

LAKE HARVEY DAM UPDATE – STATUS AND HISTORY – Red Dufresne
As of April 30, 2022

Current Status:

The “Preliminary Design Report Harvey’s Lake Dam Removal” was completed by Inter-Fluve, Inc in November of 2018. Concept design plans depicted a project which included partially breaching the existing concrete dam and creating a “passive riffle” across the outlet channel northeast of the Town beach and upstream of the confluence with the South Peacham Brook. The plans were developed with input from State regulators from the Dam Safety Program (DSP). But after the plans were submitted for DSP review these officials indicated the concept proposed by engineering consultants would not comply with recently updated regulations unless additional extensive improvements were incorporated into the project.

Because DSP officials indicated they could not approve the project in its current form, the Barnet Select Board is now considering completion of some needed maintenance activities on the dam. These activities may include:

- Replacing the wooden stop boards with an automatic gate.
- Repair or replacement of the bottom drain gate. Currently this gate is damaged and inoperable.
- Installation of grating and railings to increase safety.
- Lowering the east fish ladder wall to coincide with the dam crest elevation.

These maintenance activities would improve conditions at the dam and provide the following benefits:

- Allow more flow to pass downstream during storm events and reduce back flow into the lake. However, due to the limited size of the existing stop board opening, some storm events would still backflow into the lake.
- Reduce the fall hazard at the dam during activities such as adjusting and/or replacing stop-boards or removing debris obstructing the dam.
- Allow the upstream side of the dam to drain for maintenance and dam inspection.
- The fish ladder has been unusable for decades as most of the baffles have been swept away. Lowering the elevation of the east wall of the fish ladder would expand the weir length of the dam and allow more flow to pass over the dam and further reduce backflow into the lake during storm events.

Although these maintenance activities are limited in scope, they do provide tangible benefits and hopefully can be accomplished with local funds and labor. Unfortunately, after DSP officials indicated they would not approve the Inter-Fluve concept plan, the Town is left with either leaving the dam in its current condition for the foreseeable future or completing these maintenance improvements to provide the best benefit possible without substantially modifying or replacing the dam. Currently the Select Board is assessing permit necessity for these maintenance items and developing schedules, cost estimates, and funding opportunities. If these maintenance items are deemed exempt from permit necessity, the Select board plans on proceeding.

- Brief Dam History:

- The current Harvey Lake Dam was constructed in 1970 and was the third dam constructed at this location.
- The original 1908 dam raised the surface level of the lake by about 4.5 feet.
- After the 1927 flood, the original dam was replaced in 1949. The 1949 dam then owned by Green Mountain Power (GMP) was designed to hold the same water level as the 1908 dam. This 1949 dam was equipped with two substantial flood gates which were normally closed but could be manually opened to pass flood flows from South Peacham Brook down the Stevens Branch to prevent back flow into the lake.
- Ownership of the 1949 dam passed from GMP to the Town of Barnet in 1970 just prior to the construction of the current dam.
- Unlike the 1949 dam, the current dam was not designed to pass flood flows. Except for the manually operated stop boards, the existing dam represents a fixed concrete weir and lacks flexibility for passing high flows downstream to the Stevens Branch without increasing the water level at the dam which causes back flow into the lake which increases lake level and nutrient levels.
- Backflow into the lake was routinely observed during large storm events after the 1970 dam was completed. Also observed was deposition of silt in the outlet channel as well as in the lake itself. The backflow issue and silt deposition have long been the subject of concern to both local and state officials.
- A “Diagnostic – Feasibility Report” was prepared in April of 1983 by the State of Vermont. The study contained a listing of some of the water quality issues facing the lake with phosphorus loading being primary issue. Several projects were recommended to reduce phosphorus loading.
- Also, in 1983, a “Feasibility Study for the Correction of the Backflow Problem at Harvey’s Lake Outlet” was prepared by Dufresne Henry Engineering Inc. This report included a recommendation for a stop log structure to be constructed at either the lake outlet (east of the Town Beach) or just upstream of the confluence of the South Peacham Brook and the Lake outlet channel. This structure would normally be open but closed during flood events to prevent high flows from South Peacham Brook from passing back into the lake. However, this project was never designed or completed.
- In 2001, the Town completed three of the four projects identified in the State’s 1983 Diagnostic – Feasibility Report with the cooperation of the Roy farms, and members of the Lake Harvey Association (LHA). These three projects included diversion ditches, earth berms, and pipes to divert runoff from the easterly agricultural lands from entering the lake. Unfortunately, the fourth recommended project calling for reducing backflow from South Peacham Brook into the lake has remained unfinished.
- A concept for an electronically controlled inflatable bladder dam concept was noted in the June 12, 2002 inspection report by the Dam Safety Engineer from the State of Vermont. This bladder dam would be fitted into the existing dam after a three-foot-high section of the concrete weir is removed. The bladder dam would be similar to the one on Joe’s Pond and would be inflated to hold the lake at normal levels but would deflate during high storm events to allow more flow to pass over the dam instead of flowing back into Harvey Lake.
- In 2003, this inflatable bladder dam was identified by members of the Lake Protection Committee Sub-Committee of the Lake Harvey Association as a viable solution to the backflow issue and was noted in the 2003 Barnet Town Report.

- In 2003 a Dam Alteration Permit was submitted by the Town of Barnet to the State of Vermont to modify the dam in order to facilitate an inflatable bladder dam. Later that year, the State deemed the application incomplete. One item required for inclusion was a hydraulics and hydrology (H&H) study.
- In September of 2013, Malone and MacBroom, Inc. completed an H&H Study for the Town of Barnet. Eight alternatives were briefly discussed and construction of a new “boulder sill” dam was recommended. In addition to the “boulder sill” dam, a more detailed evaluation was included for either modifying the existing dam by cutting a lower notch in the crest of the dam or breaching the dam. A complete breach of the dam was recommended as part of the “boulder sill” dam project. However, M&M reported that backflow into the lake would still occur during high storm events even with the existing dam completely removed and the “boulder sill” dam was in place.
- In 2014, the Town of Barnet retained Fairbanks Mill (FM) for consulting services regarding the dam. Robert Desrochers of FM recommended dredging silt material from the east side of the dam to allow more flow to pass over the dam and lesson the flow back into Harvey Lake. This work was completed for a cost of \$119,000 in 2014 and the results were shown on the cover of the 2015 Town Report. This project was presented as an initial step toward constructing the “boulder sill” dam and breaching the existing dam.
- In May of 2018, Inter-Fluve, Inc completed a Feasibility/Alternative Analysis Report on the dam. This report was paid for by Connecticut River Conservancy for the Town of Barnet. Although the term “Alternative Analysis” was used in the report title, only one alternative was considered for a new “boulder sill” dam (referred to in this report as a “passive riffle” dam. Two alternative sites were considered for this “passive riffle” with a recommendation to pursue either site. Also presented were alternatives to deal with potential adverse effects on the Harvey Mountain Road bridge caused by breaching the existing dam.
- In November of 2018 Inter-Fluve completed a Preliminary Design Report and 30% complete design plans for the recommended “passive riffle” concept along with a partial breach of the existing dam and minor improvements at the Harvey Mountain Road bridge. As part of the project about 15,000 cubic yards of silt would be removed and transported off site. The construction cost for this project was estimated at about \$1,100,000 for this project based on 2018 costs.
- After the 2018 study was completed, the Vermont Dam Safety Division indicated the “boulder sill” or “passive riffle” would be classified as a dam under their new regulations and substantial additional items would be required such as a low level emergency drain pipe into the lake. These additional items were deemed to have a substantial effect on project costs and forward momentum on this project stopped.
- Currently the Select Board is considering maintenance items to provide the most cost-effective means of reducing backflow into the lake given the limitations at the existing dam.
- Watershed and Environmental Characteristics:
 - The drainage area above the dam encompasses 20.7 square miles
 - Harvey Lake has about 352 acres of water surface at normal lake level.
 - Most of the drainage area (about 12 square miles) is drained by the South Peacham Brook and much of this watershed is agricultural in nature.
 - Based on historical water quality sampling, the South Peacham Brook contains nutrients including nitrogen and phosphorous.

- During high water and runoff events, the South Peacham Brook transports sediment downstream.
- The South Peacham Brook and the Harvey Lake outlet channel confluence located just upstream of the dam is quite unique when compared to most dams at lakes in New England and likely was originally envisioned as a hydro power dam with a goal to collect water from a drainage area as large as possible.
- During high flow events, high-water level at the dam causes reverse flow back into Harvey Lake.
- Past monitoring data for both rainfall and lake level indicates a 1-inch rainfall event raises lake level by about 4-inches due to backflow.
- Over time, the silt and other sediment has collected in the outlet channel upstream the dam.
- Sediment also enters the lake during high flow events and settles out in the lake in the area south of the outlet channel and east of the Town Beach.
- Beaver activity in the outlet channel can have a substantial effect on lake level. Beaver dams are usually located between the lake outlet and confluence of the Lake Outlet Channel with the South Peacham Brook. Beaver dams at this location can raise lake level by 6 inches or more. Importantly, beaver activity in the Lake outlet channel will be continuing issue regardless of any dam improvement project and as such will need to be controlled in the future.
- Wetland areas exist in the areas along the outlet channel but have not yet been delineated.
- The most successful loon nest locations are in the wetland area near the existing outlet channel.

Submitted by Red Dufresne