

Agenda Summary
April 29, 2026

Agenda Item No. B-2

Stowe PFAS Drinking Water Response Plan – Project Update on Stowe Alternate Waterworks

Summary: Public Works has advanced and will provide an updated presentation regarding the Stowe Drinking Water Response Plan with a focus on the Alternate Waterworks Project on the K2 Realty Site on Barrows Road. Attached is copy of the presentation document. In addition to an update for the Selectboard, the presentation is intended to be a Public Informational Meeting, with Notice letters sent to abutters and owners of existing private water supply wells within 3000’ of the site, in accordance with VTDEC Drinking Water Source Testing and Permitting requirements. The project requires numerous permits from various entities going forward, and this is intended to be an Introduction of the project to the Public before forthcoming permit applications.

Town Plan Impact: Draft Town Plan.

- 1) Page 131: *“In September 2025 the Town entered into a purchase agreement with K2 Realty to purchase 26.5 acres of land on Barrows Road to develop a new municipal well and water treatment facility. The Town is presently conducting capacity testing, engineering, and permitting and has until July 1, 2027 to close on the property”.*
- 2) Action Tasks-Municipal Utilities and Infrastructure, Page 163: *“Identify and develop an alternative PFAS free public water source, Responsibility: DPW, Priority: **BOLD Move**”*

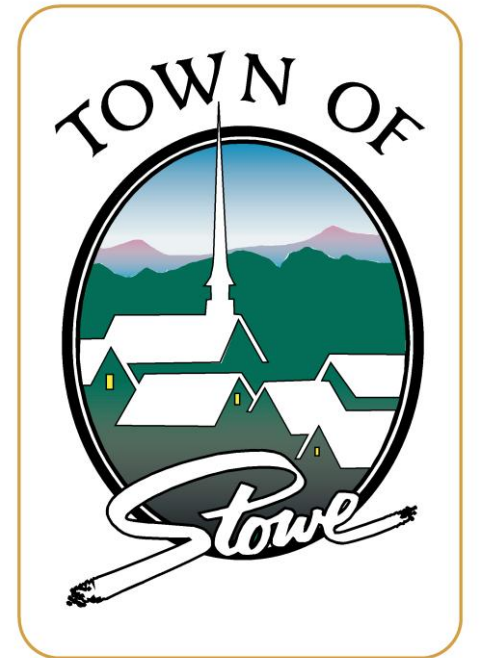
Fiscal and HR Impact: Significant financial and human resources have been expended for this effort. Financially through March 2026, \$155,224 has been expended from the Water Fund for various consultants and service providers. Additional expenses to the FY26 Water Capital appropriation of 250,000 is expected. The additional total estimated cost of \$700,000 has been recently authorized for the work currently under construction associated with the temporary access and forthcoming source/well construction, testing and permitting. An additional \$800K-\$1.0M is anticipated soon for Final Design, Permitting, Bid/Contract Documents and Construction Phase professional services for the Water Treatment Plant and Distribution System Connection. An appropriation request for this effort is planned for the forthcoming FY27 Water Budget recommendations. The current Engineer’s Estimate for the proposed construction is \$12M+/- but it must be stressed that these are based upon preliminary designs and subject to development and change. A potential Bond Vote for advancing construction can be anticipated in Fall 2027 or Spring 2028. Human Resource impacts are currently estimated to be over 1000 person-hours since the signing of the Purchase and Sales Agreement. Advancing this project will require 1-2 FTE annually until completion.

Recommendation: Public informational meeting. No action is required at this time.

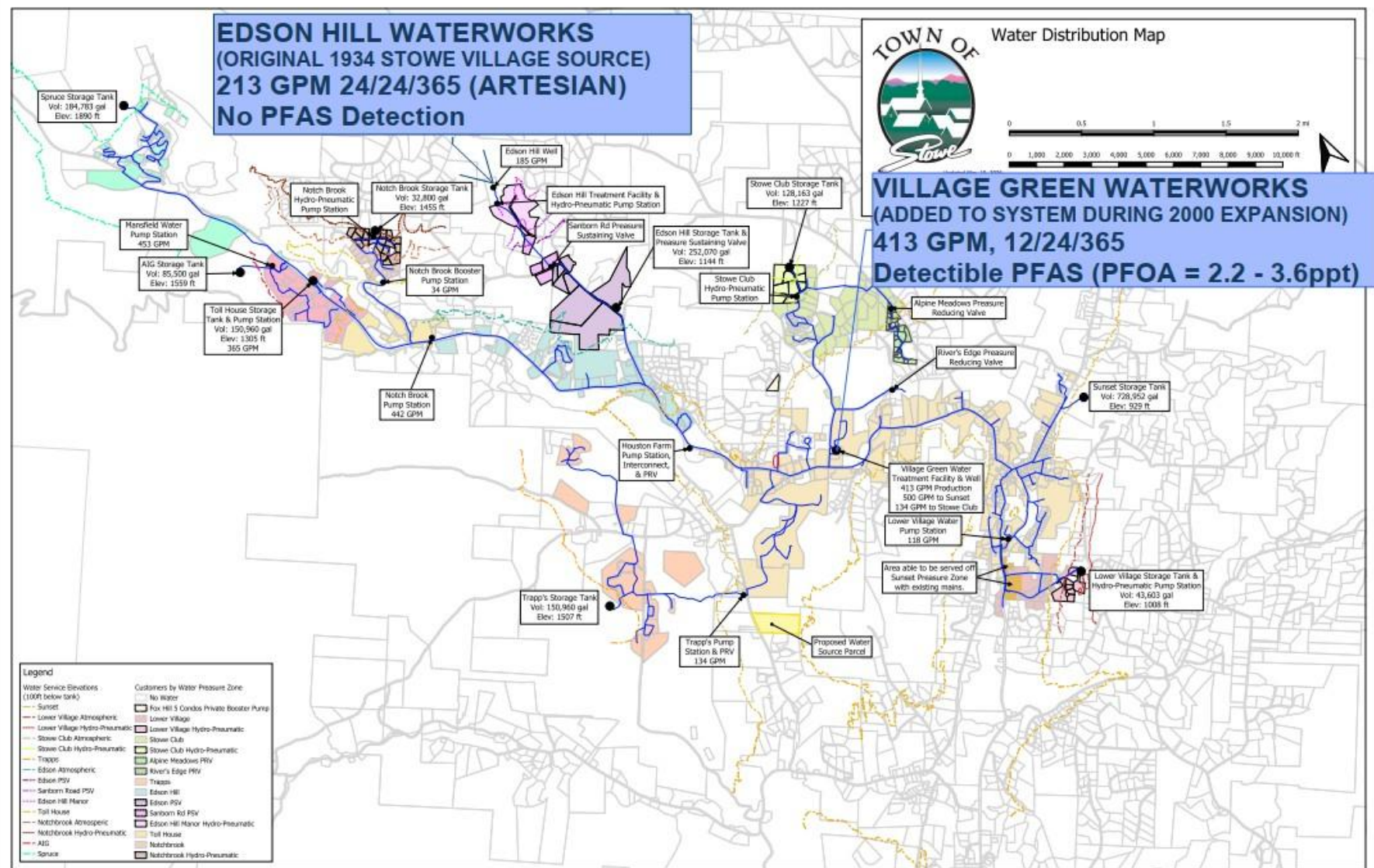
STOWE'S PFAS RESPONSE PLAN PROJECT UPDATE

SPRING 2026

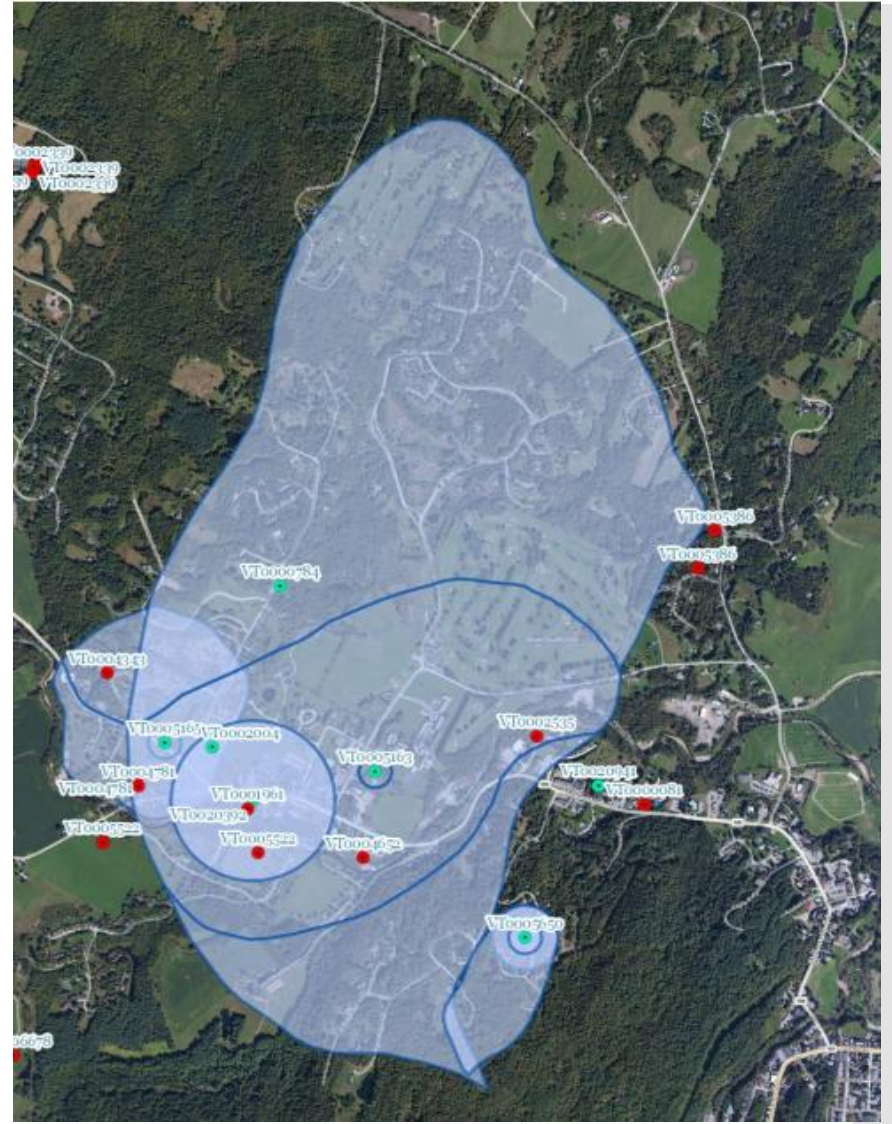
STOWE PUBLIC WORKS



STOWE WATER SYSTEM



SOURCE PROTECTION AREAS



2016 VERMONT LEARNS OF PFAS IN BENNINGTON COUNTY

Bennington's PFOA story among those highlighted at EPA summit

By Jim Therrien, Banner/VT Digger Jun 25, 2018



The audience on Monday in Exeter, New Hampshire, at the first of several regional summits on PFOA/PFOS and related chemicals that the federal Environmental Protection Agency plans to sponsor over the coming year.

1 of 3

YAHOO

Research Vacation Homes Today

Popular searches
Vacation House R
Asheville NC

A small thumbnail image showing a person standing in front of a white building with a porch, possibly a vacation home or a research facility.

EARLY TIMELINE FOR PFAS AND STOWE WATER

- 2019- Act 21- “An Act relating to the Regulation of polyfluoroalkyl substances in drinking and surface waters”. Public Water Systems required to test for PFAS. PFOA (Teflon) detected in Village Green Waterworks, slightly above detection limit of 2.0ppt = 3.2 ppt but well below current EPA Guidelines of 70 ppt.
- 2020- VT Water Rules revised to establish Maximum Containment Levels (MCL) for 5 types of PFAS including PFOA, with the Sum of 5 < 20.0 ppt. Stowe remains compliant and undertakes additional testing in attempt to identify source. Raw Water = 2.2 ppt. Finished Water = 3.4 ppt
- JUNE 14, 2022; “THE CALL” – Advised by VTDEC Drinking Water that EPA was planning to issue a Health Advisory the following day with PFOA and PFOS at 4.0 ppQ (parts per quadrillion). Also, Stowe had the largest Public Water Supply with detectible levels of PFAS.
- HUMMMM-THAT IS VERY INTERESTING

PUBLIC NOTICE REQUIRED

AUGUST 2022

STOWE PFAS RESPONSE PLAN



PUBLIC NOTICE

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Notice of The U.S. Environmental Protection Agency's Health Advisory Levels for Some Per- and Polyfluoroalkyl Substances (PFAS)

The Town of Stowe delivers water that is high in quality and meets all federal and state drinking water standards, including all current State of Vermont drinking water standards. For the most recent copy of our Water Quality Report, visit our website at https://www.townofstowevt.org/vertical/sites/%7B97FA91EA-60A3-4AC6-8466-F386C5AE9012%7D/uploads/Water_Quality_Report_2021.pdf

Since the 1940s, per- and polyfluoroalkyl substances have been used in the manufacturing of carpets, clothing, fabrics for furniture, and other materials and consumer products. They are released into the environment through various processes. Drinking water is one source of exposure. Some PFAS do not break down in the environment for a very long time, especially in water. Some types of PFAS are associated with negative health effects. The amount of chemical you are exposed to, how much of the chemical is in the water, and during which life stage(s) you are exposed, all affect your risk. For example, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are associated with negative health effects in children who are developing, and people who are exposed to PFAS, the lower your risk. PFAS may result in a wide range of negative health effects, including:

- developmental effects including to fetuses and infants (for example, decreased birth weight, developmental delays)
- cancer (for example, testicular, kidney)
- liver effects
- immune effects (for example, decreased ability to fight off infections)
- thyroid effects and other effects (for example, changes in hormone levels)

Currently, there are not any federal regulations for PFAS in drinking water. The U.S. Environmental Protection Agency (EPA) has issued a Maximum Contaminant Level of 20 parts per trillion (ppt) for PFOA, PFOS, perfluorohexane sulfonic acid (PFHxS), and perfluorononanoic acid (PFNA). On June 15, 2021, EPA issued new Health Advisory Levels (HALs) for 4 PFAS. The new HALs are 0.004 ppt for PFOA and 0.02 ppt for PFOS, PFHxS, and PFNA. This advisory indicates negative health effects can be detected in water using current technology.

What is being done?

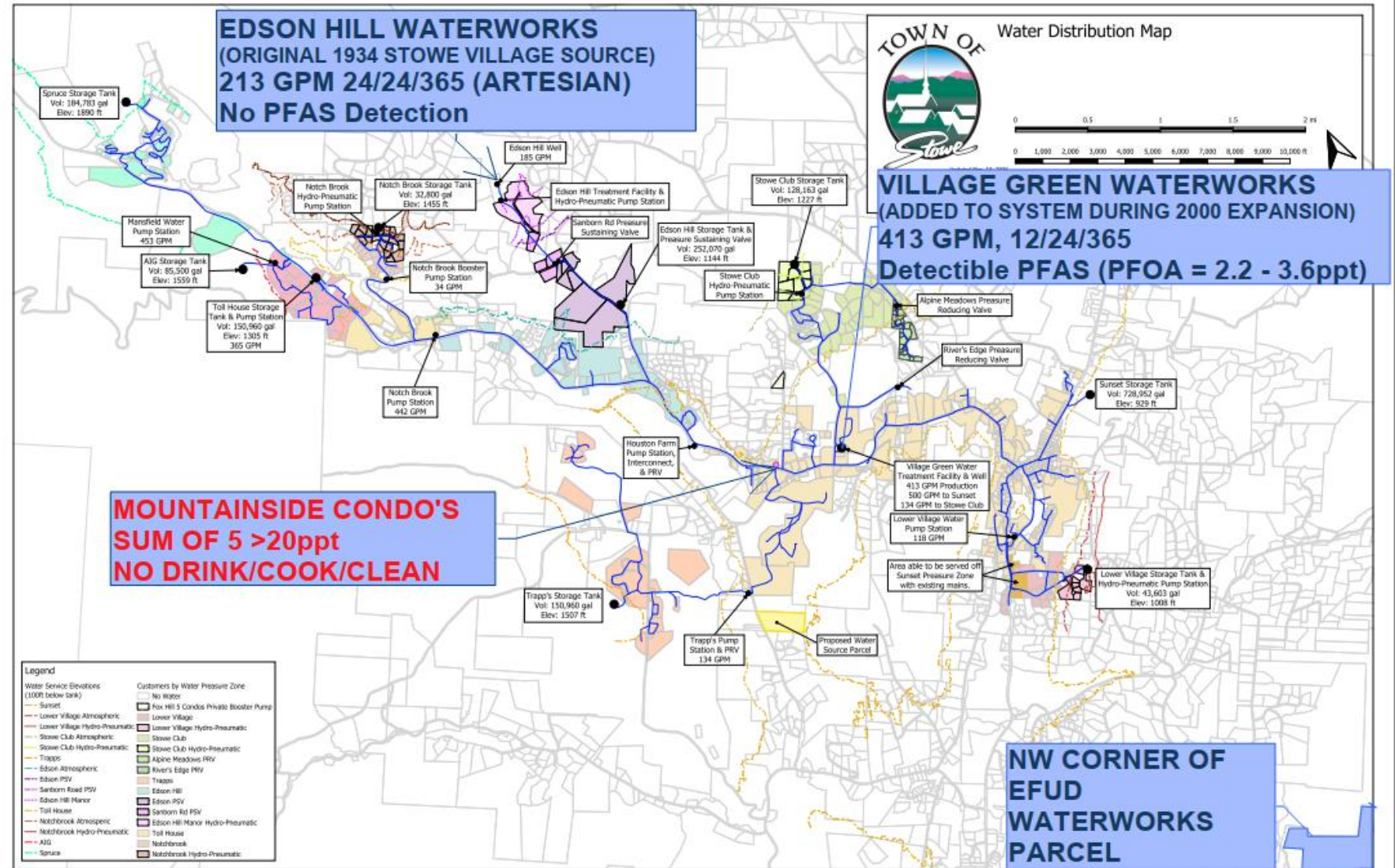
- The Stowe Water Department is required to continue to monitor for PFAS according to State requirements.
- PFOA and PFOS detections are reported annually in the Consumer Confidence Report for community drinking water systems. PFAS sample data and test results is available in real time at: <https://anrweb.vt.gov/DEC/DWGWP/SearchWS.aspx>.
- Implementation of operational modifications to maximize the use of water sourced from our Edson Hill supply, which has no PFAS detection, effectively diluting PFOA levels by blending Village Green water supply.
- Undertaking additional testing at our Village Green Treatment facility, to better understand the source of our PFOA detected.
- Commencement of evaluation of potential treatment options. These are believed potentially feasible but with likely significant capital expense and operating costs associated with the management of PFAS saturated residuals.
- Conceptually evaluating securing additional supply capacity from the Town's Edson Hill Waterworks property and other potential sources of supply, including work associated with integrating these with the existing distribution system.



STOWE WATER SYSTEM

+

MOUNTAINSIDE CONDO'S



2023
PFAS
TREATMENT
EVALUATION
AT
VILLAGE
GREEN
WATERWORKS

PROCESS MODIFICATIONS
AND PFAS TREATMENT via
GRANULATED ACTIVATED
CARBON OR ION EXCHANGE
RESIN FILTRATION

STOWE, VT

Village Green PFAS Treatment
Alternatives Analysis

RECOMMENDATIONS

1.7 Treatment Recommendations Summary

Various configurations of GAC and IX vessels, as well as two options for dechlorination contact time, were evaluated as treatment options to remove PFAS within the existing VGTF. A summary of treatment alternatives evaluated is provided below. All configurations would treat PFAS concentrations to non-detect levels, below current and future state and federal MCLs.

- PFAS treatment vessel options:
- Three pairs GAC Model 12-20
 - Two pairs GAC Model 12-30
 - One pair GAC Model 12-40
 - Two pairs IX Model 8
 - One pair IX Model 10
 - One pair IX Model 12-20

- Dechlorination contact time options:
- New 24-inch pipeline
 - Existing reclaim tank

1.8 PFAS Treatment and Dechlorination Recommendations

For the PFAS treatment vessel options, the recommended configuration is one pair of 12 ft diameter vessels with 40,000 lb of GAC media, which is vessel Model 12-40 (GAC Option #3 from Tables 2-1 and 2-2). This option will require the least amount of space, process piping, and cost.

To achieve the dechlorination required after green sand treatment, the recommended configuration is to utilize the existing reclaim tank with added baffles to achieve adequate contact time. This recommendation is based on cost, contact time, and area.

Shown below in Figure 3-1 is a plan view of the recommended GAC vessel configuration and potential PFAS treatment building size.

2023 ESTIMATED
TOTAL COST = \$10M - \$12M

W/ RESIDUALS MANAGEMENT
ESTIMATED INCREASE IN
ANNUAL OPERATING
EXPENSES = \$1.0M

STOWE, VT

Village Green PFAS Treatment
Alternatives Analysis

Table 2-2: GAC Cost Estimates

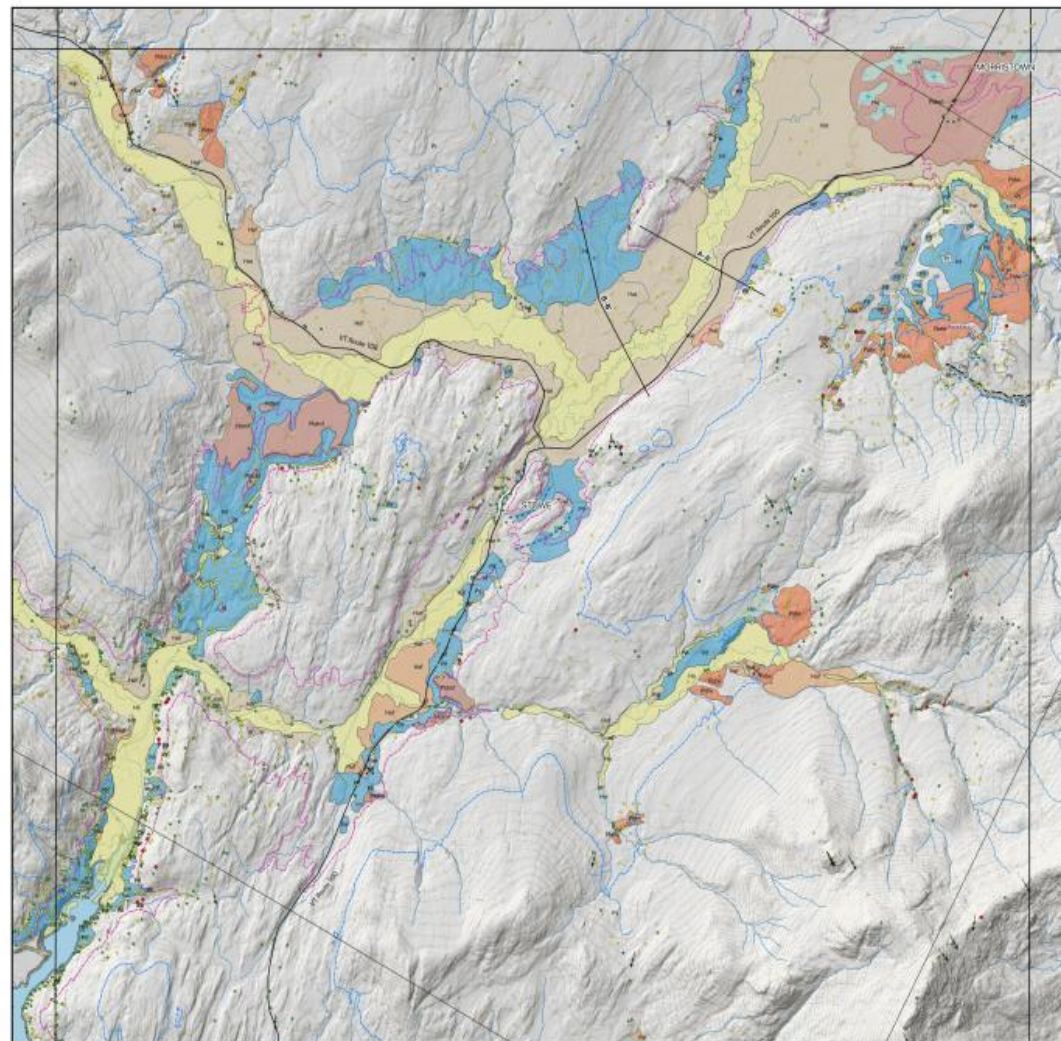
	VGTF – GAC Option #1 (Vessel Model 12-30)	VGTF – GAC Option #2 (Vessel Model 12-20)	VGTF – GAC Option #3 (Vessel Model 12-40)
Capital Costs (Present Value)			
Vessels	\$ 1,000,000	\$ 1,200,000	\$ 500,000
Building	\$ 3,037,500	\$ 4,387,500	\$ 2,812,500
Initial Media	\$ 240,000	\$ 240,000	\$ 160,000
Other	\$ 3,229,875	\$ 3,927,375	\$ 2,867,625
Total Capital Costs	\$ 7,600,000	\$ 9,800,000	\$ 6,400,000
Operation Costs (Future Value, 20-year cycle)			
Media Replacement	\$ 4,320,756	\$ 4,320,756	\$ 2,880,504
Electricity from Pump	\$ 285,230	\$ 285,230	\$ 285,230
Total Operation Costs	\$ 4,700,000	\$ 4,700,000	\$ 3,200,000
Total Costs (Capital + Operation)			
Total	\$ 12,300,000	\$ 14,500,000	\$ 9,600,000

2023 NEW SOURCE? EVALUATIONS OF STOWES WATER RESOURCES

Surficial Geologic Map of the Stowe 7.5-Minute Quadrangle, Vermont

Stephen F. Wright
Department of Geology
University of Vermont
2020

Vermont Geological Survey
Open File Report VG2020-1
Plate 1



EXPLANATION OF MAP UNITS

Holocene Deposits

- Artificial Fill:** Artificially emplaced material along road beds, embankments and in developed areas. Material varies from natural sand, gravel, or till to various artificial waste materials. Thickness varies.
- Wetland Deposits:** Accumulations of organic matter and/or clastic sediment in low-lying areas. Includes a wide variety of wetland types. Commonly overlying other deposits such as alluvium, lacustrine sediment, or till. Larger deposits are shown.
- Alluvium:** Silt, sand, and gravel deposited by modern streams. Includes stream channel, bar, and floodplain deposits. Wetland deposits are common within these areas and are not distinguished. Thickness in tributary valleys is typically less than 3 meters, although the depth may be much greater in the valleys of the larger streams.
- Alluvial Terrace Deposits:** Silt, sand, and gravel deposited on terraces above the modern floodplains of streams. They are composed of a variety of channel, bar, and floodplain deposits. Generally less than 5 meters thick.
- Alluvial Fan:** Boulder, pebble, and cobble gravel and pebbly sand deposited at sites where steep, stream gradients are sharply reduced. Common at the mouths of steep tributaries where they meet the main stream. Commonly less than 5 meters thick.

Pleistocene Deposits

- Pd Pleistocene Alluvial Fan:** Similar to above, but deposited during the late Pleistocene when streams incised into recently abandoned deltas.
- PL Lacustrine Sediments (Fine-grained):** Clay, silt, and very fine to fine sand deposited in deeper waters. Commonly laminated. Deposited in distal lake bottom environment of a proglacial lake.
- Pldm1 Glacial Lake Mansfield 1 Delta:** Well-sorted sand and gravel deposited in a glacial lake at the mouth of a tributary stream. Includes topset, and foreset beds. May also include proximal bottomset beds if exposures permit. Although foresets are commonly steep, delta foresets in shoaling lakes may have considerably lower dips.
- Pldw Glacial Lake Winooki Delta:** Well-sorted sand and gravel deposited in a glacial lake at the mouth of a tributary stream. Includes topset, and foreset beds. May also include proximal bottomset beds if exposures permit. Although foresets are commonly steep, delta foresets in shoaling lakes may have considerably lower dips.
- PL Lacustrine Deposits, Undifferentiated:** Coarse- to fine-grained sediment deposited in a proglacial lake.
- Og Sand and Gravel, Undifferentiated:** Encompasses a wide variety of coarse-grained surficial materials in cases where information is inadequate to determine age and environment of deposition.
- Pir Readvance Till:** Extremely poorly sorted, moderately dense, silt-matrix diamict with abundant clasts ranging in size up to 2 m in diameter. Occurs above lacustrine deposits at ~365 m in the Thatcher Brook valley. Commonly <3 m thick. See Springston and Dunn, 2006.
- Pt Glacial Till:** Very dense to loose, unsorted to very poorly sorted material deposited directly from glacial ice. Contains a wide range of grain sizes, from clay or silt up to large boulders. Matrix commonly dominated by the silt or sand fraction. Surface boulders are generally common. Thickness is highly variable, from less than 3 meters to greater than 30 meters.

Map Symbols

- Surficial Material or Landform Observation Site
- Bedrock Outcrops
- Water Well
- Glacial Striations: Arrow points in inferred down-glacier direction.
- Large (>4 m diameter) erratic
- Landslide (small)
- Kettles
- Landslide (large)
- Gravel Pit
- Rock Quarry
- Abandoned Channel
- Projected Elevation of Glacial Lake Mansfield 1
- Glacial Lake Winooki: Shoreline Bench
- Projected Elevation of Glacial Lake Winooki
- Moraine Ridge
- Geologic Cross-sections
- Geologic Contact: Approximate location of surface separating different types of surficial geological materials.

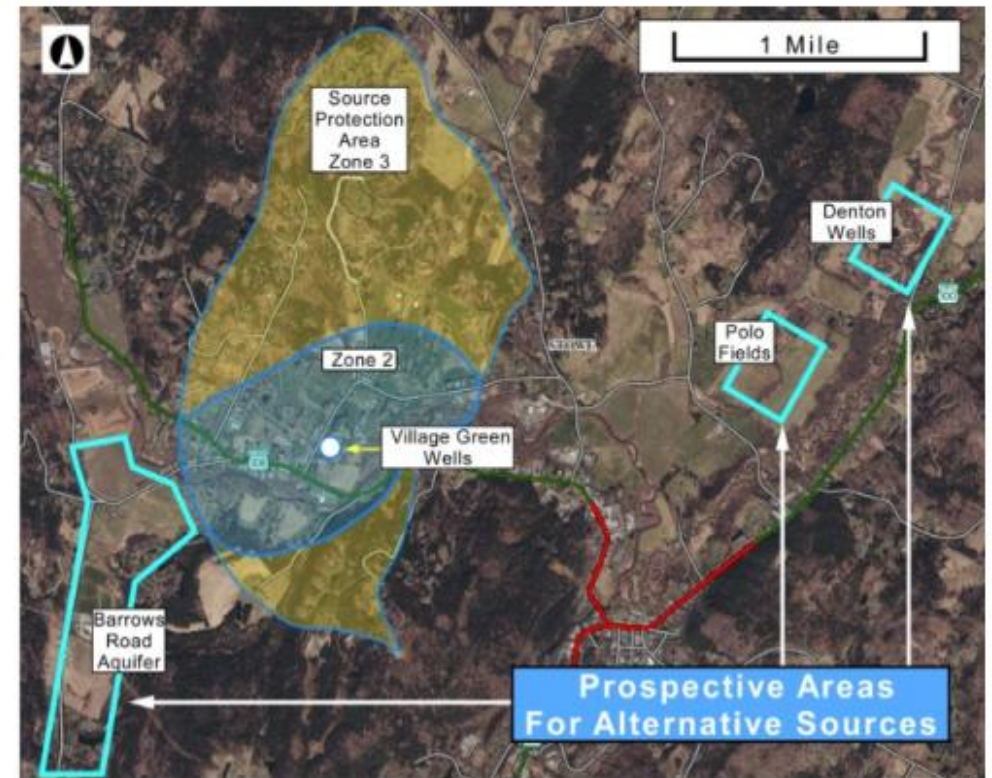
HYDRO- GEOLOGIC ASSESSMENT

CONCLUSIONS

➤ The most promising area to develop an alternate source of water is the "Barrows Road" aquifer, located southwest of the Village Green wells and on the opposite side of the West Branch. Well logs show deep buried gravels that can support well yields up to 1,000 gallons per minute (gpm). No PFAS compounds were detected in samples collected in 2022 and 2023 from several wells completed within or beneath the Barrows Road aquifer (Stony Brook bedrock well, and High School / Bouchard Farm gravel wells).

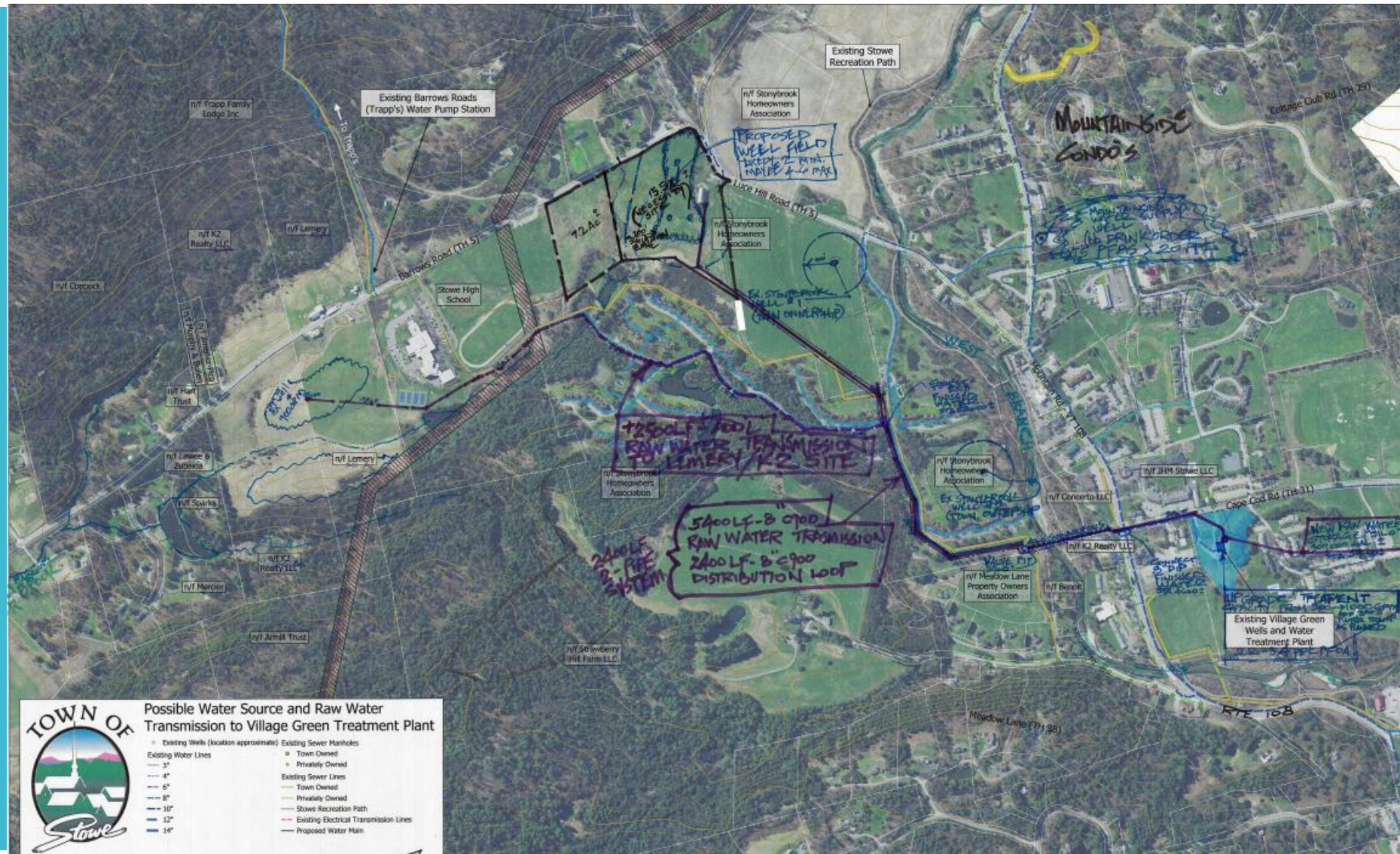
➤ Two other prospective areas, although less promising, are situated to the east of the Village Green wells within the valley of the North Branch. Well logs in this region indicate the presence of some gravel layers, but not as extensive or thick as what is found in the Barrows Road or Village Green aquifers. Test-well drilling can verify whether and where these areas could potentially support high-yielding wells.

➤ Wells upgradient from the Village Green wells should be sampled for PFAS to help define the current extent of PFAS contamination, potential source areas, and the possible future concentrations of PFAS in groundwater that enters the Village Green wells.



INITIAL RAW WATER SAMPLING AND TESTING

PROSPECTIVE PROPERTY EVALUATIONS



WINTER 2023-2024

ALTERNATE SOURCE EVALUATIONS

STONYBROOK CONDO'S P&S

**RATIFICATION
VOTE DEFEATED
DECEMBER 2024**



2023-2024

REGULATORY CHANGES FOR PFAS

- March 2023- EPA proposes and then adopts National Primary Drinking Water Regulations establishing legally enforceable MCL's for 6 types of PFAS including PFOA and PFOS @ 4.0ppt with compliance required by 2029.
- July 2024- VT Water Supply Rules revised to establish 2023 EPA Maximum Containment Levels (MCL) for 6 types of PFAS including PFOA @ 4.0ppt, but with expedited compliance requirements by 2027.
- April 2025- EPA revises National Primary Drinking Water Regulations maintaining MCL's of 4.0ppt for both PFOA and PFOS, suspends MCL's for other 4 types of PFAS. Extends compliance dates to 2031.
- January 2026- VT Water Supply Rules revised to comply with 2025 EPA Regulations. Increased sampling and testing required for all Public Water Systems with detectible PFAS.

WINTER – SPRING 2025

ALTERNATE SOURCE EVALUATIONS

**GEOPHYSICAL SURVEY
COURTESY OF STATE
GEOLOGIST**

STONYBROOK NOT VIABLE

PERCY WELL ON K₂ SITE IN CENTER OF PRE-PLIESTICENE STREAMBED



FALL+WINTER 2025

BOUNDARY SURVEY

WETLANDS SURVEY

BORINGS AND MONITORING WELLS

SOURCE CONSTRUCTION

APPROVAL

PRELIMINARY

ENGINEERING

DISCHARGE PERMITTING

1593

WELL OWNER Paul Perry Name Mailing Address _____

WELL DRILLER DEAN Name Mailing Address _____

PROPOSED USE OR USES: (Check):
☐ Domestic ☐ Agriculture ☐ Business Establishment ☐ Municipal ☐ Industrial
☒ Other (Specify use) Screened Well (150 Slot)

	CASING DETAILS (Inside)	YIELD TEST		WATER LEVEL (From land surface if possible)
☒ New Well	Length: <u>219' 4"</u> Feet	☐ Bailed or ☐ Pumped or ☐ Compressed Air	Hours _____ GPM _____	Static <u>4.5</u> Feet
☐ Replacement Well	Diameter: <u>8</u> Inches	WELL CAP		During Yield _____ Feet
☐ Set-Over Existing Well	Kind: <u>Cased</u> <u>12 Bags Type III</u> <u>8" Bore Seal</u> Weight: _____ lbs./p.ft.			Test: _____ Feet
	☐ New ☐ Used	Yield: <u>900+</u> GPM		DRILLING EQUIPMENT ☐ Cable Tool ☐ Rotary ☐ Air Percussion ☐ Other (Specify) _____

TOTAL DEPTH OF WELL 227' FEET TOWN WELL IS LOCATED IN: Stowe
 (248 test) (Make sketch of well location on reverse side of sheet.)

- WELL LOG -

Depth From Ground Surface	Give description of formations penetrated, such as peat, silt, sand, gravel, clay, hard-pan, shale, limestone, granite, etc. Include size of gravel (diameter) and sand (fine, medium, coarse) color of material, structure (loose, packed, cemented, hard). For example: 0 ft. to 27 ft. fine, packed, yellow sand; 27 ft. to 134 ft. gray granite.	
0 ft. to 52 ft.	Brown clay	Dev. Time
52 ft. to 77 ft.	Fine Gray sand	1/22 - 1 hr.
77 ft. to 180 ft.	Fine Gravel + sand	4/23 - 7 1/2 hrs.
180 ft. to 231 ft.	Gravel + sand	4/24 - 6 1/2 hrs.
231 ft. to 248 ft.	Bedrock	

DATE WELL STARTED 1/3/90 DATE WELL COMPLETED 1/25/90

Bite Used # _____ Footage _____ Daily Footage _____

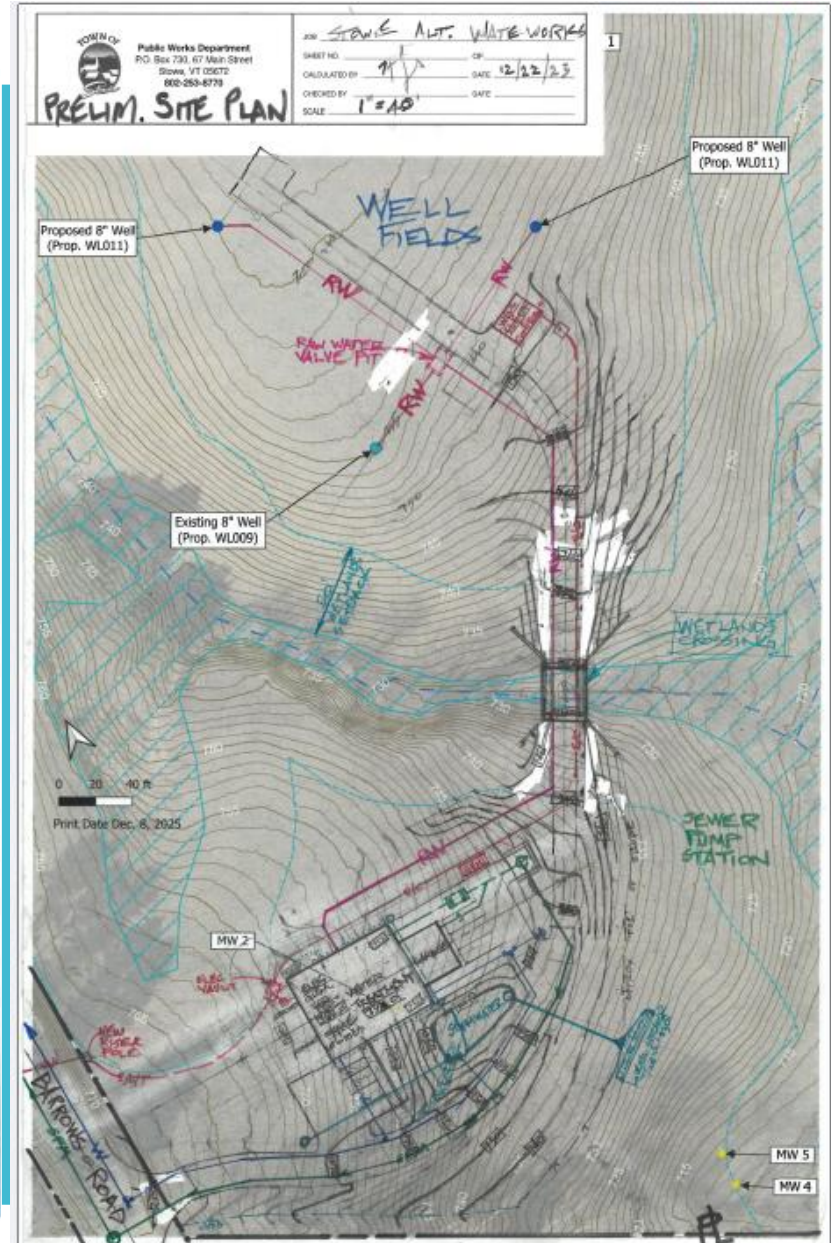
16 3/4" Roller to set working casing SET 63' of working casing

10 5/8" Roller to _____ 241' Pulled back 17'

8" Bit C.O.B. _____

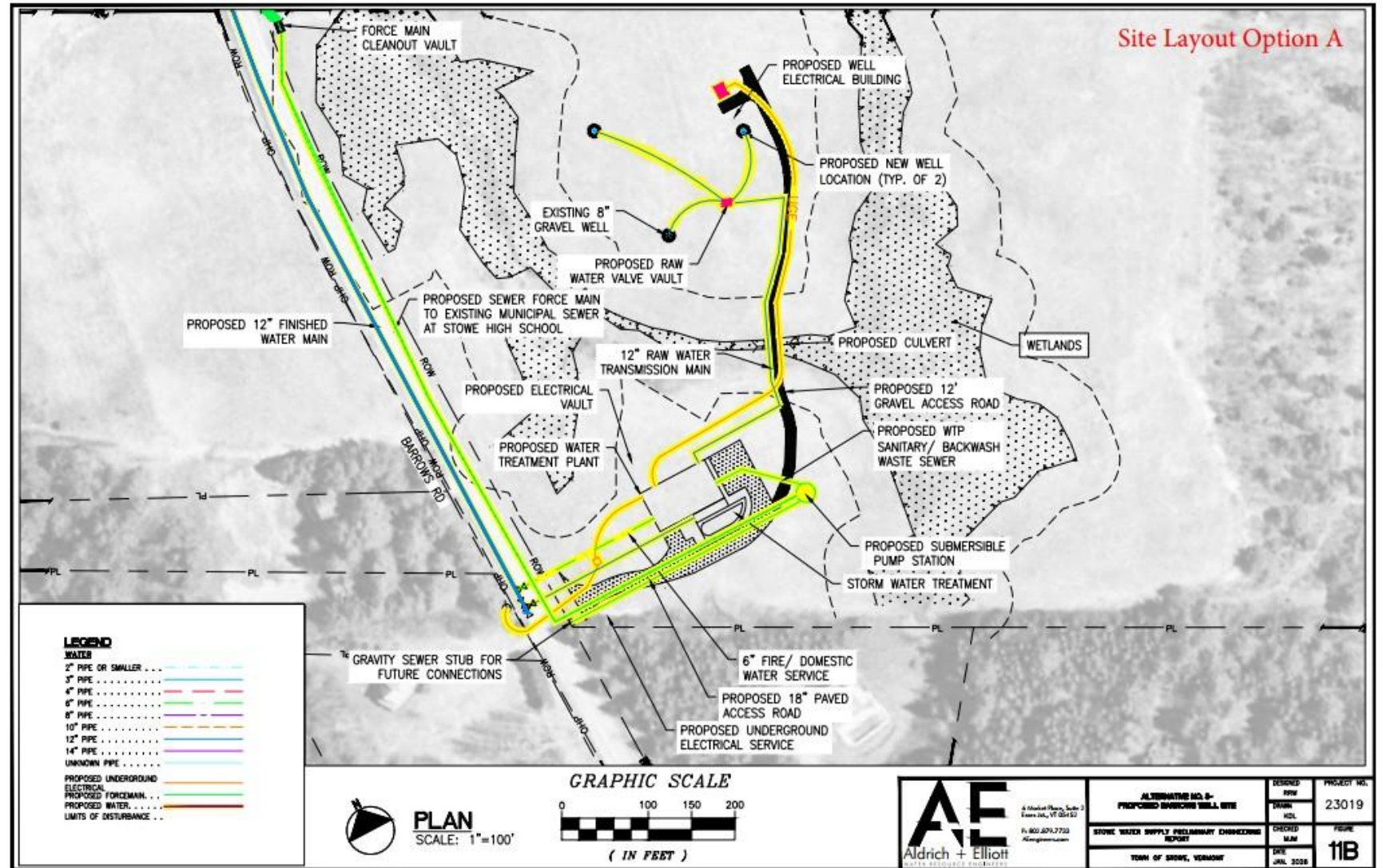
DRILLER'S HOURS _____ HELPER'S HOURS _____

FEB 26 1990



MARCH 2026

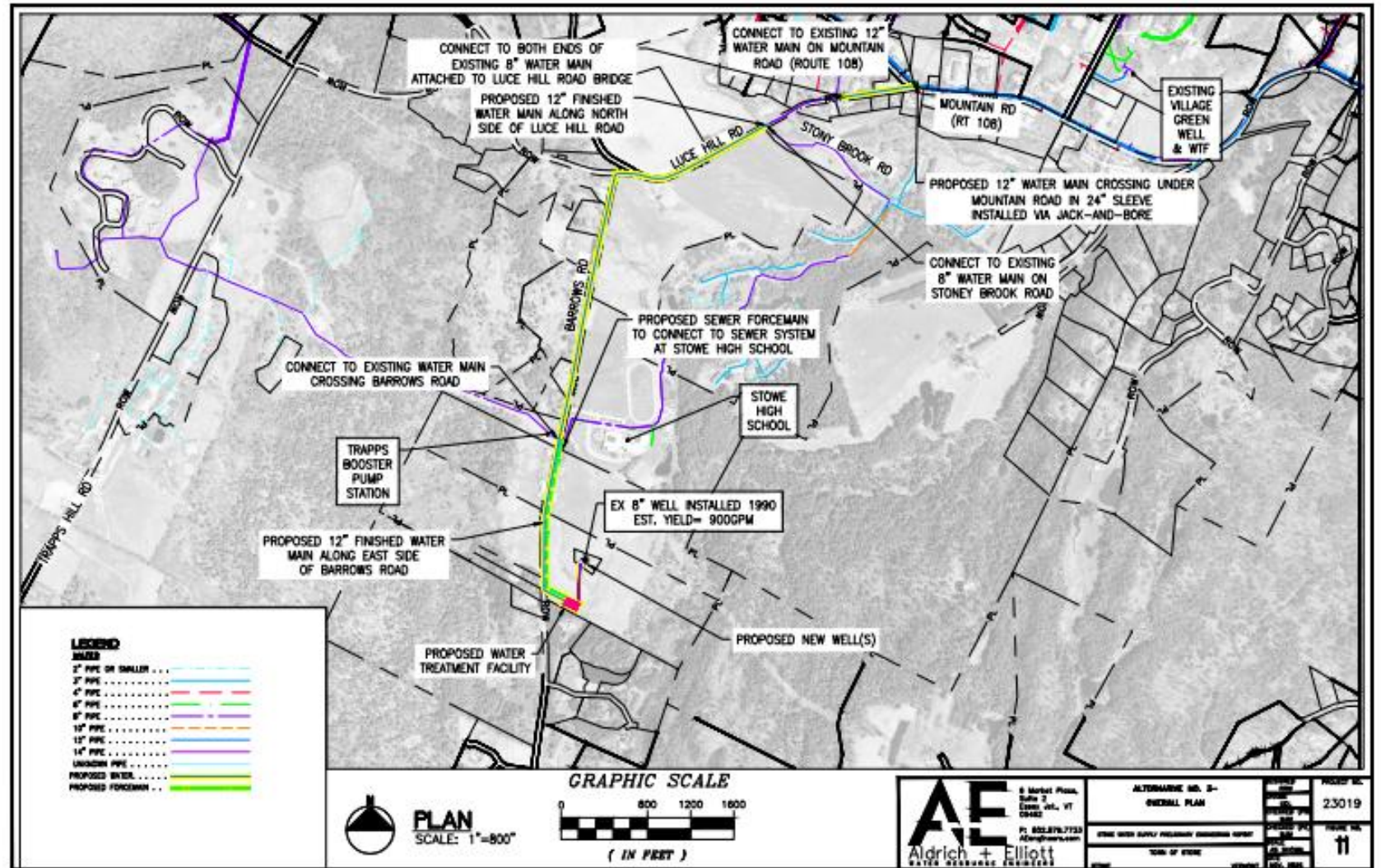
PRELIMINARY ENGINEERING SITE PLAN



MARCH 2026

PRELIMINARY ENGINEERING

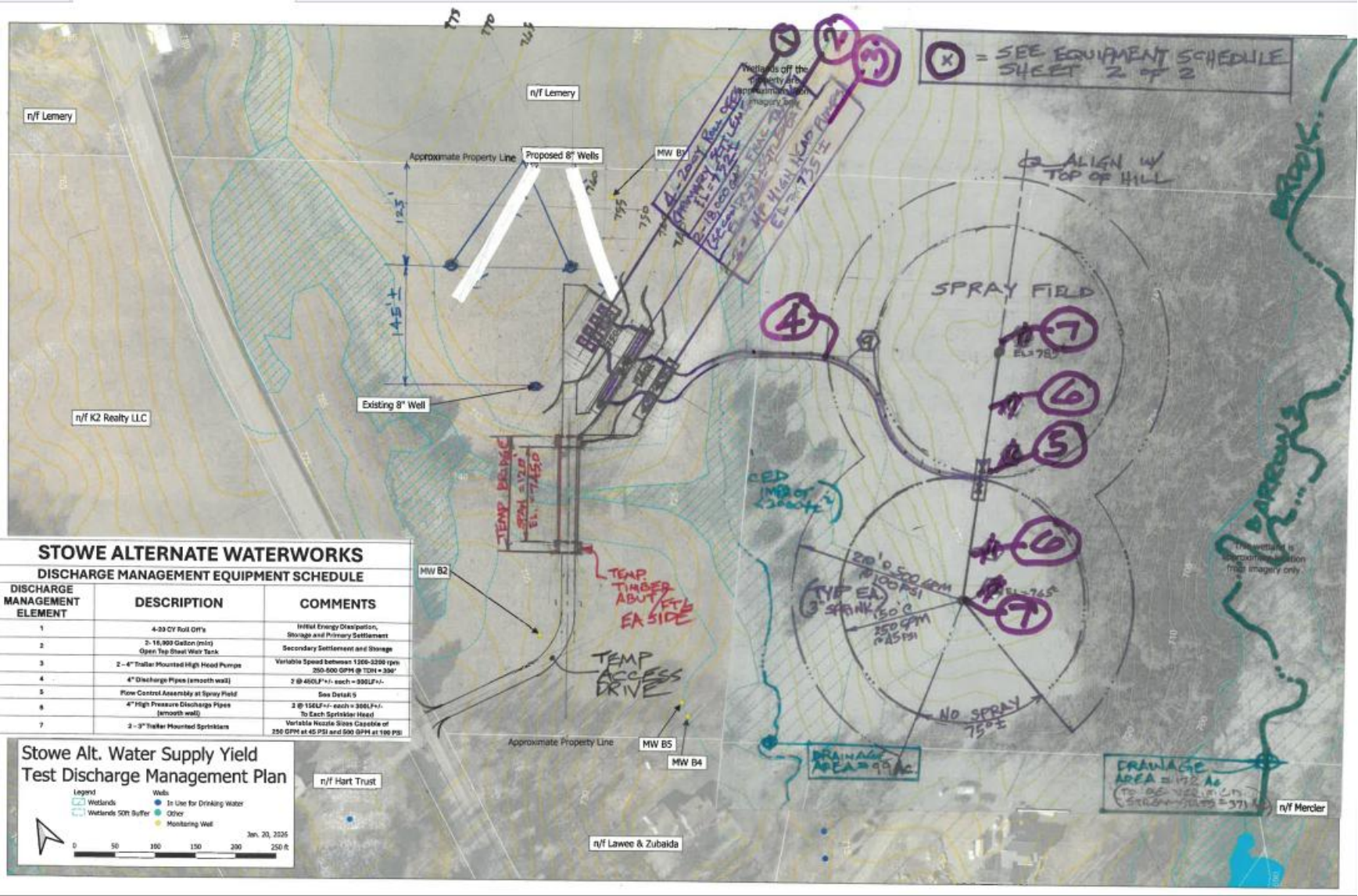
WATER DISTRIBUTION SYSTEM CONNECTION



SPRING - FALL 2026

SOURCE
DEVELOPMENT
AND
PERMITTING

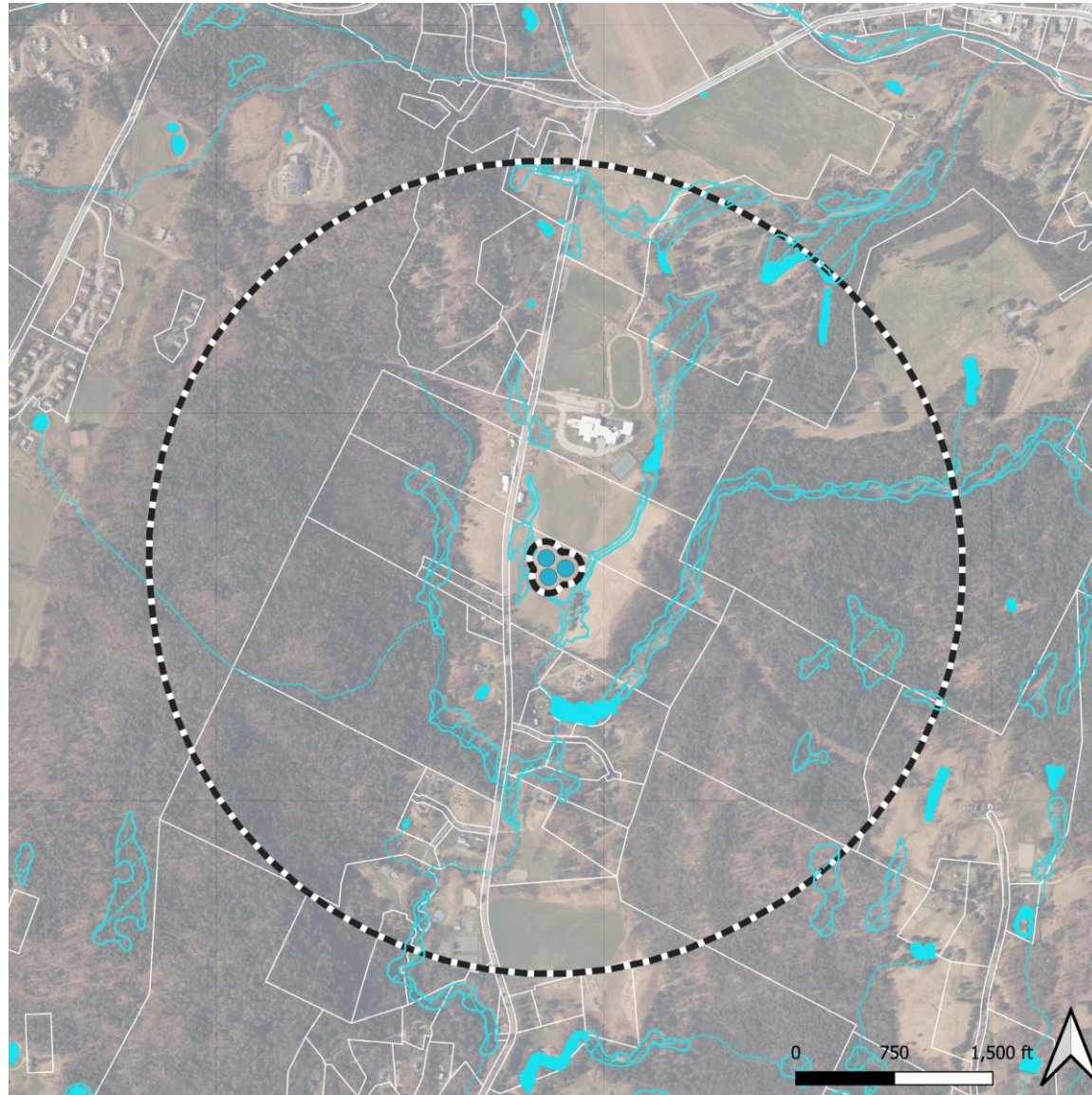
SITE PREP AND ACCESS
WELL DRILLING
WELL DEVELOPMENT
YIELD TESTING
SOURCE PERMITTING



TEMPORARY
ACCESS
BRIDGE OVER
20' WIDE
WETLANDS &
2-50' WIDE
WETLANDS
SETBACKS



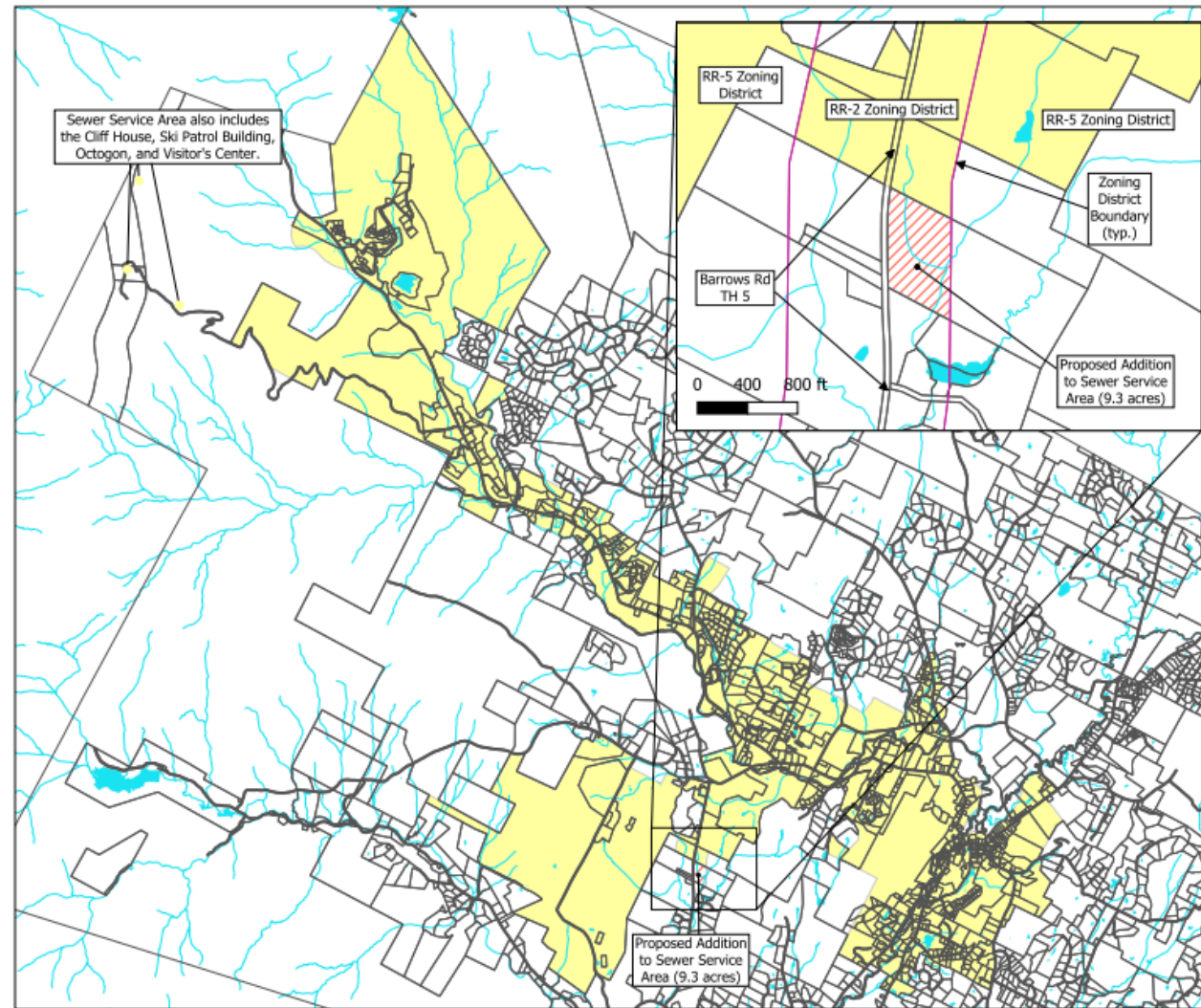
PRELIMINARY SOURCE DEVELOPMENT EVALUATION ZONE-3000' R



FALL 2026 – SUMMER 2027

DESIGN DEVELOPMENT
LAND USE PERMITS
WETLANDS PERMITS
STORMWATER PERMITS
VTDEC DRINKING WATER
PERMITS TO CONSTRUCT
ACT 250 PERMITS (4)

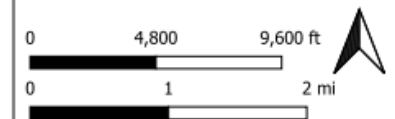
CLOSING PER P&S
JULY 1, 2027



Town of Stowe Proposed Sewer Service Area 2026

- Existing Sewer Service Area (6446 acres)
- Proposed Additional Sewer Service Area (9.3 acres)
- 2024 Tax Map Parcels

The proposed addition to the sewer service area is a 9.3 acre portion of the property owned by K2 Realty, LLC to the east of Barrows Road (TH 5) and within the RR-2 Zoning District. The existing sewer service area contains 6,446 acres, with the proposed addition the sewer service area will contain 6,455 acres. The sewer service area was last modified in 2011 by 100035-9B.



February 18, 2026

WINTER 2026-
WINTER 2027-2028

FINAL DESIGN AND COST
ESTIMATE

BID AND CONTRACT
DOCUMENTS

LOCAL APPROVALS
AND BOND VOTE
NOVEMBER 2027 or
MARCH 2028



WINTER 2028

BIDDING AND
AWARD

SPRING 2028 - FALL 2030

CONSTRUCTION
AND
COMMISSIONING



FUTURE STOWE WATER SYSTEM

