



Background

The Great Dam is located in the Exeter River at the center of Exeter’s business district, just upstream of where the river flows into the tidal Squamscott River near the String Bridge. The dam impounds the river about 4.5 miles upstream, including a portion of the Little River.

The NHDES Dam Bureau identified safety problems with the Great Dam and notified the town in a Letter of Deficiency issued on July 25, 2000. Since then, the town has studied various ways to address the dam safety issue.

Various alternatives have been considered including the permanent modification of the dam and removing the dam entirely. A comprehensive study of these efforts, including an Executive Summary highlight, was published in October 2013 and is available on the town’s website at <http://exeternh.gov/bcc/river-study-committee>.



Funding for this project was provided in part by a grant from the NH Department of Environmental Services with funding from the US Environmental Protection Agency under Section 319 of the Clean Water Act, by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, The Gulf of Maine Council and the Town of Exeter.

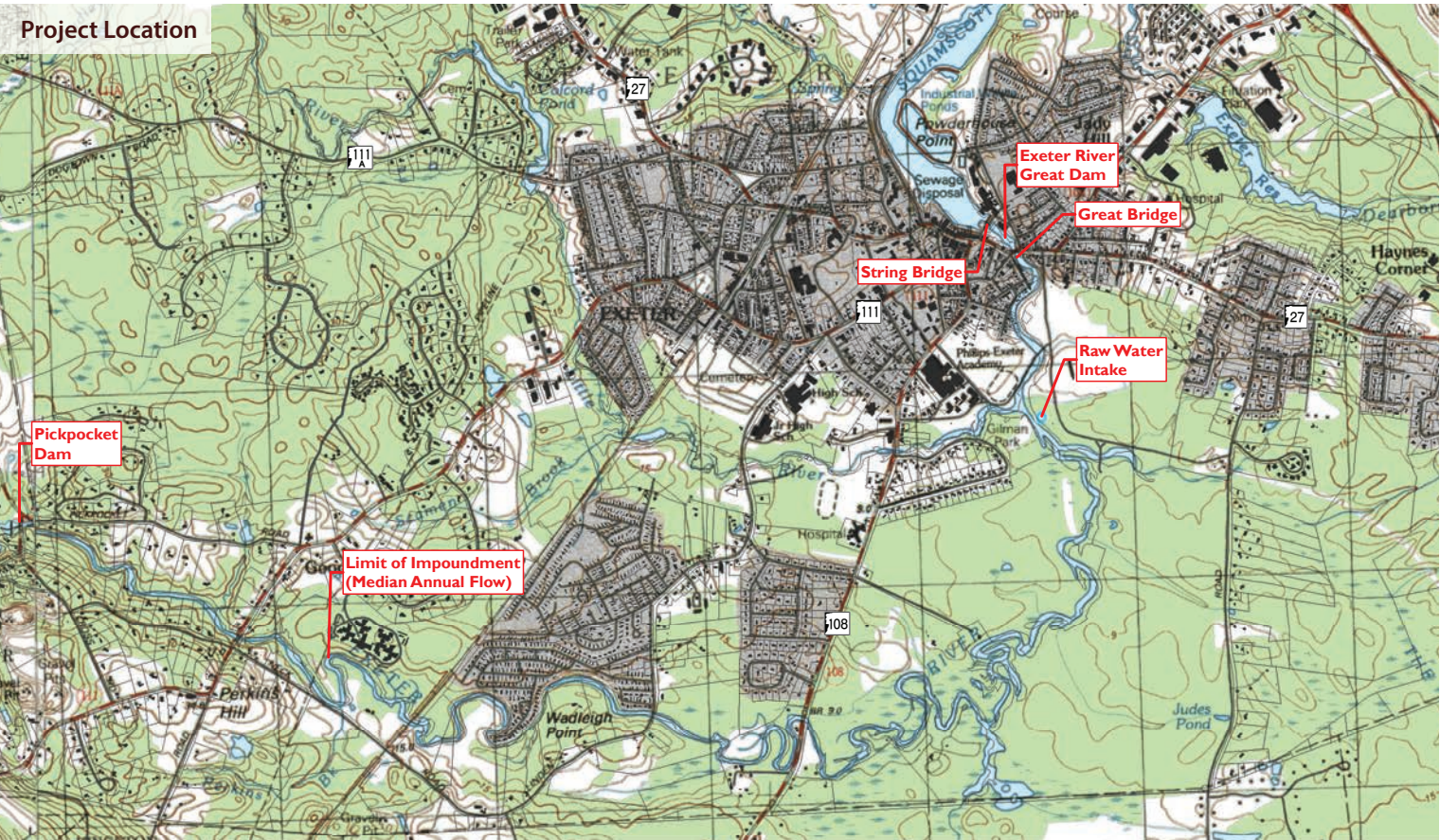
Potential Alternatives for Addressing the Great Dam Safety Issue

Four alternatives are considered feasible:

- **Alternative B – Dam Removal.** Remove the entire dam, including the fish ladder and lower dam, and reshape the river channel immediately upstream and downstream.
- **Alternative F – Partial Removal.** Lower the dam height by 4 feet, which leaves a dam height of 2 feet on the upstream side. A brand new fish ladder will need to be constructed.
- **Alternative G – Stabilize in Place.** Install “Rock Anchors” to better anchor the existing dam to its underlying bedrock.
- **Alternative H – Dam Modification** – Inflatable Flashboard/Gate System. Lower the dam height by 4.5 feet then replace this portion of the spillway with a 4.5 ft tall adjustable “flashboard” system.

The main difference among the alternatives relates to their potential effects on the size and depth of the dam impoundment:

- **Dam Removal** and **Partial Removal** would lead to a significant reduction of the impoundment, although water levels further upstream would be maintained to an extent due to naturally occurring bedrock outcrop at the site of the present dam.
- **Stabilize in Place** would maintain the impoundment at its current level.
- **Dam Modification** would allow the impoundment to be raised and lowered depending on flow conditions.



Cost Considerations

Comprehensive costs were developed for each alternative. The costs in the first table represent the investment that would need to be made in the short term, over a period of a few years, to implement each alternative. The second table accounts for the long term operation and maintenance costs for each.

Initial Construction and Mitigation Costs

Alternative	Design, Permitting and Construction	Infrastructure and Environmental Mitigation	Total
Alt B – Dam Removal	\$732,150	\$512,608	\$1,244,758
Alt F – Partial Removal	\$1,338,630	\$912,608	\$2,251,238
Alt G – Stabilize in Place	\$418,000	\$565,000	\$983,000
Alt H – Dam Modification	\$1,016,000	\$795,200	\$1,811,200

The Exeter Mills currently withdraws water from the river for various purposes. If the dam were either **fully** or **partially** removed, this intake would require modification. The estimated cost for retrofitting the Exeter Mill intake is \$542,000.

The citizen petition warrant article specifies a total expenditure of \$1,786,758, which is the estimated cost of the dam removal (\$1,244,758) plus the cost of retrofitting the Exeter Mills water intake (\$542,000).

An informal review of recent projects in New Hampshire indicates that grant funding typically covers a significant portion of the cost of **Dam Removal**.

Although there are grant programs that could be applied to the **Stabilize-in-Place** and **Dam Modification Alternatives**, there are no known examples of grant funds being awarded for dam repair or reconstruction in New Hampshire.

Total Costs including O&M and Replacement (30 Year Analysis)

Alternative	Initial Cost	O&M and Replacement Costs	Total
Alt B – Dam Removal	\$1,244,758	\$0	\$1,244,758
Alt F – Partial Removal	\$2,251,238	\$385,170	\$2,636,408
Alt G – Stabilize in Place	\$983,000	\$181,894	\$1,164,894
Alt H – Dam Modification	\$1,811,200	\$616,724	\$2,427,924

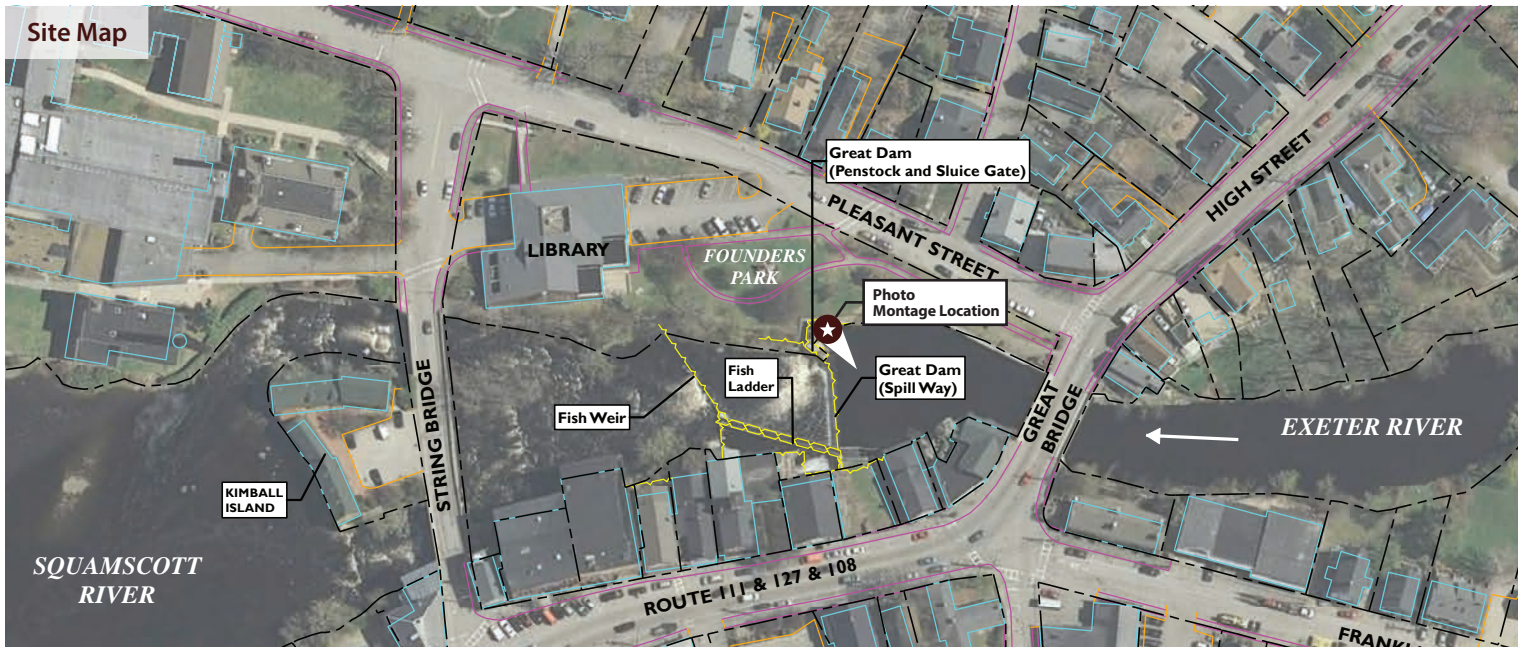
Exeter River Great Dam Removal Feasibility and Impact Analysis



Existing conditions photomontage | This image is an actual panoramic photograph of the site taken in 2011.



Proposed dam removal photomontage | This image was developed using hydraulic engineering and digital photography tools, and depicts what the river in the vicinity of the dam would most likely look like under normal flow conditions if the dam were to be removed.



Site map showing the location of the Great Dam and other key associated features.



These two photos show the process of installing "rock anchors" on a dam as would occur if Alternative G – Stabilize-in-Place were implemented.



An example of an Inflatable Flashboard/Gate system, similar to Alternative H.

Impacts and Benefits

Below, we summarize the key findings that have developed over the course of the study.

Changes in Flooding and Hydraulics

- **Dam Removal** and **Partial Removal** would substantially lower water levels upstream of the dam under normal flow conditions.
- There would be no changes in river depths, widths or velocities downstream of the dam under any of the alternatives. The effects on water levels upstream of the dam do not extend beyond borders of the Town of Exeter.
- The **Dam Removal, Partial Removal** and **Dam Modification Alternatives** would all reduce the depth of flooding substantially. The area subject to flooding would decrease, but not by a substantial amount.
- The **Dam Modification Alternative** could maintain the river in more or less its current state under normal flow conditions, but allow for management of river levels during floods.
- The **Stabilize in Place Alternative** would meet dam safety rules, but would not mitigate future flooding damage, nor would it directly increase dissolved oxygen levels in the river or provide enhanced fish passage.

Sediment Transport and Potential Erosion

- **Dam Removal, Partial Removal** and **Dam Modification** would restore sediment transport to the river to normal or near normal conditions, leading to a substantial but w increase in the amount of sediment transported into the Squamscott River.
- Testing of the sediment in the Exeter and Little River indicates the presence of some environmental contamination, but not at levels that would cause serious ecological or health risks.

Infrastructure

- Bridges, walls and foundations upstream of the Great Bridge and downstream of the dam should not be affected by any of the Alternatives.
- Regardless of the alternative chosen, additional investigation is needed to ensure that structures in the immediate vicinity of the dam are properly founded and not damaged.
- Surface water intakes would be adversely affected by the **Dam Removal** and **Partial Removal**, but these impacts could be mitigated.
- Public and private wells are not likely to be impacted to a great degree with any alternative.

Cultural Resources

- The Great Dam is a contributing element of Exeter’s historic character. Its modification or removal would represent an adverse impact to a historic structure and the surrounding historic district.
- The area around the Great Dam is considered sensitive for archaeological resources which could be impacted by any of the alternatives, although this impact could be mitigated.

Recreation

- The **Stabilize in Place** and **Dam Modification Alternatives** would not change the recreational experience on the river.
- **Dam Removal** or **Partial Removal** would alter the recreational experience on the river, but opportunities would still be plentiful, and some opportunities would be enhanced.

Natural Resources

- **Dam Removal** and **Partial Removal** would create a substantial net benefit on water quality. This same benefit would not occur if either the **Stabilize-in-Place** or **Dam Modification Alternatives** were selected.
- **Dam Removal** would have a significant benefit to important fish populations.
- **Dam Removal** or **Modification** is not expected to result in significant adverse impacts to wildlife populations.
- The full or partial removal of the Great Dam could affect wetlands and floodplain forests which rely to some degree on flooding, including a rare swamp white oak forest community upstream.

For further discussion, please go to exeternh.gov. Scroll to “Supplementary Documents” and “Great Dam Removal Feasibility Report final October 2013.”