain, particularly when large equipment is involved.
    - The original access easements and routes to the dam and dike have not been maintained.
    - There is no access to the western abutment of the dam other than hiking through steep wooded terrain or traversing across the reservoir by boat/barge.
    - The main access to the dam includes a steep section of dirt/gravel road which is not plowed by MW&L in the winter due to safety concerns. Access during winter months requires snowshoeing into the dam or using specialized equipment.

- The current access route to the dike has largely become a footpath and requires crossing a small wooden footbridge which spans over a pond outlet stream.

Screening Level Engineering Analyses and Dam Safety Risk Assessment

- The following engineering analyses were performed:
  - Hydrologic and Hydraulic (H&H) analyses to estimate the probability of various reservoir levels being reached during flood events.
  - Geotechnical and geologic evaluation of rock erodibility at base of the dam due to overtopping during the design flood.
  - Structural and geologic evaluation of dam stability (concrete and bedrock) during the following loading conditions:
    - Summer Pool
    - Summer Pool + Seismic Loading
    - Winter Pool + Ice Loading
    - Design Flood Pool
  - Dam failure and downstream flood routing analyses to quantify potential consequences of dam failure.
  - Downstream flood routing analyses to better understand effects of dam removal.
  - Dam safety risk assessment and ranking of potential failure modes (ways the dam and dike could fail).
- Continuous records of reservoir inflow, water levels, and outflow were unavailable for use in the H&H analyses. Calculated reservoir inflows relied on statistical analysis of data from a surrogate stream gauge with approximately 86 years of data. Information from regionally significant floods such as the 1927 flood, and an existing Vermont paleoflood study were also used to inform the statistical analysis.
- The H&H analysis concluded the following:
  - Dam overtopping is estimated to be low probability (between a 100,000-year and 1,000,000-year recurrence interval event, FERC Likelihood Category 2).
  - Dike overtopping is estimated to be remote probability (greater than a 1,000,000-year recurrence interval event, FERC Likelihood Category 1).
  - These metrics suggest that a low or remote likelihood precipitation/flood event would need to occur to cause overtopping of the dam or dike.
  - The design flood for the dam (according to FERC/Federal guidance) is the Probable Maximum Flood (PMF). According to the National Oceanic and Atmospheric Administration's (NOAA) Hydrometeorological Reports HMR-51 and HMR-52, the PMF at the Green River facility equates to approximately 29-inches of rain over a period of 72-hours. Calculations indicate the PMF will overtop the dam by 5.4-feet and overtop the dike by 0.4-feet.
- Bedrock erodibility analyses suggest it is plausible for existing loose rock blocks to topple, slide down the slope, or be plucked when the PMF overtops the dam. While satisfactory performance

of the dam is anticipated under current conditions, removal of blocks over time or during extreme events could change conditions and be a cause for reevaluation.

- Stability analyses of the concrete arch dam and the rock which holds it in place indicated adequate factors of safety and stresses within allowable limits for all load cases (including the new higher ice load due to the reduced winter drawdown required by the 401 WQC). Accordingly, the dam and foundation meet stability criteria based on these analyses.
- The dam safety risk assessment determined all identified potential failure modes are within FERC tolerable risk limits. This suggests that the dam performs well with respect to modern dam safety and engineering standards.
- The downstream routing of the 100-year flood without the dam in place showed that flooding depths along the Green River would increase by 0 to 3 feet with median of less than 2 feet. No habitable structures were identified within the expanded inundation limits. Were the dam to be removed, downstream culverts and bridges along the Green River such as the one located on Garfield Road would likely need to be upsized to safely pass the 100-year flood. Once flows reach the Lamoille River the change in flooding depth is less pronounced because the Lamoille River just upstream of the Green River confluence has a considerably larger watershed area (200 square miles in comparison to 14.1 square miles at the Green River Reservoir).

<u>Alternatives Development</u>

- The study considered the following alternatives:
    - **1 - No Investment** – Hypothetical scenario where the State does not acquire the facility. MW&L relinquishes the FERC license and stops making power. The dam falls under ANR-DEC-DSP regulation instead of FERC. MW&L is still the owner but has no financial incentive to maintain the dam and dike which now only serve to maintain the reservoir and State Park. To avoid placing an unfair financial burden on its customers, MW&L lowers or drains the reservoir to mitigate safety risks until a path forward is found or they are forced to maintain the structure and normal water levels through litigation (driven by recreation, ecological, or other related interests).
    - **2 - Dam Removal** – Hypothetical scenario where MW&L relinquishes the FERC license and formally decommissions power. MW&L transfers the facility to the State who then removes the dam. Under this scenario it is assumed the State would want to remove the dam to manage the project and process. However, MW&L could do so beforehand, but the transfer of the facility would have to be adjusted accordingly. The financial burden of maintaining the dam and dike no longer exists, but neither does the reservoir. The State Park must be significantly redesigned to adapt to the new environment.
    - **3 - Maintain Dam and Generate Power** - Hypothetical scenario where MW&L relinquishes the FERC license and the State takes ownership of the facility. A new standalone FERC license is obtained for just the Green River facility. The State makes power or the State leases rights to make power to another entity. The dam is maintained

for both hydropower and recreation. The facility remains under FERC regulation and the State is obligated to meet FERC requirements.

- 3A - "Minimum Requirements" Option – Minimum improvements required to continue safely operating the facility.
- 3B - "Best Practices" Option – Minimum requirements plus additional improvements not considered immediately necessary but that would improve operations, further improve safety/reduce risk, and reduce long term costs.

- **4 - Maintain Dam and Decommission Power** – Hypothetical scenario where MW&L relinquishes the FERC license and the State takes ownership the facility and decommissions the power plant. Under this scenario it is assumed the State would want to decommission the power plant to manage the project and process. However, MW&L could do so beforehand, but the transfer of the facility would have to be adjusted accordingly. The dam and dike are maintained for recreational purposes and become subject to ANR-DEC-DSP regulation instead of FERC.
  - 4A - "Minimum Requirements" Option – Minimum improvements required to continue safely operating the facility.
  - 4B - "Best Practices" Option – Minimum requirements plus additional improvements not considered immediately necessary but that would improve operations, further improve safety/reduce risk, and reduce long term costs.

- The alternatives which involve keeping the dam do not involve significant redesign since the dam largely already meets standards. Instead, they primarily involve maintenance and/or replacement of existing components such that it can comply with the 401 WQC requirements and be safely operated into the foreseeable future. Some of the existing components at the dam date back to the original construction in 1947.
- Annual average maintenance costs for alternatives 3A and 4A which only include "minimum requirements" are higher than the "Best Practice" versions (3B and 4B) because there are fewer initial upgrades/improvements.
- The land beneath the reservoir (i.e., the current reservoir footprint) is owned by MW&L which could impact public access to the reservoir if it must be lowered for safety reasons. This land would have to be addressed as part of the transfer.
- Below are a series of tables which provide a comparison of the alternatives from the perspective of initial project costs, initial project schedule, and anticipated future maintenance costs. Additional comparisons of short-term and long-term benefits/costs over a 20-year period are included in the following section of the report.
  - Initial projects are required for all alternatives except for Alternative 1 (No Investment).
  - The anticipated timelines to complete the design, permitting, and construction of the initial projects are 3 to 5 years depending on the alternative.
  - Following the initial required projects, additional maintenance costs to maintain regulatory compliance and satisfactory performance will be required for alternative 3A, 3B, 4A, and 4B which aim to maintain the dam and dike into the future.

Table 1: Opinion of Probable Initial Project Costs - Design, Permitting, and Construction

Alternative	**Initial Project Costs - Design Permitting and Construction (1)**
(1) - No Investment	$0
(2) - Dam Removal	$16.0M
(3A) - Maintain Dam and Generate Power – "Minimum Requirements" Option	$2.0M
(3B) - Maintain Dam and Generate Power – "Best Practice" Option	$6.8M
(4A) - Maintain Dam and Decommission Power – "Minimum Requirements" Option	$2.9M
(4B) - Maintain Dam and Decommission Power – "Best Practice" Option	$8.1M

(1) Costs do not include operations and maintenance.

(2) The "Minimum Requirements" and "Best Practice" options represent a potential range of costs (i.e. "Min. Requirement" options assume re-use/refurbishment of existing equipment, "Best Practices" assume equipment replacement. Repair or refurbishment may not be possible due to factors such as condition, replacement part availability, etc.).

Table 2: Opinion of Probable Annual Average Maintenance Costs

Alternative	**Annual Average Maintenance Costs (1)**
(1) - No Investment	$0
(2) - Dam Removal	$0
(3A) - Maintain Dam and Generate Power – "Minimum Requirements" Option	$185,000
(3B) - Maintain Dam and Generate Power – "Best Practice" Option	$85,000
(4A) - Maintain Dam and Decommission Power – "Minimum Requirements" Option	$75,000
(4B) - Maintain Dam and Decommission Power – "Best Practice" Option	$30,000

(1) The annual average maintenance costs factor in future anticipated evaluations and projects required to maintain satisfactory performance and regulatory compliance after the initial project is completed. Operational costs are not included, which may be notable in cases such as 3A & 4A where the dam has to be accessed and manually operated on a daily basis. Under alternatives 3A

& 4A there is no automation of the gate(s) which control flow through the dam. These gate(s) control flow through the dam because the water level is normally maintained slightly below the concrete spillway crest for safety reasons. Staff would have to manually adjust the gate(s) to match inflows and operate the dam in accordance with the 401 WQC. Operational costs for hydropower generation under 3A and 3B are also anticipated to be notable.

Table 3: Opinion of Probable Project Schedule

Alternative	Permitting Duration and Public Input	Design Duration	Construction Duration	Total Project Duration
(1) - No Investment	0 months	0 months	0 months	0 months
(2) - Dam Removal	46 months	8 months	10 months	~5 years
(3a) - Maintain Dam and Generate Power – "Minimum Requirements" Option	24 months	6 months	4 months	~3 years
(3b) - Maintain Dam and Generate Power – "Best Practice" Option	30 months	10 months	14 months	~4.5 years
(4a) - Maintain Dam and Decommission Power – "Minimum Requirements" Option	26 months	6 months	6 months	~3 years
(4b) - Maintain Dam and Decommission Power – "Best Practice" Option	30 months	12 months	16 months	~5 years

Short and Long-term Benefits and Costs Evaluation of Alternatives

- An independent evaluation of the power generation capabilities under the 401 WQC supported MW&L's conclusion that generating power at the facility would result in financial loss. No facility upgrades or modifications which could change this conclusion were identified.
- An economic evaluation of each alternative was performed for a 20-year timeline extending from 2026 to 2045. The evaluation was informed using information provided by MW&L, FPR, various State/Federal resources, and other similar studies. The evaluation considered upfront capital costs, power generation revenue, operation and maintenance costs, State Park revenue and costs, economic benefits to the neighboring communities, and consumer surplus.
- The economic evaluation concluded the following:

- Operating and maintaining the dam from a direct benefits versus direct costs perspective results in a financial loss under all alternatives.
- Significant investments in the State Park are necessary under Alternatives 1 and 2 to adjust to the new environment after the reservoir has been lowered or the dam removed.
- Economic activity generated from visitor spending in the local economy associated with State Park visits exceeds the total cost of all alternatives except dam removal. However, it is important to note that State Park associated visitor spending and subsequent State sales tax revenue do not translate directly to park revenue or resources available to ANR-DEC who is assumed to be tasked with ownership and therefore responsibility for the on-going operations, maintenance and capital needs of the facility.
- State ownership will require on-going, annual investment to maintain and operate the dam and dike. ANR-DEC does not have resources to put towards these costs and will need a base operating budget, in addition to the initial capital improvement costs, to be able to responsibly operate and maintain the dam and dike into the future.

Table 4: Alternatives Comparison of Present Value Economic Characteristics over 20-years (2026 – 2045) (color scaling provided to help illustrate range of costs under each alternative)

	Alternative 1 - No Investment	**Alternative 2 - Remove Dam**	**Alternative 3A – Maintain Dam and Generate Power (Minimum Requirements)**	**Alternative 3B – Maintain Dam and Generate Power (Best Practice)**	**Alternative 4A – Maintain Dam and Decommission Power (Minimum Requirements)**	**Alternative 4B – Maintain Dam & Decommission Power (Best Practice)**
Total Capital Costs	$0.0 (2)	$16.4 M	$2.0 M (3)	$7.0 M (3)	$2.9 M	$8.4 M
Total Maintenance Costs (1)	$0.0 (2)	$0.0	$4.7 M	$2.0 M	$1.9 M	$0.7 M
Net Power Generation Revenues (4)	$0.0	$0.0	Loss of $610 K	Loss of $539 K	$0.0	$0.0
State Park Planning (5)	Cost of >$10.0 M	Cost of >$10.0 M	N/A	N/A	N/A	N/A
Visitor Spending (6)	Generates $22.7 M	Generates $4.8 M	Generates $32.7 M	Generates $32.7 M	Generates $32.7 M	Generates $32.7 M
State Sales Tax Revenue (7)	Generates $1.0 M	Generates $216 K	Generates $1.5 M	Generates $1.5 M	Generates $1.5 M	Generates $1.5 M

Notes: (1) Total maintenance costs reflect annual maintenance over a 20-year period.

(2) Capital and maintenance cost estimates for Alternative 1 do not include the deferred maintenance in the long term to address safety concerns. Those costs would be borne by MW&L.
(3) Total capital costs for Alternatives 3A and 3B include up-front hydropower facility improvements costs.
(4) Power generation revenues are net of annual power-related operations costs.
(5) State Park planning/redevelopment costs are associated with FPR planning efforts and the costs of infrastructure required to provide alternative recreational opportunities in the absence or lowering (possible outcome of Alternative 2) of the reservoir. This represents a very cursory/high level cost estimate.
(6) Currently, ANR-FPR incurs a modest loss by operating the Green River State Park each year. In general, Vermont State Parks are operated to provide an affordable public service and not generate excess revenue. Visitor spending reflects the total economic benefits of the State Park by including direct and indirect expenditures associated with State Park visits over the 20-year period.
(7) Estimates of sales tax revenue do not account for any additional local option taxes.
(8) Present value estimates account for inflation to the year of cost or benefit activity and application of the Federal water resources discount rate for FY 2025.

Table 5: Alternatives Comparison of Net Present Value over 20-years (2026 – 2045)
(color scaling provided to help illustrate range of costs under each alternative)

	Alternative 1 - No Investment	**Alternative 2 - Remove Dam**	**Alternative 3A – Maintain Dam and Generate Power (Minimum Requirements)**	**Alternative 3B – Maintain Dam and Generate Power (Best Practice)**	**Alternative 4A – Maintain Dam and Decommission Power (Minimum Requirements)**	**Alternative 4B – Maintain Dam & Decommission Power (Best Practice)**
NPV (Costs / Benefits to ANR-DEC) (1)	$0	($16.4M)	($7.3M)	($9.5M)	($4.8M)	($9.0M)
NPV (Costs/Benefits to State) (2)	($9.0M)	($26.1M)	($6.1M)	($8.3M)	($3.6M)	($7.9M)
NPV (Above, plus Visitor Spending)	$13.7M	($21.3M)	$26.6M	$24.4M	$29.1M	$24.8M

Notes: (1) NPV reflecting the costs and benefits realized by ANR-DEC taking dam ownership, includes capital costs, maintenance costs, and net power generation revenues.
(2) NPV reflecting the costs and benefits realized by the State as a whole, includes capital and maintenance costs, net power generation revenues, State Park planning and finance costs and benefits plus sales tax revenues from State Park associated visitor spending.
(3) Values in parentheses are net negative.

Table 6: Alternatives Comparison Matrix

	Alternative 1 - No Investment	**Alternative 2 - Remove Dam**	**Alternative 3A – Maintain Dam and Generate Power (Minimum Requirements)**	**Alternative 3B – Maintain Dam and Generate Power (Best Practice)**	**Alternative 4A – Maintain Dam and Decommission Power (Minimum Requirements)**	**Alternative 4B – Maintain Dam & Decommission Power (Best Practice)**
Aesthetics	Dramatic change if water level is lowered or reservoir is drained for safety.	Dramatic change in aesthetics without dam and reservoir.	No Change	No Change	No Change	No Change
Cultural	Resource which is likely considered historic deteriorates and degrades if the facility is unmaintained.	Removes resource which is likely considered historic. Some portions of the dam and powerhouse may be able to be left in place.	No Change	No Change	No Change	No Change
Dam Safety	Risk of dam/dike failure increases over time as structures deteriorate (highest risk).	Risk of dam/dike failure eliminated (lowest risk).	Dam and dike are maintained in a compliant manner (tolerable risk).	Same as 3A plus additional upgrades to further reduce risk.	Same as 3A.	Same as 3B.
Downstream Flooding (non-dam failure related)	Initially no change, but additional flood storage/attenuation if reservoir is lowered or drained for safety.	Flood attenuation provided by dam is gone. Increased flood depth (0 to 3 feet) along Green River, negligible change along Lamoille River.	No Change	No Change	No Change	No Change

Environmental	No initial impact, but impact anticipated if reservoir is lowered or drained for safety.	Initial impact due to loss of reservoir and construction activity but over time the environment/ecosystem adapts to the new landscape.	Relatively minor construction activity will have a relatively minor impact.	Similar impact to 3A except for some additional impact due to additional concrete repairs and access routes.	Relatively minor construction activity will have a relatively minor impact.	Similar impact to 4A except for some additional impact due to additional concrete repairs and access routes.
Financials	Decrease in State Park revenue, significant upfront cost to redesign the State Park to adapt to a lower water level or drained reservoir.	Decrease in State Park revenue, significant upfront cost to remove dam and redesign State Park. However, no ongoing costs associated with dam/dike ownership after completion.	Significant upfront cost to implement initial improvements. Ongoing financial burden to maintain dam and dike. Hydro-facility operates at a financial loss each year.	Similar to 3A, but higher upfront cost for additional improvements which result in lower ongoing O&M costs.	Similar to 3A but no financial losses from generating power.	Similar to 3B but no financial losses from generating power.
Life Span	Limited intervention is likely required within 10-15 years if no maintenance is performed.	N/A	Further upgrades likely required within 20-years.	Minor upgrades likely required in 25 years. Next major upgrades likely in 50-years.	Same as 3A.	Same as 3B.
Local Economy	None initially, but anticipated reduction in park visits and associated spending even if the park gets redesigned.	Anticipated reduction in park visits and associated spending even if the park gets redesigned.	No Change	No Change	No Change	No Change
Ownership	MW&L owns the hydro facility, and the State	State owns everything (simple).	State owns everything but leases hydro to another	Same as 3A.	State owns everything (simple).	Same as 4A.

	owns the State Park (complex).		entity who operates the dam (complex).			
Regulatory	Initially regulated by FERC, later regulated by DEC Dam Safety Program after MW&L surrenders license and completes FERC decommissioning process.	N/A	Regulated by FERC, must meet FERC requirements.	Same as 3A.	Regulated by ANR-DEC Dam Safety Program.	Same as 4A.
Renewable Energy	Loss of renewable energy source.	Loss of renewable energy source.	Renewable energy source maintained.	Renewable energy source maintained.	Loss of renewable energy source.	Loss of renewable energy source.
Staffing	N/A	High upfront commitment to manage dam removal project, but commitment goes away after dam is removed.	Comparable effort required to maintain Waterbury Reservoir Dam. Entity leasing hydro rights is assumed to handle maintaining daily flows in accordance with 401 WQC.	Similar to 3A except automated gate(s) make compliance with 401 WQC easier.	Similar to 3A but no entity leasing hydro rights to handle maintaining daily flows in accordance with 401 WQC (staff have to visit site to adjust gates daily).	Similar to 4A except automated gate(s) make compliance with 401 WQC easier (staff do not need to visit site to adjust gates daily).
State Park	Potential for loss of public access to reservoir if water level is lowered.	Park redesign required to adapt to new environment. Loss of some existing recreational uses.	No Change	No Change	No Change	No Change

Figures

Figure 1: Green River Reservoir Dam and Dike locations shown on topographic map.

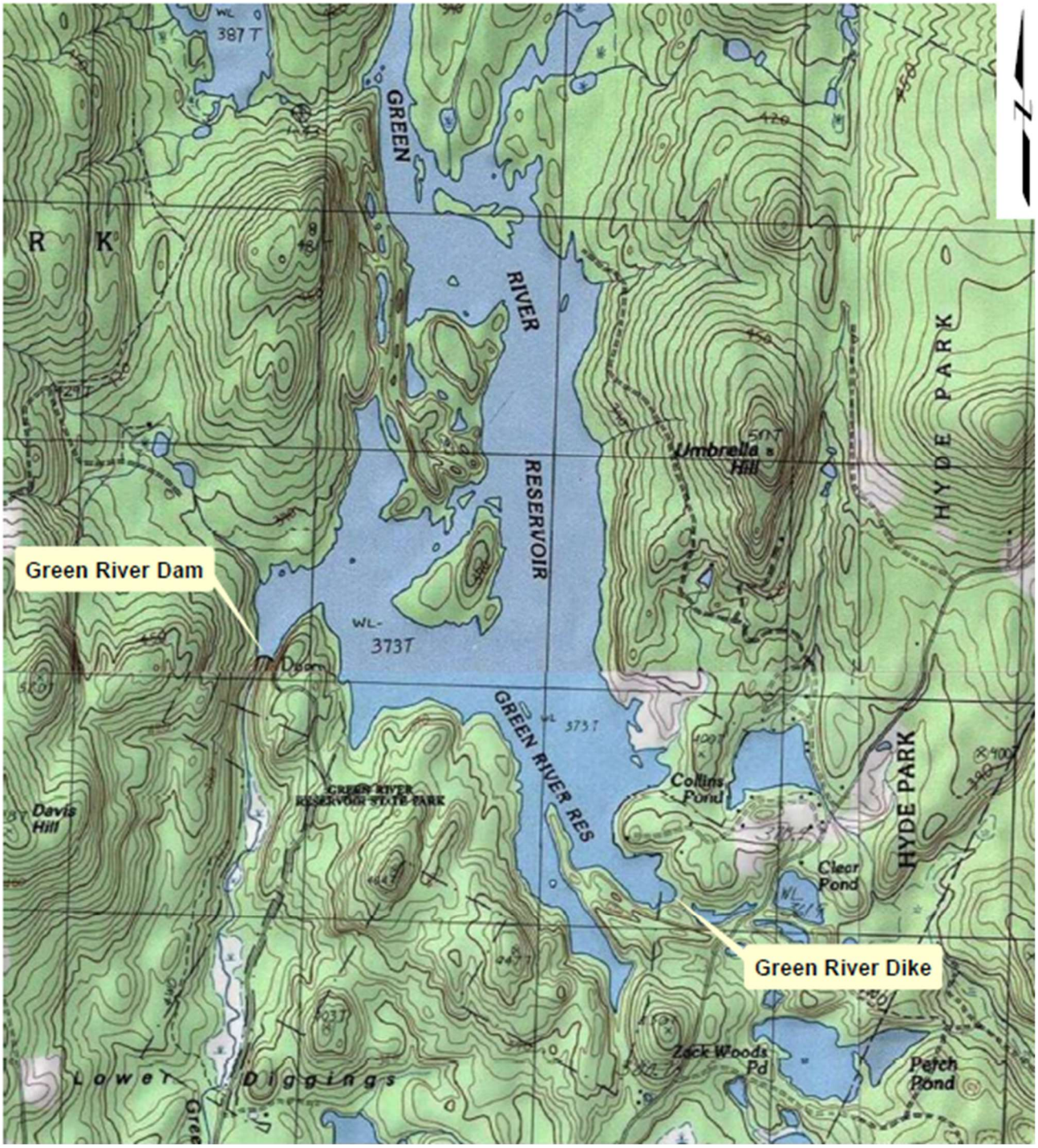

Figure 2: Parcel map showing relevant lands currently owned by MW&L and the State.

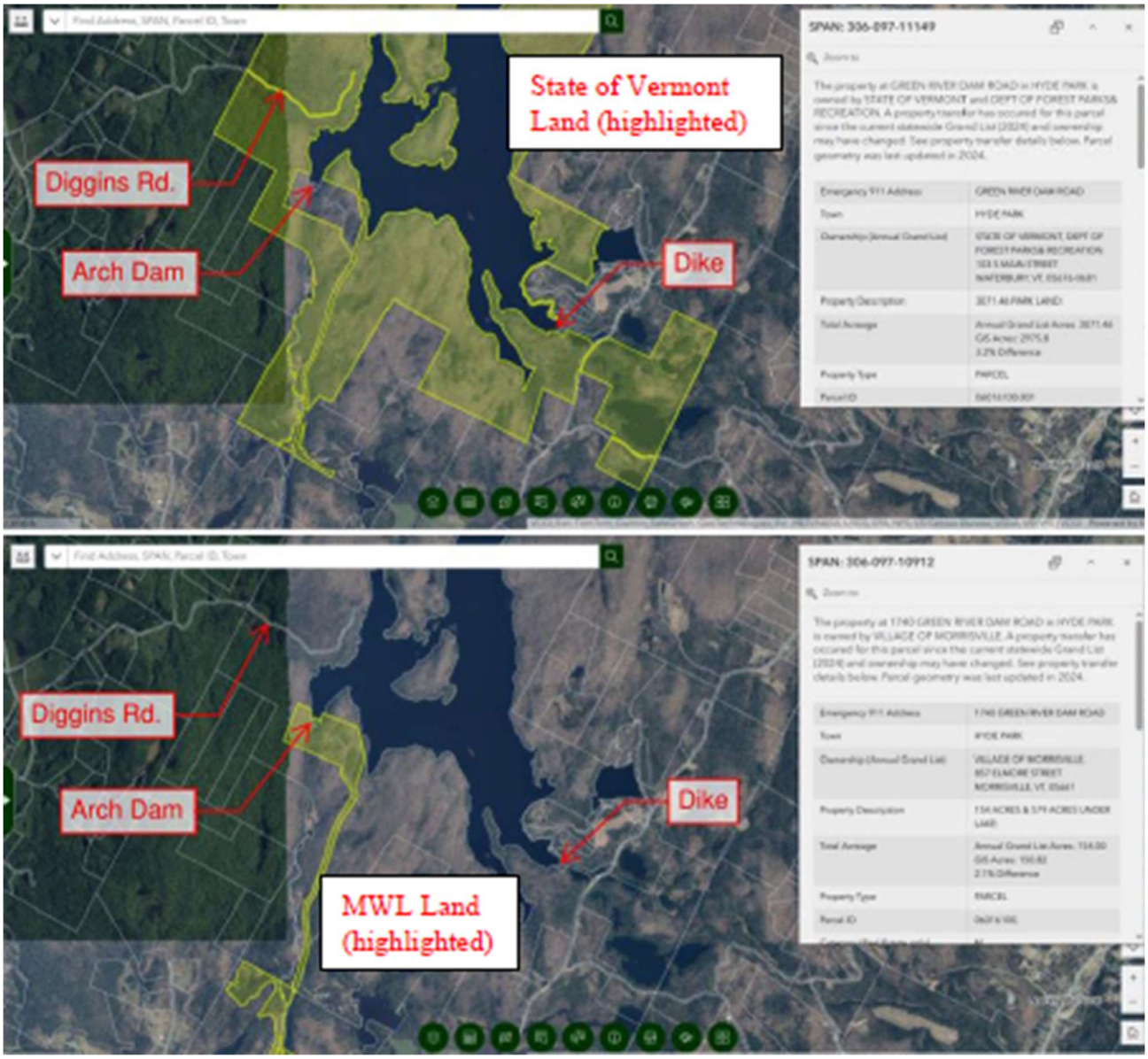

Figure 3: Parcel map showing relevant lands currently owned by MW&L and the State.

Figure 4: Concrete arch dam looking from dam crest at western abutment (10-21-2024).

Figure 5: Downstream face of concrete arch dam and valve/gate buildings (9-18-2024).

Figure 6: Upstream side of powerhouse, stair access and entrance (11-21-2023).

Figure 7: Downstream face of powerhouse and concrete stilling basin dam (10-4-2024).

Figure 8: Upstream slope of earthen saddle dike and wave boards (9-18-2024).

Figure 9: Crest and downstream slope of earthen saddle dike (9-18-2024).

Figure 10: Aerial view of northern half of reservoir (photo obtained from FPR's website on 4-18-2025).

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