

**ARCHAEOLOGICAL RESOURCES ASSESSMENT
AND HISTORIC RESOURCE REVIEW,
TROUT BROOK RESERVOIR DAM REMOVAL PROJECT,
BERKSHIRE, FRANKLIN COUNTY, VERMONT**



View northeast of the Trout Brook Reservoir Dam

University of Vermont
Consulting Archaeology Program
111 Delehanty Hall
180 Colchester Avenue
Burlington, VT 05405

UVM Report No. 1639

October 21, 2024
Revised February 26, 2025

REDACTED

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BERKSHIRE, FRANKLIN COUNTY, VERMONT**

Submitted to:

Lauren Weston
District Manager
Franklin County Natural Resources Conservation District
50 South Main Street, Suite B-20
Saint Albans, Vermont 05478

Submitted by:

Kate Kenny
and
Catherine A. Quinn
University of Vermont
Consulting Archaeology Program
111 Delehanty Hall
180 Colchester Avenue
Burlington, VT 05405

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PROJECT DESCRIPTION

The Franklin County Natural Resources Conservation District proposes the removal of the Trout Brook Reservoir Dam¹ (VT State ID #19.02), located in Berkshire, Franklin County, Vermont (Figures 1 – 3). The dam, which is owned by the Village of Enosburg Falls and located on an 87.67-acre parcel north of Reservoir Road, was built in 1924 to supply water to the Village of Enosburg Falls (SLR 2023:13). The proposed project will reconnect 4.8 mi (7.7 km) of the Missisquoi River watershed (SLR 2023:1). The proposed sediment disposal site is located near the chlorination facility on the same village owned property as the dam. Two possible construction access routes have been identified. One follows up the eastern side of the brook from Reservoir Road along an old overgrown access road to the dam, which was probably cut during the dam's construction, and the other runs along a modern access road leading from Reservoir Road to the wells currently used by the village on the western side of the brook, before continuing northward along the east edge of an open field to the north end of the current impoundment (Figure 4) (SLR 2023:38).

This combined Archaeological Resource Assessment (ARA) and Historic Resource Review (HRR) was prepared by the University of Vermont Consulting Archaeology Program (UVM CAP) to assist with satisfying federal and state permitting requirements, including Section 106 of the National Historic Preservation Act (NHPA) as amended, and Vermont's Historic Preservation Act, 22 VSA 14. Historic Preservation Specialist Catherine Quinn and Archaeological Research Technician/Program Historian Kate Kenny of the University of Vermont Consulting Archaeology Program (UVM CAP) conducted the review.

The objective of the HRR is to identify and document any historic resources on or eligible for listing on the National Register of Historic Places that have the potential to be directly or indirectly affected by project work, and if present, to recommend a determination of effect on the resources by the proposed project. The proposed project was reviewed according to standards set forth in 36 CFR Part 800, the regulations established by the Advisory Council on Historic Preservation to implement Section 106 of the National Historic Preservation Act, and its amendments.

The goals of the ARA are to identify any portions of the project's APE that may contain precontact Native American and/or historic archaeological sites, to provide sufficient information to gauge their potential for archaeological significance, and to recommend if further archaeological work would be needed prior to project work. To assess the potential of the proposed project for precontact Native American sites, a review of the files maintained by the Vermont Division for Historic Preservation (VDHP) was undertaken to identify the location and nature of nearby previously reported sites in order to understand the archeological potential of the general area. Additionally, the criteria outlined in the VDHP's *Environmental Predictive Model for Locating PreContact Archaeological Sites* were used to establish the general sensitivity of the project area for precontact Native American sites.

¹ Also known as the 'Enosburg Reservoir Dam.'

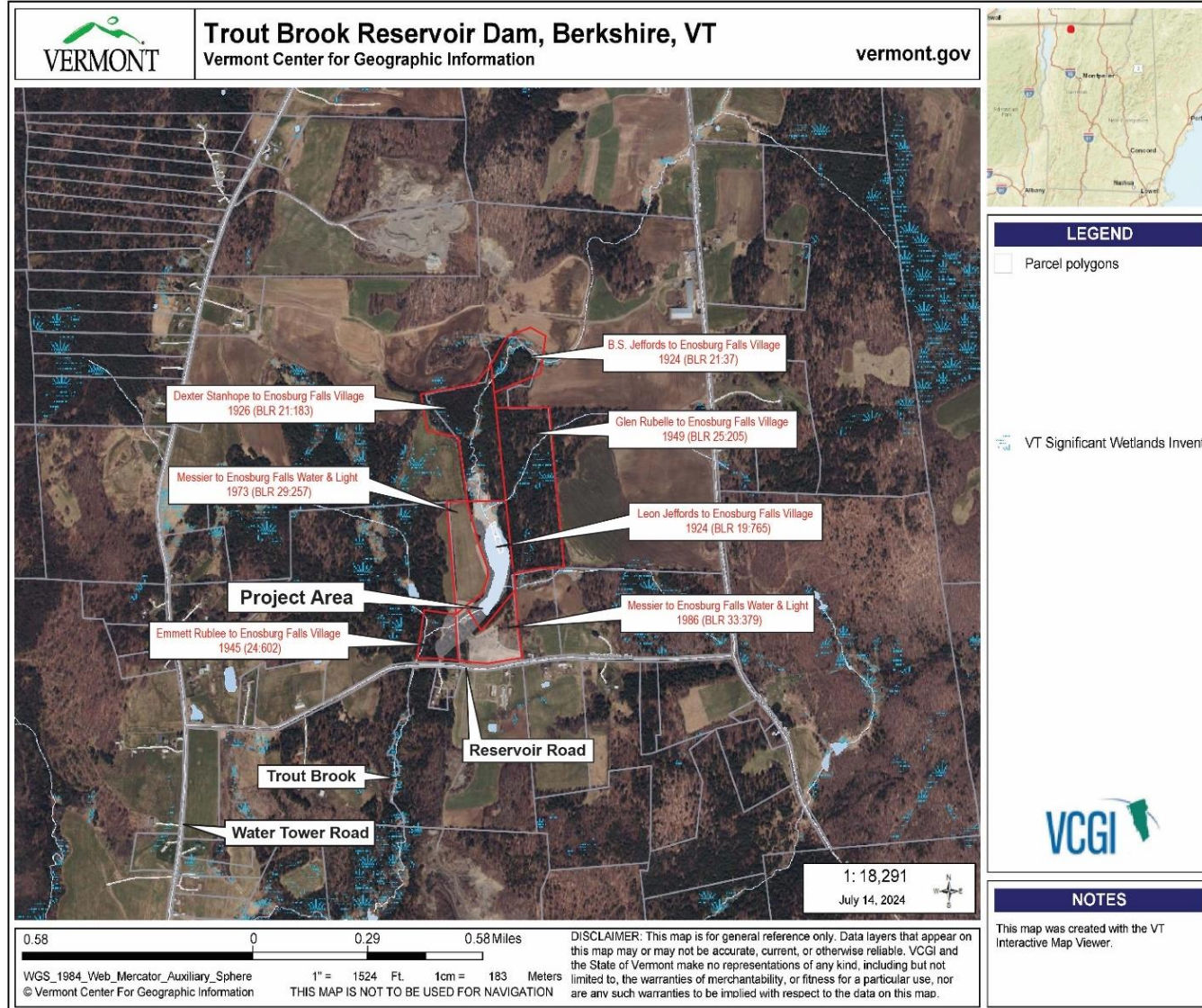


Figure 1. Map showing the location of the Trout Brook Reservoir Dam Removal Project in Berkshire, Franklin County, Vermont, along with parcels acquired by the Village of Enosburg over the years (VCGI 2024; Appendix I). .



Figure 2. View of the downstream face of the Trout Brook Dam, looking north.



Figure 3. View of the upstream face of the Trout Brook Dam, looking southeast from the right bank of the impoundment.

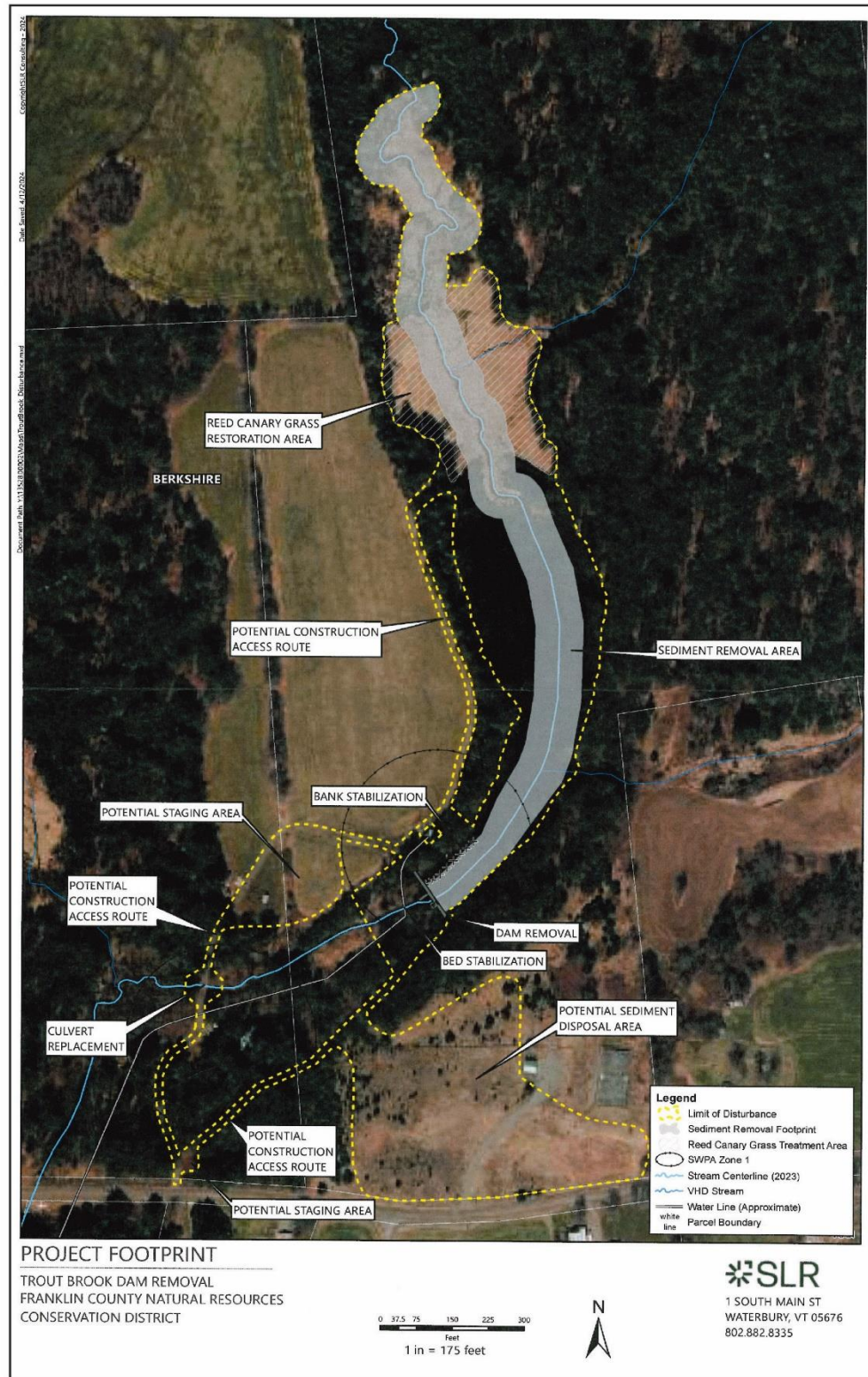


Figure 4. Trout Brook Dam Removal Project plans (provided by SLR).

The archival records examined in the preparation of this report included historic maps, land records, newspapers, town histories, vital records, municipal records, and aerial photographs. The on-line databases utilized included: www.https://newspapers.com; www.https://findagrave.com; and www.https://Ancestry.com. Aerial imagery was accessed at the Vermont Archives and Records Administration Center (VARAC) in Middlesex, Vermont, and at the University of Vermont's Howe Library Map Room, Burlington, Vermont. The files of the VDHP were accessed through the Vermont Agency of Commerce and Community Development's Online Resources Center at www.https://orc.vermont.gov (ORC). Land records were examined at the Berkshire Town Clerk's Office in Berkshire, Vermont. Municipal records were checked at the Enosburg Town Clerk's Office in Enosburg, Vermont. The archives of the Vermont Historical Society's Leahy Library in Barre, Vermont, and the University of Vermont's Silver Special Collections, Billings Library Annex, Burlington, Vermont, were checked. The Berkshire Historical Society was contacted. Additional secondary sources were accessed on-line at www.https://books.google.com/ and at https://www.hathitrust.org. Environmental information was drawn from the Vermont Center for Geographic Information's website www.https://vcgi.vermont.gov/ (VCGI); the USDA's Natural Resources Conservation Service's Web Soil Survey website at www.http://websoilsurvey.nrcs.usda.gov; and from the ORC. The descriptions and illustrations of the dam were derived from a 1924 description of the dam by the engineer in charge of the project, the 2023 SLR engineering report, and from a field visit conducted by UVM CAP on April 22, 2024. All current photographs were taken during the field visit.

ENVIRONMENTAL SETTING

The Town of Berkshire is in the northeastern part of Franklin County and lies within the eastern part of the Champlain Hills Biophysical Region of Vermont (Thompson, Sorenson, and Zaino 2019:45). The region begins about 6-9 mi east of Lake Champlain and continues eastwards to the western foot of the Green Mountains (Thompson, Sorenson, and Zaino 2019:45). The region is bounded south by the Lewis Creek watershed in Addison County and north by the Canadian border (Thompson, Sorenson, and Zaino 2019:45). This region is an elevated glaciated plateau characterized by "compact rugged" till covered foothills and broad valleys dominated by "sediments deposited by post-glacial lakes and seas" (Thompson, Sorenson, and Zaino 2019:51-52). The forest cover in this area consists predominantly of Northern Hardwood Forest and Hemlock-Northern Hardwood Forest (Thompson, Sorenson, and Zaino 2019:53). Berkshire's topography is "somewhat hilly" with elevations ranging from about 440 ft amsl in the Missisquoi River Valley up to about 1,320 ft amsl on top of Ayers Hill (Figure 5) (VCGI 2024; Vermont Bureau of Publicity 1914:101). The Missisquoi River is the largest watercourse in town. It originates northwest of Lowell, Vermont, at the union of its two main branches, and flows about 81 mi (130 km) westward to Lake Champlain, clipping the eastern and southeastern part of Berkshire along the way (VCGI 2024).

The dam is located on Trout Brook,² a primary tributary of the Missisquoi River. This brook rises in the central part of Berkshire at about 720 ft amsl and flows southward about 4.7 mi (7.6 km) to its confluence with the Missisquoi River just above the Village of Enosburg Falls at about 390 ft amsl (Figure 6) (Pierce 1917:209; VCGI 2024). The dam is located about

² Also known as Jeffords Brook.

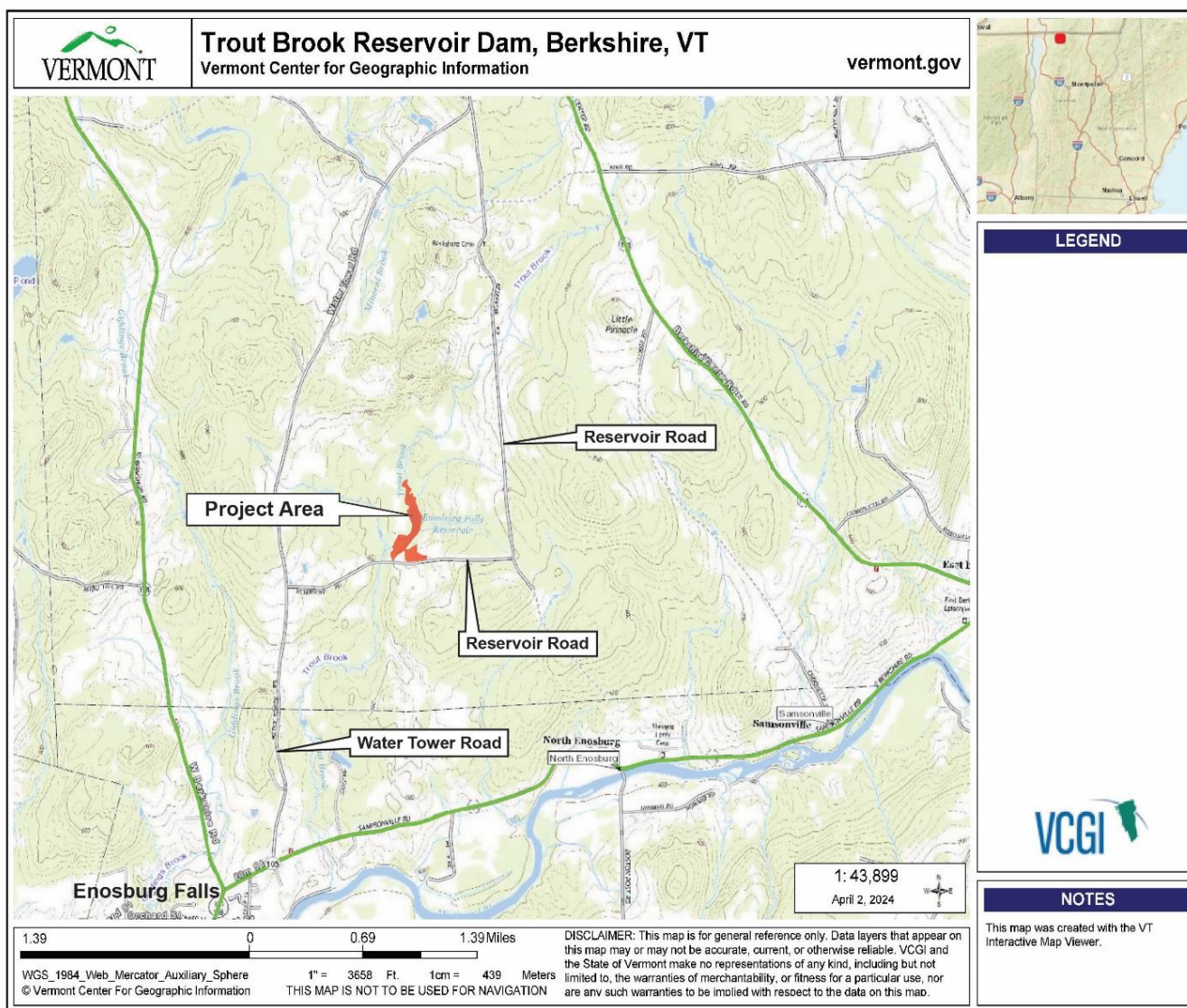


Figure 5. Map showing the location of the Trout Brook Reservoir Dam Removal Project in Berkshire, Franklin County, Vermont, in relation to the surrounding topography and hydrology (VCGI 2024).

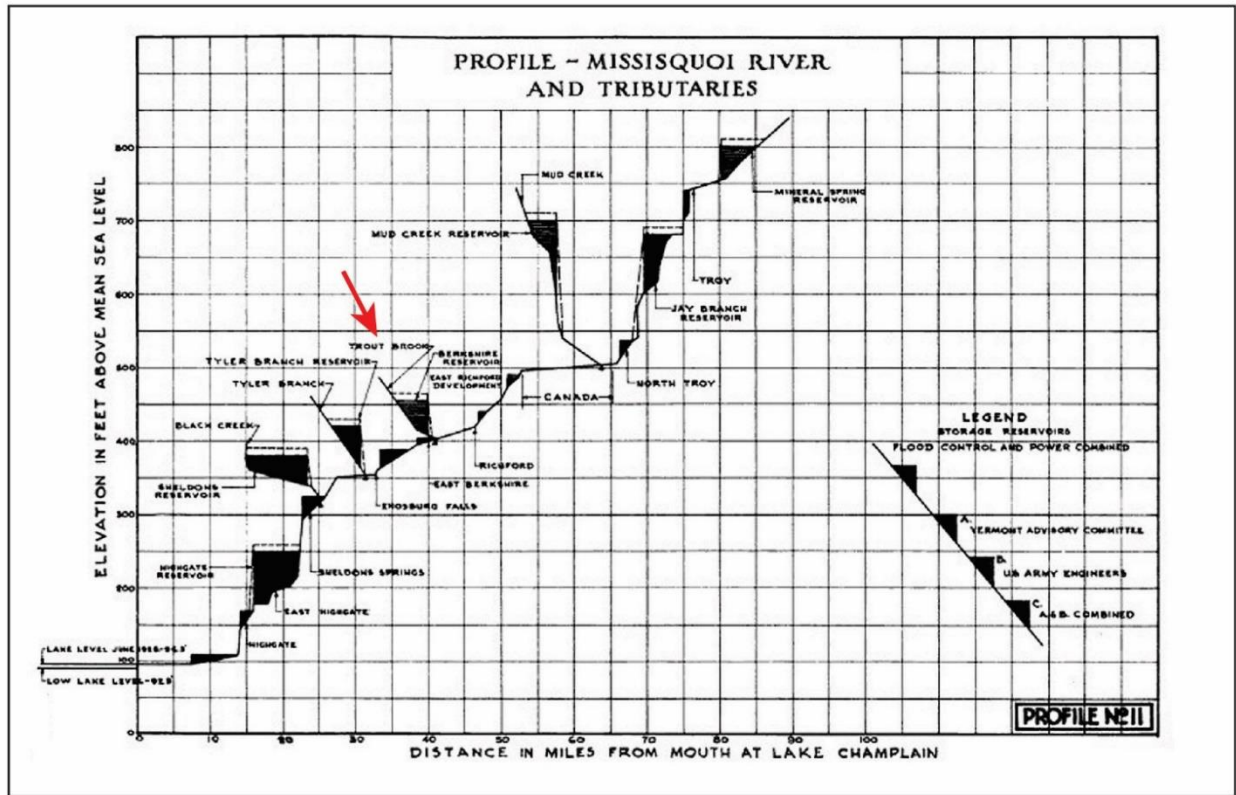


Figure 6. Graphic from the New England Regional Planning Commission's *Water Resources of New England: Drainage Basin Data and Problems* (1937), illustrating the geographical context and the storage capacity of the Trout Brook / Berkshire Reservoir Dam.

2.3 mi (3.7 km) upstream of the confluence between Trout Brook and the Missisquoi River at about 500-520 ft amsl (SLR 2023:8; VCGI 2024). The dam has a drainage area of about 1.8 sq mi (SLR 2023:1). As designed, the depth of the impoundment ranged “from 11 ft [3.35 m] at the dam to from 6 to 8 ft [1.83-2.43 m] through the center and upper portions” and had a “storage capacity of approximately eight million gallons” (Figure 7) (Enosburg Falls 1925:28-29). The impoundment has an estimated maximum area of about 8.23 acres (SLR 2023:13). However, the impoundment retreated significantly between 1995 and 2021, and it now covers only about 3.7 acres (SLR 2023:3, 13).

The dam is located within a narrow and steep sided portion of the Trout Brook Valley (Figure 8). Near the dam, the slopes of the embankments are over 20%, but the bank declines in height going north along the western side of the impoundment. Three short unnamed tributaries, which appear to flow from small spring fed wetlands, join Trout Brook in or near the project area. One stream, about 0.58 mi (0.93 km) long, joins the left side of Trout Brook about halfway up the present impoundment, about 385 ft (117.4 m) upstream of the dam. Another stream, about 0.68 mi (1.1 km) in length, joins the left side about 1,150 ft (350.5 m) upstream of the dam (within the old impoundment area). The last tributary, which is about 1.2 mi (1.9 km) long, joins the right side of Trout Brook about 740 ft (225.5 m) below the dam (VCGI 2024).

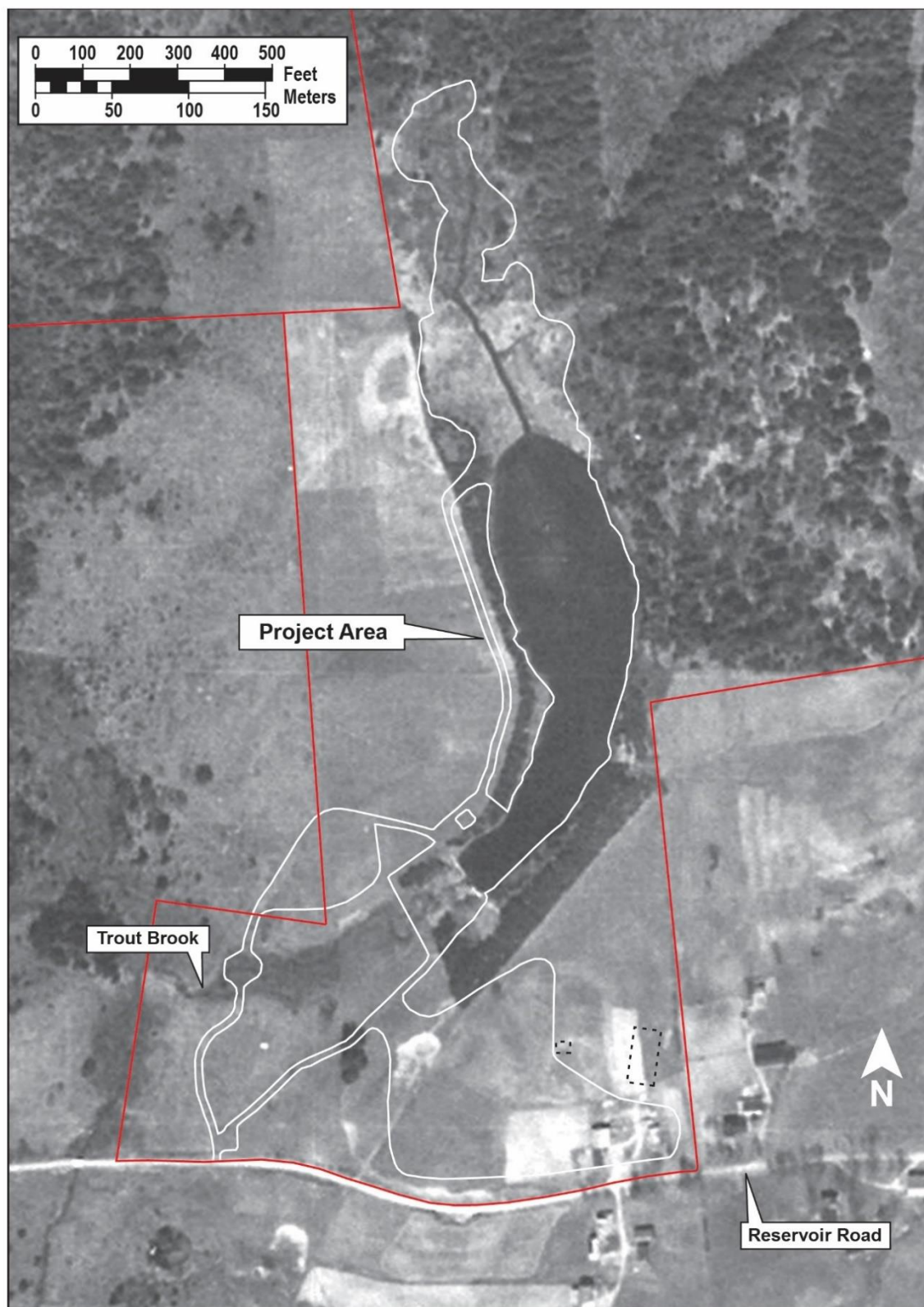


Figure 7. Detail of an aerial photograph showing the Trout Brook Reservoir in 1941; note dashed boxes north of farmstead are added current buildings/structures (Woltz Studios Inc., 1941).

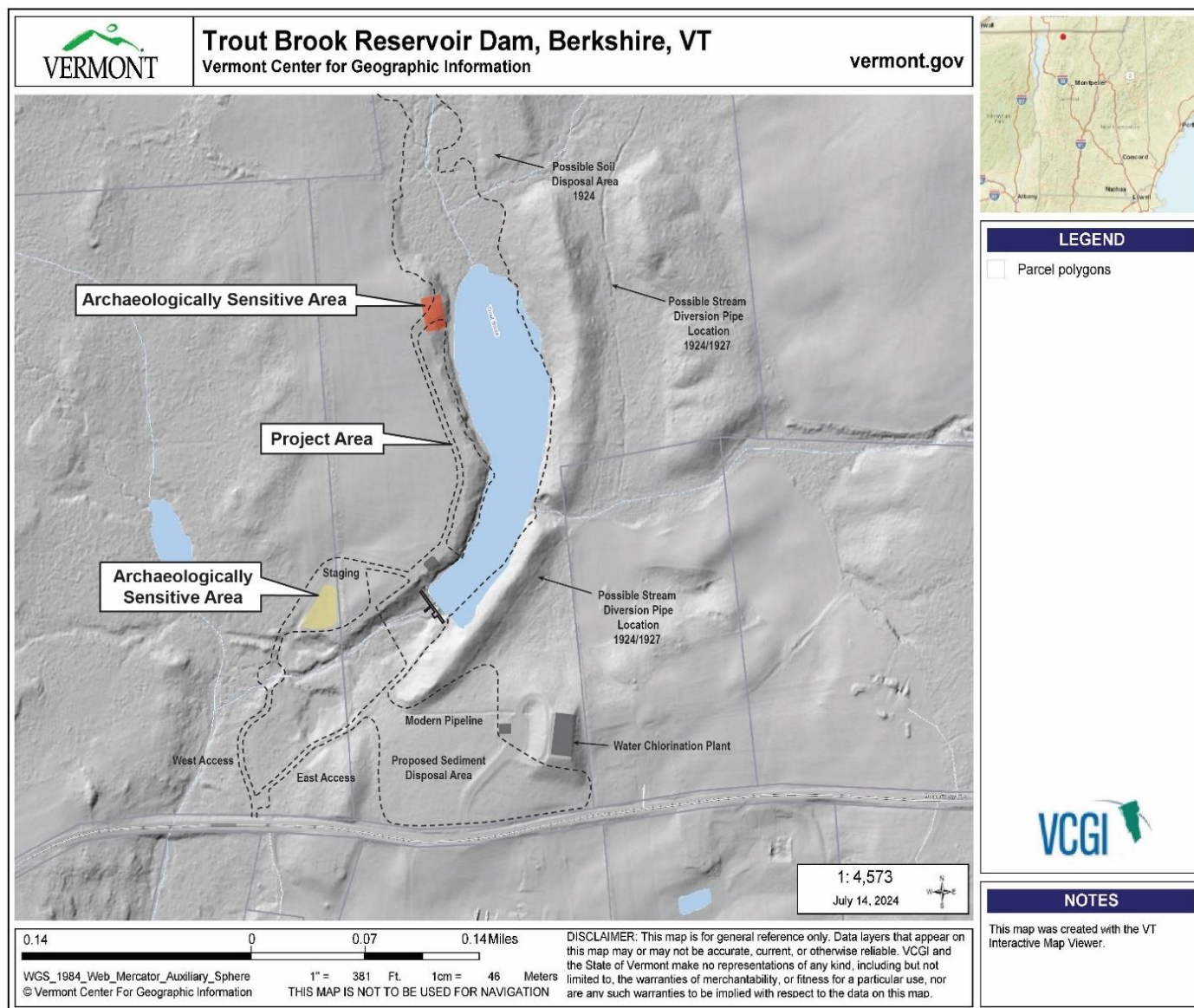


Figure 8. LiDAR image showing the Trout Brook Reservoir Dam Removal Project, Berkshire Vermont (VCGI 2024).

At the dam, the land along west side of Trout Brook is part of the northern end of a small esker (a glacial outwash feature composed of glacio-fluvial gravel and sand deposits) while the land on the east side of the dam is identified as Isolated Kame (Cannon 1964:7; VCGI 2024). The field northwest of the dam is part of glacial lake plain, and off beyond the northern end of the of the impoundment there is a large area of lake sand (a glaciolacustrine deposit) likely associated with Lake Vermont. At one time, the projected shoreline of this glacial lake was only about 230 ft (70.1 m) below the dam (ORC 2024).

Along the project area on the west side of the dam (on the esker) and on the east side of the dam and extending eastward through the proposed soil spoil disposal site (in the isolated kame area), the NRCS had identified the soil as Missisquoi loamy sand (25 to 60% slopes). This is a deep excessively drained sandy / gravelly soil. A typical profile includes an upper dark brown loamy sand (5% gravel) (Ap); underlain by a brown to strong brown loamy to gravelly sand (15% gravel) (Bs); then a yellowish brown gravelly coarse sand (15% gravel) (BC); and, finally, a light olive brown grading to grayish brown gravelly coarse sand (20% gravel) (C). The soil on the western side of the upper reservoir (north of the esker) is identified by the NRCS as Binghamville silt loam, a deep, poorly drained soil that forms in silty glacial lacustrine deposits. A typical profile consists of an upper historically disturbed very dark grayish brown silt loam (Ap) underlain by a grayish brown silt loam (often with redox features) that grades to an olive gray silt loam with depth (Bg); over a firm or very firm gray silt loam that grades to a dark grayish brown silt loam (C). Finally, within both the current and former impoundment area north of the dam, the NRCS has identified the soil as Terric Medisaprists. This is a very deep, poorly drained soil found in depressional areas on till plains, which forms in organic material and alluvium, often having woody organic material over loamy lacustrine deposits. When the preliminary tests were made for the construction of the dam in 1923, “about 35 or 40 places scattered over the entire area were examined and in nearly every case fine white sand was found at a depth of six to eight inches below the surface,” and this sand, “overlaid a stratum of decayed vegetable matter which extended, in places, to a depth of three feet below the surface” (Enosburg Falls 1925:26-27). The area within the former impoundment near the dam is likely composed of recent sediment deposits covering a stripped or truncated profile, because the upper organic horizons were intentionally removed from the site in 1924 to prevent the contamination of the water supply.

CULTURAL CONTEXT

Precontact Native American Background

The VDHP’s Vermont Archaeological Inventory (VAI) indicates that there is one previously reported precontact Native American site, VT-FR-466, within a 0.93 mi (1.5 km) radius of the proposed project area (Figure 9). VT-FR-466 was identified in April of 2023 at the northern end of the field immediately west of the reservoir and about 1,100 ft north northwest of the dam. This site was identified during a pedestrian survey undertaken for the proposed Encore Renewable Energy’s Reservoir Road Solar Project³ by the recovery of one chert stemmed projectile point (Middle to Late Archaic, ca. 5500-1000 BC), a chert biface, and two quartz

³ This project proposes a 2.25MW solar array to be located on a 11.26-acre site owned by the Village of Enosburg Falls.

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Figure 9. GIS based map with overlay of habitability factors that correlate with the location of precontact Native American sites for the Trout Brook Reservoir Dam Removal Project in Berkshire, Vermont (ORC 2024).

flakes (ORC 2024). A GIS version of the VDHP's *Environmental Predictive Model for Locating Archaeological Sites* indicates that portions of the project area may include up to five habituality factors which have been identified as important to precontact Native American populations including Drainage Proximity Presence; Kame Terrace or Glacial Outwash Soils Proximity Presence; Paleo Lake Soil Proximity Presence; Level Terrain Presence and Stream-Stream Proximity Presence.⁴ The VDHP's paper version of the predictive model is a checklist that provides an area a score based on environmental features statistically associated with precontact Native American sites. A score of 32 or greater indicates that an area may be archaeologically sensitive. This project area scores a 64 indicating that it may be sensitive for precontact Native American sites (Appendix II).

Historic Euroamerican Background

The Vermont legislature created the town of Berkshire in 1780 and Euro-American settlement began around 1792 (Thompson 1824:63). Throughout the 19th century and well into the 20th century, farming and dairying were the principal occupations (Vermont Bureau of Publicity 1914:101). While Berkshire remained a quiet agricultural community, the Village of Enosburg Falls, located about two miles south on the bank of the Missisquoi River, grew rapidly into a regionally important trading and manufacturing center (Aldrich 1891:439). In the early 1880s (ca. 1882), Enosburg Falls developed its first public water system. Initially, this system consisted “of pump logs and storage tank of wood” which drew water from the Missisquoi River “at a dam in the village” (Vermont State Board of Health 1916:56-57). However, in the late 1890s, serious problems began to emerge.⁵ Beginning around 1898-1899 and continuing for about five years, typhoid fever “prevailed excessively” in the village cumulating in “a severe epidemic” in the winter of 1903-1904 (*Swanton Courier* March 3, 1904; Vermont State Board of Health 1906:20). In 1903, there were 24 cases of the disease (12 cases per thousand population), “with two deaths” (*Swanton Courier* March 3, 1904). Then, in just the first three months of 1904 there were “nine cases” all “in a very serious form” with one death resulting (*Swanton Courier* March 3, 1904). The village water supply was the obvious suspect. According to one observer, “in practically every place in Vermont where typhoid has been more or less prevalent it has been where the main water supply came from a river or stream exposed to sewage contamination” (*Swanton Courier* March 3, 1904).

In response, the Village of Enosburg Falls warned their citizens against “the use of this water for drinking purposes unless boiled or distilled” and retained three outside experts, Dr. H.D. Holton of Brattleboro, Dr. T.R. Stiles of St. Johnsbury, and X.H. Goodnough, the chief engineer of the Massachusetts State Board of Health, to examine the existing system and recommend changes (*St. Albans Daily Messenger* August 1, 1904; *Swanton Courier* March 3, 1904). The consultants concluded that, “the most favorable conditions for securing a sufficient supply of pure water for the village” by “the expenditure of the least money” was to be “found in the valley of Trout Brook . . . northeast of the village” (Vermont State Board of Health 1906:21;

⁴ Some areas of the project's APE may have included Wetland Proximity Presence before the development of the reservoir (e.g., beaver pond/meadow).

⁵ In ca. 1901, Charles P. Moat, a chemist for the Vermont State Laboratory Hygiene, reported that water taken from the “river system” at Enosburg Falls could have a bacteria load ranging anywhere from “400-10,000 per C.C.” (Moat 1901:514-521)

St. Albans Daily Messenger August 1, 1904). They noted that “this stream drains an area of three-or four-square miles and the ground in the valley is porous and much spring water finds its way into the stream” (Vermont State Board of Health 1906:21; *St. Albans Daily Messenger* August 1, 1904).

Despite these recommendations, the Village of Enosburg Falls chose to contract with the Doctor B.J. Kendall Company to provide the whole community with drinking water from a spring that it owned “about two miles away in Berkshire” (*Burlington Free Press* September 12, 1905; Vermont State Board of Health 1916:56-57).⁶ In September of 1905, it was reported that, the Dr. B.J. Kendall Company’s water system was “being extended so by the fall the entire village will be covered” (*Burlington Free Press* September 12, 1905). In 1906, it was reported that “the work of tearing out the storage tanks on the Dr. B. J. Kendall company’s water system is in progress. They will build one of cement on the same site but with double the capacity of the old ones” (*Burlington Free Press* August 4, 1906). Meanwhile, the village retained the system connected to the Missisquoi River “for fire purposes” (Vermont State Board of Health 1916:56-57). This “double supply,” although deeply “unsatisfactory,” was still in use as late as 1923 (Moat 1923:292; *St. Albans Daily Messenger* August 4, 1916). As the village and the demand for water grew, it was found that the Kendall Spring could not keep pace (Moat 1923:292). For example, in 1911, it was reported that “owing to the large amount of water being used, it has become necessary for the Dr. B.J. Kendall Co. to shut off the spring water system for a time from the village from 8 pm until 6 am, so as to keep an adequate supply for daily use, and to give time for the storage reservoir to gain what it loses through the day” (*St. Albans Weekly Messenger* July 13, 1911). A few years later, it was reported that “so many users of the Dr. B.J. Kendall company’s spring water were allowing the water to run all the time that the company has found it necessary to shut it off at night” (*Burlington Free Press* February 28, 1914). Around 1923, the village “tried with poor success [to] double [the] supply in each house” but found the spring water supply “inadequate to furnish water for all domestic purposes” (Moat 1923:292).

In the fall of 1923, David W. Ames (1876-1949), a local contractor chaired a village committee charged with finding a solution to the village’s inadequate water system (*Burlington Free Press* September 14, 1923; October 22, 1936; May 6, 1949; *St. Albans Daily Messenger* June 3, 1903). In the latter part of August of 1923, the village hired Lewis D. Thorpe, a Boston based civil and sanitary engineer who specialized in water supply systems, to examine the problem (Enosburg Falls 1925:23).⁷ In November of 1923, the village commissioned Thorpe to “design a system, prepare the necessary contracts, and superintend the construction of the same” (Enosburg Falls 1925:23). In 1923-1924, the village embarked on a \$75,000 plan, which quickly grew to an almost \$98,000 project, to secure its water supply (Table 1).⁸

⁶ In reference to this spring, it was noted that although its “watershed is inhabited . . . the nearest farm building is a quarter of a mile from the spring” (Vermont State Board of Health 1916:56-57).

⁷ Lewis Drummond Thorpe (1871-1942) was a son of William J. and Elizabeth Sarah Thorpe of Boothbay Harbor, Maine (*Boston Globe* December 5, 1942; *Maine Birth Records 1715-1922*; *Massachusetts U.S. Marriage Records 1840-1915*). Over the course of his professional career, he “installed water works systems in more than a score of New England cities and towns” (*Boston Globe* December 5, 1942). His work in Vermont included a dam in the Town of Orange built to supply the City of Barre in 1909 and the water system in Richford, which was built in 1933 (*Barre Daily Times* June 14, 1909; *St. Albans Daily Messenger* August 1, 1933).

⁸ Very roughly, about 1.7 to 1.8 million in today’s money.

Table 1. Reported cost of the new Enosburg Falls Village water system to 1925 (Enosburg Falls 1925:19-20).

Item	Cost to 1925	Projected Additional Costs	Total
Land Damages [Purchases & ROW]	\$3,143.75		
Damages claimed by D. Stanhope [Land]		\$5,000.00	
Damages claimed by W. Lafley [Land]		\$200.00	
Reservoir	\$9,331.87		
Dam	\$11,958.90	\$3,118.34	
Stand Pipe	\$2,000.00	\$7,950.00	
Stand Pipe Foundation	\$997.72		
Gate House	\$202.78		
Pump House	\$943.21		
Electric Pump and Motor	\$200.00	\$1,649.71	
Cast Iron Pipe	\$31,232.54		
Pipe Line	\$9,710.01		
Valves, Fittings, etc.	\$1,191.75		
Fencing	\$216.93		
Unloading & Trucking	\$810.97		
Engineer	\$3,500.00	\$1,300.00	
Miscellaneous	\$1,163.17		
East Branch Estimate		\$2000.00	
Totals	\$76,603.89	\$21,217.85	\$97,821.74

The site chosen for the dam and reservoir was located on the dairy farm of Leon Temple Jeffords. Other locations were considered including the East Branch of Ladd Brook, but this was found “less pure” as it received “drainage from certain farms” (Burlington Free Press September 14, 1923). Leon Jeffords (1890-1967) was a son of Burton S. (1867-1938) and Lillian (Temple) Jeffords, a grandson of Merrill L. Jeffords (1832-1899), and a great-grandson of Stephen Jeffords (1806-1882) who all lived in the same general area (Figures 10 and 11) (*Burlington Free Press* October 26, 1967). According to Thorpe, the dam site had a 1.25 square mile watershed,

“composed of meadow, pasture, and woodland with but little low swampy land. There is within the watershed and particularly in the vicinity of the reservoir large areas of sandy material. This is saturated with water which breaks out in the form of springs. Owing to the character of the watershed the dry weather flow in the brook will be more uniform than in the case of a watershed with steep rocky banks or clayey material” (Enosburg Falls 1925:29-30).

On June 2, 1924, the Village of Enosburg Falls bought the initial 10.8 acres for the dam and reservoir site from Leon Jeffords for \$1,500 (see Figure 1) (BLR 19:765; *St. Albans Daily Messenger* April 3, 1925). This purchase came with the right to travel to and from the dam and reservoir during the construction (BLR 19:765). As part of the exchange, Jeffords got the right to tap into the water line for free (BLR 19:765). In an effort to control and protect the water quality, the village also purchased land to the north (upstream) of the reservoir including 6 and 15/100 acres from B.S. Jeffords for \$768.75 on November 15, 1924, and 18.5 acres from Dexter H. Stanhope on February 15, 1926 (see Figure 1) (BLR 21:37; 21:183; *St. Albans Daily Messenger*

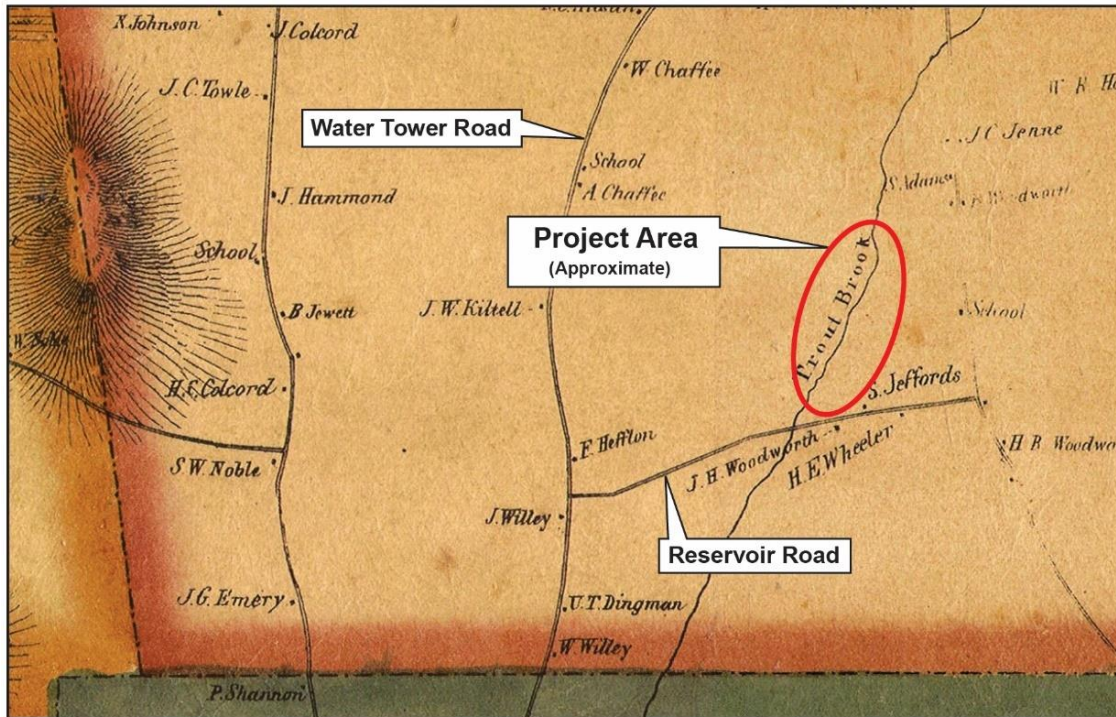


Figure 10. Detail of H.W. Walling's Map of the Counties of Franklin and Grand Isle, Vermont. (1857).

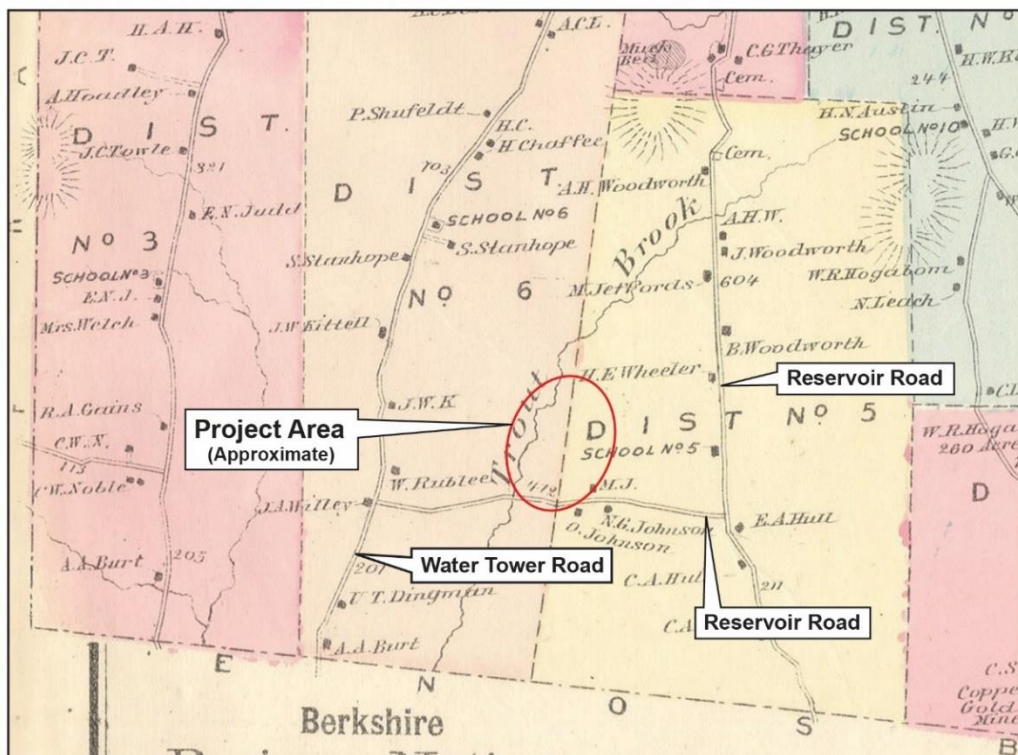


Figure 11. Detail of "Berkshire" from F.W. Beers' Atlas of Franklin and Grand Isle Counties, Vermont (1871).

April 3, 1925). The village purchased the right of way for the pipeline from the reservoir to the village from Thomas Green, Myron Tracy, D.C. Woodworth, and R.M. Stanhope as well as the location for the standpipe from William Lafley (*St. Albans Daily Messenger* April 3, 1925).

Late in 1923, Lewis D. Thorpe made all the necessary contracts for the completion of the project. The pipe contract went to the Central Foundry Company of New York City;⁹ the standpipe contract went to the Chicago Bridge Company; and the contract for the dam and reservoir, which “involved building the dam with overflow, gate house, laying diversion pipes, the clearing of trees, bushes, stumps, etc., and removing loam and vegetable matter from the reservoir site,” was awarded to the G. Ferullo Company of Boston (Enosburg Falls 1925:23-25). Work on the dam and reservoir started on July 1, 1924, and was completed by the middle of September (Enosburg Falls 1925:24). Soon afterwards, the Village “thoroughly cleaned the West Branch and the springs along its banks, removing all roots, leaves, branches and other objectionable material. A fence was built around the entire property and notices prohibiting hunting and fishing were posted” (Enosburg 1927:26).

A little over a decade after the completion of the dam, the reservoir began experiencing issues with its water quality. In 1938, the village considered “the possibility of constructing filtering tanks at the reservoir to reduce the silt and coloring entering our system” (Enosburg Falls 1939:19). Routine maintenance, which included the clearing of all hardwood brush from around the reservoir, did not resolve the problem and in 1940 there were still “many complaints from dirty water” (Enosburg Falls 1940:21). In 1941, an exceptionally dry year provided the village an opportunity to do “considerable work” on the reservoir and to “maintain our dam, spillway and gate house” (Enosburg Falls 1942:17). On August 16, 1942, a flash flood caused “much damage . . . around our reservoir that had to be repaired” (Enosburg Falls 1943:18).

By 1944, boil water recommendations for Enosburg Falls Village were again in place (*St. Albans Daily Messenger* July 6, 1946). Subsequently, “all attempts to purify the water by chlorinating the large reservoir” by the “regular treatment of 60 pounds chlorine every 12 days” failed (*St. Albans Daily Messenger* July 6, 1946). In 1946, Edward L. Tracy, the director of the Division of Sanitary Engineering of the State Board of Health, indicated that the village might have to install chlorinating equipment “at the water reservoir outlet” noting that water samples taken from Jeffords’ Brook, Well Brook, and Vaillancourt Brook had all “showed presence of animal bacteriological content” (*St. Albans Daily Messenger* July 6, 1946). Tracy indicated that the only other option for the village “would be to acquire all land adjacent to the brooks feeding into the reservoir,” but observed that acquiring “the large area would be an expensive purchase” (*St. Albans Daily Messenger* July 6, 1946). In the summer of 1946, the water system was condemned as “unsafe for drinking purposes” and the town drilled its first test well (Enosburg Falls 1946:21; *Newport Daily Express* August 14, 1946). In 1949, a gravel packed well, which produced about 600 gallons per minute (“about twice the present need of village”) was drilled by the Layen NY Co. of Arlington, Massachusetts (Enosburg Falls 1949:20; *St. Albans Daily Messenger* August 31, 1949). In ca. 1950-1951 another well was added to the system (*Richford Journal* February 22, 1951).

⁹ The pipe leading from the reservoir to the village was approximately 12,200 ft (2.3 mi) in length (Enosburg Falls 1925:24).

Even after switching over well water, the village continued to maintain the dam on Trout Brook for a few decades. For example, in 1966, the brush was again cleared, the fence fixed, and the “pond was completely drained, the gate house cleaned, and the intake valve replaced” (Enosburg Falls 1965:17; 1966:16-17). At this time,

“the intake line to the gate house was extended and raised so that it is now out of the mud and silt. The bottom of the reservoir was found to be covered with silt and decayed organic matter . . . it was estimated there is about four thousand yards of this muck which will have to be removed before the water will be clear and, hopefully, more palatable” (Enosburg Falls 1965:17; 1966:16-17).

However, at the same time efforts were being made to locate another well (Enosburg Falls 1965:17; 1966:16-17). The village purchased additional land around the reservoir in the later 20th century including land north of Reservoir Road including the course of Brook Trout in 1945 from Emmett Rublee (BLR 24:603); land to the east of the reservoir from Glen Rublee in 1949 (25:205); the land to the west of the reservoir (including the open field) from Maurice Messier in 1973 (BLR 29:257); and 9.67 acres north of Reservoir Road which includes the area of the proposed sediment disposal area (presently the location of the 1988 chlorination system) from Maurice Messier in 1986 (BLR 33:379; plaque on Chemical Feed Building) (see Figure 1).

ARCHAEOLOGICAL RESOURCES ASSESSMENT

The Area of Potential Effect (APE) for archaeological resources was identified as the project area, including the dam removal site, potential construction access roads and staging areas, and the sediment removal and disposal areas (see Figure 4). All of these areas were walked during the field visits and hand soil cores were taken.

Precontact Native American Archaeology

Dam Removal Site, Bank Stabilization and Bed Stabilization Area

A combination of excessive slope and previous ground disturbance eliminates the area immediately around the dam, including the bank and bed stabilization areas, as archaeologically sensitive areas for precontact Native American sites. The natural slope to the embankments on either side of the dam are 30 degrees or more (Figure 10). Furthermore, the construction of the dam likely involved significant ground disturbances immediately around it not only to place the dam but also for the temporary construction infrastructure it likely required, such as access roads, a derrick location, a space for concrete mixing,¹⁰ and places for the general staging of equipment and material. There is a former access road and work area on the left bank of the stream at the dam, which has been cut into the hillside (Figure 11). The area below the dam, if not sloped, is in a narrow, largely level, heavily eroded/scoured stream bottom having little to no soil development (Figure 12). This part of the project’s APE is therefore not considered sensitive for precontact Native American archaeological sites.

¹⁰ The concrete could have been hand mixed on specially built 12 to 20 ft square platforms or by a powered mixer brought to the site (Reid 1907:87; Portland Cement Association 1916). The concrete could have been placed in the forms in any number of ways (e.g., by wheelbarrows or cement carts, by dump cars on a light tramway, or by buckets handled by a crane) (Reid 1907:87; Portland Cement Association 1916).



Figure 10. View of the steep bank on the east side of the impoundment immediately upstream of the dam, looking northeast.



Figure 11. View of a former access road cut into the hillside at the left end of the dam, looking south.



Figure 12. View of the right bank of Trout Brook immediately below the dam, looking west.

Sediment Removal Area

In the proposed project, the accumulated sediments will be removed up to about 1,800 ft (549 m) upstream from the dam following up the thread of the natural stream and about 50 ft (15 m) either side of it (Figures 13 and 14; see Figure 4). Archival documents indicate that much of the area upstream from the dam was likely entirely stripped of its upper soil horizons during the construction of the reservoir. According to Thorpe,

“in preparing the reservoir, all trees, bushes, stumps, etc. were removed from the flooded area. The loam and vegetable matter were then removed and placed in an embankment at the upper end of the reservoir. The top of the embankment being from 1 to 2 ft [0.3 to 0.61 m] above the high-water line. The removal of the loam and muck makes the reservoir clean and attractive and will prevent the water from becoming colored and reduces the shallow flooded areas and prevents, to a large degree, vegetable growths” (Enosburg Falls 1925:26-27).

The amount of material removed was impressive. In 1923, the preliminary shovel tests for the dam indicated a layer of fine white sand just 6 to 8 in below the surface and

“the amount thought necessary to remove was, therefore, based upon this examination. During construction it was found that, with few exceptions, the sand above mentioned, overlaid a stratum of decayed vegetable matter and which extended in places to a depth of three feet below the surface. It was necessary to remove all of this muck so as to have a clean bottom. The preliminary estimate



Figure 13. View of the impoundment area, looking north from the crest of the dam.



Figure 14. View of the impoundment area, looking south from the north end of the present pool's limit, towards the dam.

was based on 3,000 cubic yards. The total amount removed, however, was 8,215 yards or 5,215 cubic yards in excess of the estimate and which at the contract price amounted to \$6,518.00” (Enosburg Falls 1925:26-27).

Although not discussed by Thorpe, the speed of the project suggests the employment of heavy machinery such as drag line excavators, power shovels, and/or dump trucks to remove the organic material and upper soil horizons from the reservoir. Cores made in this area by UVM CAP indicate extensive sediment accumulation, but no buried surfaces, up to 3-4 ft (0.9-1.2 m) below the modern ground surface. Therefore, this area is not considered sensitive for precontact Native American archaeological sites, based on the documentary evidence of widespread ground disturbance as well as the area was likely formerly a wetland.

Western Construction Access

The proposed western construction access route follows an established improved dirt road from Reservoir Road northward to the active well houses near the dam then continues north running along the easterly edge of an open field to the north end of the current impoundment, then heads down a steep bank into the former impoundment area (see Figure 4). In the first part of the route, it is only in the area around the Trout Brook crossing that the proposed project’s APE extends beyond the currently traveled dirt road, as culvert replacement is proposed here (see Figure 4). This area has been extensively altered by flooding and subsequent culvert and road repair and it is not considered sensitive for precontact Native American sites (Figures 15 – 17).

Most of the proposed access route in the field north of the well house has already been subject to an archaeological study including a pedestrian survey and subsurface testing, with no archaeological remains reported in the path of the proposed access route (Figure 18) (Knight 2023). However, within the access route in a small space between the field and the high bank overlooking the north end of the impoundment, an area not included in the earlier survey, intact soil profiles were found (some areas have a slight overburden) (Figures 19 and 20; see Figure 8). Given its proximity to a known site, its position on a level area overlooking the little valley of Trout Brook, and its intact soils, this area is considered sensitive for precontact Native American sites. Phase I testing is therefore recommended if it cannot be avoided during project work.



Figure 15. View of the culvert crossing Trout Brook on the proposed western access route, looking north.



Figure 16. View of the proposed western access route in the area where it crosses Trout Brook, looking south.



Figure 17. View of a cement culvert on Trout Brook and an extensive area of fill around it on the proposed western access route, looking southeast.



Figure 18. View of proposed western access route along the east side of the open farm field and on the right side of the impoundment, looking south.



Figure 19. View of the archaeologically sensitive area within the western access route, looking east towards the impoundment from the open field.



Figure 20. View of a hand core showing a largely undisturbed upper soil profile in the archaeologically sensitive area within the western access route on the right (west) side of the impoundment.

Eastern Construction Access

The proposed eastern access route follows an old road cut in 1924 when the dam was built. This road was created by extensive cut and fill into a moderate to steep side slope (Figures 21 – 23; see Figure 4). The area is not considered sensitive based on the steepness of the original slope and the historic period ground disturbance.



Figure 21. View along the proposed eastern access route to the project area, looking north; note cut and fill into steep slope.



Figure 22. View along the proposed eastern access route, looking south; note cut and fill into steep slope.



Figure 23. View of the terminus of the proposed eastern access route at the south end of the dam, looking northeast.

Staging Area

Two potential staging areas are proposed for the project. One is located within the farm field along the west side of the proposed western access route, between the established dirt road and the top of the high stream bank, on either side of a modern property line (Figure 24; see Figure 4). The higher portions of the APE in this area lie on top of a sandy / gravelly esker feature. Cores made on top of this feature did not encounter developed soil horizons, suggesting the possibility of either overburden or stripping in this area (the cores could not get very far). It was also noted that there is a slight but distinct difference in elevation running along a straight-line feature directly on the property boundary also suggesting the possibility of land modification on the Village's property. The lower lying ground in this part of the overall APE is situated on the silty glacial lake plain soil and not far from the projected shoreline of glacial Lake Vermont. Although moderately sloped, this area is potentially sensitive for precontact Native American sites. However, the abutting property could not be tested by coring at the time of the site visit as that landowner was not informed of the study and the village only has a right of way easement to the established road. Due to its sensitivity, if the area on the adjacent property is to be used as a staging area for the proposed project, Phase I testing is recommended (see Figure 8).

A second staging area is located immediately north of Reservoir Road, at the juncture of the two proposed construction access routes (Figure 25; see Figure 4). This area has been modified by the construction and use of the roads and its use as a pull-off area. Little to no intact soils remain in this area and it is not considered sensitive for potential precontact Native American archaeological sites.



Figure 24. View of proposed staging area within the farm field along the west side of the western construction access route, looking south, along the property boundary (the bushes). The tree line in background is located near the projected margin of glacial Lake Vermont (VTORC 2024).



Figure 25. View of proposed staging area immediately north of Reservoir Road, at the juncture of the construction access routes, looking northeast.

Sediment Disposal Area

The proposed sediment disposal area is located on the isolated kame landform southeast of the dam, on both sides of an access drive that leads to the village's chlorination plant (Figures 26 – 28; see Figure 4). This area was purchased by the Village of Enosburg Falls in 1986 and previously had a farmstead complex on it (see Figures 1 and 7). The complex was removed between 1941 and 1962, and the area was subsequently redeveloped by the village for the chlorination system c. 1988 (Figure 29; see Figure 7). Large areas of ground with minimal vegetation and/or bare soils to the west of the chlorination plant, along with an aerial photograph from 1974, suggest that this area may have been disturbed an/or partially stripped (e.g., borrow/topsoil removal) (Figure 30). Hand cores attempted in this area confirm this disturbance as they go directly to gravel with no developed soil noted. This area is also located about 110 m (360 ft) southeast of Trout Brook, with a moderate slope to the brook. Due to the setting and significant disturbance, the sediment disposal area is recommended as not sensitive for precontact Native American sites.



Figure 26. View east of the sediment disposal site on the east side of the drive to the chlorination plant; note that this area is the location of former farmstead buildings.



Figure 27. View west of the sediment disposal site on the west side of the drive to the chlorination plant.



Figure 28. View southeast of the sediment disposal site on the west side of the drive to the chlorination plant, looking towards Reservoir Road.

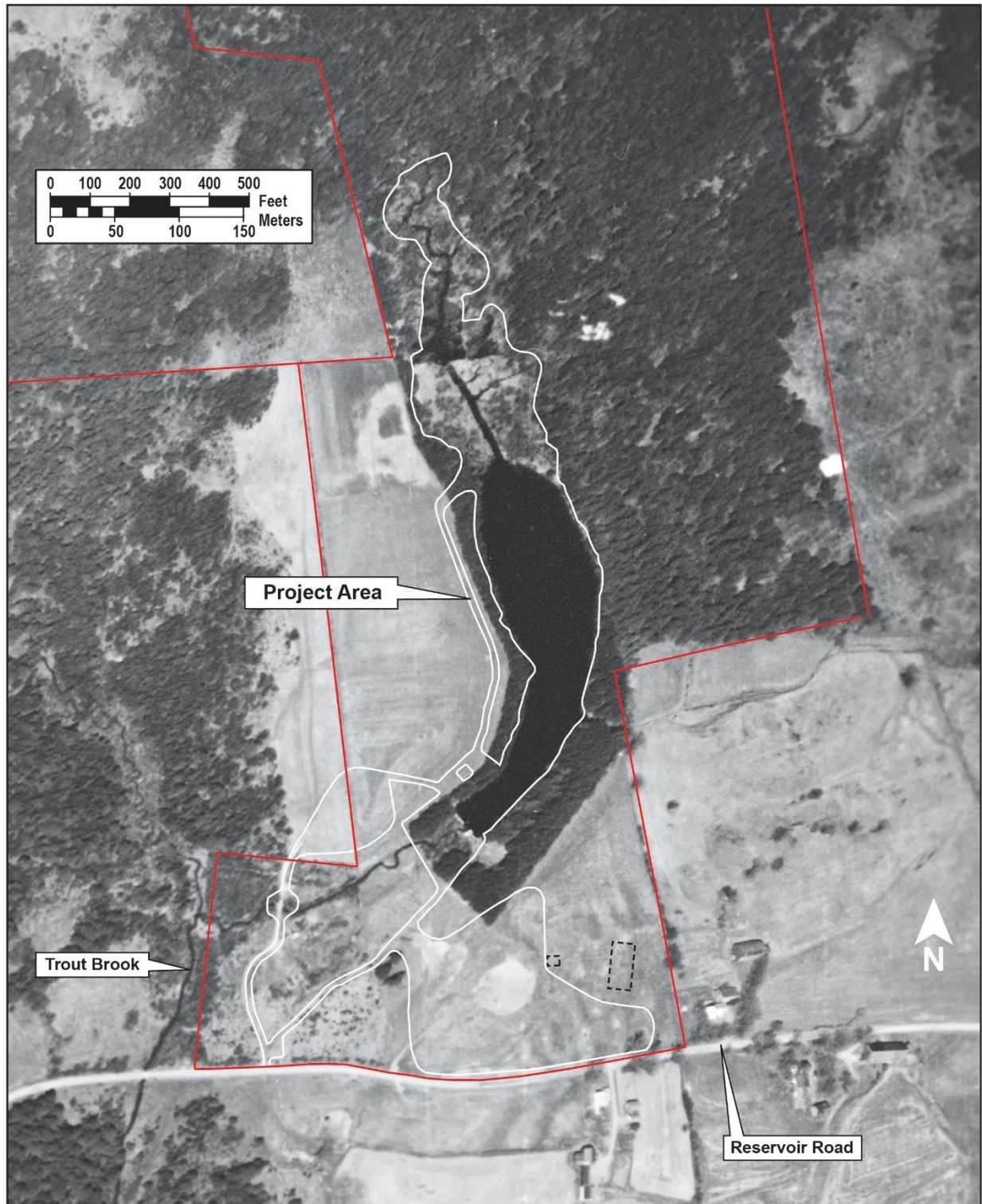


Figure 29. Detail of aerial photograph showing the Trout Brook Reservoir in 1962 and the farm buildings no longer present south of the reservoir; note dashed boxes are added current buildings/structures (Geotechnics & Resources Inc. 1962).



Figure 30. Detail of aerial photograph showing the Trout Brook Reservoir in 1974 and disturbed and/or partially stripped area west of the chlorination plant structures (dashed lines) (AreoGraphics Corp. 1974).

Red Canary Grass Restoration Area

The red canary grass restoration area is located upstream of the dam, toward the northern extent of the project area (Figure 31; see Figure 4). As noted in the sediment removal section, archival documents indicate that much of the area upstream from the dam was likely entirely stripped of its upper soil horizons during the construction of the reservoir. Soil cores taken in this area showed about 15 cm (6 in) of gray, probable impoundment sediments overlying more than 46 cm (18 in) of very homogeneous gray sediments with no soil development indicated (Figure 32). Soils here are mapped as Terric Medisaprists, which are described as poorly drained, so the area may have been a wetland type environment during the precontact period. Based on the lack of developed soils and likely disturbance from the creation of the reservoir, the red canary grass restoration area is recommended as not sensitive for precontact Native American sites.



Figure 31. View north toward the northern extent of the project area, within the red canary grass restoration area.



Figure 32. View of a hand core showing soil profile within the red canary grass restoration area.

Historic Euro-American Archaeology

Based on historic maps and land records research, other than its use as farm land, no early historic development took place at the dam site or along the proposed access roads leading to it (see Figures 10 and 11). The historic c. 1850 Jeffords farmstead formerly located at the proposed sediment disposal site, was removed between 1941 and 1962, and no evidence of the complex, such as foundation remains or historic debris scatter, was identified during the field visit (see Figures 7 and 29). The ground here appears to have been heavily disturbed during the construction of the chlorination plant and is very unlikely that any significant historic period archaeological resources remain intact. No portions of the Trout Brook Reservoir Dam Removal project are recommended as sensitive for historic Euroamerican archaeology sites.

HISTORIC RESOURCES REVIEW

Trout Brook Reservoir Dam APE

At the Trout Brook Reservoir Dam, the APE for standing historic resources was identified as the project area and buildings / structures immediately adjacent to it (Figure 33). In addition to the dam, identified resources consist of buildings and structures associated with the current Village of Enosburg Falls well water supply system which includes two well houses, a chemical feed building and a concrete reservoir, along with a culvert that carries Trout Brook under the access road to the farm field, dam and well houses (see Figure 33). Buildings along Reservoir Road, near the sediment disposal portion of the project, were not identified as within the APE given that the spreading of the sediment would have no indirect effect on them. No resources within the APE in the dam area are listed on the National Register (NR) or State Register (SR) of Historic Places and none are included in the Vermont Architectural Resource Inventory / Historic Sites & Structures Survey. A farm complex (Survey No. 0602-22) that was located on the north side of Reservoir Road, just south of the concrete reservoir, was listed on the SR but it was demolished by 1962 (see Figures 7 and 29) (VDHP 1983).

Related Historic Districts

The Trout Brook Reservoir Dam was built to supply water to the Village of Enosburg Falls. The downtown portion of the Village is listed on the SR (Survey No. 0603-1) as the “Enosburg Falls Downtown Historic District” (Figures 34 and 35) (VDHP 1984a). The District is described as “a well-preserved example of an early mill and agricultural village in Northern Vermont which experienced a large amount of economic and residential growth in the last quarter of the 19th century due to the coming of the railroad” (VDHP 1984a). The District consists of numerous residential and commercial buildings, along with churches, a school, two parks and a cemetery. The buildings date from c. 1830 – 1930 and represent the various styles of architecture from this 100-year period. A desk review that consisted of comparing photographs from the 1984 SR-listing to current Google Earth imagery was conducted and determined that although some listed resources are no longer extant and others may no longer contribute due to alteration, the majority of the District retains integrity and remains eligible for inclusion on the SR. The Enosburg Falls Downtown Historic District also appears eligible for inclusion on the NR. A sample of the compared images are presented in Appendix III. Two adjacent SR-listed

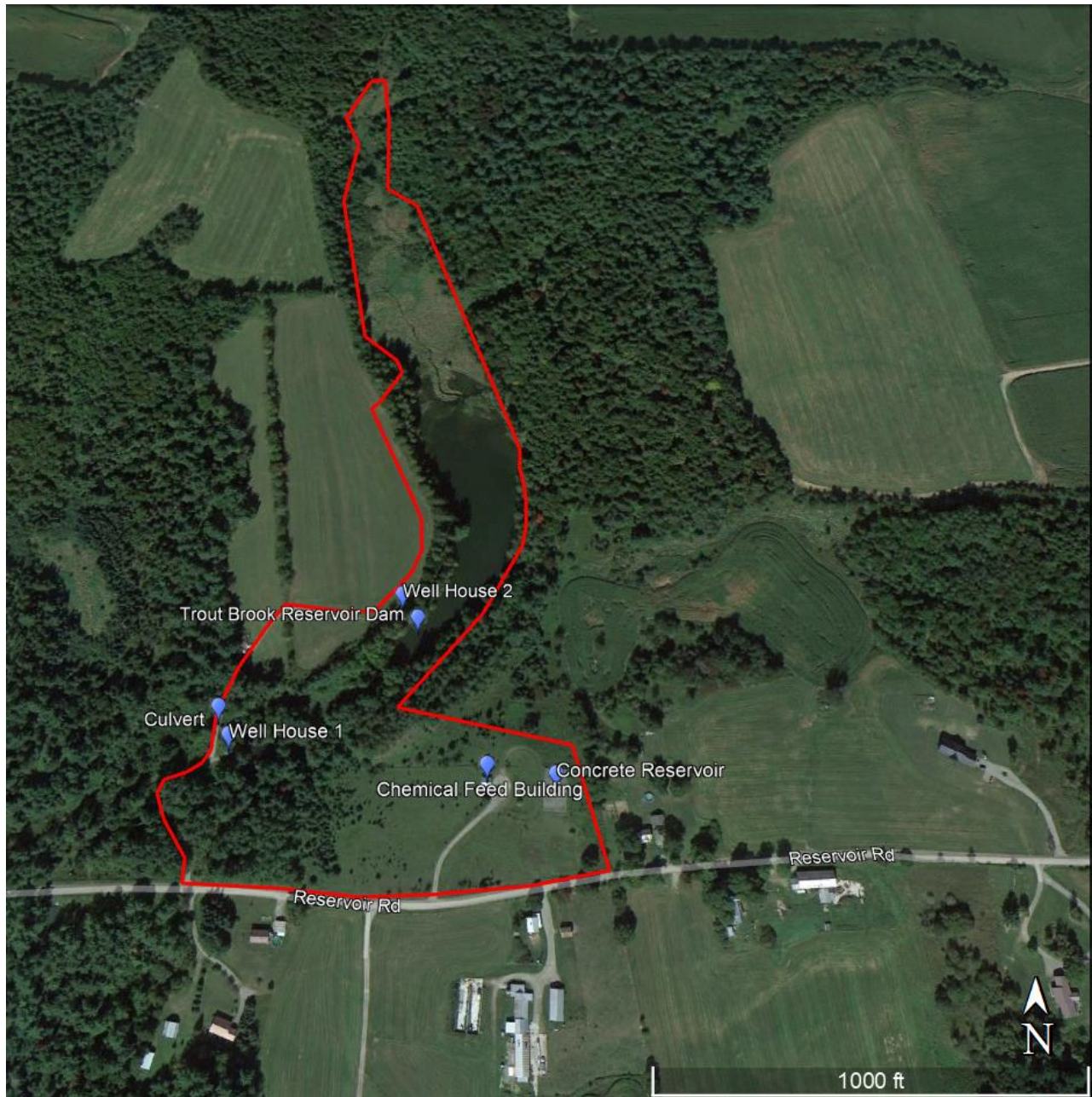


Figure 33. Map showing the Area of Potential Effect for standing historic resources at the Trout Brook Reservoir Dam site, with the location of buildings / structures within it identified.

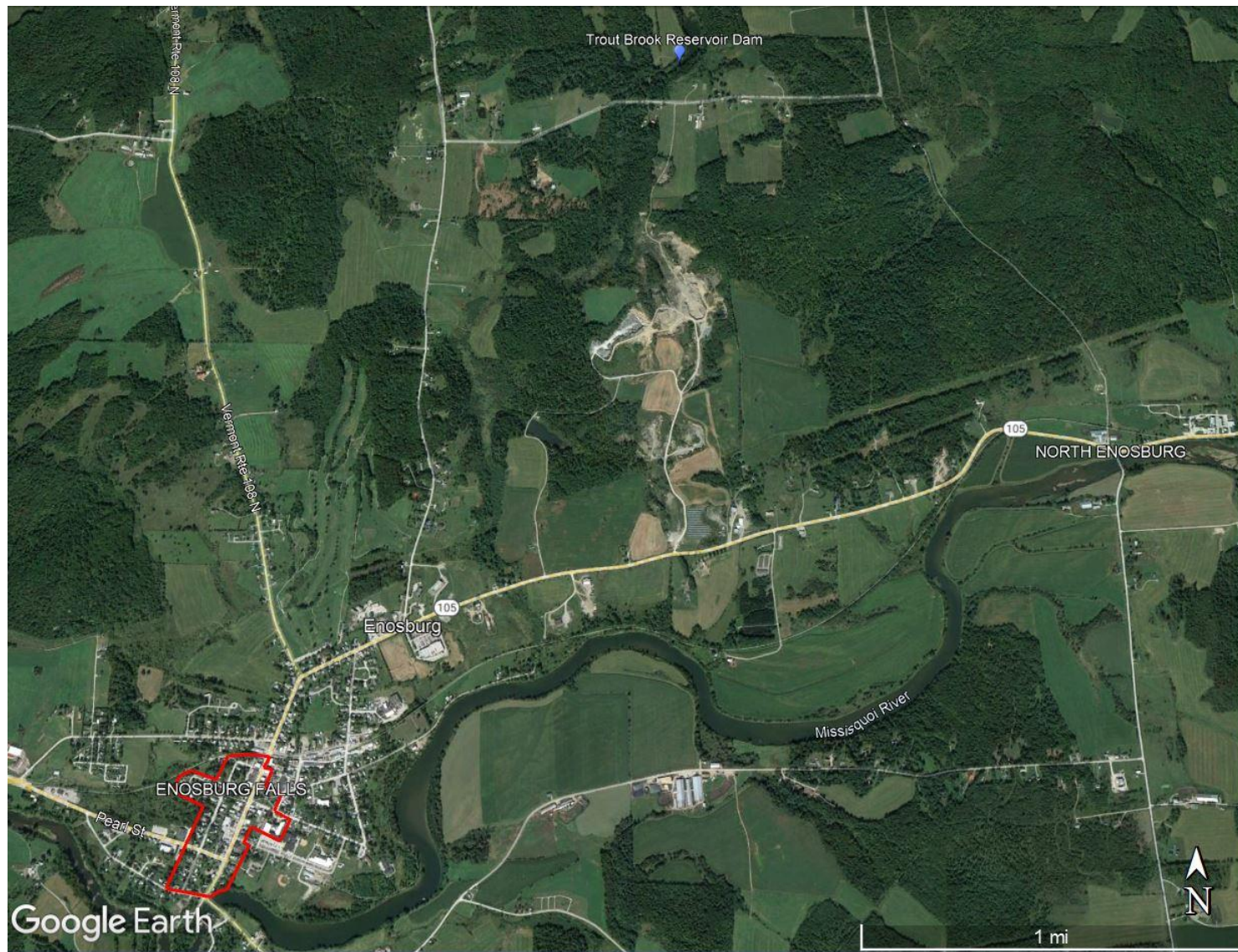


Figure 34. Map showing the location of the Enosburg Falls Downtown State Register-listed Historic District (red polygon) and the Trout Brook Reservoir Dam.

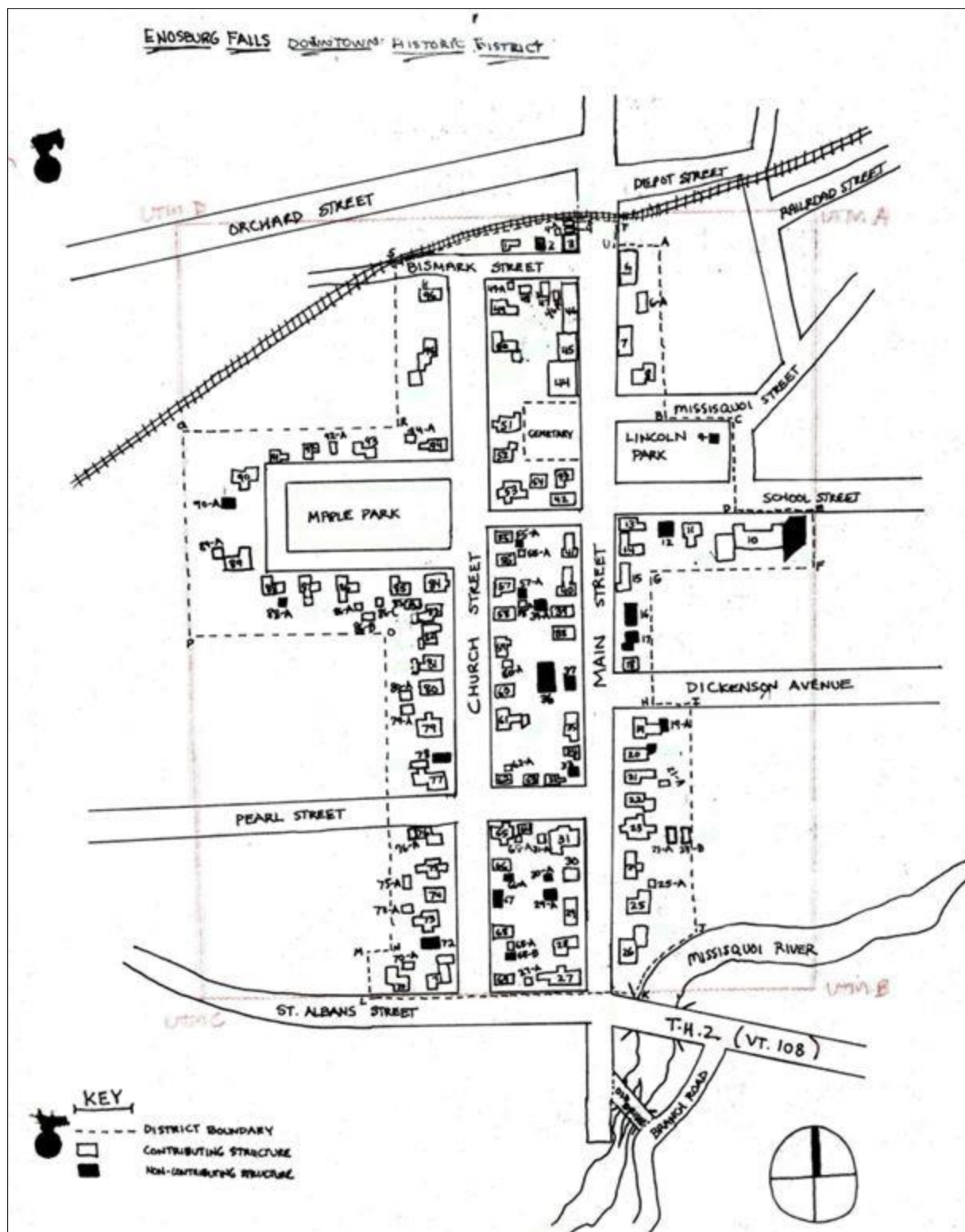


Figure 35. Map of the Enosburg Falls Downtown State Register-listed Historic District (VDHP 1984a).

Historic Districts, the “Historic Railroad District” (Survey No. 0603-2) and the “Orchard Street – North Main Street Historic District” (Survey No. 0603-3) have histories and resources similar to the Enosburg Falls Downtown Historic District, and they also retain integrity and appear SR and NR eligible (VDHP 1984b, 1984c). Built in 1924, the construction of the Trout Brook Reservoir Dam falls within the period of significance for the Districts; however, its distance from them and the lack of any known standing structures or buildings related to the dam/reservoir water system within the Districts (at present, it is not known if any of the cast iron conveyance pipe remains) results in a recommendation that, although related to them, the Trout Brook Reservoir Dam does not contribute to their significance.

Municipal Water Supply Systems in Vermont

Research was conducted to place the Trout Brook Reservoir Dam and its reservoir, and the Village of Enosburg Falls’ water supply system, in a general context of municipal water supply systems in Vermont. Although additional research beyond the scope of this project is needed to fully document and develop a context for municipal water supply systems in Vermont, preliminary history is presented here to assist with assessing the significance of the dam within this context.

“The early history of Vermont is closely related to the water resources of the state” (Carr et. al. 1990:500). Not only were early settlements often located near major rivers or large lakes, “which provided routes for transportation and commerce,” but smaller communities soon developed on lower order rivers and streams around waterpower sites (Carr et. al. 1990:500). However, the availability of drinking water was one of the most influential factors in the broader settlement patterns and community growth in the state (Carr et. al. 1990:500). Fortunately for Vermont, as state geologist, G.H. Perkins, noted in 1906, “no state in the Union is more abundantly supplied with pure water than is Vermont, in none is it more readily obtained for town supply, in none are the sources of water supply less likely to be contaminated” (*St. Albans Daily Messenger* May 26, 1905). In the early Euro-American settlement period, Vermonters sourced their drinking water from various ‘self-supply systems’ (Carr et. al. 1990:500-501). The “most common” source for individual farms were springs (Perkins 1904:87; Votey 1913:87).¹¹ In the historic period, “on account of the numerous springs throughout the hilly regions, wells [were] far less common than in most other states” (Perkins 1904:83). In 1904, a survey of the water supply of Vermont found that “190 of the 240 towns reporting” (or 79%) were “supplied wholly or in large part from springs” (Perkins 1904:87). Where the water did not come to the surface in springs, the aquifer could often be accessed by an open dug well, usually about 8-30 ft deep,¹² barring that, Vermonters had to rely on cisterns located underground or in buildings to

¹¹ The USGS states “a spring is a water source formed when the side of a hill, a valley bottom or other excavation intersects groundwater at or below the local water table, below which the subsurface material is saturated with water” (<https://www.usgs.gov/special-topics/water-science-school/science/springs-and-water-cycle>). At these points, water exists the aquifer and emerges onto the ground surface (or sometimes into a pond). There are “two types of principal aquifers . . . in Vermont, unconsolidated deposits and bedrock” (Butterfield 1988:501).

¹² In Vermont, “stratified drift forms the most productive unconsolidated aquifer;” however, “many rural private wells are completed in till aquifers” (Butterfield 1988:501). Usually, a dug well provides enough water for a single family, but they are vulnerable during period of droughts (Butterfield 1988:501). Some wells in Vermont are brick lined, but most are ‘stoned-up’ although, in some cases, the top 6 ft or so of a stone lined well is built with brick and/or mortar to prevent surface water from directly entering the well (Votey 1913:90).

collect rainwater from roofs, or had to get their water directly from rivers, streams, or lakes (Carr et. al. 1990:500-501; Stone 1906: Votey 1913:89-90).

As the population of Vermont grew, cases of waterborne diseases such as typhoid and dysentery became increasingly prevalent.¹³ This was often due to poorly located wells or to the direct discharge of sewage, industrial waste, and/or field runoff into the surface waters (Stone 1906:179). Possibly the first communal water distribution system in Vermont was located in Westminster where a group of eight homeowners built an underground conduit to serve their houses in 1787; this was followed in 1794 with a proposed project in Rutland to bring spring water from Mendon, about 2.5 mi away, in wooden pipes (<http://www.waterworkshistory.us/>, Documentary History of American Water-Works). As various population centers transitioned from hamlets to villages in the early 1800s, especially where the population density exceeded the capacity of a self-supply system capable of avoiding contamination, or in places where self-supply was not obtainable for all residents, private companies or individuals began to develop small scale commercial water distribution systems, often called Aqueduct Companies. The planned systems up to ca. 1821, were in St. Albans, Middlebury, Montpelier, Vergennes, Battleboro, Bristol, St. Johnsbury, Springfield, Woodstock, Pittsford, Wallingford, and Burlington (Ibid.). Occasionally, these companies were rechartered at a later date.

As the number of residents moving into population centers continued to increase, the scale of the waterworks required also grew. Larger water distribution systems began integrating reservoirs and/or impoundments and began using improved technology such as standpipes (introduced ca.1850 to maintain pressure), large pumps (to force water into elevated storage), and hydraulic rams (by the 1850s) (Ibid.). Several villages had multiple private systems operating in them. However, access to water across a given community could be far from complete as the private companies sometimes did not have the resources to scale up with the demand, and in some villages these systems remained non-existent. For example, Burlington's water system had been established by the Burlington Aqueduct Company in 1821 (rechartered 1849) and by time the City purchased it in 1866, it only supplied 7.5% of the population (Thayer 1866 80-83). As a result, one of the state's largest communities had to rely on cisterns, water hauled in casks from Lake Champlain, and/or wells (Perkins 1906:255-258; Thayer 1866:80-83).

In the early 1850s, incorporated villages and cities in Vermont began to enter the water supply business themselves, occasionally developing their own systems from scratch, but more often buying and expanding existing ones (<http://www.waterworkshistory.us/>). The first municipal system in the state appears to have been established in Rutland in 1853 (Trowbridge 1883:44). It was "supplied by two small streams . . . East Creek and Tanyard Brook" and included a reservoir built "in the bed of the stream" (Trowbridge 1883:44).¹⁴ By 1880, there were thirty-three municipal water systems in Vermont (<http://www.waterworkshistory.us/>). In 1904, Perkins noted, "While a large number of the inhabitants are still supplied from their own

¹³ Between 1857, when Vermont officially started keeping vital statistics, and 1892, annual typhoid deaths ranged between 100 and 550 (Anonymous 1892:590). However, in 1892 it was noted that deaths from this cause "has notably declined in the past few years" due to "a knowledge of the causes and improvement in the dwellings and drainage" (Anonymous 1892:590).

¹⁴ In 1857, the Village of Rutland leased The Rutland Water Company for 1,000 yrs (<http://www.waterworkshistory.us/>).

private springs, public supplies have been installed in a very large number of towns. This is because of the unusual abundance of springs and the consequent ease and cheapness with which public systems can be installed” (Perkins 1904:73). By 1904, “at least 65 towns and villages have more or less complete systems, owned either by the town or by corporations or private individuals” (Perkins 1904:73).

In 1855, John Snow of London proved the reality of waterborne illness with his classic cholera study (US EPA 2000). This was followed by the development and acceptance of germ theory in the late 1880s (Ibid.). The Vermont State Board of Health, one of the first in the country, was created in 1886 and started implementing water standards, testing water, and making inspections and recommendations about public water systems. In this period, rivers and stagnant water sources fell into disfavor. In 1913, J.W. Votey, the Dean of College of Engineering at the University of Vermont, wrote, “all surface water supplies should be regarded with suspicion because they are so easily polluted” (Votey 1913:90). A survey of 80 of Vermont’s public water systems in 1906 indicated that one system (1.25%) was supplied by a well; two (2.5%) were supplied by a major river; five (6.25%) were supplied from Lake Champlain; twenty-four (30%) were supplied from a pond, brook, or stream; and forty-eight (60%) were supplied by springs (Perkins 1906). As recorded by Haybrook, between 1900 and 1930, about two dozen new dams were built for municipal water supply in Vermont (Haybrook 1952).¹⁵ A survey of Vermont dams in the early 1950s included thirty-five dams serving municipal water supply systems then in actual service (Haybrook 1952). These included 23 embankment dams (65.7%)¹⁶ five stone masonry dams (14.3%), and seven concrete masonry dams (20%) (Haybrook 1952).

In the late nineteenth century, “the design of most drinking water treatment systems built in the U.S. during the early 1900s was driven by the need to reduce turbidity” (US EPA 2000). Sand filtration had been introduced to the United States by the early-mid 1800 and was “a fairly effective treatment method for reducing turbidity” (US EPA 2000). Reservoirs hold reserves of water, supply head pressure, and serve as a possible filtration and sedimentation point in the system. Many of Vermont’s historic period water systems included one or more reservoirs. Reservoirs could be open or covered, they could be lined or unlined, and they could be in the stream or water could be pumped to them. Reservoirs were often located at a higher elevation than the service area to generate head for the distribution system. Protecting open reservoirs from contamination was a major challenge (Barre Daily Times May 5, 1926). Buffer zones were purchased around the reservoirs, fences were built, vegetation was cut back and attempts at curbing both human and animal (e.g., beavers and woodchuck) activity around them were made.

In the early 20th century, two major changes in public water supply were beginning to take shape with each development taking the approach to water supply in different directions. On one hand, there was a movement towards large yield drilled wells¹⁷ capable of tapping into deep groundwater sources. Drilled wells in the United States for self-supply were introduced ca. 1808,

¹⁵ Haybrook’s list does not include dams that may have been built in this period but taken out of service before the ca. 1952 survey, such as the Trout Brook Dam.

¹⁶ These dams were usually built to raise the level of a natural waterbody (e.g., a pond).

¹⁷ “Most large yielding (005 Mgal/d or greater) wells which provide water for public systems withdraw from the stratified-drift aquifers” (Carr et al 1990:501).

but needed better technology (beginning ca. 1820-1830s) to become more widely used (<https://www.usgs.gov/publications/notes-early-history-water-well-drilling-united-states>). However, in Vermont, possibly due to its other available water sources, bored wells only appear to become relatively common in the 1860s and 1870s. Perkins noted,

“in the valleys . . . and in other portions where the unconsolidated surface deposits of drift are thick, wells are frequently used as a source of water. Very few of these wells penetrate the rocks; but in some instances, where the shallow source of water had yielded insufficient quantities, deep wells have been bored. Such wells are most commonly found along the clay deposits of the Champlain Valley and in areas of the consolidated stratified rocks” (Perkins 1904:83).

However, drilled wells for community supply were “probably . . . introduced to the region in the early 1900s,” but “not used extensively until electrical distribution became generally available, allowing the use of electric pumps” (Carr et. al. 1990:500). The other major trend in water supply in the early 20th century was towards safe access to surface water, such as Lake Champlain, through chemical treatment. “Disinfectants like chlorine,” which was first used in the United States in a public water system in 1908, “played the largest role in reducing the number of waterborne disease outbreaks in the early 1900s” (US EPA 2000). As of the late 20th century, the major source of water in Rutland, Franklin, and Chittenden Counties was surface water, mainly from Lake Champlain (Carr et al 1990:499). Currently, about 20 million gallons are taken from the lake each day for drinking water supply (<https://www.lcbp.org/our-goals/clean-water/fishable-swimmable-drinkable/drinking-water/>).

Together, these trends appear to have left open reservoir construction for water supply a thing of the past in Vermont. Several of the reservoirs that were built in this period are still maintained, though not all are used. For example, Brattleboro’s Sunset Lake Dam, which was built in the early 1900s at the outlet of a natural pond (North Pond) to raise the water six feet, was disconnected from the distribution system to be used only in periods of drought (*Brattleboro Reformer* March 1, 1976). In 1963, the U.S. Department of Health Education and Welfare surveyed 185 public water systems in Vermont. At that time, the state had one system (0.54%) by an abandoned quarry; seven (3.8%) supplied by Lake Champlain; thirteen (7%) supplied by a mix of spring and wells; twenty (10.8%) supplied by wells; twenty-six (14%) supplied by a mix of surface and ground water sources; 34 (18.4%) supplied by a surface source such as a river, brook, or pond; and eighty-four systems (45.4%) supplied by springs (U.S. Department of Health, Education, and Welfare 1963). By the late 1980s, about 2/3 of Vermont’s population was supplied by a public system with groundwater sources being “the primary water supply for 54 percent of the population” (Butterfield 1988:501; Carr et. al. 1990:502). By the late 20th century, there were “527 public community wells, about 1,500 non-community public wells, and about 50,000 private wells” in Vermont (Butterfield 1988:501).

Trout Brook Reservoir Dam APE Resources

Trout Brook Reservoir Dam

The Trout Brook Reservoir Dam, VT State ID #19.02, lies at latitude 44.9373114, longitude -72.78175971. The dam is a low, reinforced concrete masonry, straight, gravity-type dam on an earthen foundation¹⁸ and has earthen embankments on both its upstream and downstream sides (Figures 36 and 37). The dam is assessed as in poor condition with significant cracks through its horizontal construction joints and seepage occurring under the structure (SLR 2023:1).¹⁹ The main (or central) section of the dam is 112 ft long and is about 16 ft high (Figure 38) (Enosburg Falls 1925:26; SLR 2023:3-4). The crest sits about 14 ft above the bottom of the reservoir (Enosburg Falls 1925:26; SLR 2023:3-4).²⁰ The dam has a crest thickness of 3 ft and a base thickness of 8 ft (Figure 39) (Enosburg Falls 1925:26). However, the crest length given for the main dam does not include the “cut off walls” (wings) that “extend from the main section into the banks at both ends” (Figure 40) (Enosburg Falls 1925:26). Presently, the full traceable crest of the structure is about 128 ft (see Figure 12).

The geology of the site, specifically the unconsolidated sandy/gravelly deposits associated with the isolated kame and esker features at either the end of the structure resulted in the addition of two ‘cut-off’ walls²¹ to the design while the dam was being built to prevent the flow of water under or around the structure (see Figure 36) (Enosburg Falls 1925:26). According to Thorpe,

“in constructing the dam conditions were encountered which could not be foreseen and which had to be overcome. When the preliminary examination was made in 1923, test wells were dug at the site of the dam. These tests indicated hard impervious material at a depth of 5 to 7 ft below the surface. On excavating the base of the dam this material was found and extended for about 100 ft across the lower portion of the valley. At each end of this section the impervious material ended abruptly and sand and gravel thoroughly saturated with water was encountered, which extended into the banks at both ends of the dam. These conditions made work extremely difficult and in order to ensure tightness it was necessary to go to a large expense. All reasonable precautions are being used in order to prevent the water from finding its way either under or around the ends. At the south [left] end a trench three feet in width was excavated, beginning in the tight close material and extending southerly into the bank, a distance of 41 ft. The bottom at the deepest portion, being 29 ft below the top of the dam. A concrete cut-off wall

¹⁸ Dams can be built on sand and gravel, “provided that water be prevented from flowing through the body of sand on which the dam rests, and the streambed be protected against wash on the downstream side, so that the toe may not be undermined. The complete prevention of any flow through the sand is practically impossible, but the path of water may be so lengthened, and its passage so retarded, that the velocity can never be sufficiently high to move any particles of sand” (Wegmann 1922:237).

¹⁹ Concrete dams typically last 50-100 years, with maintenance.

²⁰ The full structural height of this dam is 36 ft.

²¹ The term ‘cut-off wall’ usually refers to a section of wall built below the bottom of the dam proper to combat seepage under the structure. Standard cut off depth was usually a minimum of 1.6 x dam height (but was often up to 2.5 x dam height).

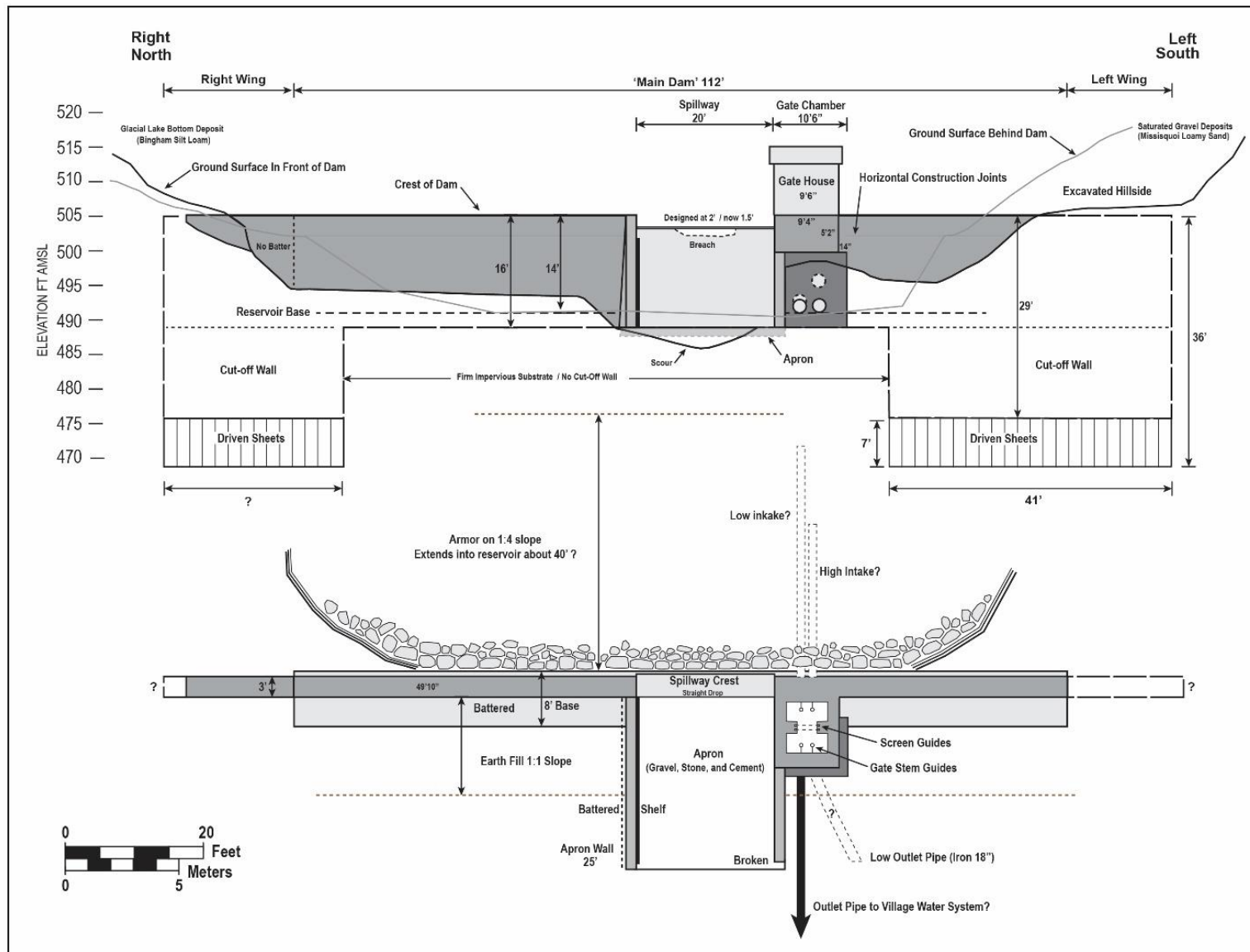


Figure 36. Elevation and plan of the Trout Brook Reservoir Dam, Bakersfield, Vermont.



Figure 37. View of the Trout Reservoir Dam, looking northeast.

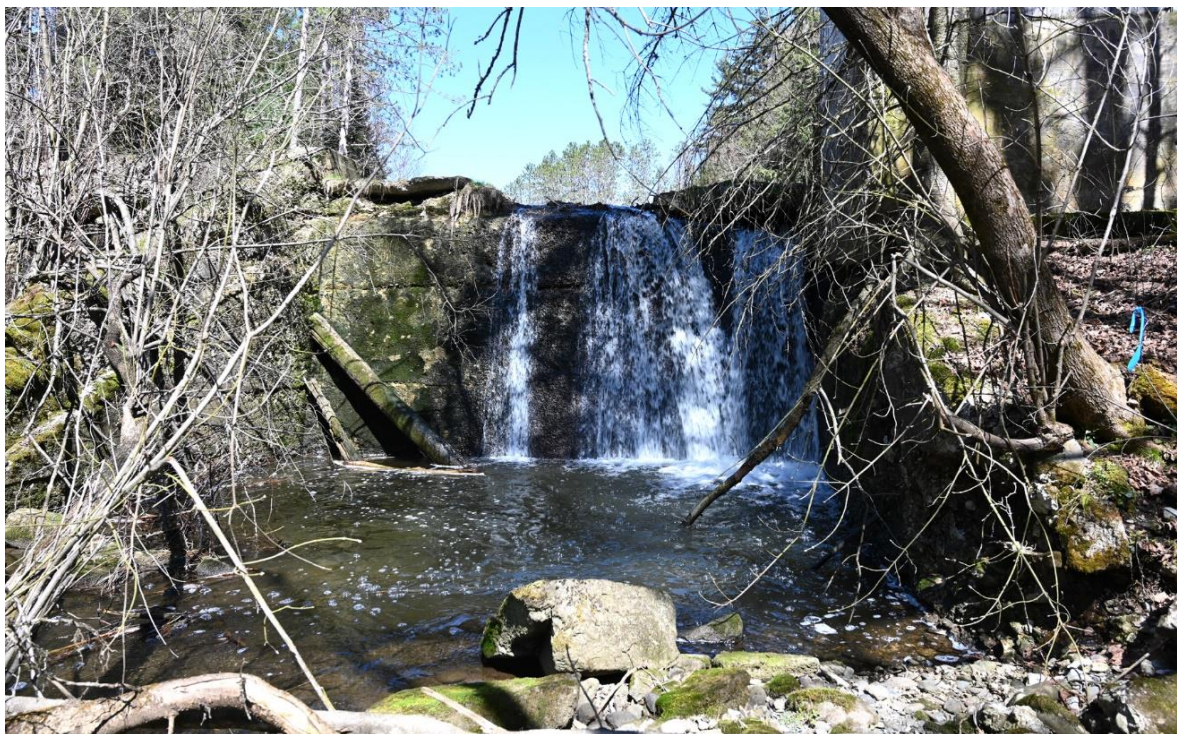


Figure 38. View of the spillway and apron area of the main dam, looking north.



Figure 39. View of the crest of the dam, looking east across the spillway from the control chamber.



Figure 40. View of the right side of the main dam, looking west.

was then constructed and forms a portion of the dam. Before the concrete was poured, the sheet piling on the upstream side was driven to a depth of about 7 feet below the bottom of the trench or at a total depth of 36 ft below the top of the dam.²² At the north [right] end, the same conditions were encountered and met by the same method. The extra work at the ends of the dam involved an expenditure of about \$3,000.00” (Enosburg Falls 1925:26).²³

The spillway is located roughly in the center of the dam (Figure 41) (Enosburg Falls 1925:26). It was designed as “20 ft in width” and its crest was set at “2 ft below the top of the main dam” (Figure 42) (Enosburg Falls 1925:26). It appears that the spillway crest has been modified since its construction by the addition of some concrete, possibly to repair and/or reinforce this area, as it is now only 18 in deep. On either side of the spillway on the downstream

²² According to a contemporary text, “where practicable, seepage should be prevented by carrying a tight cut-off, under the heel of the dam, to an impermeable foundation” (Creager 1917:184). Options for this included “interlocking steel sheet-piling, or tongued and grooved wood sheet-piling,” however it was noted that “wooden sheet piling should never be used where the foundation contains boulders which are large enough to cause the piles to buckle or deflect. Even steel sheet-piling has been made useless under very heavy driving” (Creager 1917:184). Another period text noted, “where the layer of sand or gravel is so deep . . . the best plan is to drive sheet piling of wood or metal along the line of the cut-off wall. To do this a trench 2 or 3 feet deep should be dug the full length of the embankment and the piling driven continuously in the bottom of this trench. If the sand or gravel layer is under several feet of subsurface soil, the bottom of the reservoir should be puddled so that little water will seep through the bottom into the sand or gravel layer” (Lewis 1934:6).

²³ As in the case of all dams, “the site . . . will greatly influence the character of construction” (Lewis 1934:3). If there is “earth foundation, to prevent erosion and excessive seepage, requires an expenditure far in excess of that necessary for foundations of dam on rock. In fact, the cost of foundation treatment for dams on earth is often the major part of the total cost of the structure” (Creager 1917:183).



Figure 41. View of the right side of the spillway crest, looking east.



Figure 42. View of the right side of the spillway crest, looking west.

side of the structure are the apron (or lead) walls (Figures 43 and 44). These board formed concrete walls are 18 in thick and extend downstream about 25-26 ft. They guided the water away from the dam and in this case, protected the downstream earthen fill along the front of the dam. The right apron wall has a slight batter outward and a narrow 6 in ‘shelf’ running parallel to and 30.5 in below its top. The purpose of this last feature is not clear, but it could be a reinforcement. Directly below the spillway’s straight drop was the dam’s apron.²⁴ According to Thorpe, the apron’s deck was composed of “gravel, over which stone paving, bedded in cement mortar, [was] laid” (Enosburg Falls 1925:26). Although this could not be directly observed during the field visit due to the water levels, this apron may be significantly damaged and/or largely lost. The SLR 2023 report indicates that there is a “large scour hole below the spillway undermining the dam” as well as a significant amount of displaced concrete and rip rap that has been distributed up to 40 ft downstream from the dam (SLR 2023:3-4). The apron would have dissipated the force and velocity of the water coming off the spillway and prevented scour at the toe of the dam. The main or central portion of this dam is battered outward slightly on its downstream side (Figure 45) (SLR 2023:3-4). According to Thorpe, “the downstream face” of the dam was also “protected by an earth embankment” when the structure was built (Enosburg Falls 1925:26). However, not much of this feature remains in place. It appears that water has been flowing over the non-spillway section of the dam and eroding this material away for some time.

²⁴ If water overflows a dam on a non-bedrock foundation site “there must be an apron” (Wegmann 1922:237). The apron “serves to protect the streambed from the power of the falling water and to prevent seepage of water under the structure” (Wegmann 1922:238). The length of the apron was generally calculated at “not less than 1.5 times the height of the dam” (Wegmann 1922:238).



Figure 43. View of the outside surface of the right apron wall, looking east.



Figure 44. View of the spillway and apron area, looking west.



Figure 45. View of the left side of the main dam's downstream face, looking west.

To the left of the spillway, on the downstream side of the dam, there is a gate chamber (or control chamber), which was built as “an integral part of the dam” (e.g., one part of the chamber wall is also part of the left apron wall and another part of the chamber wall is also part of the main dam²⁵) (Figures 46 – 49) (Enosburg Falls 1925:26; SLR 2023:3-4). The exterior of the chamber measures 9.33 by 10.25 ft and it “extends from the bottom of the reservoir to the top of the dam” (Enosburg Falls 1925:26). The lower part of the chamber is reinforced by an additional 13-14 in of concrete on two sides starting at 4 ft 6 in down from the crest next to the dam face and angling down to 5 ft 2 in below the dam crest on its downstream face. The interior space of the chamber measures 7 ft 4 in by 6 ft and has walls about 26 in thick. This space likely included both the intake and outlet gates for the dam. Four ferrous gate thread guides are still in position protruding from the chamber's walls, two on the upstream wall and two on the downstream wall, but the floor of the gate house and the hoist mechanisms are no longer present. It is possible that the gate leaf(s) and guides, or, possibly in this case, gate valves could still be present under the water (Figure 50). According to Thorpe, “the gates are so located that the water can be drawn from the bottom of the reservoir or from a point 5 ft above the bottom” (Enosburg Falls 1925:26). Built into the foundation of the control chamber were formed concrete guides designed to retain frames equipped with ¼ in copper mesh screens (Enosburg Falls 1925:26). These screens were placed to “prevent all floating matter as well as fish from entering the piping system” (Enosburg Falls 1925:26). All the water in the system had to pass these screens (Enosburg Falls 1925:26). The screens were “removable and can easily be taken out and cleaned when necessary” (Enosburg Falls 1925:26). The formed gate guides were 2.5 in wide.

²⁵ Along the gate chamber area, the dam crest is 3 ft 9 in (1.1 m) wide.



Figure 46. View of the gate house and control chamber on the left side of the spillway, looking east.



Figure 47. View of the gate house and control chamber on the left side of the spillway, looking north.



Figure 48. View of the gate house and control chamber on the left side of the spillway, looking west.



Figure 49. View of the gate house and control chamber on the left side of the spillway, looking west.



Figure 50. View of the interior of the gate chamber; note the concrete formed guides for the copper screens and the metal gate thread guides.

In *Water-works for Small Cities and Towns*, John Goodell diagrams a gate chamber that appears very similar to the Trout Brook Reservoir Dam chamber (Figure 51) (Goodell 1889). Goodell records that, “In this arrangement, “the chamber is divided into two portions . . . by the double set of screens [copper screens in wooden frames] and the grooved masonry walls in which they slide up and down” and two sluice gates “are provided by which the supply can be drawn off of the bottom of the reservoir or from about mid-depth” (Goodell 1899:43). In this case, the discharge pipe “has no communication with the gate chamber in which its valve is located” (Goodell 1899:43).

A wooden gate house sits on top of the gate chamber. The structure has vertical board siding and a shed roof. On its upstream side, it measures 116 in from the top of the dam to the bottom its roof, on the downstream side it measures 93 in to the base of the roof. The structure has one 30 in wide door opening centered on its upstream (north) side, two rectangular openings at ground level to the left of the door, one rectangular opening at ground level to the right of the door, and a small window type opening under the roof line on the east wall. A plain wooden bracket is attached to the rear (south) wall of the gate house just above the concrete chamber (Figures 52 and 53).

Thorpe noted that, “a blow-off pipe is provided and discharges into the brook at a point a short distance below the dam” (Enosburg Falls 1925:26). The end of an 18 in diameter iron pipe was observed partially buried in the streambed about 18.5 ft south of and about 5 ft below the visible concrete portion of the control chamber, which could be the ‘blow-off pipe’ (Figure 54; see Figure 52).

According to Thorpe, “the dam is constructed of concrete mixed in the proportion of 1 part cement to 2.5 parts sand and 4.5 parts gravel screened.²⁶ Small boulders²⁷ were bedded in the concrete. These were thoroughly washed and cleaned before being put in place. By their use a material saving was made to the Village in the cost of cement” (Enosburg Falls 1925:26).²⁸ The

²⁶ According to the SLR dam inspection report, the concrete aggregate was composed of “river gravel and cobble” (SLR 2023).

²⁷ Larger aggregates were often employed as a cost cutting filler in massed concrete work where “the walls are not less than 3 or 4 feet thick” (Cochran 1913:366; Hool, Johnson, and Hollister 1918:20). According to contemporary sources, coarse aggregate was defined as under 3 inches and ‘rubble’ aggregate was defined as greater than 3 inches and up to 100 pounds (American Society for Testing Materials Vol. 21 Proceedings of the Twenty-Fourth Annual Meeting 1921:227 American Society for Testing Materials, Philadelphia, Pennsylvania). Of the rubble aggregate, pieces larger than 5 inches were often referred to as ‘plums’ (Hool, Johnson, and Hollister 1918:21) and larger aggregates were often called pudding stones, boulders, displacement stones, or bulk-swellers (Cochran 1913:366-367). The amount of rubble stone incorporated into massed concrete structures at this time usually ranged from 15% to 25% (though up to 60% could be used) (Cochran 1913:366). Modern definitions put ‘cobbles’ at 6.4 cm to 25.6 cm and boulders at more than 24.5 cm.

²⁸ Not until the 1940s were trucks developed to transport wet concrete, therefore, the concrete for this dam was probably mixed on site (<https://mudmixer.com/the-evolution-of-concrete-mixers-from-traditional-to-modern/>). It could have been mixed by hand on temporary wooden platforms specially built for the purpose or by machine. In the early 1900s, the “technologies for mixing and distributing concrete developed quickly” (Slaton 2001:146). “Steam and then gas-operated mixers proliferated between 1900 and 1920” to supply “a nonstop flow of concrete to waiting forms” (Slaton 2001:146).

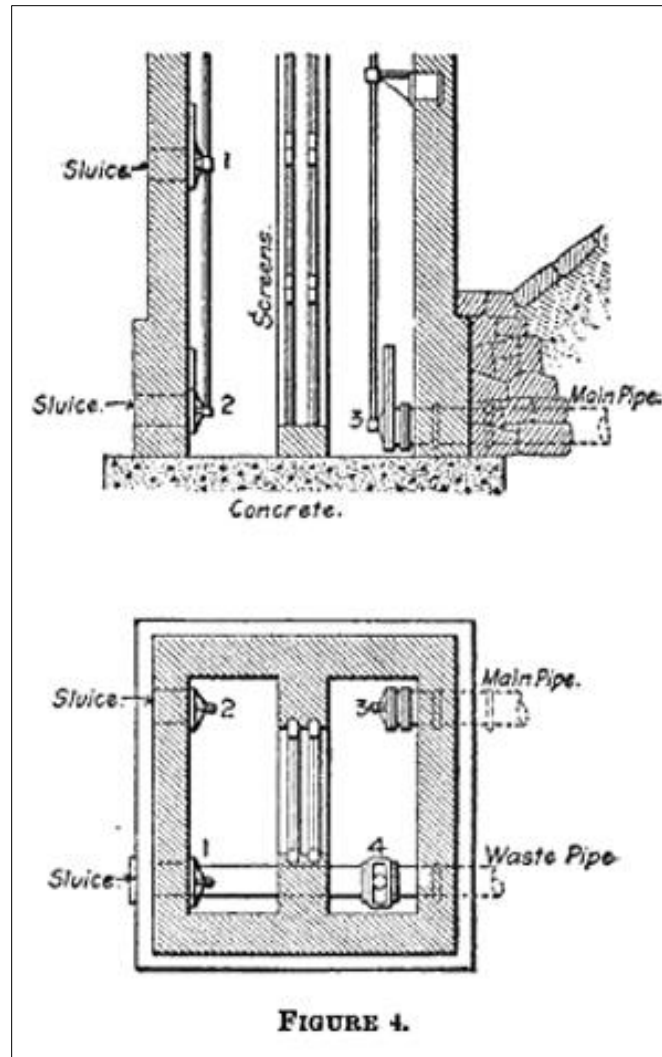


Figure 51. Plans for a gate chamber, being a “representative of the best class of such structures for small works” (Goodell 1899:41).

concrete was placed into the structure in a series of lifts. The two uppermost lifts are three feet high, and the lower lifts appear to be somewhat higher. There are clear longitudinal construction joints between the upper lifts that have deteriorated significantly (see Figures 15 and 20).

In addition to adding ‘small boulders’ into the concrete, another cost cutting tactic used in this dam appears to have been the use of ‘scrap metal reinforcement.’²⁹ Metal reinforcement was commonly used in dams by the early 20th century. While ‘twisted bar’ (aka. Ransome Bar), ‘plain bar,’ and ‘deformed bars’ (aka. rebar), were all available when this dam was built, the

²⁹ According to one concrete manual from 1918, “in recent years the use of reinforced concrete has spread very rapidly, and in 1904 a beginning was made of building dams of this material” (Wegmann 1918:210). It appears that various metal reinforcement was integrated into dams (to add strength to concrete under tension) increasingly as the “laws governing the combination of concrete and steel” (especially in connection with water) “although not absolutely fixed, are known with sufficient exactness to permit the design of nearly all classes of structures with assurance” (Taylor and Thompson 1905:282).



Figure 52. View of the gate house and control chamber on the left side of the spillway, looking west, note bracket on back of structure and pipe to left of milk can.



Figure 53. Close up view of bracket on back of gate house structure.



Figure 54. View of iron pipe / possible “blow-off pipe” south of the gate house and control chamber on the left side of the spillway.

builders chose to use scrap metal. Initial research suggests that some low head concrete dams built from ca. 1904 up to the 1920s may contain scrap metal, such as old rails (especially light gauge rails), rods, iron wagon tires, iron pipes, collected from blacksmith shops, machine shops, manufacturing plants, etc., instead of the more standardized / engineered metal reinforcements (Brown 1905:346; Fegley 1915:5; Van Wegenen 1909:107). In this dam, all the metal reinforcement elements observed were different: different sizes, different shapes; some perforated, some not. The most common group appears to be very slightly curved, punched beveled bars with rounded ends ranging from 2 to 2.5 in wide (Figure 55) (SLR 2023). However, other pieces are very different (Figure 56). The method of reinforcement placement was the ‘loose bar’ or ‘loose-rod system,’ meaning that each piece of reinforcement was placed “as a separate unit without any mechanical union to its neighboring piece” (Ballinger and Perrot 1909:10). Though some of the pieces appeared to be lapped, they were not connected. The larger metal elements run horizontally through the structure, but between the lifts there appears to be a series of two strand twisted wires (together totaling about 1/8” in diameter) placed every 16 in / 1.33 ft (or so) running from heel to toe through the structure (SLR 2023). These are most likely wire form ties used to stabilize the wooden concrete forms used in the construction of the dam when filled with concrete.

According to Thorpe, “the upstream face of the dam is protected by an earth embankment over which stone paving is laid” (Figures 57 and 58) (Enosburg Falls 1925:26). This large feature starts about 3-4 ft below the top of the dam, has a relatively level top up to about 3 ft wide, then slopes down into the impoundment on a 1:4 slope (SLR 2023:Dam Inspection



Figure 55. View of exposed metal reinforcement elements on the left side downstream face of structure; also note the concrete aggregate sizes and volume.



Figure 56. View of an exposed metal reinforcement element embedded in the right apron wall.



Figure 57. View of the upstream stone pavement feature, looking eastwards.



Figure 58. View of the pavement feature on the upstream side of the dam, looking northeast.

Report). The flat pavement stones armoring the entire top of the embankment were tabular and generally ranging from 2 to 3 ft in either top dimension and were from 2-5 in thick. Both the upstream and downstream earthen embankment features were likely included to help prevent seepage under the structure.

One final feature of the site was mentioned by Thorpe, who wrote,

“there is at this location an area of meadow and pastureland, the run-off from which, during heavy rains, discharged into the reservoir at a point about 500 ft above the dam. Acting upon the advice of the State Board of Health, this portion of the watershed was diverted to a point below the dam. In order to prevent the water from entering the reservoir, a small collecting dam was built at a point near the Davis property and about 500 ft above the main dam. A line of cast iron pipe, 16 inches in diameter, was laid from the collecting dam, along the bottom and southerly side of the reservoir and through the main dam to a point where the water finds its way into the brook” (see Figure 8) (Enosburg Falls 1925:26-27).

This feature may have been revisited in ca. 1927 to comply with recommendations made by the State Board of Health. At that time the village,

“diverted the so-called East Branch in such a manner that there should be no overflow from this branch into our reservoir. This was done by digging a suitable ditch from a point above the reservoir down to the dam on the south side of the reservoir. The water collected by this dam is discharged below the main dam, through a proper size cast iron pipe” (see Figure 8) (Enosburg 1927:26).

The Trout Brook Reservoir Dam was built during a brief window of time when municipal reservoirs were being constructed for water supply and it is representative of a limited period in concrete dam construction, design, technology, and techniques for this purpose, dating to ca. 1900 – 1930. Within the context of municipal water supply systems in Vermont, and more specifically with its relationship to the Village of Enosburg Falls’ water supply system, the Trout Brook Reservoir Dam is recommended as a significant historic resource eligible for inclusion on the NR under Criterion A. Although the dam and its reservoir no longer serve to supply water, the structure possesses integrity of location, design, setting, materials, workmanship and feeling and is significant for its association with the Village of Enosburg Falls’ efforts in securing a pure and dependable water supply.

Current Well Water Supply System Buildings / Structures

Buildings and structures within the APE that are associated with the current Village of Enosburg Falls well water supply system include two well houses, a chemical feed building and a concrete reservoir (Figure 59; see Figure 33). These resources date from c. 1950 – 1988 and do not have a direct relationship to the Trout Brook Reservoir Dam as they were constructed as part of the well water system that replaced the dam water system. Although they are directly related to the Village of Enosburg Falls and to the Enosburg Falls Downtown Historic District, they lie far outside the District boundaries and outside of the period of significance for the District so are not recommended as contributing resources to it. All but one of the buildings / structures are less than fifty years old, so they are also not recommended as eligible for inclusion on the NR as a separate district / complex due to age. The one building that is greater than fifty years old, Well House #1, is not recommended as individually eligible due to a lack of distinctive characteristics of type, period or method of construction; however, within the context of municipal water supply systems in Vermont, it is recommended as a significant historic resource eligible for inclusion on the NR under Criterion A.

Well House #1 is a square plan, board-formed concrete building with a flat roof (Figures 60 and 61). It has a solid metal door centered on its front (west) side and a 6-pane fixed wooden window with concrete sill centered on its rear (east) wall. It rests on a concrete footing / slab. Small air vents are in place on its north and south walls, and numerous electrical components are attached to its north wall. Well House #1 appears in the 1962 aerial photograph, and it is likely one of the early well houses, dating to c. 1950 (see Figure 29).

Well House #2 is a square plan, brick building with a shed roof (Figures 62 and 63). It has a solid metal door centered on its front (west) side and a 6-pane fixed wooden window with concrete sill centered on its rear (east) wall. It rests on a concrete footing / slab. Small air vents are in place on its north and south walls, and electrical components enter the building at its southwest corner. A large water pipe enters the building at ground level on its north side. Well House #2 does not appear in the 1974 aerial photograph, but it is constructed by 1989 (see Figures 30 and 59). It may date to c. 1988 when the Concrete Reservoir and Chemical Feed Building on the north side of Reservoir Road were completed (plaque on Chemical Feed Building).

The Chemical Feed Building is a one-story, square plan building with a metal gable roof (Figure 64). It has vinyl siding, a solid metal door at the south end of its front (east) wall, single pane casement windows, gable peak triangular vents, and square vents under the gable peak vents. It rests on a concrete slab. A plaque on the door of the buildings indicates that its construction was completed in 1988 (Figure 65).

The Concrete Reservoir is built into an approximately 24 ft earthen mound (Figures 66 and 67; see Figure 59). Plans describe it as a “700,000 gallon, 2 cell, poured in-place concrete reservoir” (see Figure 59). The structure is surrounded by a chain link fence. The reservoir was part of the Village of Enosburg Falls Water Supply Improvements Project completed in 1988 (see Figure 65).

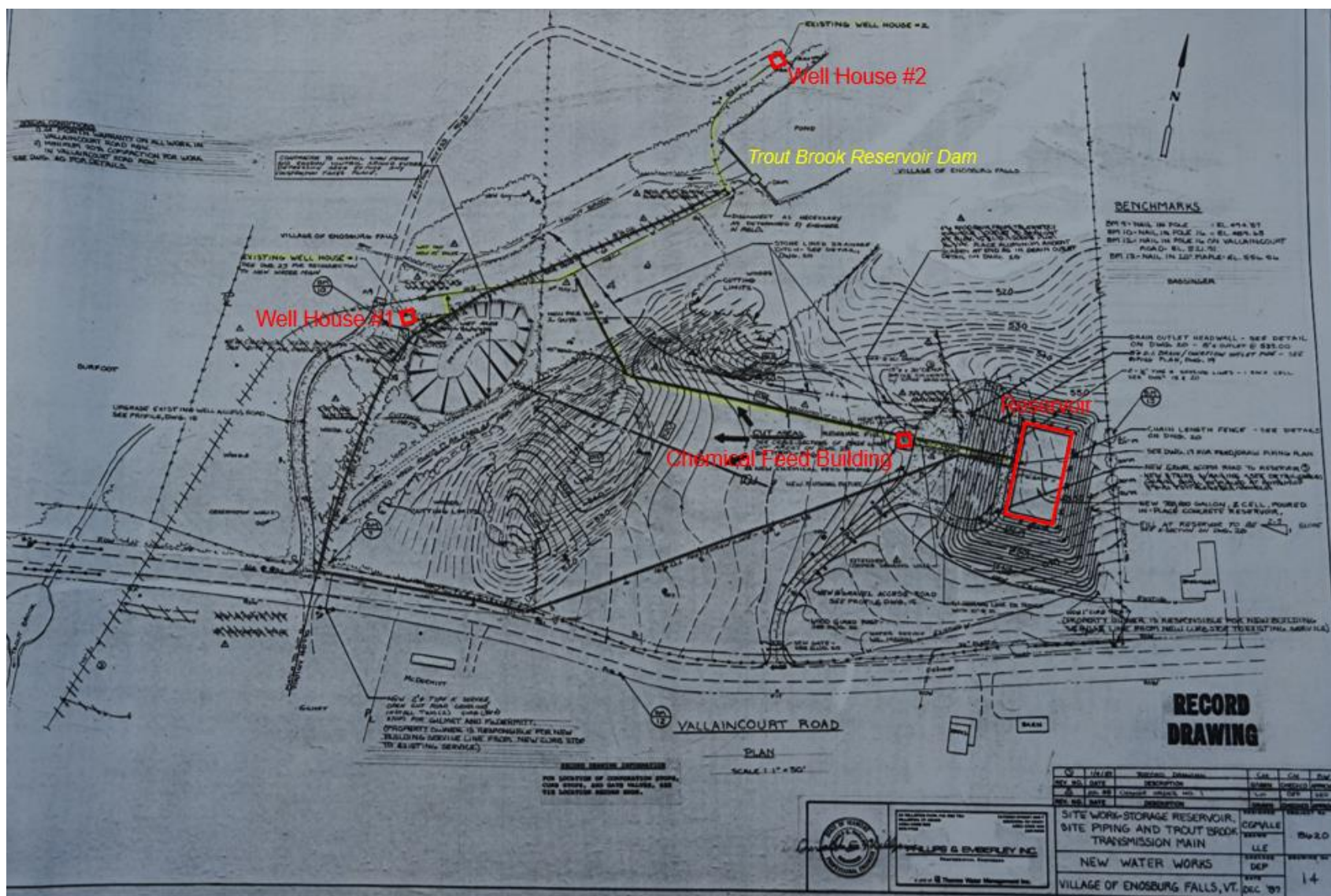


Figure 59. Plan (1989) of the Enosburg Falls Water Works with identified standing buildings and structures within the historic resources Area of Potential Effect labeled (provided by the Village of Enosburg).



Figure 60. View northeast (left) and southeast (right) of Well House #1.



Figure 61. View northwest of the rear side of Well House #1.



Figure 62. View northeast (left) and southwest (right) of Well House #2.



Figure 63. View southwest of window in the rear side of Well House #2.



Figure 64. View northwest of the Chemical Feed Building.



Figure 65. Plaque on the door of the Chemical Feed Building.



Figure 66. View east of the Concrete Reservoir.



Figure 67. View northeast of the Concrete Reservoir.

Culvert

The culvert that carries Trout Brook under the access road to the farm field, well houses and dam, consists of two side-by-side pipes (Figures 68 and 69; see Figures 15 – 17). The large pipe is a 30-inch diameter concrete pipe, and the smaller pipe is a 24-inch diameter corrugated metal pipe. They are surrounded by road fill consisting of sediment, gravel, cobbles and rock and have no associated features such as head walls or wing walls. The culvert is not recommended as eligible for listing on the NR due to a lack of distinctive characteristics of type, period or method of construction.



Figure 68. View southwest of the inlet side of the culvert that carries Trout Brook under the west access road.



Figure 69. View southeast of the outlet side of the culvert that carries Trout Brook under the west access road.

SUMMARY AND RECOMMENDATIONS

The Franklin County Natural Resources Conservation District proposes the removal of the Trout Brook Reservoir Dam, located in Berkshire, Franklin County, Vermont. The dam, which is owned by the Village of Enosburg Falls and located north of Reservoir Road, was built in 1924 to supply water to the Village of Enosburg Falls and operated until 1946. The proposed project will reconnect 4.8 mi (7.7 km) of the Missisquoi River watershed. A proposed sediment disposal site is located near the chlorination facility on the same village owned property as the dam. Two possible construction access routes have been identified. One follows up the eastern side of the brook from Reservoir Road along an old overgrown access road to the dam, which was probably cut during the dam's construction, and the other runs along a modern access road leading from Reservoir Road to the wells currently used by the village on the western side of the brook, before continuing northward along the east edge of an open field to the north end of the current impoundment. Kate Kenny and Catherine Quinn of the University of Vermont Consulting Archaeology Program conducted an Historic Resources Review (HRR) and Archaeological Resources Assessment (ARA) of the proposed project to assist with satisfying Section 106 permit requirements. Extensive background research was conducted, and a field inspection of the project area was conducted by Kenny and Quinn on April 22, 2024.

Archaeological Resources Assessment

As a result of the ARA, two locations within the archaeological APE for the Trout Brook Reservoir Dam Removal project were identified as sensitive for precontact Native American sites (see Figure 8). Both areas are located on the west side of Trout Brook, the dam and its reservoir. One area lies within the proposed west access route in a small space between the field and the high bank overlooking the north end of the impoundment. Given its proximity to a known site, its position on a level area overlooking the little valley of Trout Brook, and its intact soils, this area is considered sensitive for precontact Native American sites. Phase I testing is therefore recommended if it cannot be avoided during project work.

The second sensitive area is located within the farm field along the west side of the proposed western access route, between the established dirt road and the top of the high stream bank. Although moderately sloped, this area is situated near the projected shoreline of glacial Lake Vermont which would have been an attractive habitat for Native American populations. If the area is to be used as a staging area for the proposed project, Phase I testing is recommended.

Based on historic maps and land records research, other than its use as farm land, no early historic development took place at the dam site or along the proposed access roads leading to it. The historic c. 1850 Jeffords farmstead formerly located at the proposed sediment disposal site, was removed between 1941 and 1962, and no evidence of the complex, such as foundation remains or historic debris scatter, was identified during the field visit. The ground here appears to have been heavily disturbed during the construction of the chlorination plant and it is very unlikely that any significant historic period archaeological resources remain intact. No portions of the Trout Brook Reservoir Dam Removal project are recommended as sensitive for historic Euroamerican archaeology sites.

Historic Resources Review

The HRR review of the proposed Trout Brook Reservoir Dam Removal project recommends that within the context of municipal water supply systems in Vermont, the Trout Brook Reservoir Dam is a significant historic resource eligible for inclusion on the National Register of Historic Places under Criterion A. Although the dam and its reservoir no longer serve to supply water, the structure possesses integrity of location, design, setting, materials, workmanship and feeling and is significant for its association with the Village of Enosburg Falls' efforts in securing a pure and dependable water supply.

Likely due to its geology, hydrology, and topography, the Village of Enosburg Falls has a water supply history that reflects the evolution of municipal water supply systems in Vermont. From its settlement to ca. 1904 – 1905, the village made do with the easily contaminated Missisquoi River for its water supply, before switching to a spring in Berkshire that fed into a reservoir tank system. After outgrowing that system, the village built the Trout Brook Reservoir Dam and reservoir in 1924 on a spring fed stream, also in Berkshire. This system was only in operation for about two decades (to ca. 1946 – 1949) before being superseded by electrically operated wells. The Trout Brook Reservoir Dam was built during a brief window of time when municipal reservoirs were being constructed for water supply and it is representative of a limited period in concrete dam construction, design, technology, and techniques for this purpose, dating to ca. 1900 – 1930.

Removal of the dam is therefore recommended as an Adverse Effect. The completion of a Historic Resources Documentation Package (HRDP) is recommended to assist with mitigation of the Adverse Effect by fully documenting the dam. Given the wooded setting of the dam, additional photographs for the HRDP should be taken in the early spring or late fall when vegetation is less dense. As part of the HRDP, monitoring is recommended during the dewatering and exposure of the interior of the lower control / gate chamber on the dam as operating mechanisms may still remain below water and may add to the knowledge of how the dam operated. The results of the control / gate chamber monitoring could be reported in the HRDP.

This ARA and HRR of the Trout Brook Reservoir Dam Removal project is based on conceptual plans prepared by SLR. Final plans will require additional review. Any substantial changes to the conceptual plans may result in different recommendations. The Vermont State Historic Preservation Office (SHPO) will have the opportunity to review and comment on all recommendations prior to project work.

REFERENCES

Aldrich, Lewis Cass

- 1891 *History of Franklin and Grand Isle Counties, Vermont.* D. Mason & Co., Publishers, Syracuse, New York.

Anonymous

- 1892 Preventative Medicine and Statistics of Disease in Vermont. *Journal of the American Medical Association.* Saturday November 12, 1892. p. 590.

AreoGraphics Corp.

- 1974 *Aerial Photograph VT 7420 13-173.* AreoGraphics Corp., Bohemia, New York. Image on file: Map Room, Howe Library, University of Vermont, Burlington, Vermont.

Ballinger, Walter F. and Emile G. Perrot

- 1909 *Inspector's Handbook of Reinforced Concrete.* The Engineering News Publishing Co, New York, New York.

Barre Daily Times (Barre, Vermont)

- 1909 June 14, "Notice to Contractors." p. 2.
1915 November 8, "Big increase in water reserve" p. 1.
1976 March 1, "Brattleboro Water Studies." p. 10.

Beers, F.W.

- 1871 *Atlas of Franklin and Grand Isle Counties, Vermont.* F.W. Beers & Co., New York New York.

Berkshire Land Records [BLR]

- Various Years. Berkshire Land Records. Ms. on file: Berkshire Town Clerk's Office, Berkshire, Vermont.

Boston Globe (Boston, Massachusetts)

- 1942 December 5, "Lewis D. Thorpe." p. 11.

Brattleboro Reformer (Brattleboro, Vermont)

- 1915 November 8, "Big increase in water reserve" p. 1.
1976 March 1, "Brattleboro Water Studies." p. 10.

Brown, Charles Carroll (ed.)

- 1905 *A Hand-Book for Cement Users.* Third Edition Revised and Enlarged. Municipal Engineering Company, Indianapolis. Indiana.

Burlington Free Press (Burlington, Vermont)

- 1905 September 12, "Enosburg Falls." p. 9.
1906 August 4, "Enosburg Falls." p. 1.

- 1914 February 28, "Enosburg Falls." p. 11.
- 1923 September 14, "Enosburg Falls." p. 12.
- 1936 October 22, "Mrs. David W. Ames Dies at Milton." p. 3.
- 1949 May 6, "David Ames, 72, Retired Contractor, Dies in Milton." p. 2
- 1967 October 26, "Leon T. Jeffords." p. 14.

Butterfield, David

- 1988 *National Water Summary 1986-1987: Hydrologic Events and Ground Water Quality*. U.S. Geological Survey Water Supply Paper 2325. United States Government Printing Office, Washington, DC.

Button Professional Land Surveyors PC

- 2021 *Boundary Retracement Survey Lands of Village of Enosburg Falls, Inc., 733 Reservoir Road, Berkshire, Vermont*. Button Professional Land Surveyors PC, South Burlington, Vermont. Ms. on file: Berkshire Town Clerk's Office, Berkshire, Vermont, Map Slide #63.

Cannon, William F.

- 1964 *Report of Progress, 1964: The Pleistocene Geology of the Enosburg Fall Quadrangle*. Available Vermont Agency of Natural Resources Department of Environmental Conservation website: <https://dec.vermont.gov/sites/dec/files/geo/OpenFile/VG1964-1.2.3Cannon.pdf>.

Carr Jerry E., Edith B. Chase Richard W Paulson and David W. Moody

- 1990 *National Water Summary 1987-1988: Hydrologic Events and Water Supply and Use*. U.S. Geological Survey Water Supply Paper 2350. United States Government Printing Office, Washington, DC.

Child, Hamilton

- 1883 *Gazetteer and Business Directory of Franklin and Grand Isle Counties, Vt. For 1882-83*. Journal Office, Syracuse, New York.

Cochran, Jerome

- 1913 *A Treatise on the Inspection of Concrete Construction*. Myron C. Clark Publishing Company, Chicago, Illinois.

Creager, William Pitcher

- 1917 *Engineering for Masonry Dams*. First Edition. John Wiley & Sons Inc., New York, New York.

Enosburg Falls (Corporation of)

- 1925 *Auditors' Annual Report of the Corporation of Enosburg Falls for the Year Ending February 1, 1925*. St. Albans Messenger Co., St. Albans, Vermont.
- 1927 *Auditors' Annual Report of the Corporation of Enosburg Falls for the Year Ending February 1, 1927*. St. Albans Messenger Co., St. Albans, Vermont.

- 1939 *Auditors' Annual Report of the Village of Enosburg Falls for the Year Ending February 1, 1939.* Printed by Authority.
- 1940 *Auditors' Annual Report of the Village of Enosburg Falls, Vt., for the Year Ending February 1, 1940.* Printed by Authority.
- 1942 *Auditors' Annual Report of the Village of Enosburg Falls, Vt., for the Period from Feb. 1, 1941, to Jan. 1, 1942.* Printed by Authority.
- 1943 *Auditors' Annual Report of the Village of Enosburg Falls, Vt., for the Period from Jan. 1, 1942, to Jan. 1, 1943.* Enosburg Standard, Enosburg, Vermont.
- 1946 *Auditors' Annual Report of the Village of Enosburg Falls, Vt., for the Period from Jan. 1, 1946, to Dec. 31, 1946.* Enosburg Standard, Enosburg, Vermont.
- 1949 *Auditors' Annual Report of the Village of Enosburg Falls, Vermont, for the Period from Jan. 1, 1949, to Dec. 31, 1949.* Gilpin Printing Company, Richford, Vermont.
- 1965 *Auditors' Annual Report, Village of Enosburg Falls, Vermont, for the Year Ending December 31, 1965.* O'Shea Publishing Co., Inc., Enosburg Falls, Vermont.
- 1966 *Auditors' Annual Report, Village of Enosburg Falls, Vermont, for the Year Ending December 31, 1966.* Pel-Mac Press, Enosburg Falls, Vermont.

Geotechnics & Resources Inc.

- 1962 *Aerial Photograph: VT-62-H 20-61.* Geotechnics & Resources Inc., Amman International Corp. Division, San Antonio, Texas. Image on file: Map Room, Bailey Howe Library, University of Vermont, Burlington, Vermont.

Godfey, Edward

- 1908 *Structural Engineering Book Two: Concrete.* Published by the Author, Pittsburgh, Pennsylvania.

Goodell, John

- 1889 *Water-Works for Small Cities and Towns.* The Engineering Record, New York, New York.

Fegley, H. Winslow

- 1915 *A New Use for Scrap Iron. The Crow Bar.* Vol. XXIV-XXV: p.5

Haybrook, Stephen H.

- 1952 *Summary of Vermont Dams. In Biennial Report of the Public Service Commission of the State of Vermont, July 1, 1950-June 30, 1952.* Vermont Public Service Commission, Montpelier, Vermont. pp. 28-44.

Hool, George A., Nathan C. Johnson and S.C. Hollister

- 1918 *Concrete Engineers' Handbook: Data for The Design and Construction of Plain and Reinforced Concrete Structures.* McGraw-Hill Book Company Inc., New York, New York.

Knight, Charles

- 2023 *End of Field Letter Report for the Archaeological Phase I Site Identification of the Proposed Reservoir Road Solar Project, Enosburg Falls, Franklin County, Vermont*. Submitted to Encore Renewable Energy, CCA Report No. 2023-039, September 28, 2023.

Latimer, W. J., S.O. Perkins, F.R. Lesh, L.R. Smith, and K.V. Goodman

- 1930 *Soil Survey (Reconnaissance) of Vermont*. United States Department of Agriculture, Bureau of Chemistry and Soils, Superintendent of Documents, Washington, D.C.

Lewis, M. R.

- 1934 *Reservoirs for Farm Use*. United States Department of Agriculture Farmers Bulletin No. 1703, Government Printing Office, Washington D.C.

Maine Birth Records 1715-1922

- Various Years. *Maine, U.S., Birth Records, 1715-1922*. [database on-line]. Ancestry.com Operations, Inc., Provo, Utah, 2010. Original data: Maine Birth Records, 1715-1922, Maine State Archives, Augusta, Maine; Maine Birth Records, 1715-1922, Maine State Archives, Augusta, Maine.

Massachusetts U.S. Marriage Records 1840-1915

- Various Years. *Massachusetts U.S. Marriage Records 1840-1915*. [database on-line]. Ancestry.com Operations, Inc., Provo, Utah, 2013. Original data: Massachusetts Vital Records, 1840–1911, New England Historic Genealogical Society, Boston, Massachusetts; Massachusetts Vital Records, 1911–1915, New England Historic Genealogical Society, Boston, Massachusetts.

Moat, Charles P.

- 1901 Water Supplies of Vermont. In the *Journal of the New England Water Works Association* Vol. XIV. pp. 414-521.
- 1923 Public Water Supplies of Vermont. *Journal of the New England Water Works Association*. Vol. 37:291-297.

New England Regional Planning Commission

- 1937 *Water Resources of New England: Drainage Basin Data and Problems*. Prepared by the Drainage Basin Committees for Maine and for Central New England with the cooperation of National Resources Committee, Region One. Boston, Massachusetts.

Newport Daily Express (Newport, Vermont)

- 1946 August 14, “Enosburg Falls Voters May Change Bad Water Supply.” p. 2.

Perkins, George H.

- 1904 Vermont. *Contributions to the Hydrology of the Eastern United States 1903*. Water Supply and Irrigation Paper No. 102, Series O, Underground Waters 24. Department of the Interior United States Geological Survey. Government Printing Office, Washington, D.C. pp.73-93.
- 1906 Reports from the Towns of Vermont as to the Source of Drinking Water. *Report of the State Geologist on the Mineral Industries and Geology of Certain Areas of Vermont 1905-1906*. Argus and Patriot Press, Montpelier, Vermont. pp. 263-344.

Pierce, C.H.

- 1917 *Surface Waters of Vermont*. U.S. Geological Survey Water Supply Paper #424. Government Printing Office, Washington, D.C.

Portland Cement Association

- 1916 *Proportioning Concrete Mixtures and Mixing and Placing Concrete*. Portland Cement Association, Chicago, Illinois.

Reid, Homer A.

- 1907 *Concrete and Reinforced Concrete Construction*. The Myron C. Clark Publishing Co., New York, New York.

Richford Journal and Gazette (Richford, Vermont)

- 1951 February 22, "Village Meeting to Be February 27." p. 1.

St. Albans Daily Messenger (St. Albans, Vermont)

- 1903 June 3, "Ames-Crampton." p. 1.
- 1904 August 1, "Water Supply Impure." p. 1.
- 1905 May 26, "Municipal Water Supplies." p. 4.
- 1916 August 4, "Discuss Enosburg Falls Water Supply." p. 3.
- 1925 April 3, "Settles Land Cases." p. 2.
- 1933 August 1, "Richford Plans New Water System." p. 8.
- 1946 July 6, "Buy Chlorinating Outfit Enosburg Falls May Have To." p. 1.
- 1949 August 31, "Falls Water Supply Aided by New Well." p. 1.

St. Albans Weekly Messenger (St. Albans, Vermont)

- 1911 July 13, "Enosburg Falls." p. 4.

SLR International Corporation

- 2023 *Trout Brook Reservoir Dam: Dam Removal Feasibility Study*. Prepared for: Franklin County Natural Resource Conservation District, St. Albans, Vermont. Prepared by: SLR International Corporation, Waterbury, Vermont. SLR Project No. 146.13528.00002; Client Reference No. 1414. (On file at the Vermont Department of Environmental Conservation Facilities Engineering Division's Dam Safety Program in Montpelier, Vermont).

Slaton, Amy E.

- 2001 *Reinforced Concrete and the Modernization of American Building, 1900-1930*. The Johns Hopkins University Press, Baltimore, Maryland.

Stone B.H.

- 1906 Typhoid Fever in Rural Communities. *Public Health Papers and Reports Presented at the Thirty Fourth Annual Meeting of the American Public Health Association Mexico City Mexico, December 3-7, 1906*, Vol. XXXII, Part 1. Fred J. Heer, Columbus, Ohio. pp. 171-182.

Swanton Courier (Swanton, Vermont)

- 1904 March 3, "What the Papers Say." p. 4.

Taylor Frederick W. and Sanford E. Thompson

- 1905 *A Treatise on Concrete Plain and Reinforced: Materials, Construction, and Design of Concrete and Reinforce Concrete*. John Wiley & Sons, New York, New York.

Thayer, Samuel White M.D.

- 1865 *City of Burlington Sanitary Inspectors' Records 1860-1869*. City of Burlington, Vermont: Miscellaneous Records 1856-1917, Microfilm on file:, Vermont State Archives & Record Administration, Middlesex, Vermont.

Thompson, Elizabeth H., Eric R. Sorenson, Robert J. Zaino

- 2019 *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*. Second Edition. Chelsea Green Publishing, White River Junction, Vermont.

Thompson, Zadock

- 1824 *A Gazetteer of the State of Vermont; Containing A Brief General View of the State, A Historical and Topographical Description of All the Counties, Towns, Rivers, &etc., Together with a Map and Several Other Engravings*. E. P. Walton, Montpelier, Vermont.

Trowbridge, W.P.

- 1883 *Report of the Water-Supply of Certain Cities of the United States*. Tenth Census. The Miscellaneous Documents of the House of Representatives for the Second Session of the Forty-Seventh Congress 1882-'83. Washington, DC.

United States Environmental Protection Agency

- 2000 *The History of Drinking Water Treatment* (EPA-816-F-00-0006). United States Environmental Protection Agency, Office of Water. Accessed on-line: https://archive.epa.gov/water/archive/web/pdf/2001_11_15_consumer_hist.pdf

United States Geological Survey

- 1991 *National Water Summary 1988-1989: Hydrologic Events and Flood and Droughts*. U.S. Geological Survey Water Supply Paper 2375. United States Government Printing Office, Washington, DC.

Van Wagenen, Jared

- 1909 Building a Dam. *The Rural New-Yorker*. Vol. LXVIII. No. 3082. p. 107.

Vermont Bureau of Publicity

- 1914 *Industrial Vermont: The Mineral, Manufacturing, and Water Power Resources of the Green Mountain State*. Vermont Bureau of Publicity; Secretary of State for the State of Vermont (Guy W. Bailey), Capitol City Press, Montpelier, Vermont.

Vermont Death Records 1909-2008.

- Various years. *Vermont Death Records 1909-2008*. Database on-line. Ancestry.com Operations Inc., Provo, Utah. *Ancestry.com*. [www.http://ancestry.com](http://ancestry.com): 2011. From Microfilmed original documents of the Vermont Secretary of State, Montpelier, Vermont.

Vermont Division for Historic Preservation (VDHP)

- 1983 *Historic Sites & Structures Survey: Davis Farm*. Survey No. 0602-22. Listed on the State Register 6/23/1994. Recorded by Christopher Flagg, September 1, 1983. Vermont Division for Historic Preservation, Montpelier, Vermont.
- 1984a *Historic Sites & Structures Survey: Enosburg Falls Downtown Historic District*. Survey No. 0603-1. Listed on the State Register 6/23/1994. Recorded by Lauren H. Murphy, August 1984. Vermont Division for Historic Preservation, Montpelier, Vermont.
- 1984b *Historic Sites & Structures Survey: Historic Railroad District*. Survey No. 0603-2. Listed on the State Register 6/23/1994. Recorded by Lauren H. Murphy, August 1984. Vermont Division for Historic Preservation, Montpelier, Vermont.
- 1984c *Historic Sites & Structures Survey: Orchard Street – North Main Street Historic District*. Survey No. 0603-3. Listed on the State Register 6/23/1994. Recorded by Lauren H. Murphy, August 1984. Vermont Division for Historic Preservation, Montpelier, Vermont.

Vermont State Board of Health

- 1906 *Fifteenth (Fifth Biennial) Report of the State Board of Health of the State of Vermont from January 1, 1904, to December 31, 1905*. The Tuttle Company Marble City Press, Rutland, Vermont.

- 1916 *Twentieth (Tenth Biennial) Report of the State Board of Health of the State of Vermont from January 1, 1914, to December 31, 1915.* The Tuttle Company Marble City Press, Rutland, Vermont.

Vermont Vital Records 1720-1908.

Various years. *Vermont Vital Records 1720-1908.* Database on-line. Ancestry.com Operations Inc., Provo, Utah. *Ancestry.com.* [www.http://ancestry.com](http://ancestry.com) : 2011. From Microfilmed original documents of the Vermont Secretary of State, Montpelier, Vermont.

Votey, J.W.

- 1913 Water Supply Systems for Farmers. *Fifth Annual Report of the Commissioner of Agriculture of the State of Vermont.* St. Albans Messenger Company. Printers, St. Albans, Vermont. pp. 87-95.

Walling, H.F.

- 1857 *Map of the Counties of Franklin and Grand Isle, Vermont.* Baker, Tilden & Co., New York, New York.

Wegmann, Edward

- 1918 *The Design and Construction of Dams: Including Masonry, Earth, Rock-Fill, Timber, and Steel Structures also The Principal Types of Movable Dams.* Sixth Edition, Revised and Enlarged. John Wiley & Sons Inc., New York, New York.
- 1922 *The Design and Construction of Dams: Including Masonry, Earth, Rock-Fill, Timber, and Steel Structures also The Principal Types of Movable Dams.* Seventh Edition, Revised and Enlarged. John Wiley & Sons Inc., New York, New York.

Woltz Studios Inc.,

- 1941 *Aerial Photograph FEA-3-116.* War Department Corps of Engineers Survey, Fort Ethan Allen Project. Woltz Studios Inc., Des Moines, Iowa. Image on file: Vermont State Archives & Records Administration (VSARA) center in Middlesex, Vermont (USACE-0001 [index] and USACE-0002 [images]).

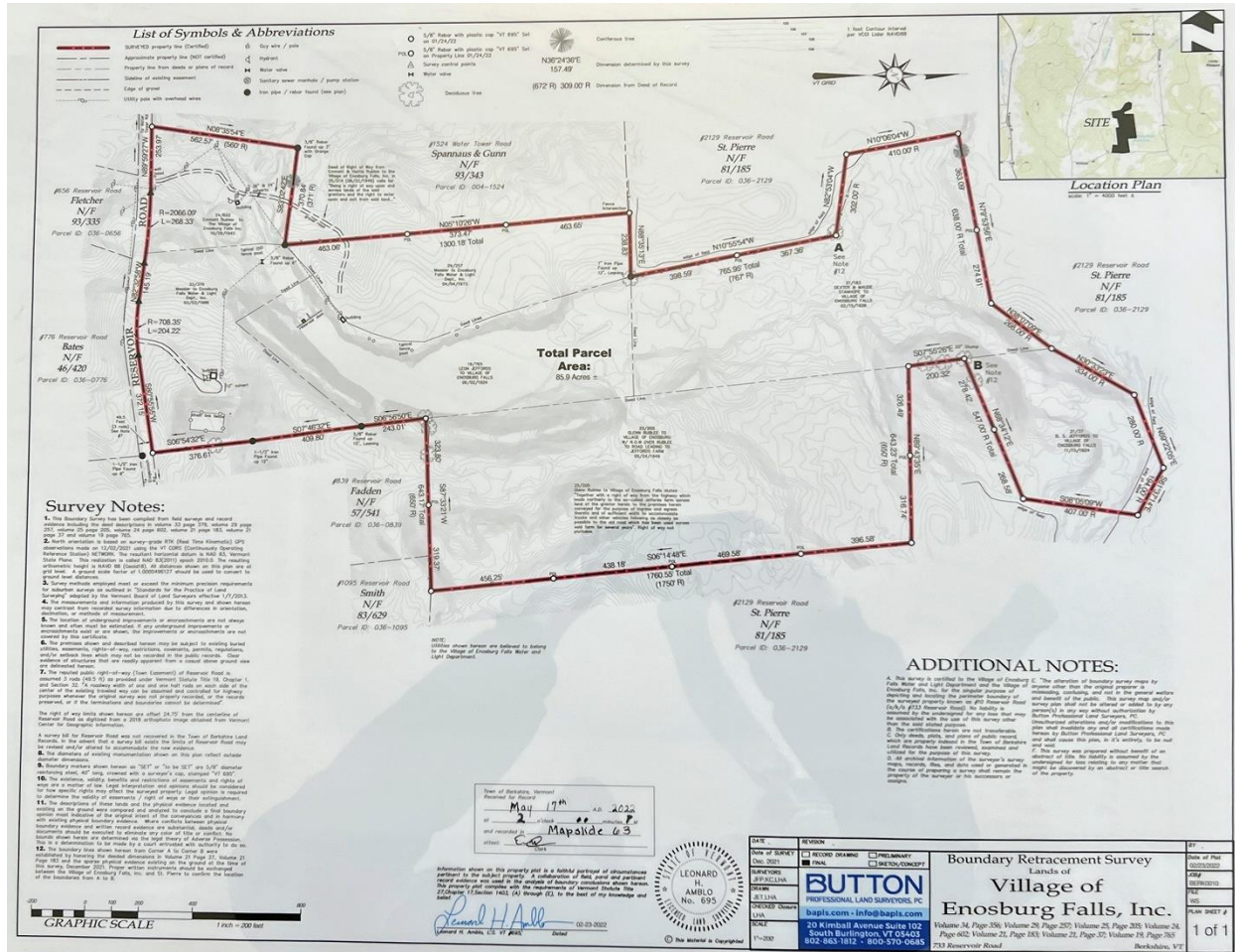


Figure 70. “Boundary Retracement Survey, Lands of Village of Enosburg Falls, Inc.” 733 Reservoir Road, Berkshire, Vermont, December 2021 (Button Professional Land Surveyors PC).

APPENDIX II: VDHP ENVIRONMENTAL PREDICTIVE MODEL FOR LOCATING PRECONTACT ARCHAEOLOGICAL SITES

VERMONT DIVISION FOR HISTORIC PRESERVATION			
Environmental Predictive Model for Locating Precontact Archeological Sites			
Project Name <u>Trout Brook Reservoir Dam</u>		County <u>FR</u>	Town <u>Berkshire</u>
DHP No. _____		Map No. _____	Staff Init. _____ Date _____
Additional Information _____			
Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m	12	<u>12</u>
	90- 180 m	6	
2) Distance to Intermittent Stream	0- 90 m	8	<u>8</u>
	90-180 m	4	
3) Confluence of River/River or River/Stream	0-90 m	12	<u>0</u>
	90 –180 m	6	
4) Confluence of Intermittent Streams	0 – 90 m	8	<u>0</u>
	90 – 180 m	4	
5) Falls or Rapids	0 – 90 m	8	<u>0</u>
	90 – 180 m	4	
6) Head of Draw	0 – 90 m	8	<u>0</u>
	90 – 180 m	4	
7) Major Floodplain/Alluvial Terrace		32	<u>0</u>
8) Knoll or swamp island		32	<u>0</u>
9) Stable Riverine Island		32	<u>0</u>
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m	12	<u>0</u>
	90 -180 m	6	
11) Confluence of River or Stream	0-90 m	12	<u>0</u>
	90 –180 m	6	
12) Lake Cove/Peninsula/Head of Bay		12	<u>0</u>
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m	12	<u>12</u>
	90 -180 m	6	
14) Knoll or swamp island		32	<u>0</u>
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	<u>0</u>
16) Valley edge features such as Kame/Outwash Terrace**		12	<u>0</u>
-over-			May 23 ,2002

17) Marine/Lake Delta Complex**		12	<u>0</u>
18) Champlain Sea or Glacial Lake Shore Line**		32	<u>32</u>
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	<u>0</u>
20) ☐ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	<u>0</u>
21) Existing or Relict Spring	0 – 90 m	8	<u>0</u>
	90 – 180 m	4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	<u>0</u>
23)) Special Environmental or Natural Area, such as Milton aquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	<u>0</u>
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	<u>0</u>
25) High Recorded Site Density		32	<u>0</u>
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	<u>0</u>
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	<u>0</u>
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	<u>0</u>
** refer to 1970 Surficial Geological Map of Vermont			
			Total Score: 64
Other Comments :			
0- 31 = Archeologically Non- Sensitive 32+ = Archeologically Sensitive			

APPENDIX III: ENOSBURG FALLS DOWNTOWN HISTORIC DISTRICT BUILDINGS



Figure 71. View southwest along Main Street (1984).



Figure 72. Google Earth view southwest along Main Street (2019).



Figure 73. View west of the cemetery on the west side of Main Street (1984).

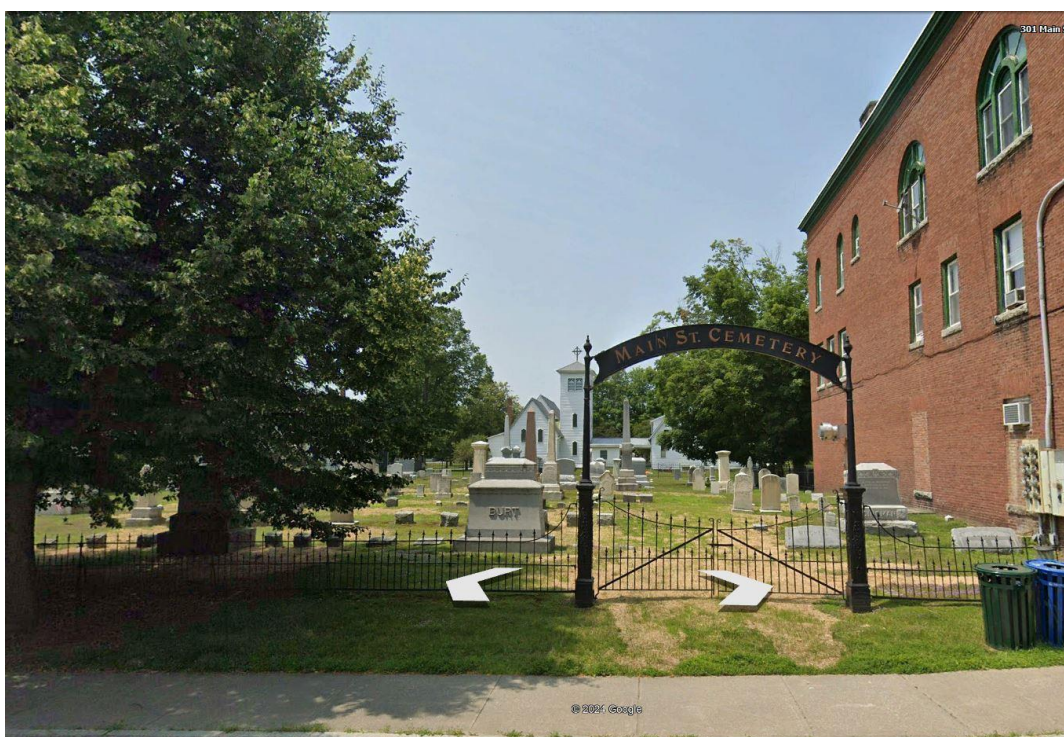


Figure 74. Google Earth view west of the cemetery on the west side of Main Street (2019).



Figure 75. View southwest along Main Street (1984).



Figure 76. Google Earth view southwest along Main Street (2019).



Figure 77. View northeast along Main Street (1984).



Figure 78. Google Earth view northeast along Main Street (2019)



Figure 79. View northwest along Main Street (1984).



Figure 80. Google Earth view along Main Street (2012).



Figure 81. View southeast along Main Street (1984).



Figure 82. Google Earth view southeast along Main Street (2019).



Figure 83. View southwest of house at the corner of Pearl and Main streets (1984).



Figure 84. Google Earth view southwest of the house at the corner of Pearl and Main streets (2019).



Figure 85. View northwest of a house along the west side of Church Street (1984).



Figure 86. Google Earth view northwest of a house along the west side of Church Street (2019).



Figure 87. View northwest of a house along the north side of St. Albans Street (1984).



Figure 88. Google Earth view north of a house along the north side of St. Albans Street (2019).



Figure 89. View northwest of a church along the west side of Church Street (1984).



Figure 90. Google Earth view northwest of a church along the west side of Church Street (2019).



Figure 91. View southwest of a house along the south side of Maple Park (1984).



Figure 92. Google Earth view southwest of a house along the south side of Maple Park (2019).



Figure 93. View northeast of the house at the corner of Bismark and Church streets (1984).



Figure 94. Google Earth view northeast of the house at the corner of Bismark and Church streets (2019).



Figure 95. View southwest of livery stable along the south side of Bismark Street (1984).



Figure 96. View southwest of livery stable along the south side of Bismark Street (2019).



Figure 97. View southeast of school along the north side of School Street (1984).



Figure 98. Google Earth view southeast of school along the north side of School Street (2019).