

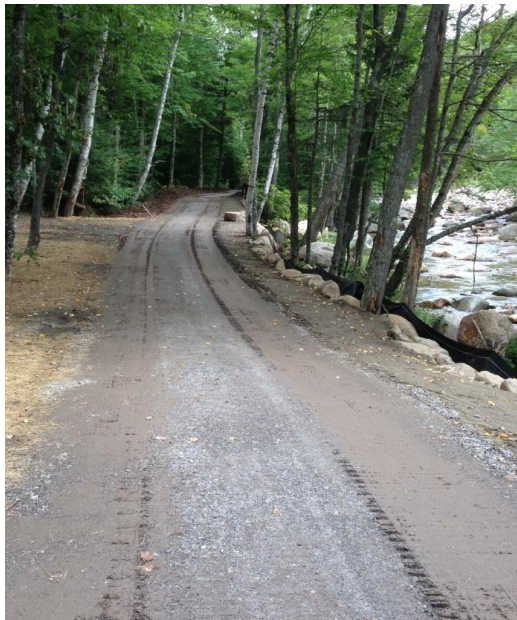
DRINKING WATER IMPROVEMENTS

Joe Ducharme, PE, BCEE, Regional Manager

Hoyle, Tanner & Associates, Inc

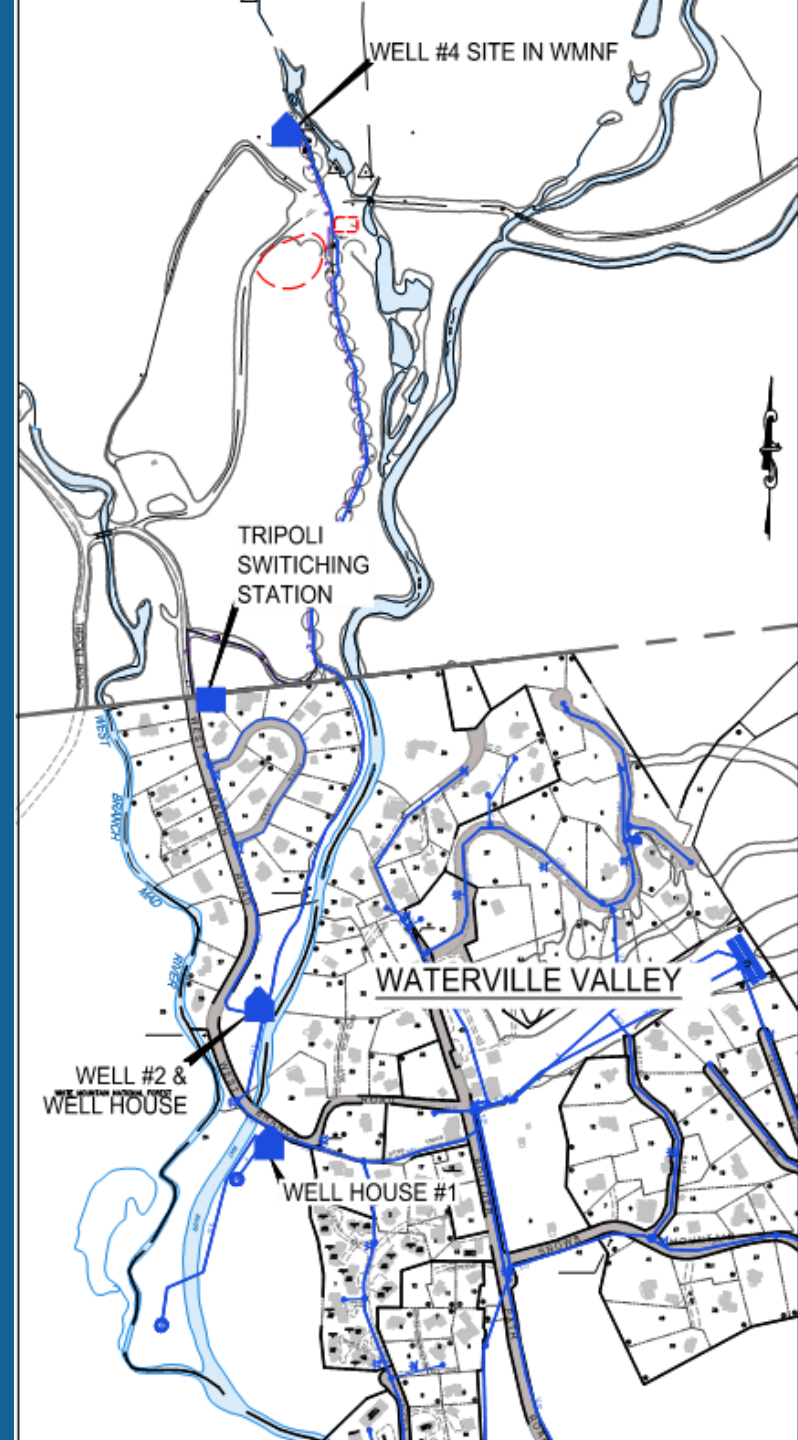
OUTLINE

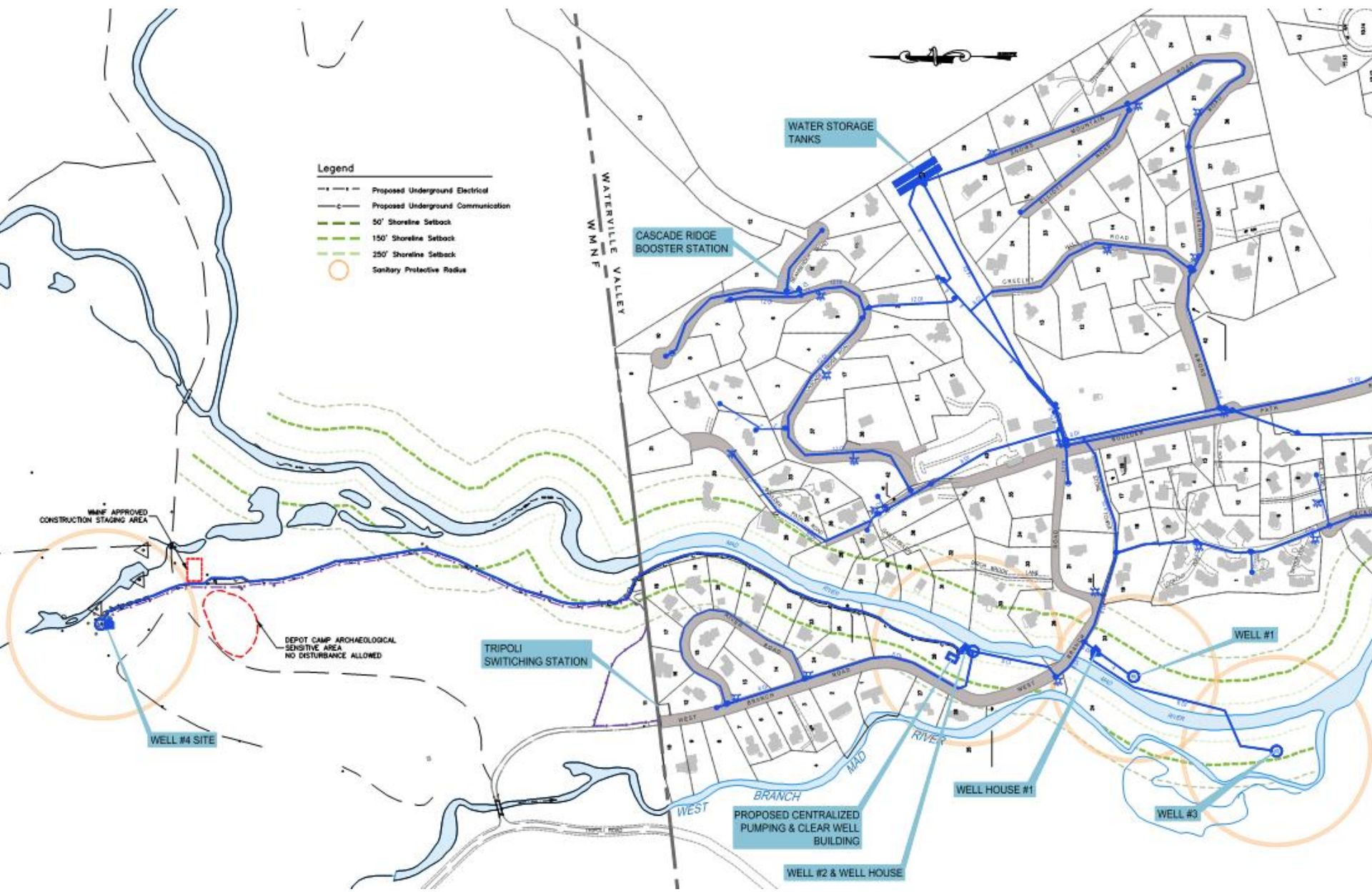
- Water System Overview
- Well History
- Regulatory Changes
- Recent Improvements
- Project Goals
- Recommended Project
- Alternatives Considered
- Project Budget
- Project Funding









WATER SYSTEM OVERVIEW

- Two active supply wells
- Two storage tanks
- One pipe connecting wells to tanks
- 7.5 miles of mains under roadways
- 2.5 miles of cross-country mains
- 1224 Connections/Water Meters
- Two well buildings
- One Centralized Treatment Building





Legend

-  Proposed Underground Electrical
-  Proposed Underground Communication
-  50' Shoreline Setback
-  150' Shoreline Setback
-  250' Shoreline Setback
-  Sanitary Protective Radius

WINE APPROVED
CONSTRUCTION STAGING AREA

DEPOT CAMP ARCHAEOLOGICAL
SENSITIVE AREA
NO DISTURBANCE ALLOWED

WELL #4 SITE

TRIPOLI
SWITCHING STATION

CASCADE RIDGE
BOOSTER STATION

WATER STORAGE
TANKS

PROPOSED CENTRALIZED
PUMPING & CLEAR WELL
BUILDING

WELL #2 & WELL HOUSE

WELL HOUSE #1

WELL #1

WELL #3

WATERVILLE VALLEY
WINEF



WELL HISTORY

- >120 exploratory wells 1968-2008
- Well #1 – 1968 (85 gpm)
- Storage Tank #1 – 1970 (est.)
- Well #2 – 1972 (280 gpm)
- Well #3 – 1984 (150-180 gpm)
- Storage Tank #2 – 2004
- Well# 4 – 2016 (200-300 gpm)

| WELL AND TEST BORING INFORMATION | | | | | | | | | |
|---------------------------------------|-------------|--------------|-----------------------------------|-----------------------|-------------|-----------------|----------|---------------|--|
| PRODUCTION WELLS | | | MATERIALS ENCOUNTERED | | YIELD (GPM) | SCREEN INTERVAL | W/L DATE | | |
| WELL ID | WELL STATUS | DEPTH (FEET) | | | | | | | |
| TOWN ENGINEER'S BUREAU - 1968 REPORT | | | | | | | | | |
| WELLS | | | DEPTH (FEET) | MATERIALS | YIELD (GPM) | SCREEN INTERVAL | W/L DATE | | |
| COM-1 | D | 50/No | sand, gravel, clay (8-10') | | MC | | | | |
| COM-2 | D | 20.5/No | sand, gravel, clay (8-10') | | MC | | | | |
| COM-3 | D | 25 | fine sand, gravel, clay | | MC | 20-25 | 31-38 | 3.0 @ 8/18/67 | |
| COM-4 | D | 30 | sand, gravel, boulders | | MC | | | | |
| COM-5 | D | 30/No | sand, gravel, boulders | | MC | | | | |
| COM-6 | D | 36/No | sand, gravel, boulders | | MC | | | | |
| COM-7 | D | 35 | fine sand, gravel, clay, silt | | MC | 27-29 | | 1.0 @ 8/18/67 | |
| COM-8 | D | 31 | sand, silt, boulders | | MC | 28-31 | | 2.0 @ 8/18/67 | |
| COM-9 | D | 31 | fine sand, gravel, clay, silt | | MC | 31-37 | | 6.0 @ 8/18/67 | |
| COM-10 | D | 28 | sand, gravel, boulders, clay | | MC | | | | |
| COM-11 | D | 34 | sand and gravel | | MC | | | | |
| COM-12 | D | 34.5 | sand and gravel | | MC | 28-33 | | 6.1 @ 8/18/67 | |
| COM-13 | D | 32 stopped | sand and gravel | | MC | 28-33 | | 2.4 @ 8/18/67 | |
| COM-14 | D | 31 stopped | sand and gravel | | MC | 28-33 | | 4.0 @ 8/18/67 | |
| COM-15 | D | 17/No | sand, silt, boulders | | MC | | | | |
| COM-16 | D | 7/boulder | sand, silt, boulders | | MC | | | | |
| COM-17 | D | 7/boulder | sand and boulders | | MC | | | | |
| COM-18 | D | 7/boulder | sand and boulders | | MC | | | | |
| COM-19 | D | 25 | sand, silt, gravel, and silt | | MC | 17-20 | | 4.4 @ 8/18/67 | |
| COM-20 | D | 8.8/boulder | sand, gravel, boulders | | MC | | | | |
| COM-21 | D | 10/boulder | gravel, boulders | | MC | | | | |
| COM-22 | D | 14/boulder | gravel, boulders | | MC | | | | |
| COM-23 | D | 27 | sand and gravel, fine clay | | MC | | | | |
| COM-24 | D | 11/boulder | gravel and boulders | | MC | | | | |
| COM-25 | D | 41 | fine sand, gravel, clay (10-20') | | MC (Sieve) | 27-42 | | 8.8 @ 1/16/68 | |
| COM-26 | D | 17/boulder | gravel and boulders | | MC | | | | |
| COM-27 | D | 17/boulder | gravel and boulders | | MC | | | | |
| COM-28 | D | 13/boulder | gravel and boulders | | MC | | | | |
| COM-29 | D | 14/boulder | gravel and boulders | | MC | | | | |
| COM-30 | D | 14/boulder | gravel and boulders | | MC | | | | |
| COM-31 | D | 34 | fine sand, gravel, clay | | MC | 24-28 | | | |
| COM-32 | D | 13/boulder | gravel and boulders | | MC | | | | |
| COM-33 | D | 19/boulder | gravel and boulders | | MC | | | | |
| COM-34 | D | 19/boulder | gravel and boulders | | MC | | | | |
| COM-35 | D | 19/boulder | gravel and boulders | | MC | | | | |
| COM-36 | D | 14/boulder | gravel and boulders | | MC | | | | |
| COM-37 | D | 32 | sand, gravel, boulders, clay | | MC | | | | |
| COM-38 | D | 34 | fine sand, gravel, clay | | MC | | | | |
| COM-39 | D | 13/boulder | gravel and boulders | | MC | | | | |
| COM-40 | D | 17/boulder | gravel and boulders | | MC | | | | |
| COM-41 | D | 19/boulder | gravel and boulders | | MC | | | | |
| ENVIRONMENTAL ENGINEERS - 1970 REPORT | | | | | | | | | |
| WELLS | | | DEPTH (FEET) | MATERIALS ENCOUNTERED | YIELD (GPM) | SCREEN INTERVAL | W/L DATE | | |
| EE-1-72 | D | 21 | sand and gravel and boulders | | MC | 21-25 | | 5.8 @ 5/28/72 | |
| EE-2-72 | D | 7/boulder | sand and gravel and boulders | | MC | | | | |
| EE-3-72 | D | 27/clay | clay sand, silt and clay | | MC | | | | |
| EE-4-72 | D | 16/boulder | sand, gravel, clay, boulders | | MC | | | | |
| EE-5-72 | D | 15.5/boulder | sand, gravel, boulders, clay | | MC | | | | |
| EE-6-72 | D | 28/No | fine sand, gravel, boulders, clay | | MC | 20-28 | | 4.0 @ 2/18/72 | |
| EE-7-72 | D | 27/No | silt, sand, gravel, clay | | MC | 20-28 | | 8.7 @ 8/18/72 | |
| EE-8-72 | D | 31 | fine sand, gravel, boulders | | MC | | | | |
| EE-9-72 | D | 31/No | sand and large boulders | | MC | | | | |
| EE-10-72 | D | 53/No | sand, gravel, boulders, clay | | MC | | | | |
| EE-11-72 | D | 13/No | sand, gravel, boulders, clay | | MC | 28-30 | | 4.8 @ 8/18/72 | |
| EE-12-72 | D | 19/No | sand, gravel, boulders, clay | | MC | | | | |
| EE-13-72 | D | 26/No | sand, gravel, boulders | | MC | 28-31 | | 4.6 @ 8/18/72 | |
| EE-14-72 | D | 26/No | sand, gravel, boulders | | MC | 14-21 | | 8.7 @ 8/18/72 | |
| EE-15-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-16-72 | D | 21/No | silt, sand, gravel, clay | | MC | | | | |
| EE-17-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-18-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-19-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-20-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-21-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-22-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-23-72 | D | 26/No | sand, gravel, boulders | | MC | | | | |
| EE-24-72 | D | 53/No | sand, gravel, boulders | | MC | | | | |
| EE-25-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-26-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-27-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-28-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-29-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-30-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-31-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-32-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-33-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-34-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-35-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-36-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-37-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-38-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-39-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-40-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-41-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-42-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-43-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-44-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-45-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-46-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-47-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-48-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-49-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-50-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-51-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-52-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-53-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-54-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-55-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-56-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-57-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-58-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-59-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-60-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-61-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-62-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-63-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-64-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-65-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-66-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-67-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-68-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-69-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-70-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-71-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-72-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-73-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-74-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-75-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-76-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-77-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-78-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-79-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-80-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-81-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-82-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-83-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-84-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-85-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-86-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-87-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-88-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-89-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-90-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-91-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-92-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8.8 @ 1/11/72 | |
| EE-93-72 | D | 53/No | sand and gravel | | MC | 28-30 | | 8. | |

REGULATORY CHANGES

1968 – 1990s

- Water Supply Testing
- Wellhead Protection
- Small System Rules
- Disinfection for bacteria

1990s – 2020

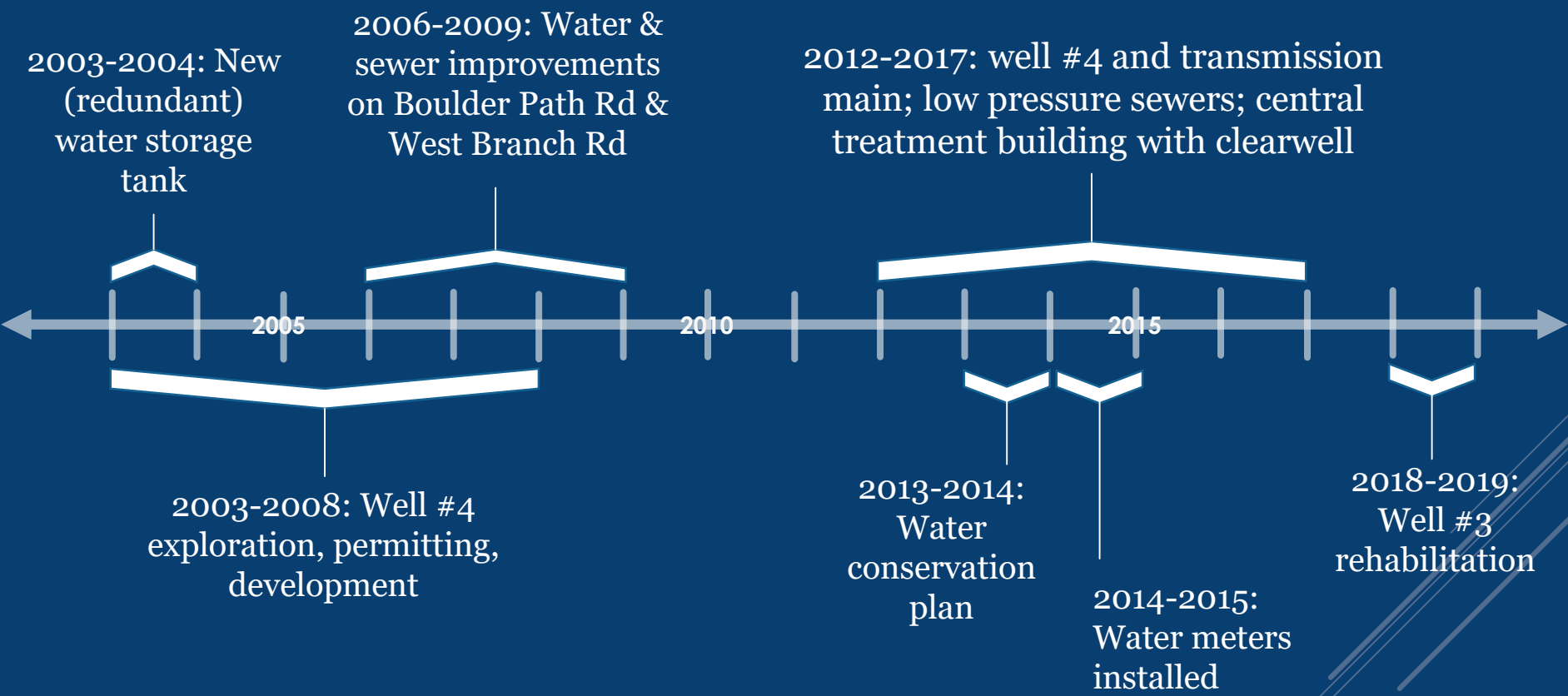
- Lead & Copper; other Metals
- 4-log virus inactivation
- Stricter Wellhead protection
- Large System Rules
- DBP/PFAS/PFOA MCLs

NH Safe Drinking Water Act (SDWA) RSA 485

Env-Dw 100-1200 Drinking Water Rules

Env-Dw 302.30 Criteria and Procedures for Approval of New Production Wells
(contaminant sources; sanitary and wellhead protection radii; water conservation plan;
back-up well; 4-log virus removal by approved disinfection method)

RECENT IMPROVEMENTS TIMELINE (2003-2019)



Projects Total = \$4.365Million (Town share \$2.8 million)

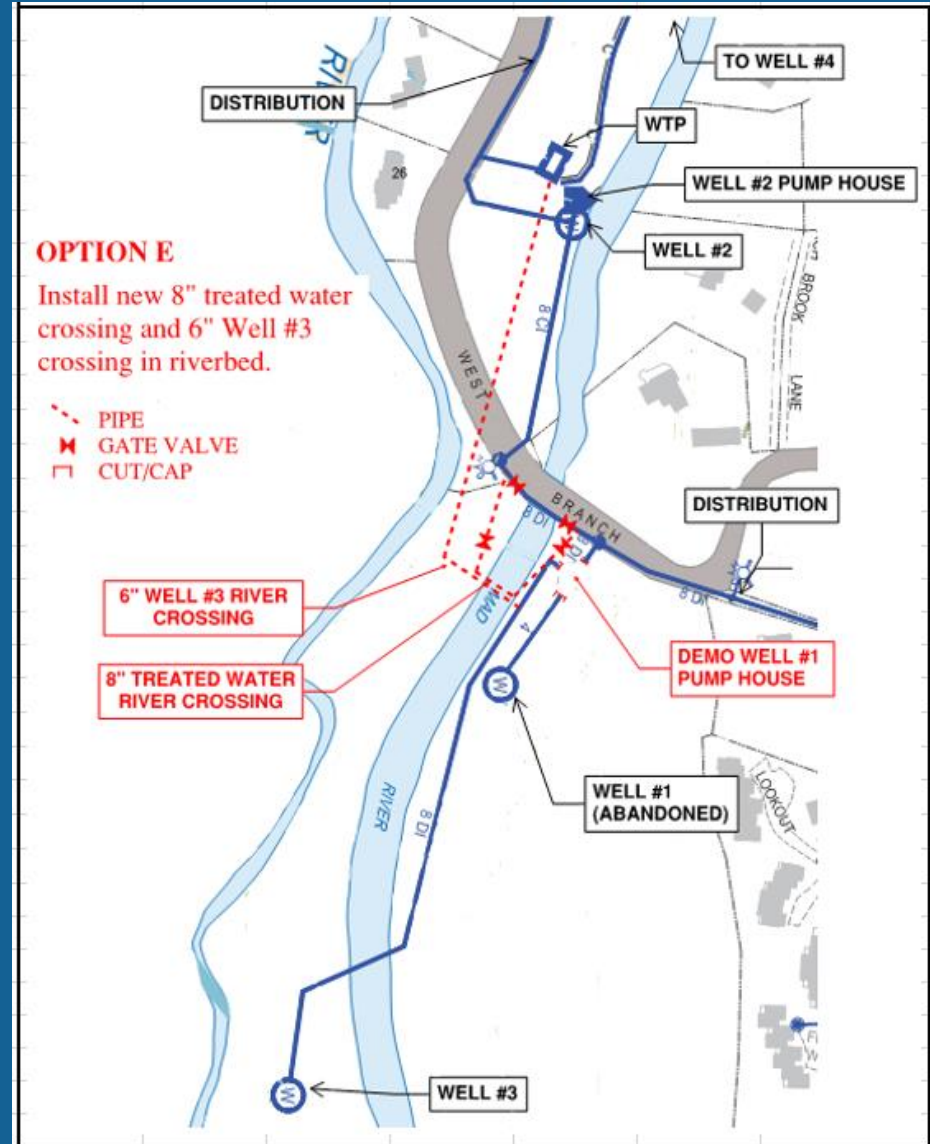
PROJECT GOALS

- Reactivate Well#3
- Redundant main across river
- Meet 4-log virus inactivation
- CT for Well#2
- Well buildings



RECOMMENDED PROJECT

- 8" Treated Water and 6" Raw Water Mains in River Bed
- Significant Increase in Water System Resiliency
- Conveys Well#3 Raw Water to Central Treatment
- Includes Well#2 Raw Water to Central Treatment
- Decommissions Well Bldg #1



OTHER ALTERNATIVES CONSIDERED

a. Well #3 new main along peninsula

b. New 8" Treated Water main on Bridge

d. New 8" Treated Water main in river bed

e. New 6" Well #3 Pipeline crossing on Bridge

g. New main on Bridge with Valves for Reverse Flow

h. Use Existing Well #3 Pipeline and Add Full Treatment at Well #1 Building



CONCEPTUAL PROJECT BUDGET

- Construction: \$715,000
 - Construction Contingency: \$71,000
 - Engineering Design / Permitting / Bidding: \$124,000
 - Engineering Construction Services: \$90,000
 - Total Project: \$1,000,000
- 

PROJECT FUNDING

Why support this project?

- ❑ Well#3 is needed for redundant supply
- ❑ Optimize treatment for all active wells
- ❑ Improved resiliency for treated water delivery
- ❑ Lower operating costs

Article 4 – To see if the town will vote to raise and appropriate the sum of \$1,000,000 (gross budget) for the engineering, permitting and construction of distribution, lines and facilities and for water distribution system improvements from the treatment building to the east side of the Mad River and to authorize the issuance of not more than \$1,000,000 of bonds or notes in accordance with the provisions of the Municipal Finance Act (RSA 33) and to authorize the municipal officials to issue and negotiate such bonds or notes and to determine the rate of interest thereon; The Board of Selectmen recommend approval 3-0. (2/3 ballot vote required).

DISCUSSION

