

Jackson Dam

Overview of Past and Future Work

Hardwick, Vermont

October 5, 2026

SLRCONSULTING.COM

SLR

Agenda

- Review of Feasibility Study
- Concept Sketch Design
- Scope of Work for 30% Design
- Questions & Discussion



Jackson Dam



- Owned by Hardwick Electric Department
- Located ~50 ft upstream of Rt 14/15 Bridge
- Impounds sections of the Lamoille River and Alder Brook

Impound - to capture and store water behind a barrier (dam) that creates an artificial lake or pond

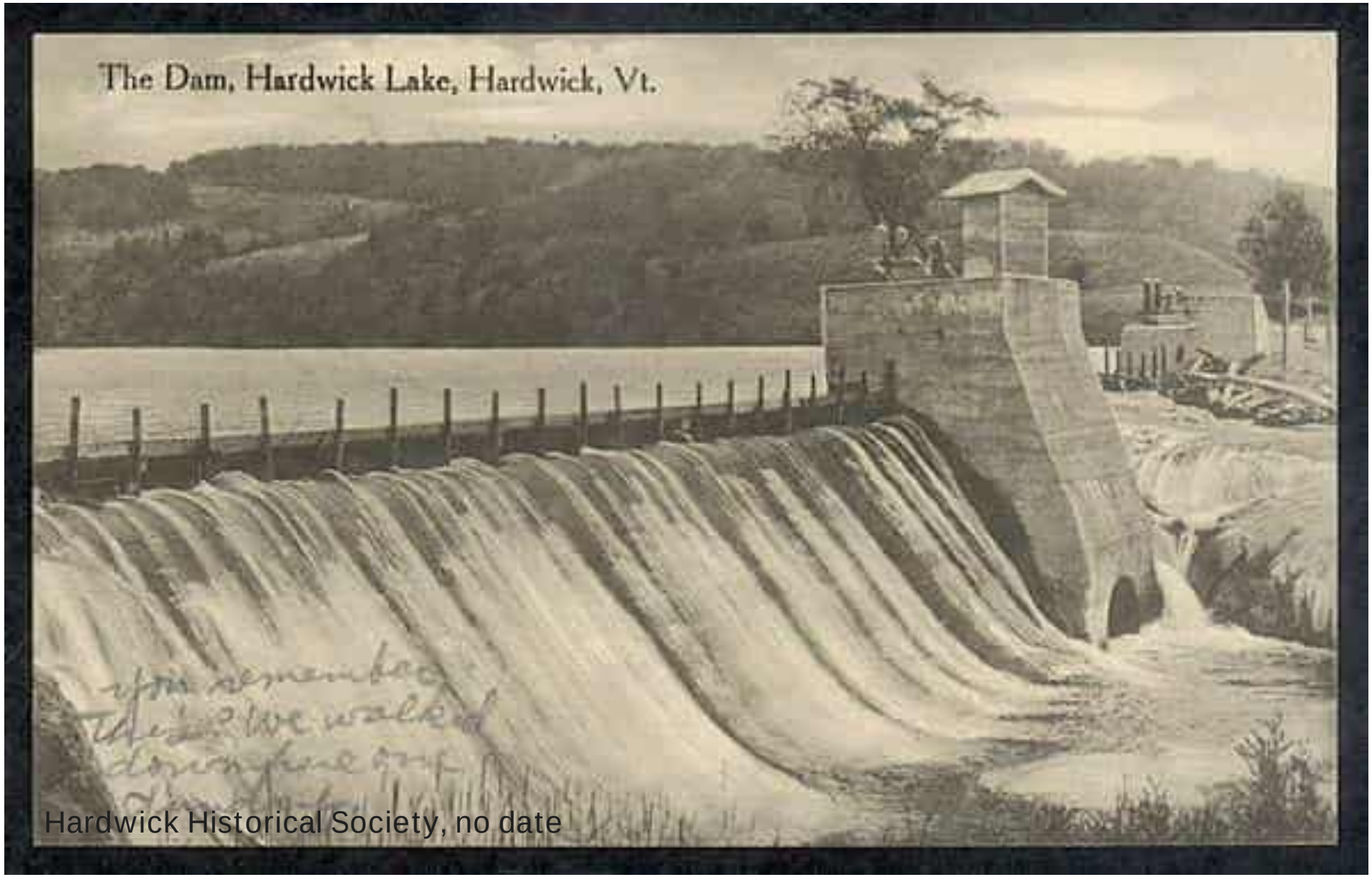
History of Jackson Dam



Hardwick Historical Society, 1912

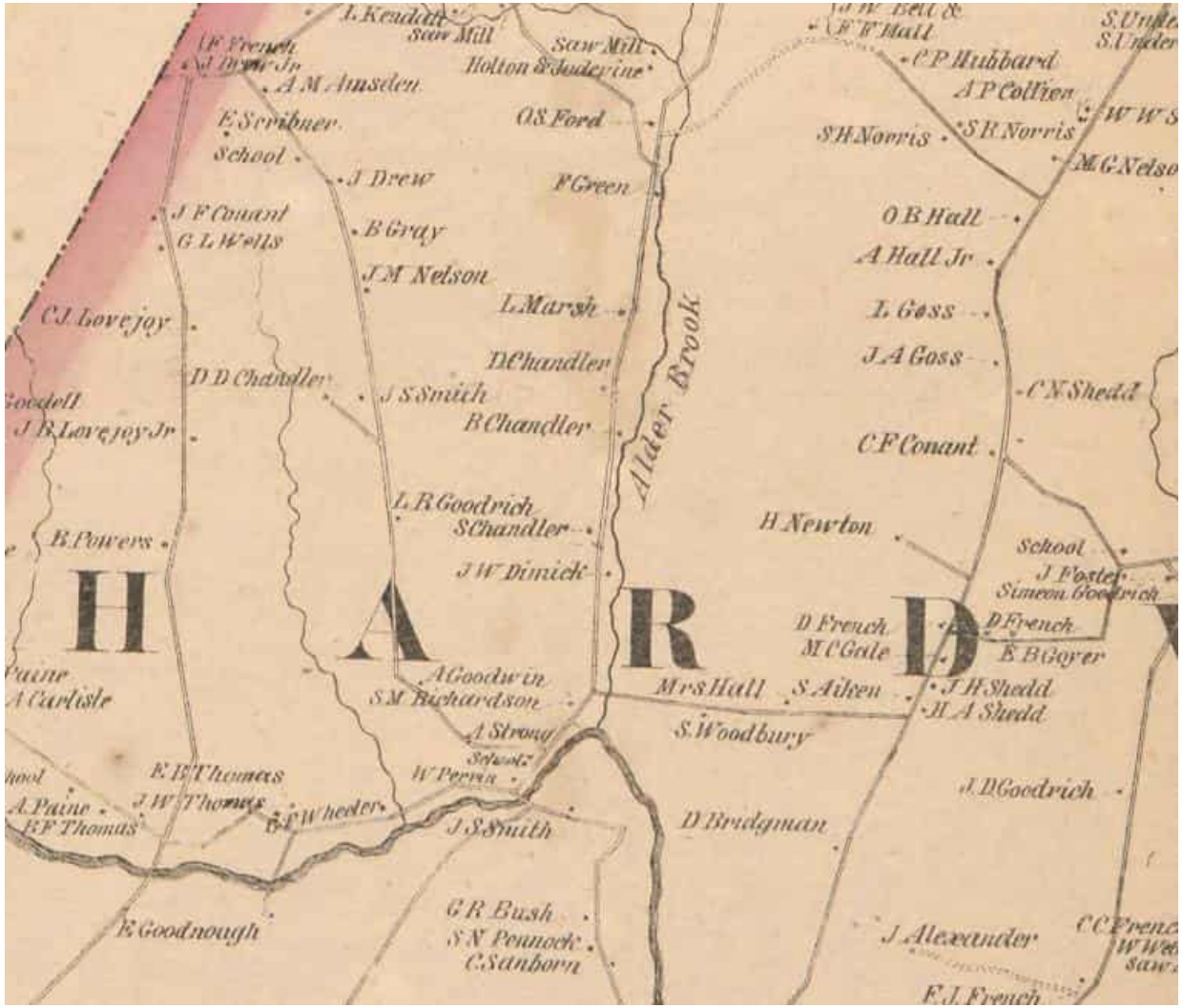
- Built in 1911
- Rebuilt in 1952
- Original purpose: store water to support hydropower at downstream Pottersville Dam (in Wolcott but also owned by HED)
- No longer used in hydropower operations

Jackson Dam Creates Hardwick Lake



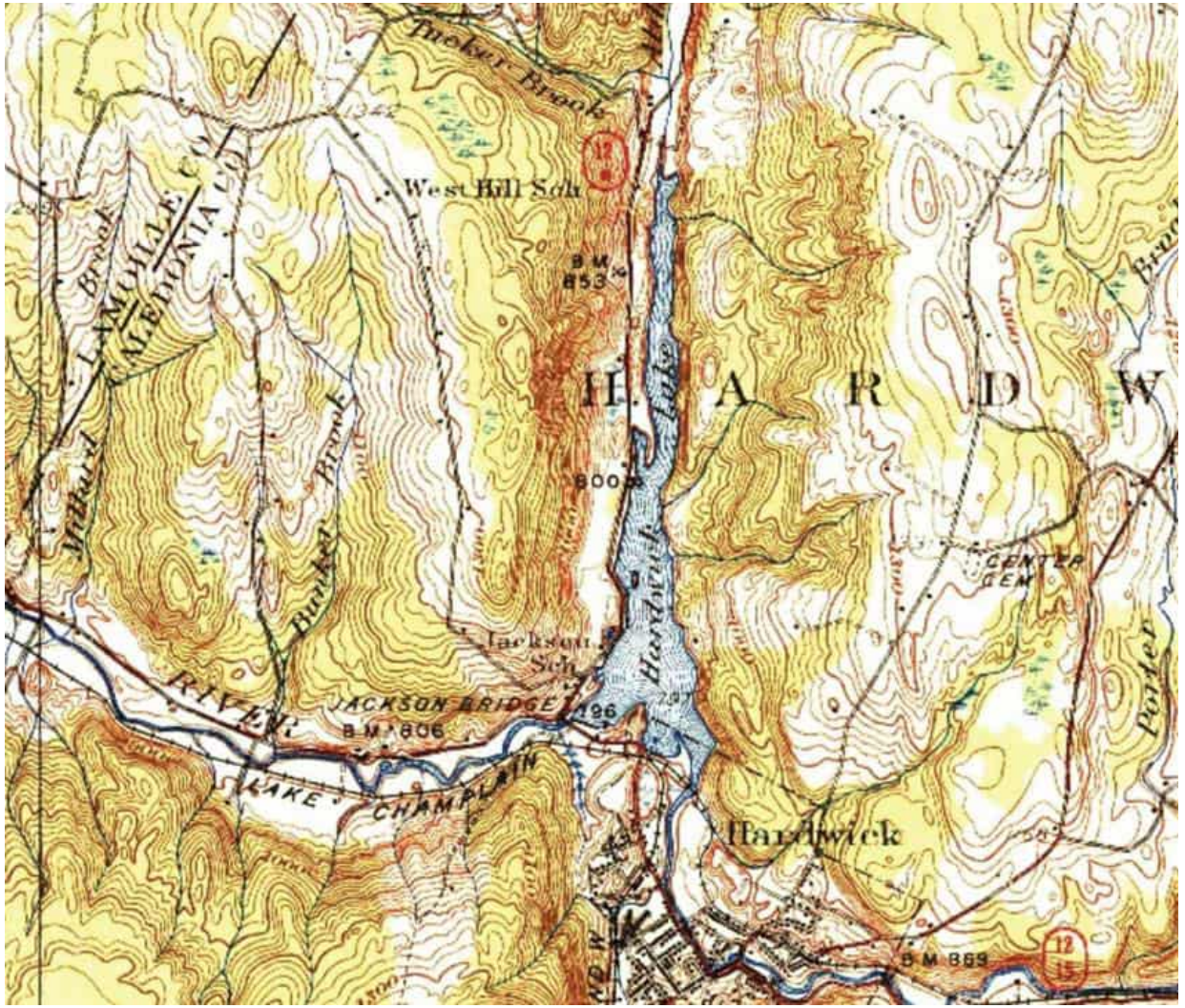
Hardwick Historical Society, no date

Jackson Dam Creates Hardwick Lake



1858

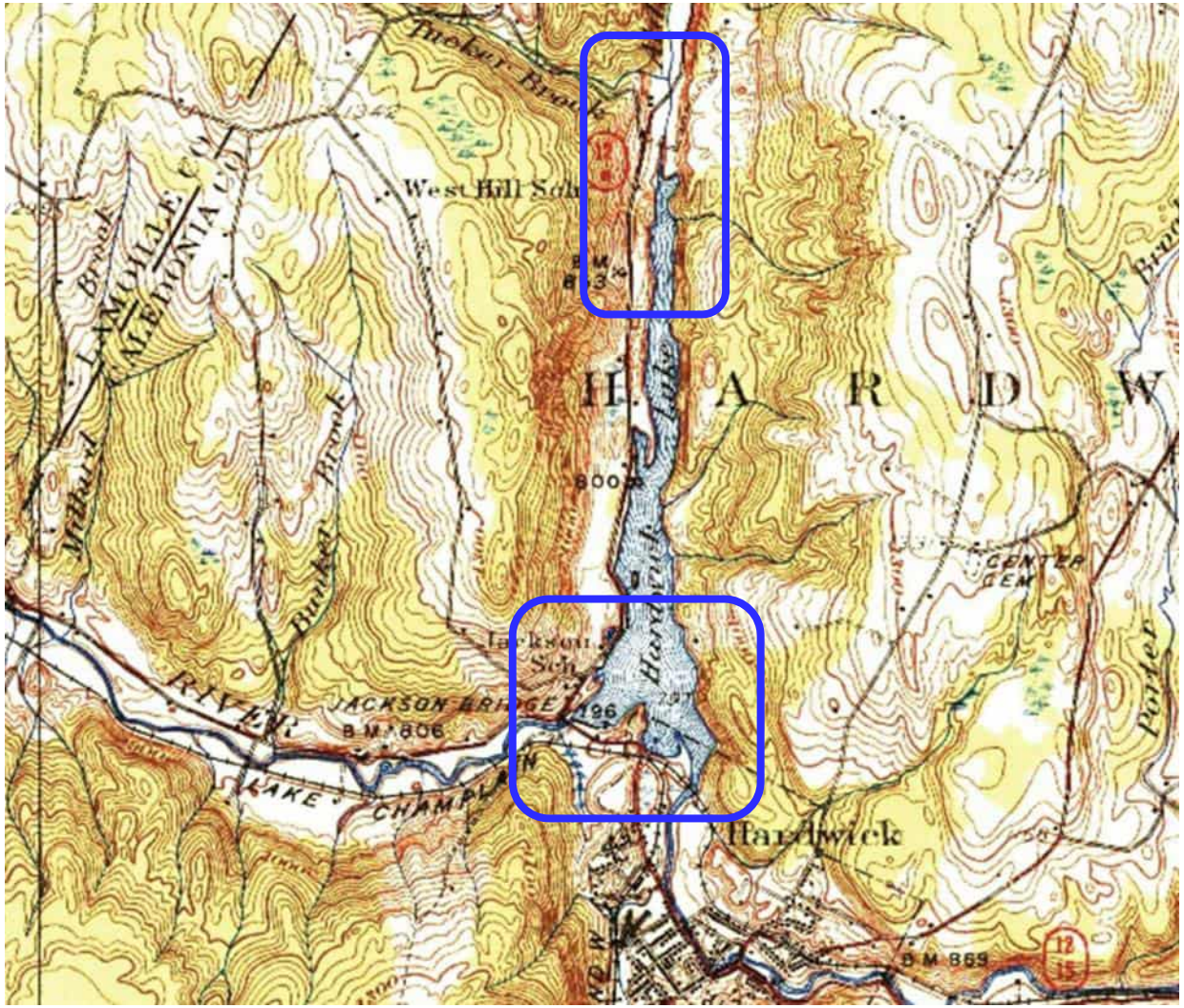
H. F. Walling



1938

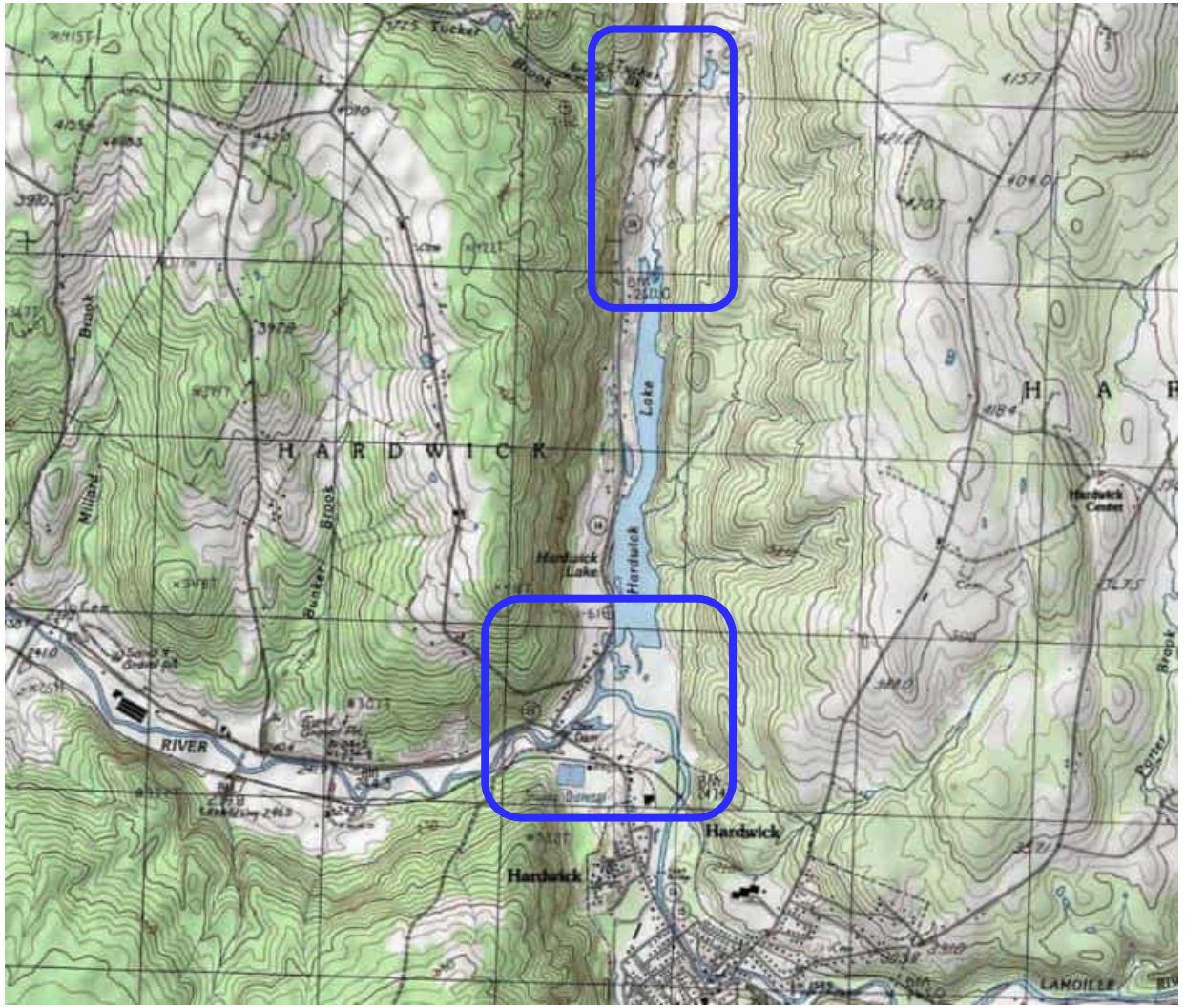
USGS

Changes to Hardwick Lake



1938

USGS



2011

USGS

Sediment Assessment

- Large volume of impounded sediment behind Jackson Dam
- Preliminary sediment probing and prior reports provide wide range of sediment volume estimates

Total impounded sediment estimated in the range of:

620,000 – 2,520,000 CY

If one dump truck carries 14 CY, we would need ~45,000 truck loads to remove 620,000 CY of sediment

If we lined up all these trucks in both lanes of I-89, the line would stretch for almost the entire length of the highway in VT from Highgate to White River Junction

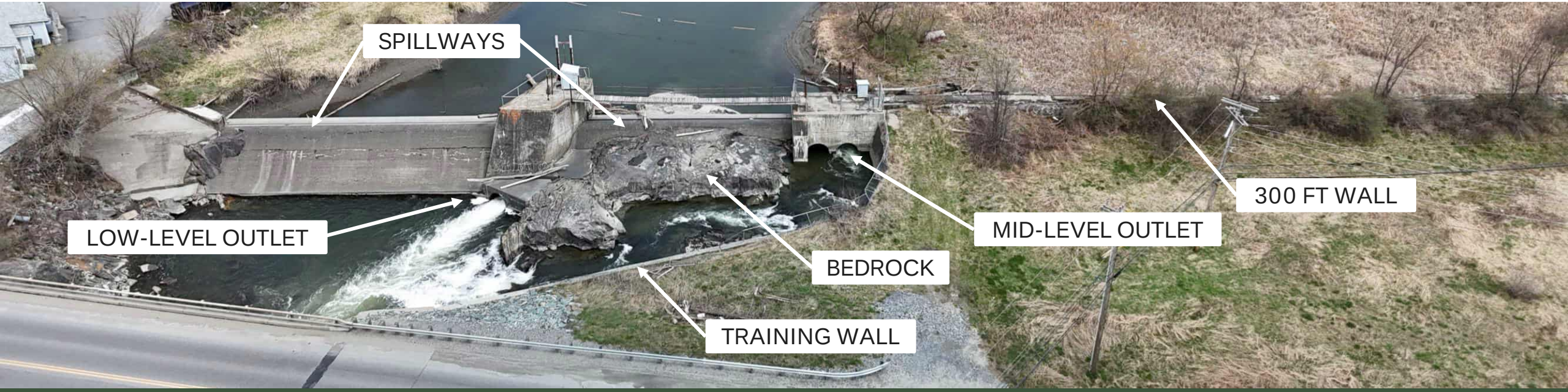


Existing Conditions of Jackson Dam

- Concrete gravity dam founded on bedrock
- Spillways
- Low and mid-level outlets
- Concrete wall extending ~300 feet to the east
- Training wall directs flow through Rt 15 bridge

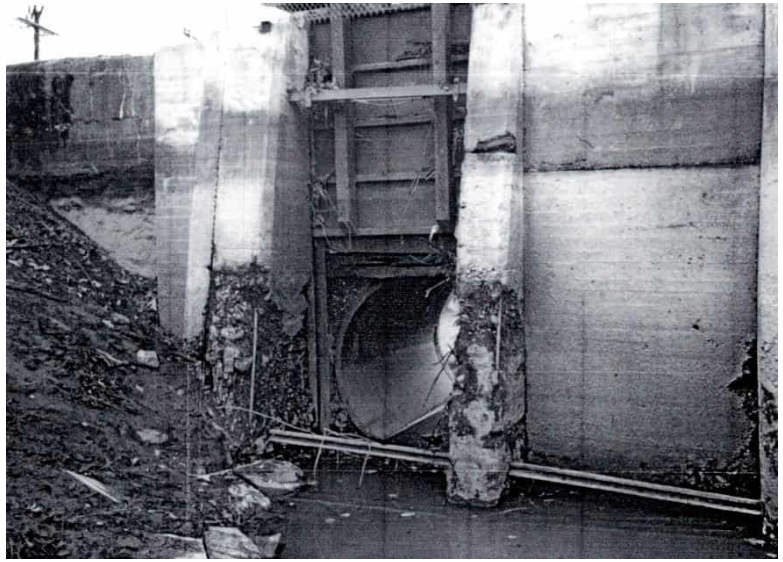
Spillway – part of the dam where water is designed to flow over

Outlet – structure/pipe to release and regulate water from a reservoir



Existing Conditions of Jackson Dam

- Dam inspection in 2001
- Horizontal crack on US and DS face
- Concrete cap from 1952 repairs is failing
- Surface deterioration
- Undermining to the foundation in certain areas





Knight, 2001

Dam Safety Assessment

- Classified as a Significant Hazard Dam
  - Dam failure = property losses and damage to downstream infrastructure
- Dam rated as POOR in dam safety inspections in 2010, 2011, 2015, 2019, 2023, and 2024
- Significant repairs and modifications are required to restore dam to safe operating conditions and to meet dam safety requirements
- Operation at the lower-level year-round was recommended for consideration until a permanent solution can be pursued



Knight, 2001

Current Dam Operations

- Not used in hydropower operations
- Annual winter drawdown for ice jam mitigation



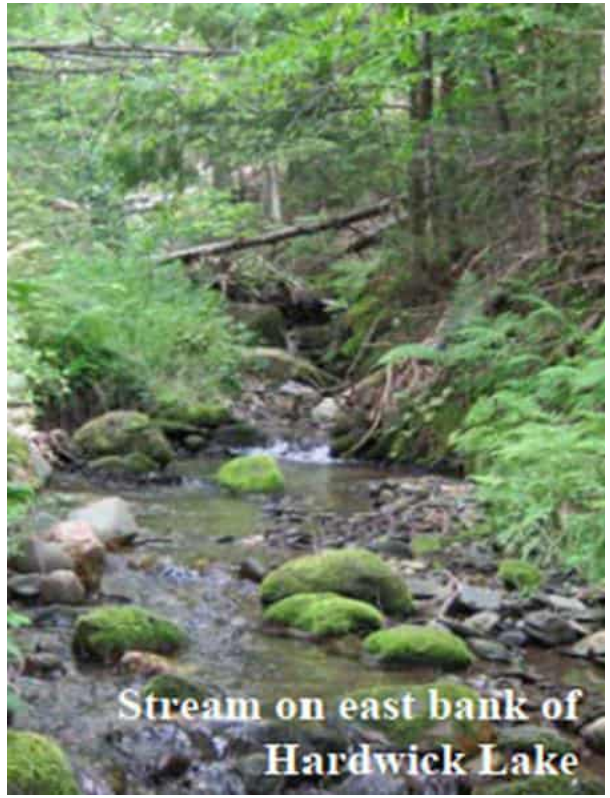
Google, 11/2015

Ecosystem and Wildlife


Tracks along Hardwick Lake


Columbine Hardwick Lake


Sedge meadow along Hardwick Lake shore


Stream on east bank of Hardwick Lake

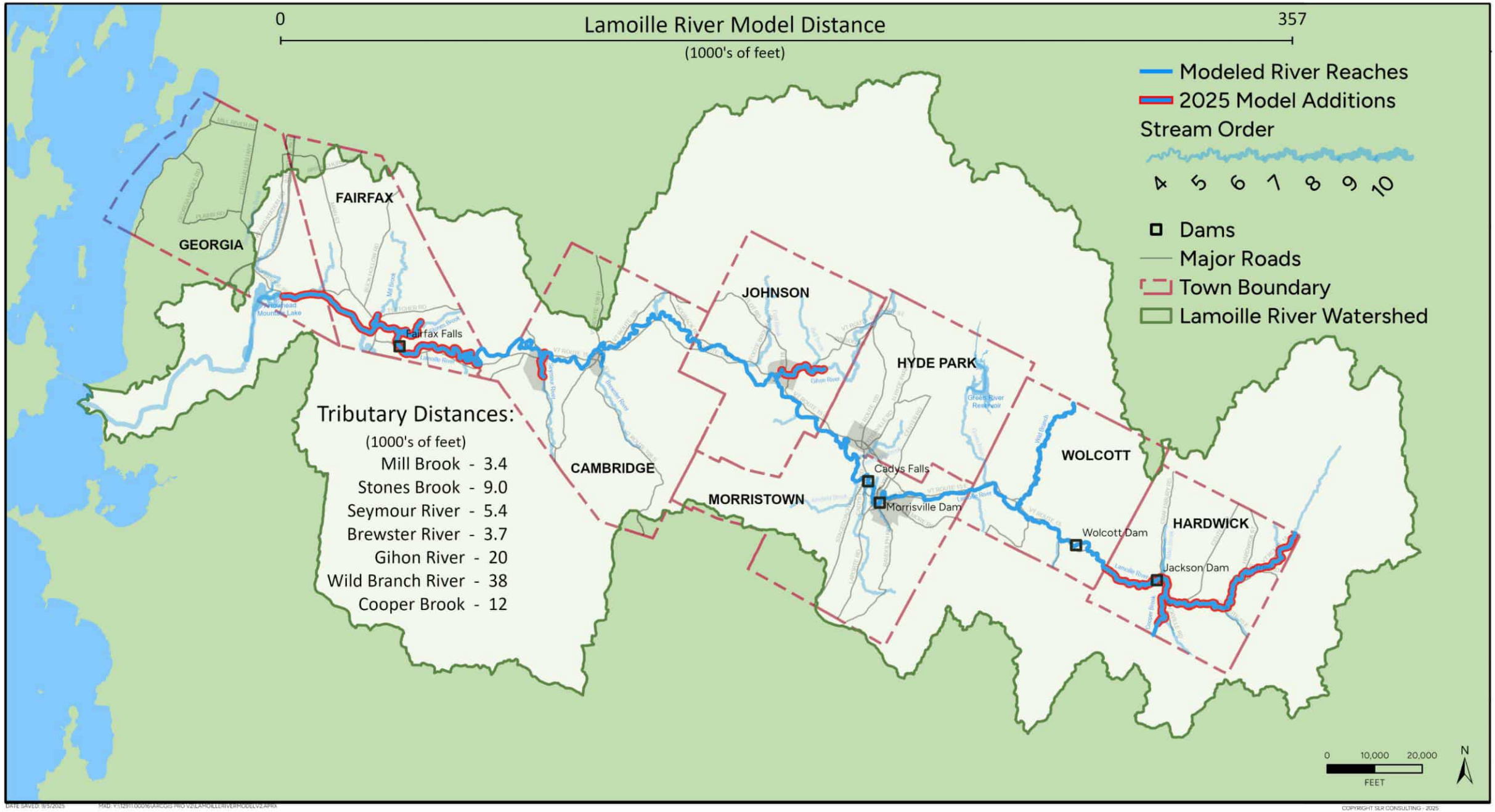
Brown, 2013

- Current ecosystem created by the dam and lake support a variety of plants and animals
- Dam acts as a barrier preventing fish passage and natural sediment transport
- Annual drawdown creates unstable upstream ecosystem and has released fine sediment downstream smothering habitat

Why this matters now?



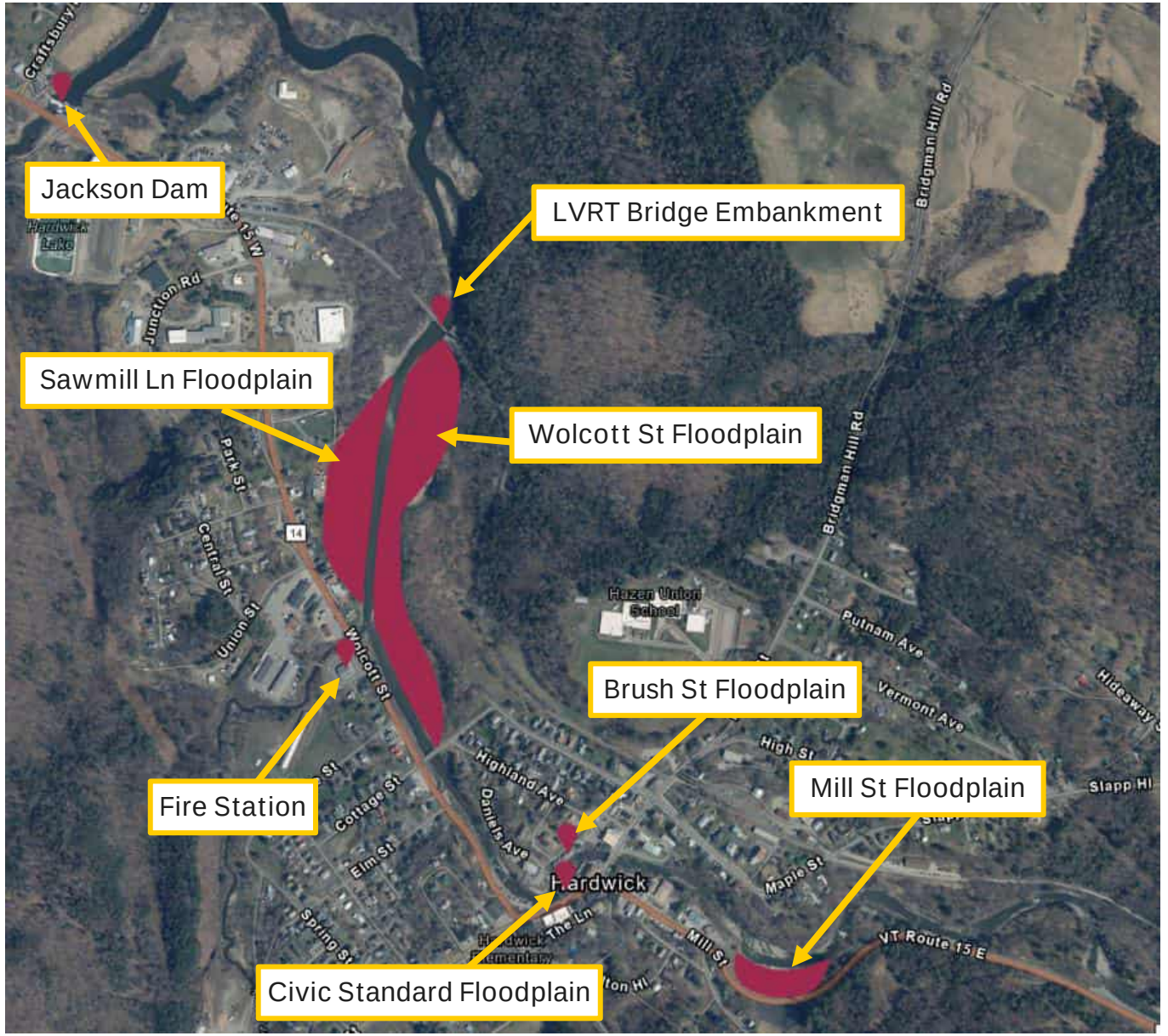
AOT, 7/11/2024



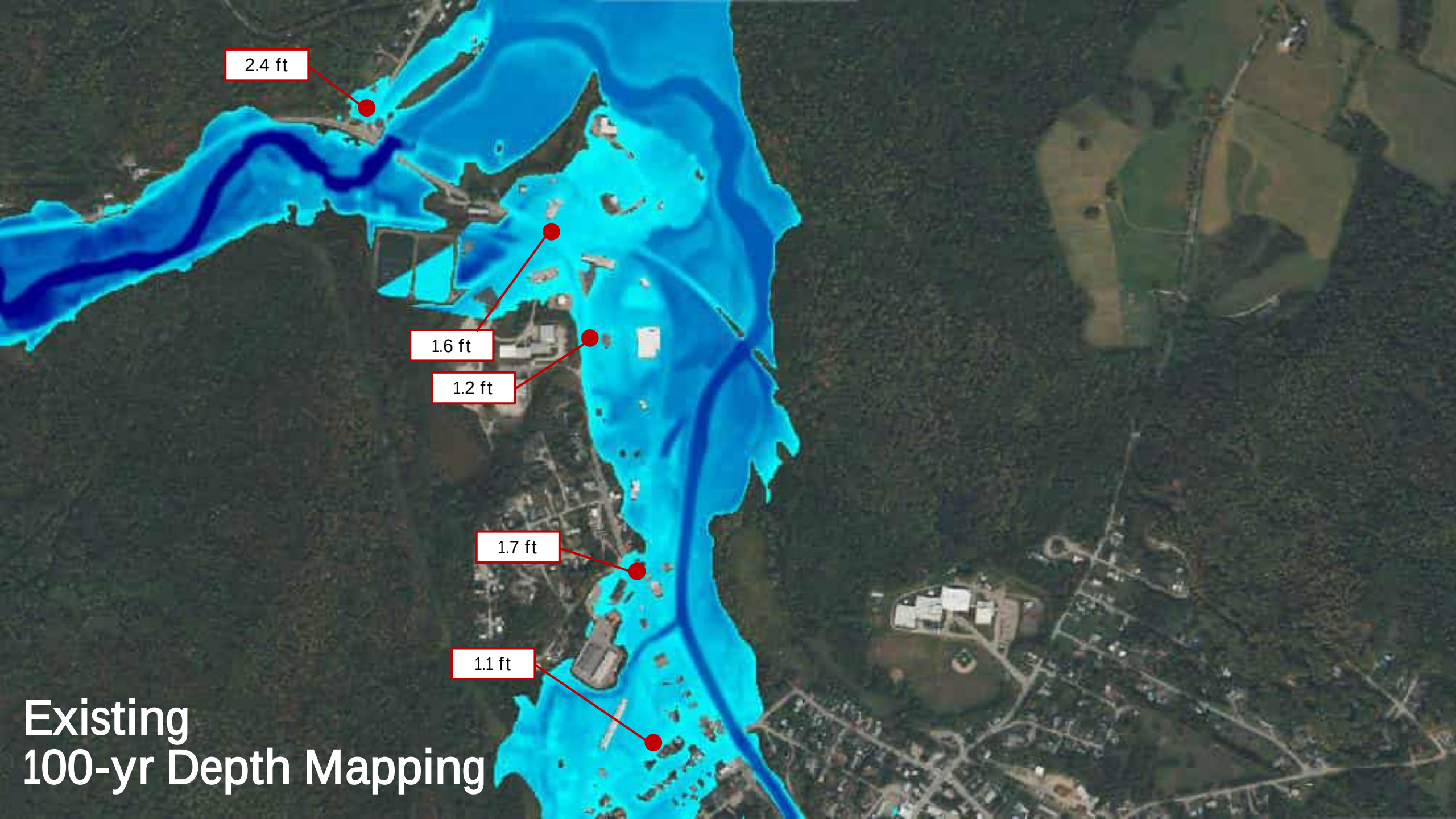
COPYRIGHT SLR CONSULTING - 2025

Potential Flood Mitigation Alternatives in Hardwick

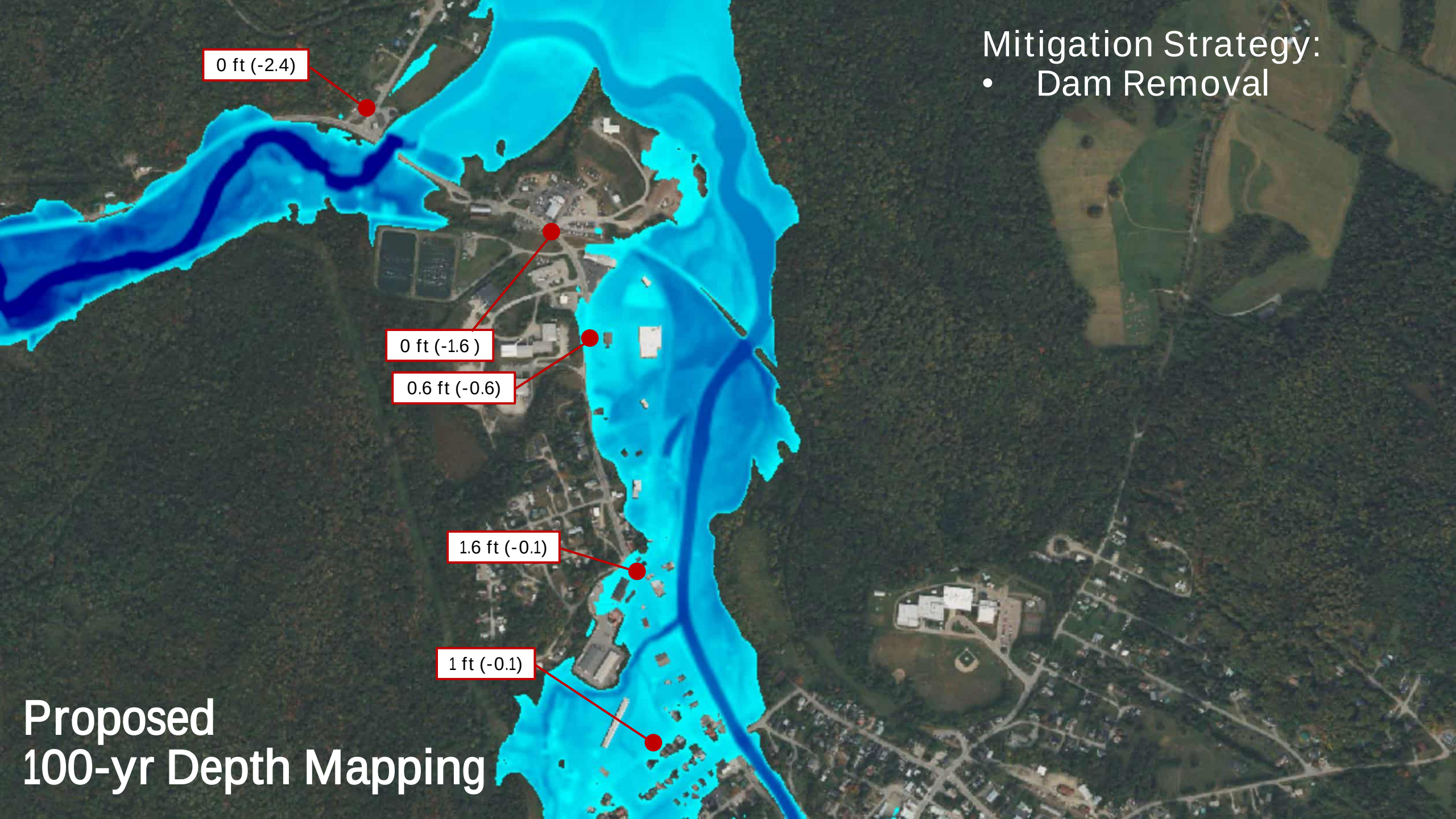








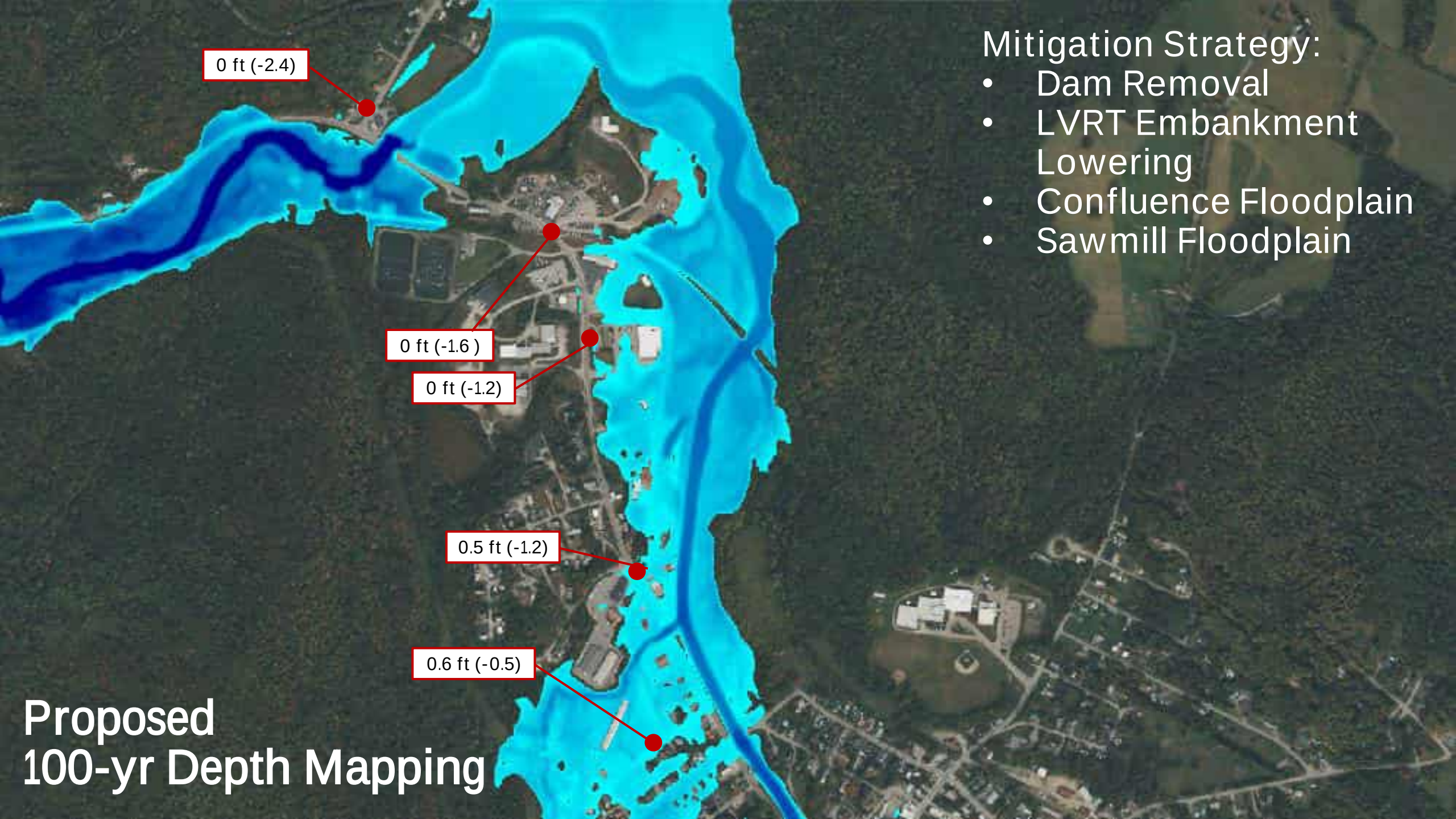
Existing
100-yr Depth Mapping



Mitigation Strategy:

- Dam Removal

Proposed 100-yr Depth Mapping



Proposed 100-yr Depth Mapping

Mitigation Strategy:

- Dam Removal
- LVRT Embankment Lowering
- Confluence Floodplain
- Sawmill Floodplain

Feasibility Study Summary

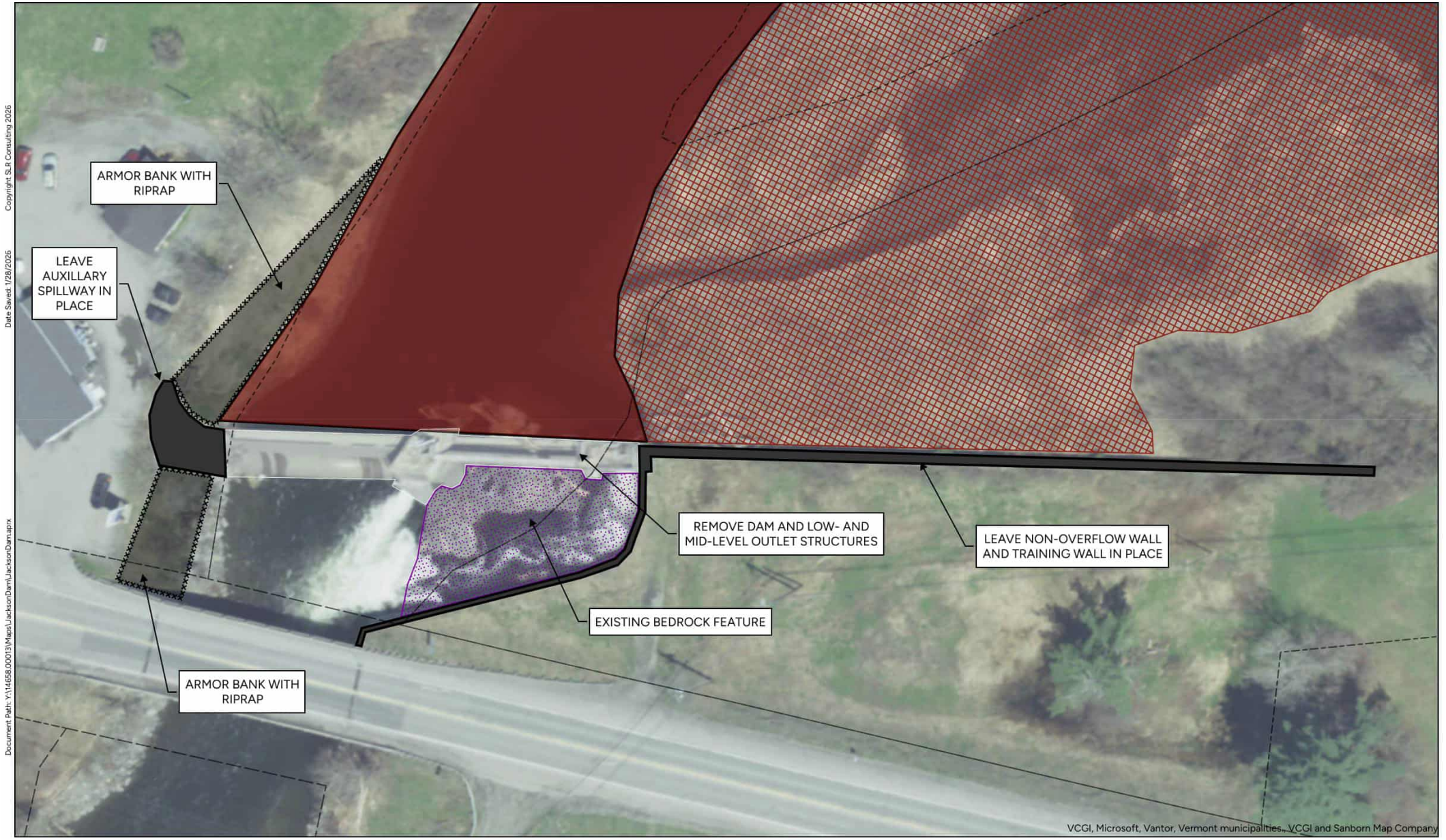
- This is a large scale and more complex project than other dam removal projects in Vermont
- Phased drawdown with adaptive management approach is recommended
- The “do nothing” approach is not recommended
- Given the dam’s deteriorating condition and hazard classification action must be taken to avoid the risks associated with an uncontrolled failure
- Dam removal would reduce risks, increase flood resilience, restore ecological function, and improve long-term river stability

Dam Removal









Copyright SLR Consulting 2026

Date Saved: 1/28/2026

Document Path: Y:\114658.00013\Maps\JacksonDam\JacksonDam.aprx

Jackson Dam Removal Concept Design - Dam

Jackson Dam Removal Feasibility Analysis

Caledonia County Natural Resources Conservation District

Channel Sediment Removal Depth (ft)

- 0-3
- 0-4
- 0-5
- 0-8

- Floodplain Sediment Removal
- Sediment to Stabilize in Place
- Proposed Riprap
- Existing Bedrock
- Vermont Parcels

0 40 80

FEET

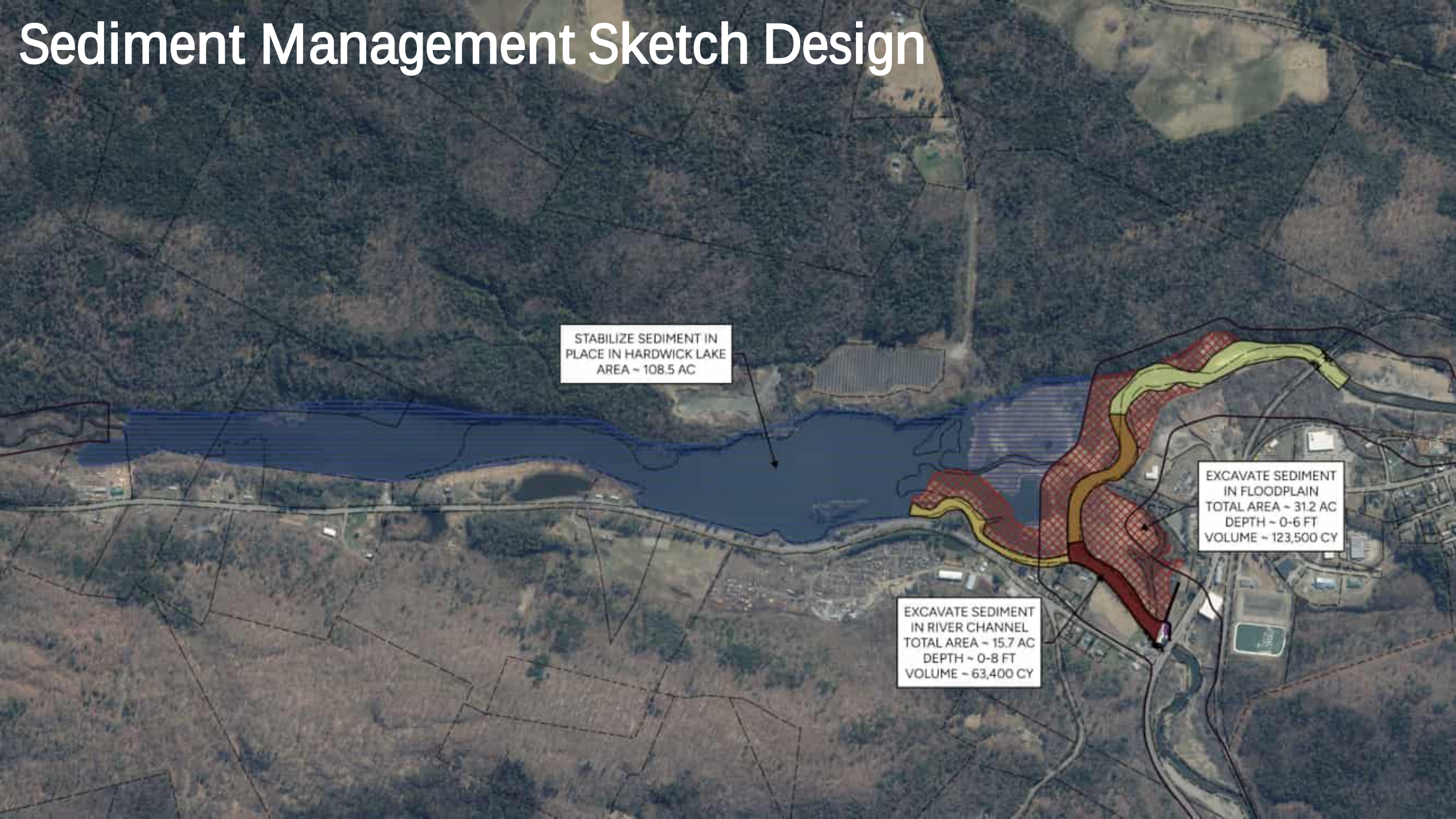
1 IN = 40 FT

N

SLR

1 SOUTH MAIN STREET
WATERBURY VT, 05676

Sediment Management Sketch Design



Phased and adaptive approach: drawdown the dam to re-evaluate key design components

- Drawdown supported by Dam Safety Engineers as a risk mitigation measure
- Phased drawdown would allow for consolidation and stabilization of sediment
  - Reevaluate sediment removal volumes
  - Identify areas that should be excavated or require further stabilization
- Exposed sediment would have the opportunity to revegetate naturally throughout a full growing season
  - Identify areas to actively plant



Task	Description
1.0	Data Collection & Field Reconnaissance
1.1	Section survey and sediment probing (17 cross sections)
1.2	Infrastructure and resource conflicts
1.3	Sediment samples (15 samples)
1.4	Survey dam, bridge, and sediment end points (set pins)
1.5	River walk/ paddle to review geomorphology
1.6	Plant and invasive inventory
1.7	Existing conditions base map
2.0	Hydraulic Analysis
2.1	Hydrology updates
2.2	Existing hydraulic model updates with new survey
2.3	Model validation with recent flood data
2.4	Prepare inundation maps
2.5	Existing conditions technical memo
2.6	Project team meeting, virtual
3.0	Hydrology / Storage Analysis
3.1	Hydrograph development (S, M, L Floods)
3.2	Model change of dam storage to floodplain storage
3.3	Unsteady 1D model, add hydrographs to EX model
3.4	Evaulation of downstream impacts
3.5	Hydrology / Storage technical memo
3.6	Project team meeting, virtual
4.0	Dam Removal Alternatives and Concept Design
4.1	Alternatives analysis (full dam removal, with 2 sediment alternatives)
4.2	Project team, virtual
4.3	Regulator and interested parties meeting, in person
4.4	Review of well logs and impact of impoundment change
4.5	Concept design (30%), plan, sections, profile
4.6	Initial engineer's opinion of cost
4.7	Summary memo update, implementation plan
4.8	Project team, virtual
4.9	Public meeting, in person
5.0	Drawdown Design
5.1	Drawdown design draft, erosion control and phasing
5.2	Project team and regulator meeting
5.3	Drawdown Final design and cost (90%)
6.0	Drawdown Permit Assistance
6.1	USACE
6.2	VTDEC Water Quality Certification
6.3	VTDEC Dam Safety
6.4	VTDEC Stream Alteration
6.5	VTDEC Wetlands
6.6	VTDEC Construction General Permit?
6.7	Town Zoning / NFIP
6.8	Plan edits (100%)

Next Steps:

1. Data Collection & Field Work
2. Hydraulic Analysis
3. Hydrology/Storage Analysis
4. Dam Removal Alternatives & Concept Design
5. Drawdown Desing
6. Drawdown Permit Assistance
7. Wetland Delineation

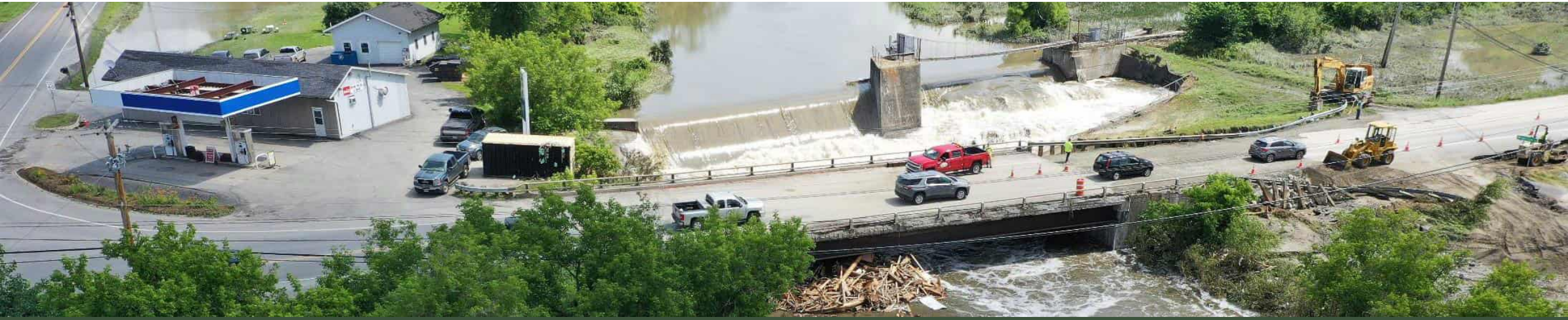
Infrastructure

What we know:	Questions we still have:	How we plan to answer them:
Dam removal would impact surrounding infrastructure	How will dam removal impact upstream and downstream bridges and culverts?	Inspect bridges and evaluate river velocities to determine if armoring or other protection measures are necessary
	How will dam removal impact nearby private wells?	Review well logs and assess how changes to impoundment will impact wells



Flooding

What we know:	Questions we still have:	How we plan to answer them:
Dam removal would lower water levels upstream and provide flood storage during flood events	How does dam removal impact downstream communities? How much flood storage is available with and without the dam?	Develop a hydrologic model to determine how flood storage will change and impact those downstream
	How will flood patterns change with dam removal?	Develop a 2D hydraulic model to evaluate flood conditions with and without the dam



Ecosystem

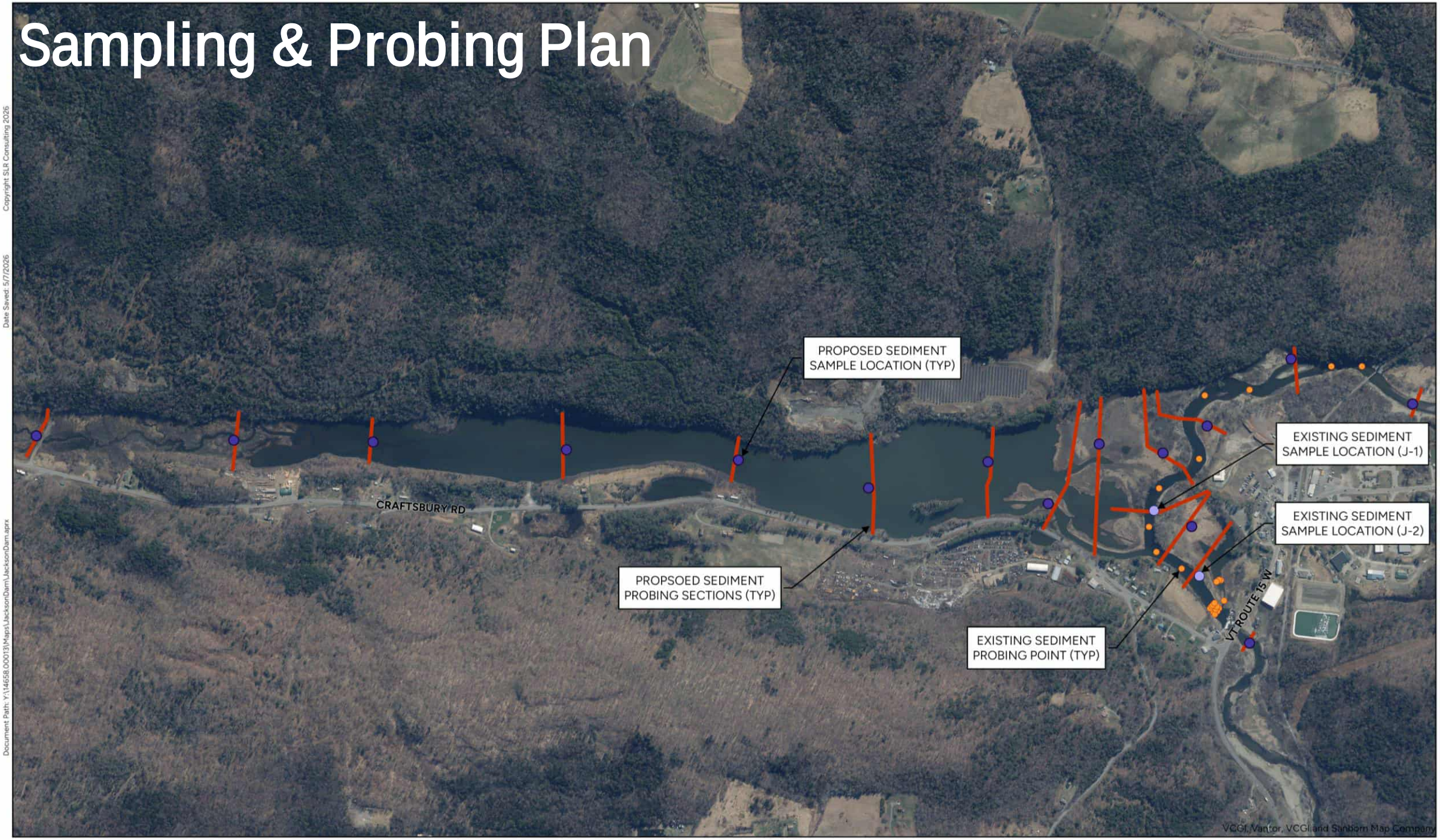
What we know:	Questions we still have:	How we plan to answer them:
Dam removal would impact the ecosystem in Hardwick Lake, Alder Brook, and the Lamoille River	What plant species are in the upstream seed bank that would revegetate areas naturally? Are there invasive species?	Assess and inventory plant species upstream of the dam and bordering Hardwick Lake
	Is fish passage possible with dam removal?	Survey the river near the dam to determine if the bedrock feature under the dam would support fish passage
	What would Hardwick Lake look like if the dam was removed?	Document existing revegetation in historic impoundment extent and evaluate proposed river slopes to determine if a smaller pond may remain



Sediment

What we know:	Questions we still have:	How we plan to answer them:
There is a large volume of sediment impounded behind Jackson Dam	How much sediment is behind the dam?	More comprehensive sediment probing to refine sediment volume estimate
	If the dam was removed, how much sediment would need to be excavated?	Identify areas where sediment may stabilize naturally
	Will dam removal or drawdown release sediment downstream?	Identify areas likely to mobilize and refine sediment removal and active stabilization plan
	Is the sediment contaminated?	Sample sediment and test for contaminates

Sampling & Probing Plan



Copyright SLR Consulting 2026
Date Saved: 5/7/2026
Document Path: Y:\146658.00013\Maps\JacksonDam\JacksonDam.aprx

What would drawdown look like?

Orleans NRCD, 5/3/2026

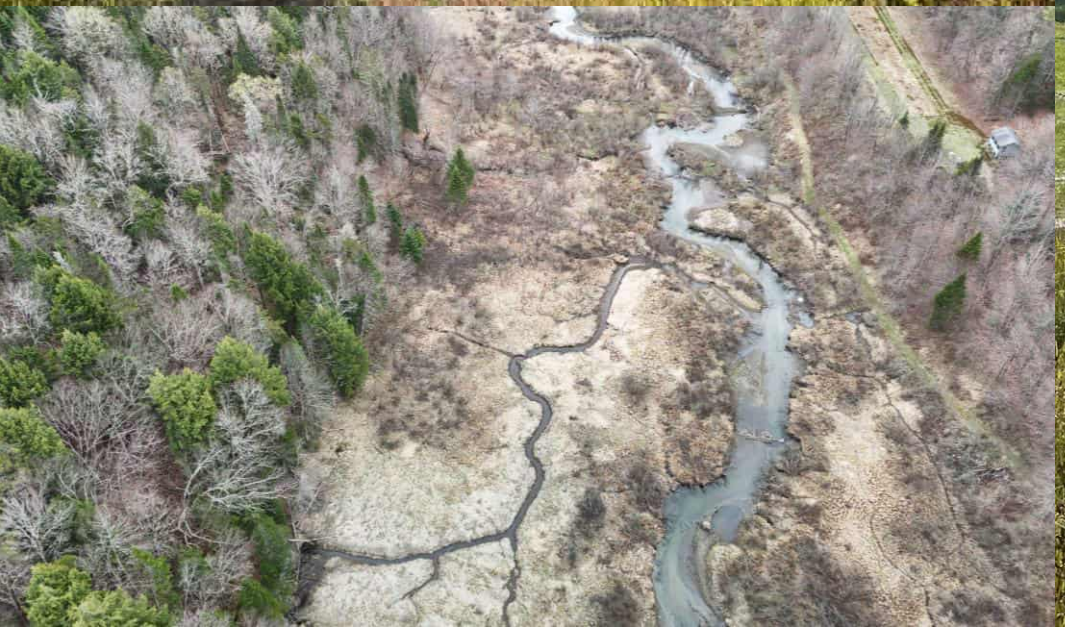



Orleans NRCD, 5/3/2026


Orleans NRCD, 5/3/2026

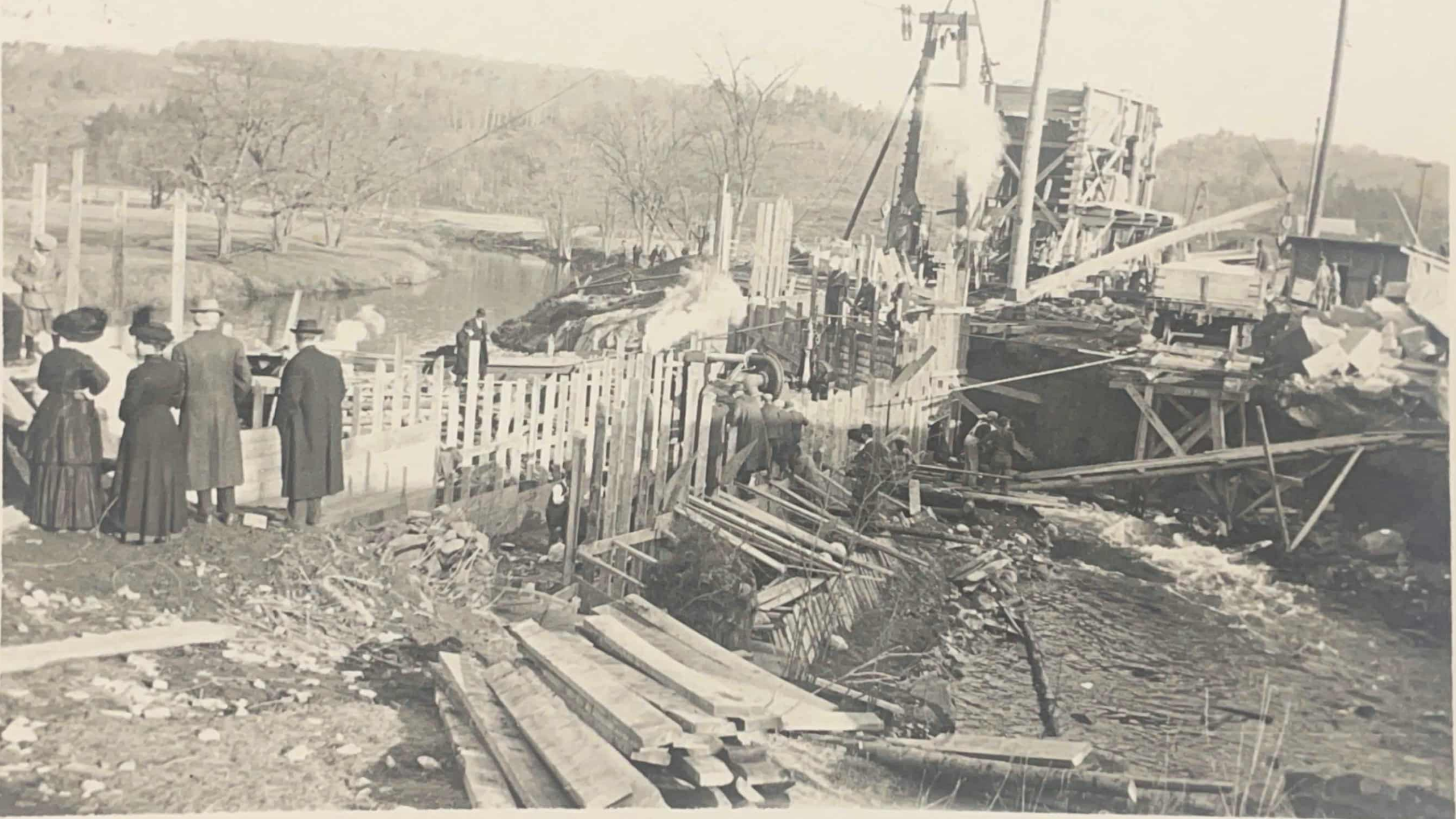
Natural Revegetation



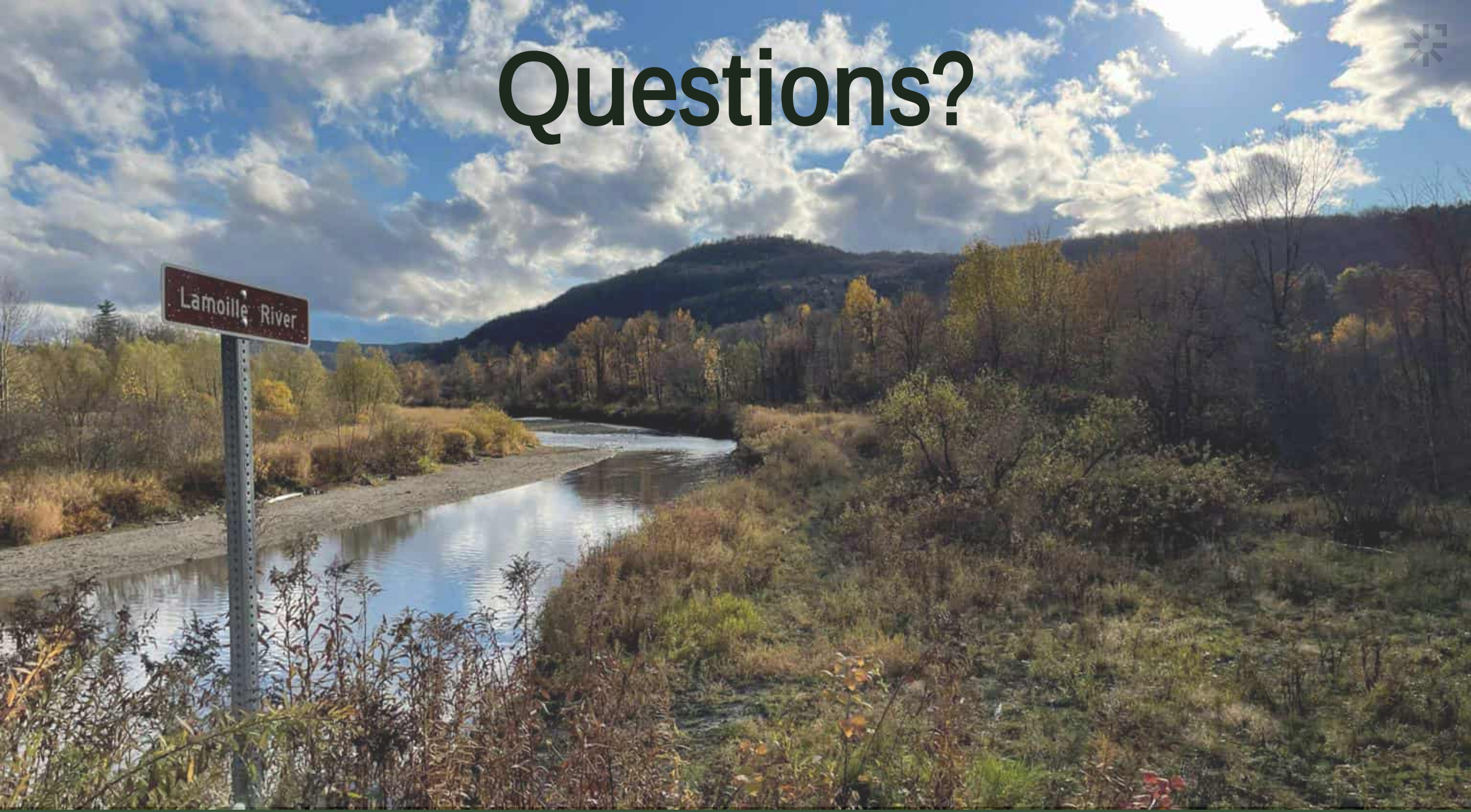






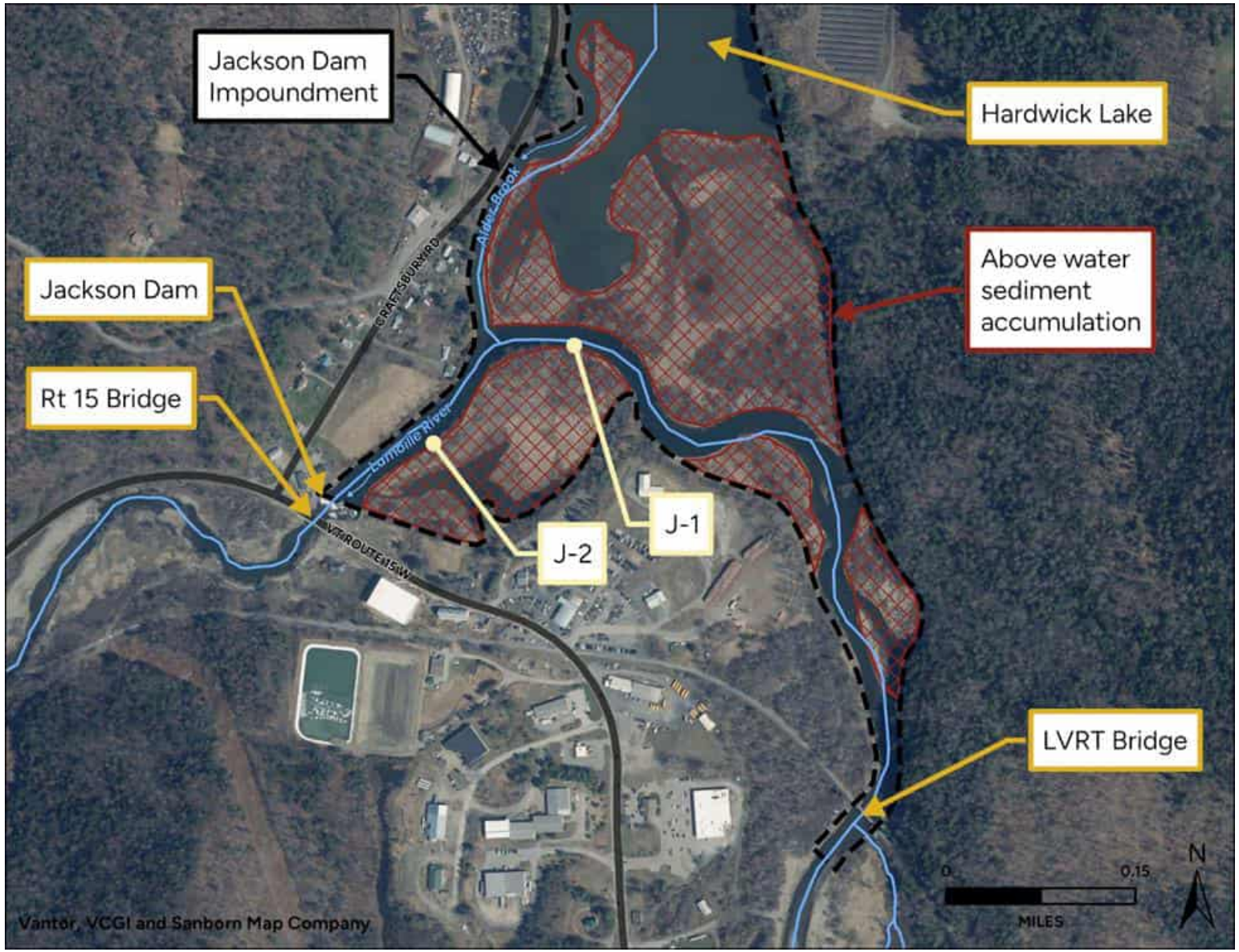


Questions?



Extra Slides

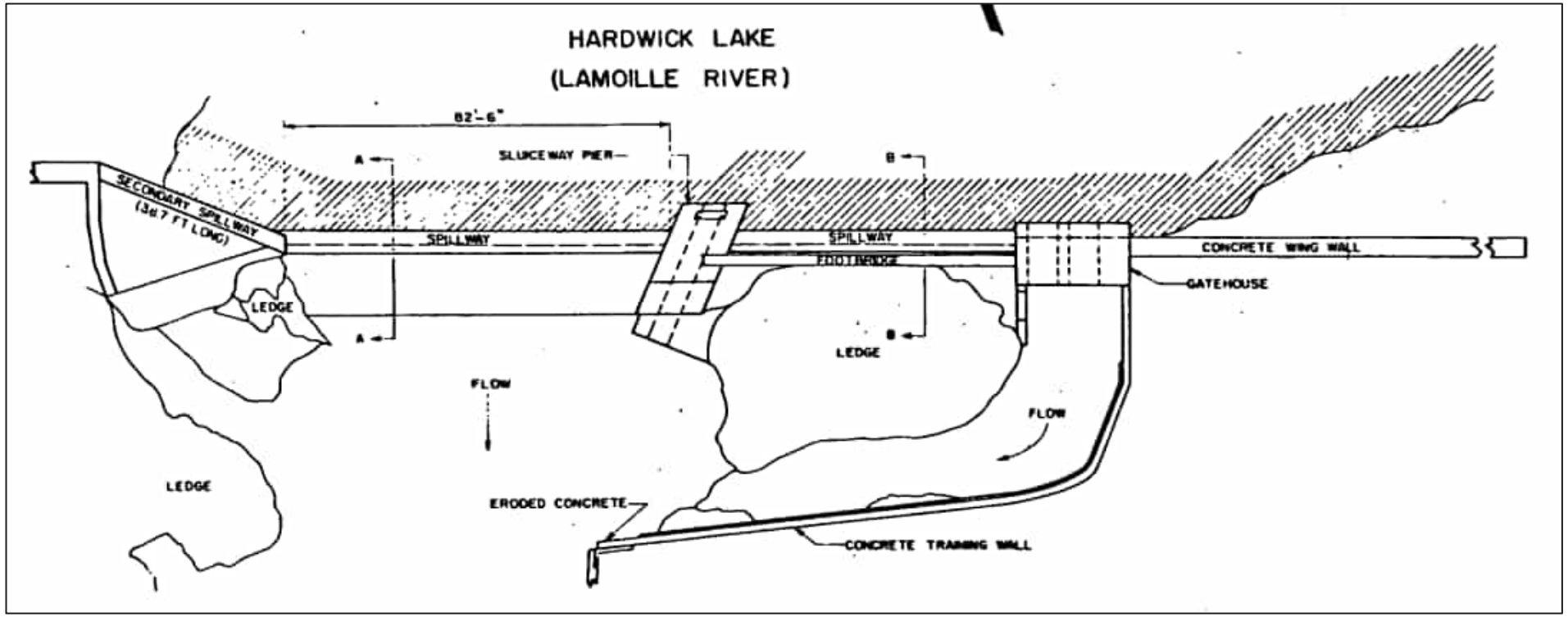
Existing Conditions of Hardwick Lake

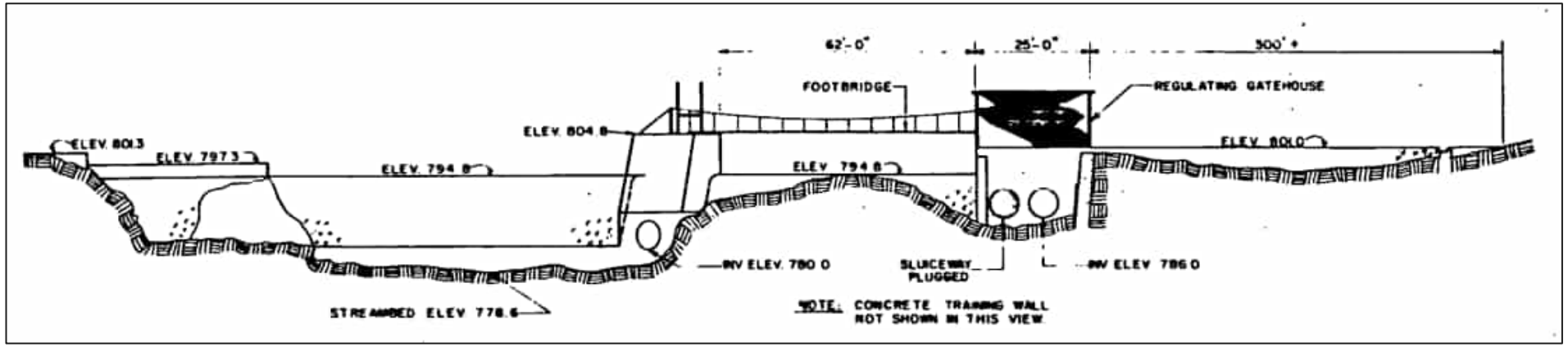




- Extensive sediment deposition
- Deep sediment-filled channel on the Lamoille
- Lake has a max depth of ~7 feet

Existing Conditions of Jackson Dam





- Total length ~523 feet
- Max height ~23 feet

USACE, 1980 from the 1952 repairs

Existing Conditions of Jackson Dam

- Engineers at DuBois & King Inc. recommended repair of the dam based on deficiencies identified in the dam inspection
- Repairs include:
  - Remove the concrete cap and repair the foundation in the main spillway
  - Repairs to the 300-foot non-overflow wall
  - Structural concrete repairs to the mid-level outlet structure
  - Repairs of the outlet gate

2001 Repair Cost Estimate
~$600,000

Repair costs would be significantly higher today



Knight, 2001

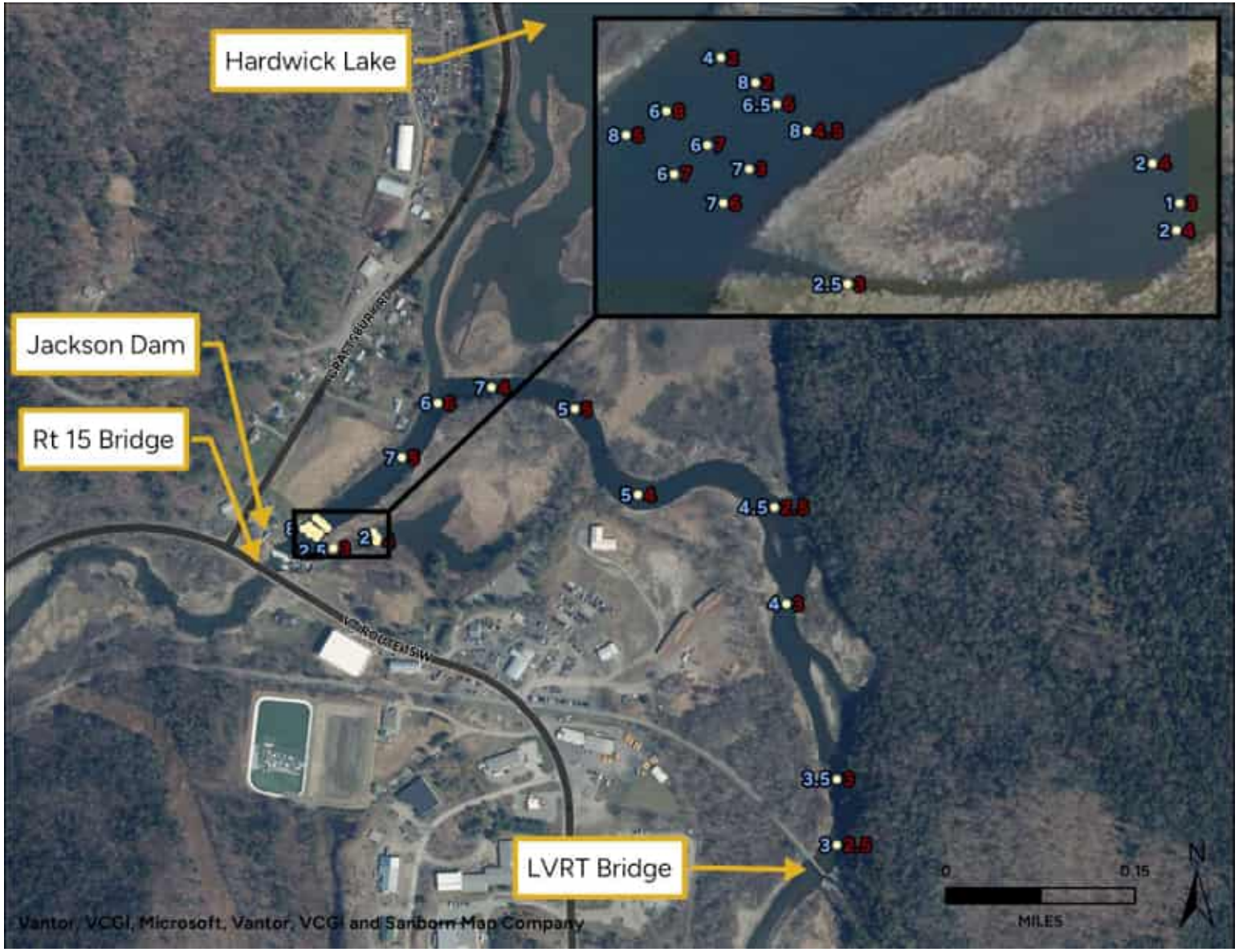
Dam Safety Assessment

- Classified as a Significant Hazard Dam
  - Dam failure = property losses and damage to downstream infrastructure
- Dam rated as POOR in dam safety inspections in 2010, 2011, 2015, 2019, 2023, and 2024
- Significant repairs and modifications are required to restore dam to safe operating conditions and to meet dam safety requirements
- Operation at the lower-level year-round was recommended for consideration until a permanent solution can be pursued

Based on the studies and analysis recommended above, repair, rehabilitate, or replace the dam to bring it into compliance with current dam safety rules and guidance. Alternatively, consider pursing dam removal.

Dam Safety Program, 2024

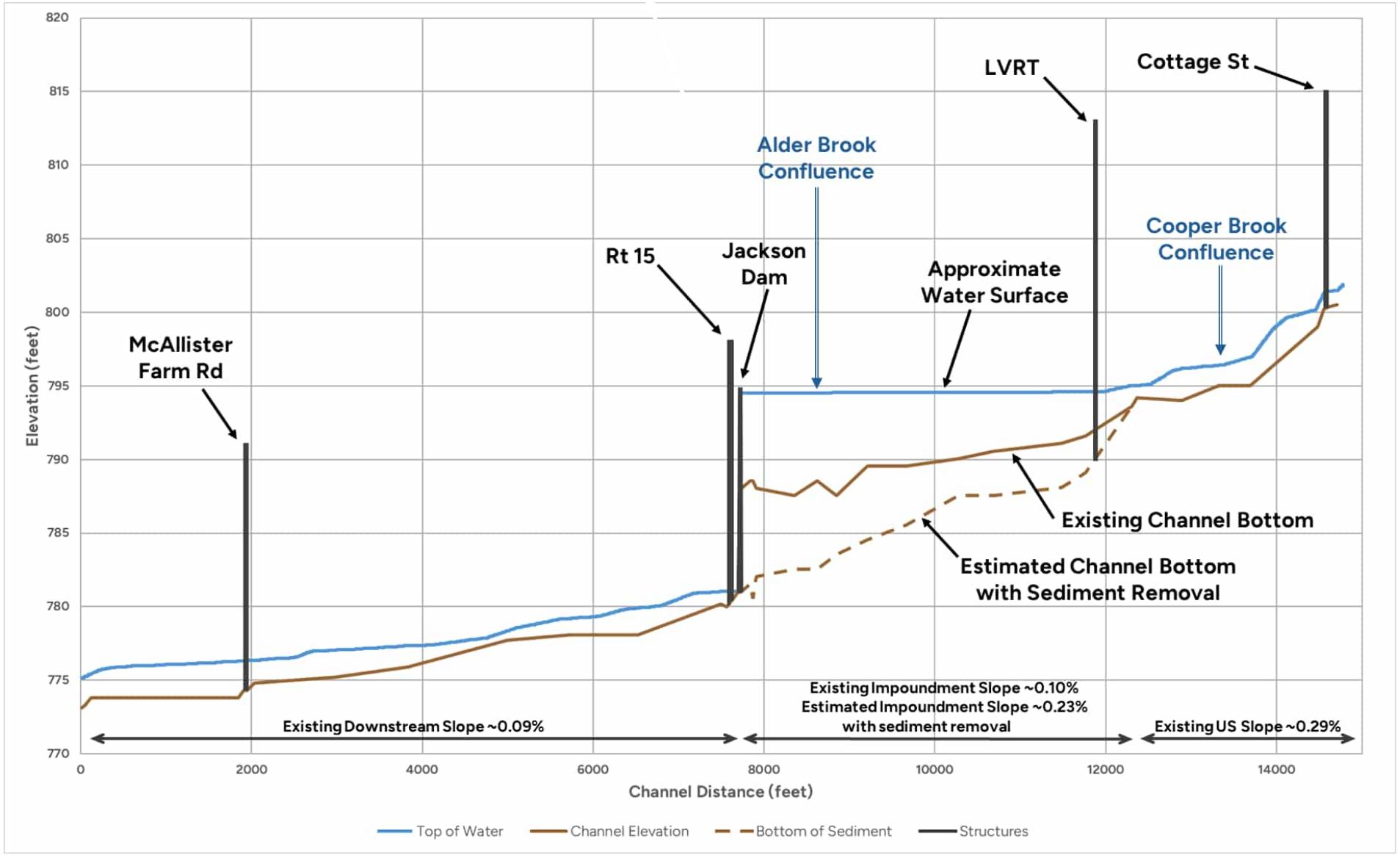
Sediment Assessment



- Sediment probing upstream of dam
- Measures water and fine sediment depth
- Water depth ~1-8 feet
- Sediment thickness ~2-8 feet

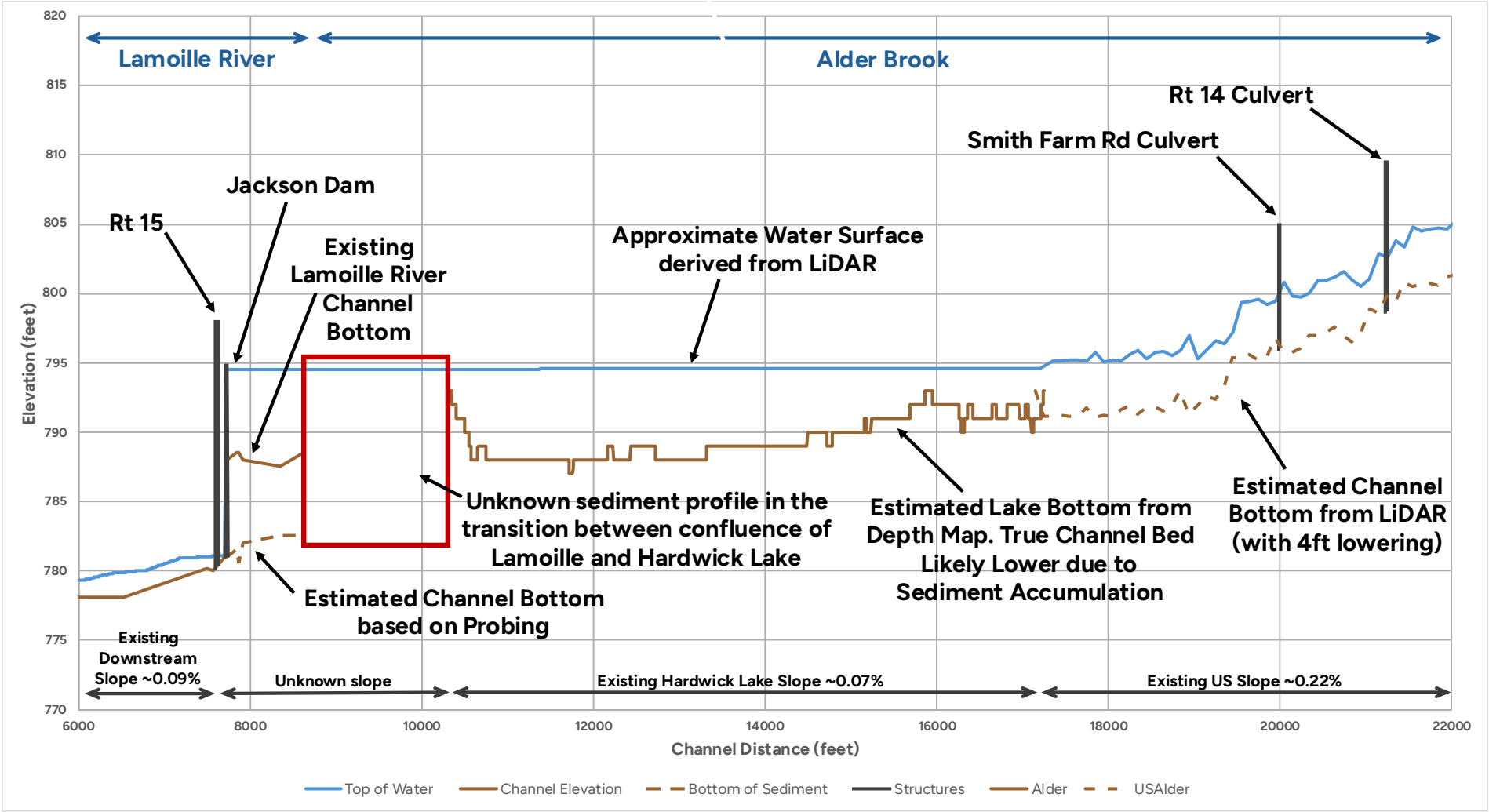
Sediment Assessment

- Lamoille River profile
- Wedge of sediment behind the dam
- Bottom of probing points indicates historic channel slope



Sediment Assessment

- Alder Brook Profile
- Lake bottom estimated from depth map
- Data gap in confluence area due to lack of probe points

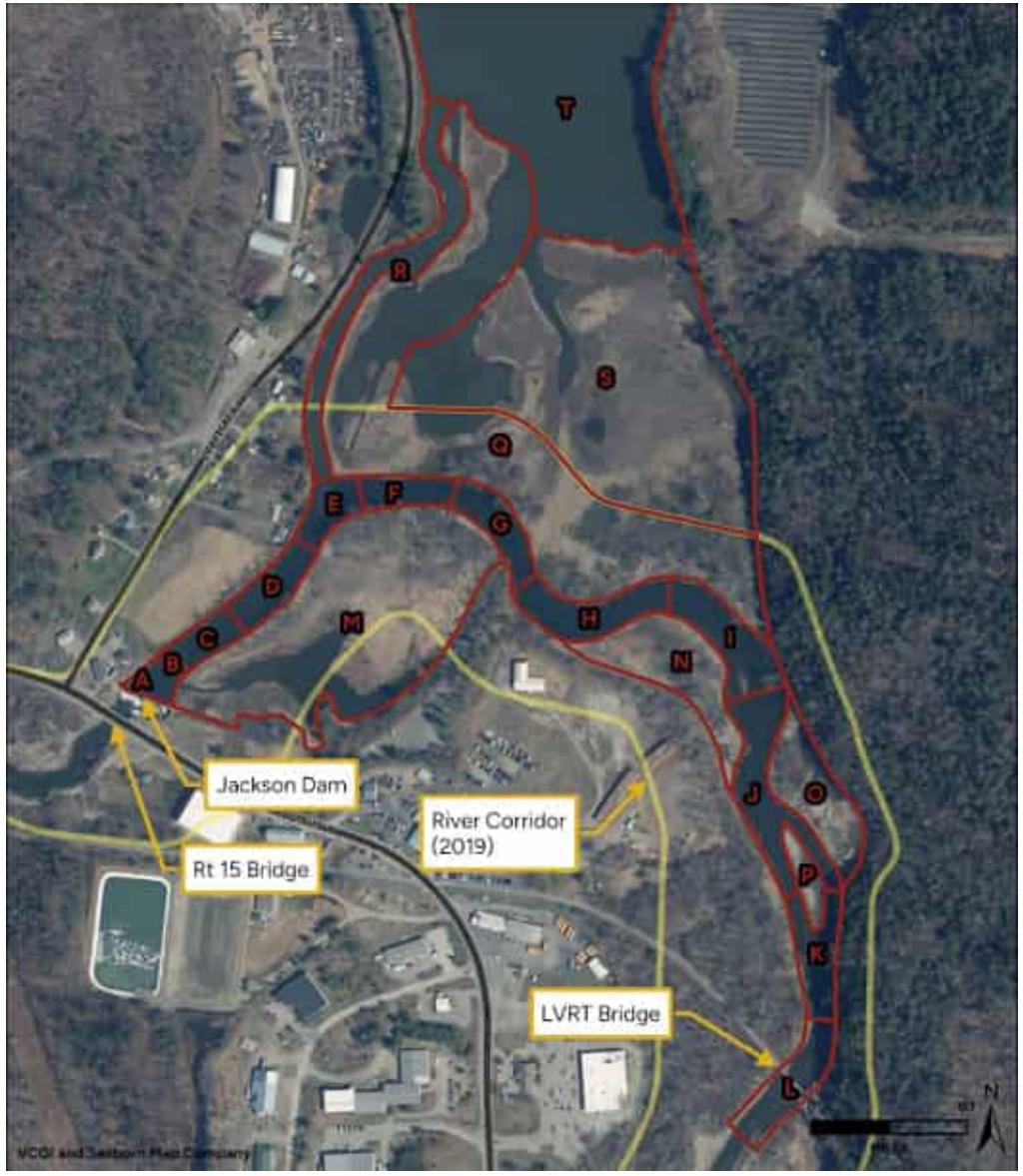


Sediment Assessment

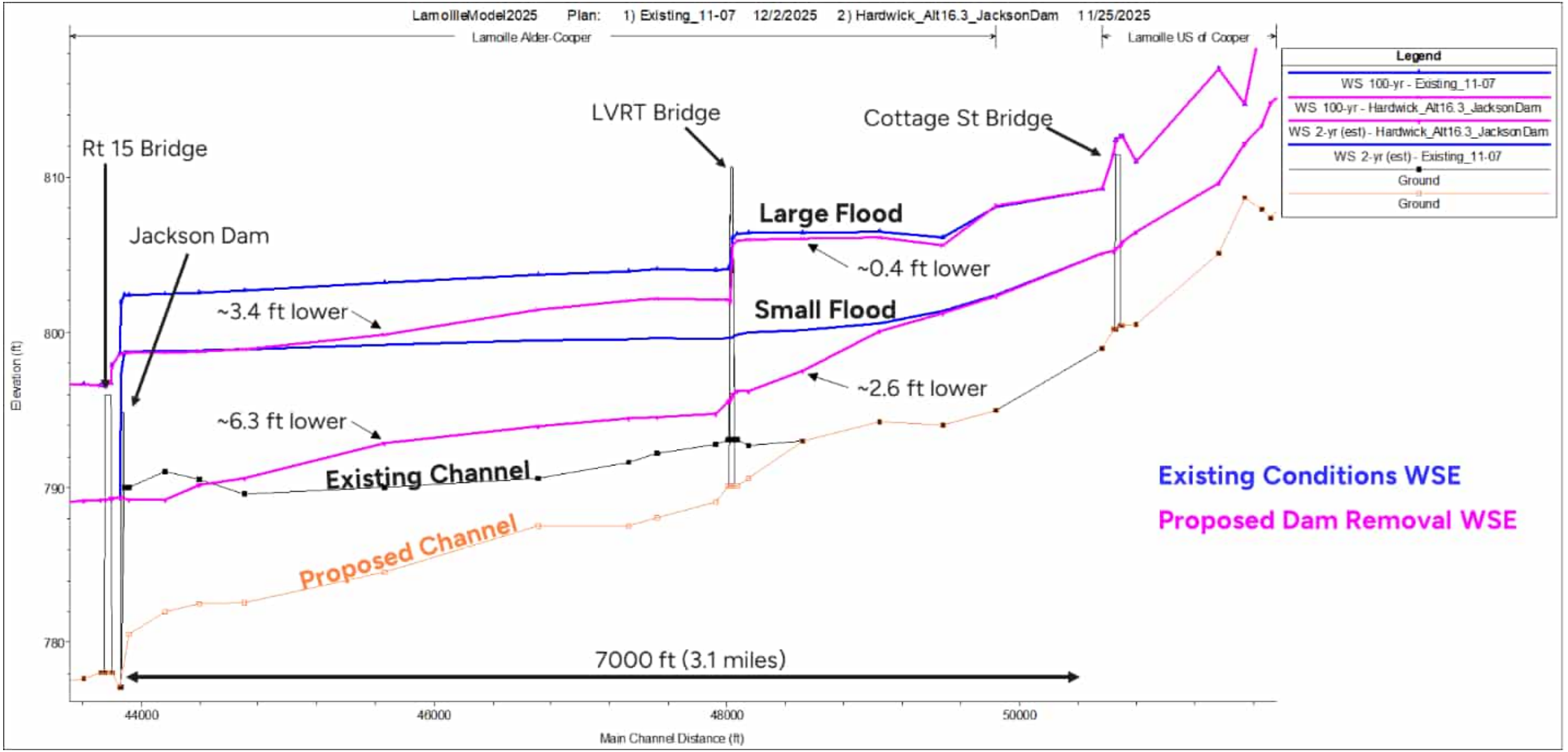
- From probing, sediment volume estimate is approximately 640,000 cubic yards
  - Likely an underestimate of total impounded sediment
  - Does not include sediment upstream in Hardwick Lake
- Report from 1949 estimates 2,520,000 cubic yards
  - Unclear how this was estimated
- Analysis of mean annual sediment yield in the upstream watershed estimates 620,000 cubic yards

Total impounded sediment estimated in the range of:

620,000 – 2,520,000 CY



Flood Mitigation



Targeted Sediment Removal and Stabilization in Place

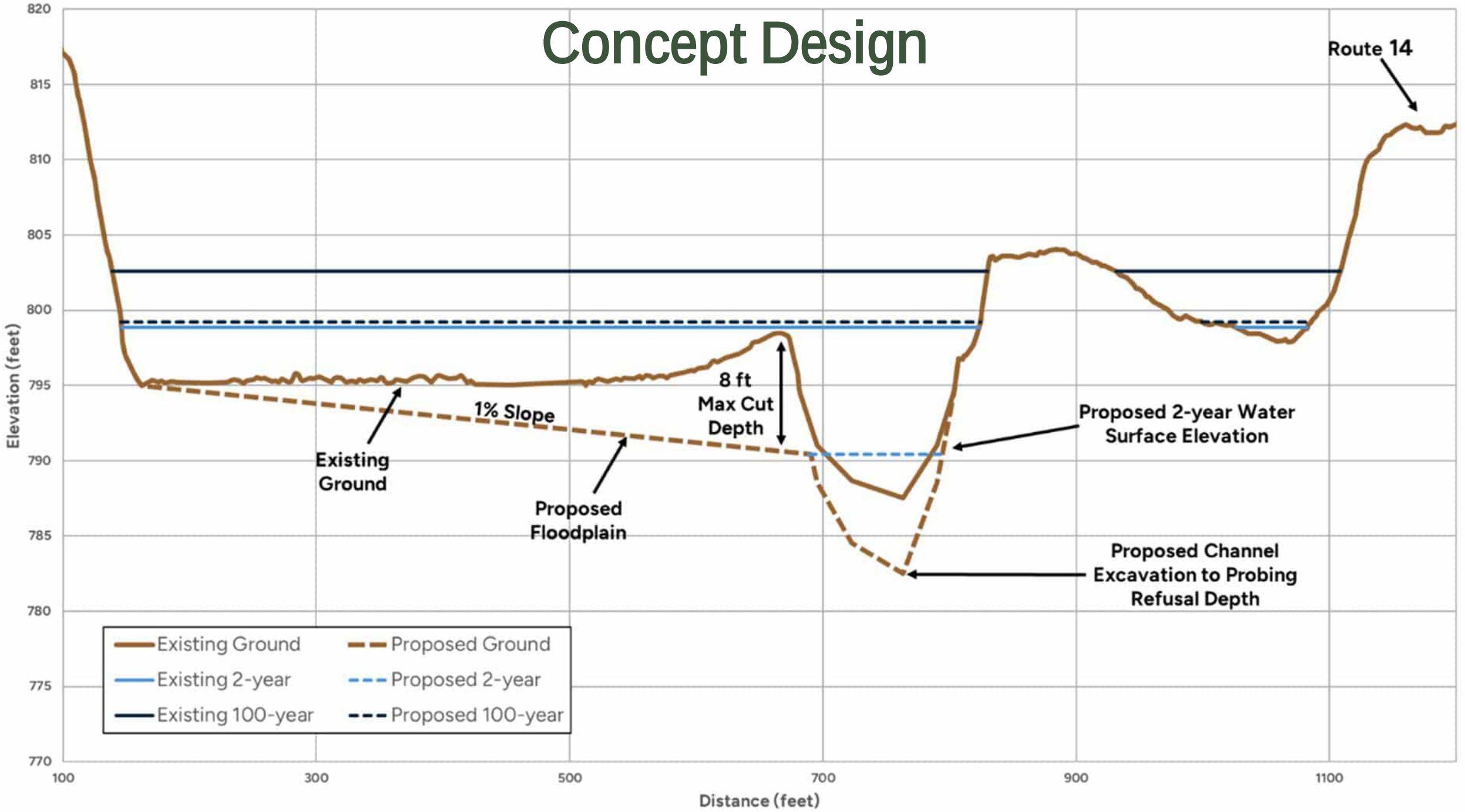


Brown, 2013

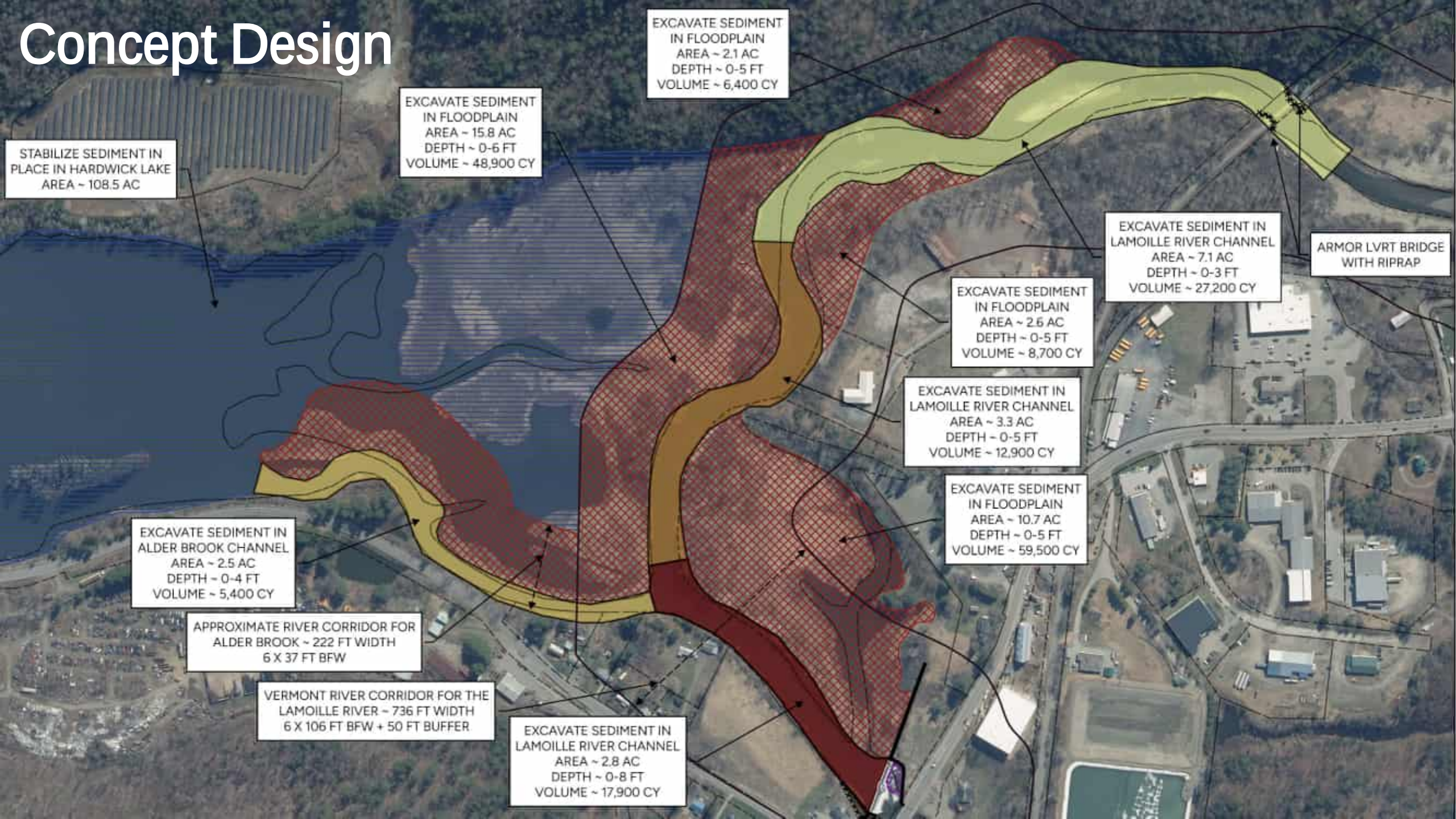
- Excavate and remove sediment in channel and floodplains to prevent downstream environmental impacts
- Stabilize in place sediment that is least likely to mobilize
- Phased approach would allow for natural site stabilization paired with target sediment removal

This alternative is recommended

Concept Design



Concept Design



Cost Estimate

Cost of dam removal construction is between $4-9 million

- Costs include site preparation, removing the dam, infrastructure protection, engineering design and permitting

- Project cost driven by level of sediment removal and site restoration approach
  - Sediment removal costs range $1,500,000-$4,500,000
  - Site restoration costs range $50,000-$1,500,000

Survey Plan



Copyright SLR Consulting 2026
Date Saved: 5/7/2026
Document Path: Y:\14658.00013\Maps\JacksonDam\JacksonDam.aprx