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Technical Memorandum

To: Mike Branley, Town Administrator

From: Ben Dreyer, P.E., and Seamus Quinn

Date: April 18, 2024

Subject: West Swanzey Water System Evaluation

1.0 Introduction and Purpose

Underwood Engineers, Inc. (UE) is under contract (executed May 31, 2023) to assist the Town with evaluating the existing water system owned and operated by the West Swanzey Water Company (WSWC).

The West Swanzey Water System (PWS 2301020) was established in the late 1960s to supply process water to the Homestead Woolen Mills. The Mill closed in 1985 and the Mill building is now being redeveloped. The Town of Swanzey's population has remained steady over the past two decades but there is an increasing trend of residential and commercial development, especially along the Route 10 corridor in West Swanzey where several new developments have recently connected to the water system. The system currently serves 430 people through 83 service connections all in Swanzey per NHDES OneStop records. As a privately owned water system it is regulated by the New Hampshire Public Utilities Commission (NHPUC).

The goal of this evaluation is to provide recommendations on whether or not the Town should take over the ownership and operation of the system. The purpose of this memo is to summarize the findings and recommendations from our evaluation related to the following information:

- System supply and demands
- Existing system conditions
- Proposed improvements
- Asset management
- User rates
- Funding considerations
- Governance structure

This evaluation is based on information from the following sources (see Attachment A for summary of referenced data, Attachment B for existing conditions work plans, and Attachment C for site visit photos):

- WSWC records
- NHDES OneStop records and sanitary survey letters
- Previous reports by GeoInsight and Miller Engineering and Testing
- Observations from site visit attended by the Town and UE on June 27, 2023

2.0 Water System Supply and Demands

2.1 Water System Supply

The system is supplied by two (2) active wells designated as GPW 1 and GPW 2. The permitted pumping volumes of the wells reported in the Water System Evaluation Letter by Miller Engineering and Testing dated October 14, 2021 (see Attachment A) are shown in Table 1 below:

Table 1: Existing Supply

Well	Reported Permitted Pumping Volume (gpd)
GPW 1	396,000
GPW 2	396,000

The Well GPW 1 and GPW 2 pumps both have a reported capacity of 350 gpm. Therefore, based on available information both well pumps appear to be capable of meeting the permitted pumping volumes of 396,000 gpd. It should be noted that the well pumps are typically operated separately and have a reported capacity of 420 gpm when pumping in tandem.

2.2 Water System Demands

Customer demographics and consumption trends have remained relatively steady for the past 15 to 20 years. In that time, the total number of connections ranged from 73 to 83. Existing system demands estimated based on monthly production records from January 2014 to June 2021 and projected demands are summarized in Table 2 below. Note that the maximum day demands (MDD) and peak demands are based on assumed peaking factors of 2 and 4 respectively and do not include fire flow.

Table 2: Existing and Projected Demands

	Average Day Demand (ADD) (gpd)	Maximum Day Demand (MDD) (gpd)	Peak Demand (gpm)
Existing (2023)	30,000[1]	60,000[1]	83
Projected (2024)	40,800[2]	81,600[2]	113
Future Design (2044+)	80,000[3]	160,000[3]	222

1. Existing demands based on production including lost water per Miller Engineering and Testing.
2. Projected demands incorporate a new connection to the workforce housing development off West Swanzey Road and Perry Lane currently under construction.
3. Future design year estimates incorporate customer demographics and consumption trends.

The projected ADD shown in Table 2 includes a demand of 10,800 gpd for the workforce housing development off West Swanzey Road and Perry Lane currently under construction. This is half of the design flow of 21,600 gpd proposed by the Developer which was assumed to represent the MDD for the development. The development is expected to consist of 84 residential units including mostly 1-bedroom and 2-bedroom apartments per Miller Engineering and Testing.

The future design ADD shown in Table 2 is based on the addition of potential new users. Potential new demands identified in planning level discussions with the Town include:

- 12,000 gpd for the potential connection of 70 to 90 apartment units proposed by Chinburg Properties at the Homestead Woolen Mills based on assumed consumption of 150 gpd per unit. Most of the apartments are expected to be 2-bedroom units.
- 15,000 gpd for a potential connection to View Point Co-Op's existing system based on assumed consumption of 150 gpd per unit.
- Potential connections to existing homes and businesses in the system's existing service area and along a potential new water transmission main for a new water storage tank and to new development sites in West Swanzey Village.

2.3 Comparison of Water System Supply and Demands

Water system demands are compared to existing system supply in Table 3 below:

Table 3: Existing and Projected Demands Compared to Existing Supply

	Existing Average Day	Existing Maximum Day	Future Average Day	Future Maximum Day
System Supply: One Active Well Capacity	396,000 gpd	396,000 gpd	396,000 gpd	396,000 gpd
System Demands	30,000 gpd	60,000 gpd	80,000 gpd	160,000 gpd
Estimated System Supply Surplus	366,000 gpd	336,000 gpd	316,000 gpd	236,000 gpd

The data above indicates that one (1) active well can meet the existing and future design maximum day demands (MDD). This is consistent with the Recommended Standards for Water Works which recommends that the total developed groundwater source capacity equal or exceed the design maximum day demand with the largest producing well or pump out of service (Recommended Standards for Water Works, 2022 Edition, Part 3.2.1 Groundwater Water Quantity). It should be noted that one (1) active well would be expected to meet the existing and future design peak demands of 83 gpm and 222 gpm respectively based on the well pumps each having a reported capacity of 350 gpm.

3.0 Water System Existing Conditions Review

3.1 Water Supply Wells

The system includes three (3) gravel-packed water supply wells, designated as GPW 1, GPW 2, and GPW 3. These wells were constructed in 1967, which pre-dates NHDES's Large Groundwater Withdrawal Permitting Rules that took effect in August 1998.

The system's two (2) active wells, GPW 1 and GPW 2, are located on the same property off West Street (Map 227 Lot 2). Both wells have vertical turbine pumps (25 HP with VFDs) located in separate pump houses which are constructed out of concrete blocks and built into an embankment

(see Attachment B for well pump houses schematic). The pump houses are antiquated and reaching the end of their useful service lives as was observed during the site visit attended by the Town and UE (see Attachment C for site visit photos).

Well GPW 3 is located on a property off California Brook Road (Map 108 Lot 3). It has not provided water to the system in decades due to reported damage to the pump output line and is not currently permitted for use per NHDES OneStop records.

3.2 Water Distribution System

The distribution system includes 83 service connections per NHDES OneStop records and approximately 21 hydrants based on GIS data provided by Northeast GIS. The number of hydrants and valves is limited according to the system operators per 2023 NHDES Sanitary Survey (see Attachment A). System flushing is conducted once a year per system operators. Water loss is approximately 20% based on WSWC's 2022 Water Loss Report. An inventory of the existing water distribution system pipes based on information from the New Hampshire Public Utilities Commission (NHPUC) is provided in Table 4 below:

Table 4: Existing Distribution System Pipes

Material	Diameter (in)	Length (ft)
Asbestos Cement	8	6,864
Ductile Iron	8	1,280
Ductile Iron	6	500
PVC	4	60
Total	**All**	**8,704**

3.3 Water Storage Tank

A 10,000-gallon steel hydropneumatic tank installed in 2004 is the only storage in the system. The purpose of the tank is to maintain system pressures between low and high pressure setpoints of 60 and 80 psi while minimizing the pump cycle time for Wells GPW 1 and GPW 2. Based on these pressure setpoints, the existing system's HGL is estimated to fluctuate between approximately 613 ft and 660 ft (see Attachment B for HGL sketch). The tank is not designed for fire flow capability and the limited available storage capacity may limit the number of new connections that can be added in the future as noted in the 2023 NHDES Sanitary Survey. It was noted during the site visit that the tank appeared to be in serviceable condition (see Attachment C).

3.4 Water Quality

Water quality monitoring records show the system is in compliance with current standards including bacterial standards and action levels for lead and copper per 2023 NHDES Sanitary Survey. Chemical treatment includes soda ash and polyorthophosphate, the latter of which has been used since 2017 to help with corrosion control after previous issues with elevated copper levels noted by the system operators. The only violation related to water quality listed in NHDES OneStop records was for "Optimal Corrosion Control Treatment (OCCT) Installation/ Demonstration" dated July 29, 2018 (return to compliance dated July 2, 2019).

Water quality results obtained by UE from NHDES OneStop are summarized in Table 5 below. The results are from samples collected between September 2022 and October 2023.

Table 5: Finished Water Quality Results

Contaminant/ Parameter	MCL/ SMCL[1]	Finished Water Concentration
Antimony (mg/L)	0.006	ND[2]
Arsenic (mg/L)	0.005	ND
Barium (mg/L)	2	0.0090
Beryllium (mg/L)	0.004	ND
Cadmium (mg/L)	0.005	ND
Chloride (mg/L)	*250*	45
Chromium (mg/L)	0.1	ND
Copper (mg/L)[3]	1.3	0.0055 – 0.52
Fluoride (mg/L)	4	ND
Iron (mg/L)	*0.3*	ND
Lead (mg/L)[3]	0.015	<0.001 – 0.0025
Manganese (mg/L)	*0.05*	0.024
Mercury (mg/L)	0.002	ND
Nickel (mg/L)	0.1	ND
Nitrate (mg/L)	10	1.5
Nitrite (mg/L)	1	ND
PFHxS (ng/L)[4]	18	ND
PFNA (ng/L)[4]	11	ND
PFOS (ng/L)[4]	15	ND
PFOA (ng/L)[4]	12	1.11
pH	*6.5 – 8.5*	7.01
Selenium (mg/L)	0.05	ND
Sodium (mg/L)	100 – *250*	30
Sulfate (mg/L)	*250*	7.9
Thallium (mg/L)	0.002	ND
Zinc (mg/L)	*5*	ND

1. MCLs are in regular text; SMCLs are indicated in italics.
2. "ND" indicates below detection limit.
3. Copper and lead have Action Levels (AL) rather than MCLs.
4. MCLs for individual PFAS listed above were set by the State of New Hampshire in July 2020. The final National Primary Drinking Water Regulation (NPDWR) announced by EPA in April 2024 requires water systems to be in compliance with the following MCLs by 2029:
    a. PFHxS: 10 ng/L
    b. PFNA: 10 ng/L
    c. PFOS: 4 ng/L
    d. PFOA: 4 ng/L

3.5 Summary of Work Needed to Meet Recommended Design Standards

Existing system assets were evaluated in accordance with the Recommended Standards for Water Works (2022 Edition). Items identified as not meeting recommended design standards are listed below:

- Well pump houses are antiquated, reaching the end of useful service, and do not meet modern standards.
    - Combined metering for Wells GPW 1 and GPW 2 should be separated.
    - Chemical feed system does not meet industry standards.
    - No well level monitoring equipment.
    - No automatic transfer switch (ATS) for emergency generator.
    - Well GPW 1 pump house door does not seal weathertight and daylight is visible along the threshold when closed.
    - Well GPW 2 pump house is currently not accessible.
    - Water intrusion appears to be an issue for both pump houses.
- Existing hydropneumatic tank does not provide adequate storage capacity.
- Limited fire flow protection provided based on results of flow testing conducted in 2005.
    - Hydrants at the Swanzey Township Housing apartment complex on Main Street and the California Brook Housing Development failed to meet the minimum ISO functional requirements.
    - A total of four (4) other hydrants tested at the Princeton Square apartment complex (2), Evergreen Knoll Apartments (1), and in a residential neighborhood on West Street (1) do not meet the fire flows of 2,250 to 4,000 gpm needed at those specific locations per ISO. The available fire flows ranged from 250 to 1,100 gpm.
- Limited looping in the water distribution system.
- Limited protections for well sites.
    - WSWC does not own the properties that Wells GPW 1/GPW 2 (Map 227 Lot 2) and GPW 3 (Map 108 Lot 3) are located on. The owner of record for both properties is Homestead Woolen Mills, Inc. which is a separate entity from WSWC but may have the same owner (per the Town).
    - Sanitary protective radii for the well sites have not been established (NHDES requires a 400 ft radius for new wells with permitted production volumes of more than 144,000 gpd).

4.0 Water System Improvements

To assist the Town with planning for potentially taking over the ownership and operation of the system, UE identified work that would be needed for the system to meet recommended design standards and increase capacity for expanded service. Proposed system improvements are presented in phases as summarized below (see Attachment D for proposed conditions work plans). The starting point for the Town taking over the ownership and operation of the system would include purchasing the system (including the two (2) properties the wells are located on) followed by Phase 1 Supply and Storage Improvements. A preliminary cost estimate of $6.4M including $0.6M for the system purchase and $5.8M for Phase 1 Supply and Storage Improvements is used

in this report for planning purposes. Future study is recommended to further evaluate system improvements and establish more precise cost estimates.

Phase 1 – Water Supply and Storage Improvements (Near-Term)

Water Supply Improvements: $2.5M

- Inspect and clean Wells GPW 1 and GPW 2 to verify condition (currently near the end of 50-60 year expected service life)
- Conduct pump tests for updated documentation of safe yields for Wells GPW 1 and GPW 2
- Replace existing pumps for Wells GPW 1 and GPW 2
    - Switching to submersible pumps with pitless adapters avoids the need to construct two (2) new separate pump houses and allows for easier maintenance
- Demolish existing pump houses for Wells GPW 1 and GPW 2
- Construct new combined pump house for Wells GPW 1 and GPW 2 including:
    - Individual flow meters for each well
    - Central chemical feed system including chlorination and corrosion control
    - Well level monitoring
    - Emergency generator with automatic transfer switch (ATS)
    - Variable-frequency drives (VFDs) and pump controls

Water Storage Improvements: $3.3M

- Construct new reservoir tank at high elevation or elevated tank in central location
    - Approximately 300,000 to 400,000 gallon volume
    - Overflow elevation of ±660 ft based on existing system's estimated maximum HGL
    - Gravity storage would provide equalization to better meet peak flows and remove the need to keep the existing hydropneumatic tank in service
- Construct up to 4,000 LF 12" DI water main to connect new tank to existing system
- Demolish existing hydropneumatic tank

Phase 2 – Water Distribution System Expansion (Mid-Term)

- Construct/restore up to 2,000 LF 12" DI water main to connect View Point Co-Op's existing water distribution piping to the West Swanzey Water System

Future Phases – Water Supply and Water Distribution System (Long-Term)

Additional future phases of system improvements could include:

- Replace Wells GPW 1 and GPW 2
    - Plan based on findings of inspections and cleanings included in Phase 1
- Restore Well GPW 3 for additional system redundancy and/or supply if needed
- Distribution system improvements to replace aging and/or undersized pipes to meet fire flow needs
- Distribution system improvements for looping
    - Up to 2,400 LF new water main on Route 10 between Perry Lane and South Winchester Street

- Up to 2,900 LF new water main on Denman Thompson Highway, Holbrook Ave, and Main Street
- Up to 2,400 LF new water main on California Street and California Brook Road

- Distribution system improvements for system expansion to the north
- Distribution system improvements for system expansion to the south
- Distribution system improvements for establishing system interconnects
  - North Swanzey Water Precinct
  - City of Keene Water System (Main Pressure Zone HGL 693 ft)

5.0 Water System Asset Management

5.1 Purpose and Goals

Asset Management (AM) can be used as a means of supporting the long-term sustainability of a water system. The primary goal of an Asset Management Program (AMP) is to maintain a desired level of service at a minimal life cycle cost.

A preliminary AMP was developed for the West Swanzey Water System as part of this evaluation to create an inventory of the basic system components and assess remaining useful life and needed improvements.

5.2 Asset Inventory and Assessment

WSWC currently maintains the West Swanzey Water System including the assets listed below:

- Wells and Pump Houses
  - Well GPW 1
  - Well GPW 1 Pump
  - Well GPW 1 Pump House
  - Well GPW 2
  - Well GPW 2 Pump
  - Well GPW 2 Pump House
  - Well GPW 3
  - Well GPW 3 Pump
- Hydropneumatic Storage Tank (10,000-gallon capacity)
- Distribution
  - AC Pipe (6,864 LF)
  - DI/PVC Pipe (1,840 LF)
  - Meters

Asset inventory spreadsheets including all the assets listed above were developed (see Attachment E). The condition and criticality of each asset was assessed, and the respective replacement costs were estimated in 2023 dollars based on the costs of other recent construction projects of similar scope and scale. Critical assets identified for near-term replacement (to be replaced in the next 1 to 5 years) as part of the proposed Phase 1 Supply and Storage Improvements are listed in Table 6 below:

Table 6: Near-Term Critical Asset Replacement included in Phase 1 Improvements

Asset	Recommended Work included in Phase 1 Improvements
Well GPW 1 Pump	Replace existing vertical turbine pump with new submersible pump with pitless adapter
Well GPW 1 Pump House	Replace existing pump house with new combined pump house for Wells GPW 1 and GPW 2
Well GPW 2 Pump	Replace existing vertical turbine pump with new submersible pump with pitless adapter
Well GPW 2 Pump House	Replace existing pump house with new combined pump house for Wells GPW 1 and GPW 2
Hydropneumatic Tank	Replace existing hydropneumatic tank with new reservoir tank at high elevation or elevated tank in central location

Other assets identified for replacement as part of future phases of system improvements are listed in Table 7 below:

Table 7: Long-Term and Non-Critical Asset Replacement

Asset	Work for Future Phases of Improvements	Estimated Cost in 2023 Dollars
Well GPW 1	Plan for replacement based on findings of inspection and cleaning included in Phase 1	$600,000
Well GPW 2	Plan for replacement based on findings of inspection and cleaning included in Phase 1	$600,000
Well GPW 3	Replace well for providing additional system redundancy and/or supply if needed	$600,000
Well GPW 3 Pump	Replace well pump for providing additional system redundancy and/or supply if needed	$30,000
AC Pipe	Replace pipe starting in 2050 based on assumed installation circa 1967 (cost includes replacing 1% of existing pipe per year)	$20,000 per year
DI/PVC Pipe	Replace pipe starting in 2100 based on assumed installation circa 2000 (cost includes replacing 1% of existing pipe per year)	$5,000 per year
Meters	Replace all meters starting in 2024 (cost includes replacing 5 meters per year)	$2,500 per year

The estimated costs for the replacement of existing pipe and meters listed in Table 7 above for the purposes of asset management are based on the replacement of a set quantity of assets per year. However, the actual construction work needed to replace these assets should be completed on a larger scale to make the work more cost-effective. For example, it would be more cost-effective to replace 1,000 LF of existing AC pipe every 15 years instead of replacing 70 LF every year.

6.0 Water User Rates

6.1 Financials

Financial data compiled from WSWC's balance sheets for calendar years 2020 to 2022 is shown in Table 8 below:

Table 8: Financial Data for Calendars Years 2020 to 2022

	2020	2021	2022
Total Assets	$315,545	$291,721	$255,828
Total Liabilities and Equity	$315,545	$291,721	$255,828
Total Income	$110,156	$99,932	$96,865
Total Expenses	$104,646	$87,587	$88,604
Net Income	$5,510	$12,345	$8,261

The data above indicates that WSWC currently operates near break-even with limited annual net income. In addition, WSWC currently has limited capital reserves and no System Development Charge (SDC) for new connections. WSWC's 2022 Balance Sheet shows that the company has multiple outstanding debts from loans that were previously used to fund system operations and upgrades.

6.2 Current Rates

WSWC's current rates include a general consumption charge of $0.895/100 gallons and the following quarterly service charges per the current rate schedule in effect since January 2018:

Table 9: Quarterly Water Service Charges

Meter Size	Quantity	General Service Charge	Fire Protection Charge
5/8"	66	$24.61	NA
3/4"	-	$27.07	NA
1"	12	$34.45	$38.82
1 1/2"	-	$44.30	NA
2"	5	$71.37	$77.66
3"	-	$270.71	NA
4"	-	$344.54	$232.95
6"	-	$516.81	$465.89
8"	-	$713.69	$776.49

6.3 Preliminary Rate Evaluation

A simplified preliminary rate model was developed to help evaluate the feasibility of proposed system improvements which would be primarily funded by user rates (see Attachment F).

The following assumptions were incorporated into the preliminary rate model:

- Water consumption is 150 gpd (4,500 gal/month) per equivalent dwelling unit (EDU) based on data for existing system users
- Non-revenue water is 20% based on WSWC's 2022 Water Loss Report
- Existing average day demand (ADD) is 30,000 gpd
- Fire revenues and operating expenses match the financial data from WSWC's balance sheets for calendar years 2020 to 2022
- At least 20% of all capital costs for proposed improvements would be covered by grants, loan principal forgiveness, and/or general funding from the Town
- Up to 80% of all capital costs for proposed improvements would be covered by a low-interest loan from a funding agency (interest rate of 3.125% based on current USDA intermediate rate)
- Annual capital reserve contribution based on asset value over expected service life
- Annual net income of at least $10,000 to cover the cost of minor repairs and other unforeseen expenses

The current average WSWC user bill was estimated to be $582 per year based on data from the NH Water and Wastewater Rates Dashboard and assumed average usage of 4,500 gal/month. This is close to the estimated statewide average user rate of $550 per year based on data from the NH Water and Wastewater Rates Dashboard and assumed average usage of 4,500 gal/month.

Multiple scenarios were created in the preliminary rate model to evaluate options for funding the purchase of the system and Phase 1 Supply and Storage Improvements. Estimated user rate impacts based on these scenarios are shown in Table 10 below:

Table 10: Rate Impacts of Near-Term Improvements with Varying Assumed Funding Levels

Funding Levels	20%	30%	40%
Capital Cost	$6.40M	$6.40M	$6.40M
Loan Principal	$5.12M	$4.48M	$3.84M
Rate Impact	336%	309%	283%

Rate impacts are expressed as a percent of the current average bill for WSWC users. The results above show that the estimated rate impact for funding the purchase of the system and Phase 1 Supply and Storage Improvements would be expected to be 336% in a scenario where 20% of the capital cost is covered by grants, loan principal forgiveness, and/or general Town funds. This estimated rate impact of 336% would correspond to an average user bill of $582 per year increasing to $1,956 per year. However, the rate impact would decrease as funding participation increases. The results in Table 10 above show that increasing funding levels from 20% to 30% would decrease the estimated rate impact to 309%. Furthermore, increasing funding levels to 40% would

decrease the estimated rate impact to 283%. It should be noted that rate impacts would also decrease as new users are added to the system. See Section 7.0 Funding for additional discussion on funding strategies that could help minimize rate impacts.

6.4 Business Plan

The criteria for setting the system's user rates to achieve financial sustainability should include the following considerations:

- Capital cost of system purchase with near-term improvements and expected funding participation.
- Number of expected user connections.
- Capital reserve contributions to fund the long-term replacement of existing system assets that will not be replaced as part of near-term improvements.
- Annual net income to cover the cost of minor repairs and other unforeseen expenses.
- Staffing needs:
    - NHDES requires that all public water systems (PWSs) designate a New Hampshire-certified water system operator to be responsible for the oversight of system operations and maintenance. The required levels of operator certifications are based on treatment complexity for water treatment facility operators and based on population served for water distribution system operators.
    - Office staff will be needed to handle the responsibilities of administration, billing, accounts payable, accounts receivable, etc.

A System Development Charge (SDC) should also be established as an equity buy-in to the system for new users. A preliminary SDC calculated based on the net value and daily capacity of the existing system is shown in Table 11 below (see Attachment G):

Table 11: System Development Charge Calculation

Total Net System Value per WSWC Balance Sheets	$255,828
System Capacity (ADD accounting for non-revenue water)	24,000 gpd
Existing Assets per Gallon Capacity	$10.66/gpd
Equivalent Dwelling Unit (EDU) Consumption	150 gpd
Existing Assets per EDU	$1,599/EDU

The calculated preliminary SDC for the existing system is $1,599 per EDU. Note that the SDC will change as the system's "Total Net System Value" changes due to the addition of improvements and the gradual depreciation of assets.

7.0 Funding

7.1 Summary of Potential Funding Sources

Potential funding sources identified in planning level discussions with the Town and NHDES include the following:

- USDA Water and Waste Disposal Loan and Grant Program
- NBRC Catalyst Program
- NHDES Drinking Water State Revolving Fund (DWSRF)
- NHDES Drinking Water and Groundwater Trust Fund (DWGTF)
- Establish a Tax Increment Financing (TIF) District
- Incorporate funding participation from potential developers
- General Town funds (required as match funding for grants; additional funds could be used on percent basis for providing fire protection and related economic benefits to taxpayers)

7.2 Loan and Grant Programs

Additional information regarding the specific loan and grant programs offered by the above-mentioned agencies is summarized below. Note that this information is based on a preliminary evaluation and additional funding opportunities not identified in this evaluation may be available.

USDA Water and Waste Disposal Loan and Grant Program

- Water and Waste Disposal Loan and Grant Program offers long-term, low-interest loans
    - Up to 40-year payback period
    - Current interest rates for 1st quarter FY 2024, effective October 1, 2023:
        - Poverty: 2.375%
        - Intermediate: 3.125%
        - Market: 3.875%
- A grant may be combined with a loan to limit increases in user costs if funding is available
- Funding may be used to finance the acquisition, construction, or improvement of drinking water sourcing, treatment, storage, and distribution
- West Swanzey CDP is eligible for funding including up to 75% Water and Environmental Program Grants based on the most recent loan and grant eligibility information published on USDA's website (dated 2020)
- Scoring includes points for potential to benefit job growth and the local economy

NBRC Catalyst Program

- Catalyst Program offers grants of up to $1,000,000 for funding infrastructure projects
- Eligible projects include those related to "core infrastructure" such as water infrastructure
- Town of Swanzey is eligible for NBRC funding with a 20% match commitment due to Cheshire County being classified as "an area of distress" based on information published on the New Hampshire Department of Business and Economic Affairs' website
- Scoring includes points for potential to benefit job growth and the local economy

NHDES Drinking Water State Revolving Fund Loans (DWSRF)

- Drinking Water State Revolving Fund offers low-interest loans to public water systems to fund drinking water infrastructure
    - Below-market interest rates with no closing costs
    - Interest during construction is 1% until project completion
    - Principal forgiveness may be offered based on financial need and available funds
- DWSRF primarily funds projects that make improvements to address system deficiencies including:
    - Replacement of aging water pipes and meters
    - Installation of new wells
    - Pump house and treatment system upgrades
    - Construction of storage tanks
    - Interconnections

NHDES Drinking Water and Groundwater Trust Fund (DWGTF)

- Annual Drinking Water Construction Project Assistance Program offers loans and grants for infrastructure improvements to public drinking water systems
- Drinking Water and Groundwater Advisory Commission determines annual funding allocations each spring
- Scoring includes points for potential to benefit job growth and the local economy
- Funding is typically provided as a "last call" and may be limited to the remaining amount needed for the project to move forward
- Demonstrating a request for funding and eligibility (i.e. pre-application) to NHDES DWSRF and the other programs will strengthen application to DWGTF (even if below funding threshold)
- A contribution from a developer as a potential match to the DWGTF request would strengthen the application

7.3 Recommended Actions for Pursuing Funding

USDA and NBRC should be pursued as the primary funding sources while funding from NHDES DWSRF and DWGTF should also be pursued as needed. NHDES noted in planning level discussions that the Town should apply for funding from DWSRF to be used for water supply improvements (but not as much for water storage improvements). This will also help with applying to DWGTF by showing that the other available funding sources have been pursued.

Short-term and long-term strategic planning could include further evaluation of potential sources of additional funding listed below. Note that these sources may or may not materialize in time for funding the near-term system purchase and improvements.

- Incorporate developer funding participation. The Town could pursue funding participation from Chinburg Properties who have proposed to redevelop the Homestead Woolen Mills into residential apartments as well as other parties interested in redeveloping the property on Route 10 where Nick's Restaurant was previously located (Map 108 Lot 20).
- Establish a Tax Increment Financing (TIF) District. This would make it possible for the Town to generate additional funding for water system improvements by borrowing against expected future increases in property-tax revenues. The intent would be for the improvements to enhance the value of existing properties and encourage new development in the District. Proceeds from the TIF could then be used to repay the upfront capital cost of the improvements.

8.0 Governance Structure

8.1 Governance Structure Alternatives

Alternatives for the governance structure of the West Swanzey Water System identified in planning level discussions with the Town and NHDES are summarized in this section. It should be noted that certain improvements will be needed in the near future regardless of system ownership and governance structure. The following governance structures are considered:

A. Town Water Department
   - Town purchases the system to establish Water Department as an enterprise fund
   - Water Department could be combined with Town DPW
   - All customer interactions are through the Town
   - Operators are Town employees (and/or outside contactors)
   - Future improvements could be eligible for funding from USDA, NBRC, and NHDES

B. Municipal Precinct or Village District
   - System users vote to establish a Water Precinct or Village District (only the users can take action; not a decision that the Town can make)
   - Precinct purchases the system
   - Precinct functions as a limited purpose governmental unit managed by a board of elected commissioners
   - Operators are Precinct employees (and/or outside contractors)
   - Property tax surcharges offer an additional source of revenue
   - Future improvements could be eligible for funding from USDA, NBRC, and NHDES

C. Private
   - WSWC retains ownership of the system or sells it to another private party
   - Managed by private owners
   - Regulated by NHPUC
   - Operators are private employees (and/or outside contractors)
   - Future improvements could be eligible for limited funding from NHDES

8.2 Preferred Governance Structure

The governance structure alternatives listed above were reviewed with the Town and NHDES at a work session on February 14, 2024. Based on input from the Town and NHDES, the preferred governance structure would be a Town Water Department if the Town does decide to take over the ownership and operation of the system. The preferred structure for the Town Water Department would be as follows:

- Town purchases the system to establish a Water Department as an enterprise fund
- Water Department would be combined with Town DPW
- All customer interactions are through the Town
- Staff are Town employees or outside contractors (such as WSO Plus, Inc. out of Henniker, NH who handle staffing for the Town's wastewater operations)
    - 2-3 full-time staff members are expected for water operations
    - At least one (1) staff member would be required to be a certified water works operator based on NHDES rules and regulations
        - Town employees could transition to working in the Water Department under outside licensed contractors prior to getting their own licenses
- Billing through Town Tax Collector
    - Town owning and operating the water system would simplify billing for sewer service since it would be based on metered water usage instead of the current practice of estimating based on occupancy
- Future system improvements could be eligible for funding from USDA, NBRC, and NHDES

9.0 Conclusions

The findings from our evaluation are summarized below:

- West Swanzey Water System's existing groundwater supply and water quality appear to be adequate for current and design demands based on available data.
- Existing wells and pump houses do not meet recommended design standards and are near the end of their expected service lives.
- Existing hydropneumatic tank is at capacity which may limit the number of connections that can be added in the near future.
- System improvements designed in accordance with recommended design standards will be needed to provide adequate service to users in the near future regardless of system ownership and governance structure. In any case, a critical asset failure would impact the system users and public health and safety.
- Ownership of the properties that the wells are located on would make it easier to implement groundwater protection measures including establishing sanitary protective radii based on NHDES regulations.
- It is anticipated that the purchase of the system and proposed near-term improvements would be primarily funded by user rates.
- Funding participation from multiple sources including grants will be an important factor in limiting impacts to user rates.

- The Town may be best positioned to control the ownership and operation of the system compared to WSWC or another private party based on the availability of resources and funding opportunities.
- If the Town does decide to take over the ownership and operation of the system, the preferred governance structure would be a Water Department managed by the Town DPW.

10.0 Recommendations

10.1 Recommendations for Near-Term Planning (1 to 5 years)

- The Town should pursue taking over the ownership and operation of the West Swanzey Water System. The purchase of the system (including the two (2) properties the wells are located on) followed by Phase 1 Supply and Storage Improvements should be the starting point for establishing a turnkey system. The total estimated capital cost is $6.40M. A cost range of $6.00M to $7.40M should be considered for planning purposes.
- The Town should pursue loans and grants from the following funding sources to limit impacts to user rates:
    - USDA and NBRC for funding the purchase of the system and Phase 1 Supply and Storage Improvements.
    - NHDES DWSRF and DWGTF as additional sources of funding.
- The Town should pursue funding participation from developers which could be used to match funding from other sources including NHDES DWGTF.
- The Town should establish a Town Water Department as the system's governance structure.
- Additional study is recommended to further evaluate system improvements including:
    - Select a site for the proposed water storage tank and size it based on system storage needs.
    - Size the proposed pumps for Wells GPW 1 and GPW 2 based on system demands.
    - Review and update the planning costs for the system improvements through the end of construction.
- Ongoing water quality sampling should be conducted periodically. Sampling should include testing for PFAS.

10.2 Recommendations for Mid-Term and Long-Term Planning (5+ years)

- A System Development Charge (SDC) should be established as an equity buy-in to the system for new users.
- Additional future system improvements should be prioritized based on asset management considerations. These improvements could include:
    - Construct new water mains to improve looping in the distribution system.
    - Replace existing meters starting after system purchase.
    - Replace existing wells based on condition and system supply needs.
    - Replace existing AC pipe starting in 2050.
    - Replace existing DI and PVC pipe starting in 2100.
- Capital reserves should be developed to fund additional future system improvements.

An updated project schedule for near-term planning is provided below (historical dates are listed in gray scale for context):

Task Description	Target Date
Funding/Contract Approval	May 2023
Site Visit	June 27, 2023
Kickoff Meeting	July 6, 2023
Data Collection and Review	Summer 2023
Progress Status Meeting	August 31, 2023
Preliminary Rate Study	September 2023
Preliminary Asset Management	October 2023
DRAFT Study and Evaluation	December 2023
Work Session with Town and NHDES	February 2, 2024
Public Information Meeting	February 14, 2024
Funding Applications	Spring 2024 – Spring 2025
DWSRF: pre-application deadline	May 31, 2024
NBRC: pre-application deadline *(fall funding round)*	September 6, 2024
NBRC: final application deadline *(fall funding round)*	Oct/Nov 2024
USDA: final application deadline *(state pool)*	December 2024
DWSRF: final application deadline	May 1, 2025
DWGTF: submit final application *(rolling deadline)*	Spring 2025
Town Meeting	March 2025
System Purchase and Governance Structuring	Spring – Fall 2025
Design of Proposed Improvements	2025 – 2026
Construction of Proposed Improvements	2027 – 2028

Summary of Attachments

A. Summary of Referenced Data
   - Summary of Referenced Data Document
   - Water System Evaluation Letter by Miller Engineering and Testing
   - NHDES Sanitary Survey Letter

B. Existing Conditions Work Plans
   - Existing Water System
   - Hydraulic Grade Line Sketch
   - Pump House Schematic

C. Site Visit Photos

D. Proposed Conditions Work Plans
   - Proposed Improvements Work Plan
   - Future Build Out Work Plan

E. Preliminary Asset Management Summary Worksheets

F. Preliminary Rate Evaluation Summary Worksheets

G. Preliminary System Development Charge Summary Worksheet

ATTACHMENT A

Summary of Referenced Data

West Swanzey Water System Evaluation
Swanzey, New Hampshire

Summary of Referenced Data

Underwood Engineers' preliminary review of existing conditions information for the West Swanzey Water System has been based on the following data (provided by reference except as noted):

1. Annual Reports of West Swanzey Water Company by State of New Hampshire Public Utilities Commission dated December 2018 to December 2022

2. Compiled Billing Data for West Swanzey Water System dated January 2018 to April 2023

3. Engineering Report on Fire Flow Capability by GeoInsight dated July 2017

4. Keene Water Supply Master Plan and Well Facilities Evaluation by Emery & Garrett and Underwood Engineers dated March 2023

5. Laboratory Reports for Chemical Monitoring of the West Swanzey Water System by Eastern Analytical for Q4 2021 and Q4 2022

6. NHDES Onestop documents including Public Drinking Water System Report, Registered Water User Report, and Water Treatment System Wastewater Project Report

7. Preliminary Engineering Report for Route 10 Mini Mart by GeoInsight dated March 2016

8. Public Protection Classification (PPC) Letters based on evaluations of the West Swanzey Water System's fire suppression delivery system by ISO dated September 2021 and September 2014

9. Sanitary Survey Letters for West Swanzey Water System by NHDES dated March 2024, August 2020, and June 2017 **- Letter Dated March 2024 Attached**

10. Source Water Protection Plan for Swanzey, New Hampshire by Granite State Water Association dated March 2017

11. Swanzey Water Committee Report to the Board of Selectmen dated December 2014

12. Water System Evaluation Letter draft for West Swanzey Water System by Miller Engineering & Testing dated October 2021 **- Attached**

13. West Swanzey Water Company Balance Sheets dated December 2018 to December 2022

14. West Swanzey Water Company Rate Schedules dated March 2018

15. West Swanzey Water Company Map by Granite State Rural Water Association dated August 2018

MILLER ENGINEERING & TESTING INC.

GEOTECHNICAL / SOIL BORINGS / ENVIRONMENTAL / SOILS / CONCRETE / MASONRY / STEEL / ROOFING / ASPHALT INSPECTION

Mail all correspondence to: 100 SHEFFIELD ROAD · P.O. BOX 4776 · MANCHESTER, NH 03108-4776 · TELEPHONE (603) 668-6016

Via email to: sbrown3302@gmail.com; jack@avanrudevelopment.com; mark@eehoughton.com

~~September~~ October 14~~28~~, 2021

Ms. Sarah Brown, President
WEST SWANZEY WATER COMPANY
P.O. Box 10
West Swanzey, NH 03469

RE: Water System Evaluation
West Swanzey Water Company
Swanzey, New Hampshire Project 21.135.NH

Dear Ms. Brown:

Pursuant to Avanru's request, Miller Engineering & Testing, Inc. is pleased to provide this proposal for services whereby we will evaluate whether the West Swanzey Water Company can adequately supply drinking water to Avanru Development's proposed residential development at 765 West Swanzey Road in Swanzey, New Hampshire. This evaluation was completed in general accordance with our proposal dated July 15, 2021 (Ref. File 232-21 Rev. I). This letter is a report of our findings. Our scope-of-work consisted of:

- Reviewing readily available on-line documents from New Hampshire Department of Environmental Services and New Hampshire Public Utilities Commission.
- Reviewing documents from the system owner (Ms. Sarah Brown) and certified system operator (Mr. Mark Houghton of E.E. Houghton Company, Inc. of Walpole, New Hampshire).
- Visual observations of the pumphouses and operating components.
- Assessing the current system operating parameters.
- Evaluating the system's new operating parameters with the anticipated water demands from Avanru's proposed residential development.

Existing Water System

West Swanzey Water Company was established during the late 1960s to supply industrial water supply to the former Homestead Woolen Mills in West Swanzey. Over the next two decades, a number of residential and commercial developments along the distribution lines were connected to the system, and the water demand from the mills declined and the mills eventually closed, leaving the system as supplier to a network of residential, commercial, and institutional customers.

Wellfield Review

We met with Mr. Houghton to review relevant documents and to view West Swanzey Water Company's wellfield on 21 September 2021. We visually observed the wellfield, the pumphouses and wellheads, and the system valving, piping, treatment, and controls in the two pumphouses.

Regulatory Aspects

West Swanzey Water Company is regulated by a number of New Hampshire agencies and regulatory programs:

- In 1986, the water company registered with the New Hampshire Department of Environmental Services public water supply program and began operating as a community water system with Public Water Supply Identification No. 2302010.
- In 2004, West Swanzey Water began reporting monthly production in compliance with the New Hampshire Department of Environmental Services water user registration program (under DES Water User Registrant Number 20785).
- As an investor-owned and operated water utility corporation, West Swanzey Water is also regulated by the New Hampshire Public Utilities Commission, and submits annual reports of operations and the financial aspects of the system.

Service Population

Review of publicly available records indicates that West Swanzey Water provides potable water to 83 service connections. DES has estimated the service population to be 203 persons based on a standard of 2.5 persons per service connection. The number of persons served and service connections has remained relatively steady for the past 15 to 20 years, ranging between 183 and 203 persons through 73 to 83 service connections. The distribution of customers as reported in 2020 was:

Residential	76
Commercial	3
Industrial	1
Municipal	3
Total	83

System Components

West Swanzey Water Company provides potable water to its customers by pumping groundwater from two production wells into a pressurized storage tank. Upon demand from customers, water under pressure flows from the tank into the distribution network and out to the service connections.

Water Sources

West Swanzey Water has three gravel-packed production wells, designated as sources GPW 1, GPW 2, and GPW 3, that are the sources of their potable water. All three wells were constructed in 1967. One well (GPW-3) was constructed at a location off California Brook Road in Swanzey; this well was damaged during use and has not provided water to the system in decades. The operating parameters of each GPW 1 and GPW 2 are:

Parameter	GPW 1	GPW 2
Well Diameter (in.)	12	12
Well Depth (ft)	77	76
Pump Type	Vertical turbine	Vertical turbine
Pump Power (hp)	25	25
Pump Capacity (gpm)	350	350
Pump Capacity (gpd)	432,000	432,000
Permitted Pumping Volume (gpd)	396,000	396,000

The wellfield that contains GPW 1 and GPW 2 is situated west of Perry Lane was constructed in October 1967 and placed in service later that year or early in 1968. The two production wells are approximately 50 feet apart within the wellfield. Both production wells draw their water from the stratified sand and gravel aquifer that underlies the western part of Swanzey within the Ashuelot River valley. Both wells were furnished with vertical turbine pumps. The pump for GPW 1 was completely rebuilt during 2004. We were not able to review records of the status of the pump for GPW 2.

Each well has a permitted production volume of 396,000 gallons per day. The wells are rarely operated together, but they reportedly have a capacity of 420 gpm (or, 604,800 gpd) when pumping in tandem.

Pumphouses

The two production wells are housed inside individual pump houses. Both pumphouses are built into the side of a low hill. The pump house for GPW 1 contains the wellhead and pump motor, piping and valves, electrical switching gear, the pump controls for both wells, and the hydropneumatic storage tank. This pumphouse also contains the piping and valves for conveying water from the two wells into the tank, as well as the water treatment system. The pump house for GPW 2 contains only the wellhead with pump motor, piping and valves, and electrical switching gear.

Storage Tank

The hydropneumatic tank is a steel tank of 10,000-gallons capacity installed in 2004 during a system upgrade. The tank is buried within the low hill between the two pumphouses, with only the face of the tank visible inside the GPW 1 pumphouse. On demand, GPW 1 and GPW 2 pump water into the tank.

The tank delivers water to the distribution network within a predetermined range of pressures so as to minimize the operating time of the two well pumps. The high- and low-pressure set points are currently set at 60 and 80 pounds per square inch (psi). The overall system typically runs at system pressures between 68 and 88 psi.

Each of the production wells has been fitted with a variable frequency drive that controls the well pump and makes for a smoother and more timely filling of the tank upon demand, better matching the water production with the water need.

Distribution Network

Information from the New Hampshire Public Utilities Commission indicates that the West Swanzey Water distribution system consists of 8,704 linear feet of pipe, consisting of:

Pipe Type	Diameter (in.)	Length (feet)
Ductile iron	6”	500
Ductile iron	8”	1,280
PVC	4”	60
Transite (asbestos-cement)	8”	6,864
	Total	8,704

The main transmission line from the wellfield to the distribution network is situated below West Street. This main runs below West Swanzey Road (NH Route 10), and has a connection to the main below Perry

Lane. Avanru would tie in to West Swanzey Water's main below Perry Lane, which runs along the northerly side of the Avanru property.

Water Flows and Demands

Records of monthly water production from the West Swanzey wellfield have been reported to NHDES since late 2004. These records indicate that monthly production rates have varied widely, from approximately 571,000 gallons per month (May 2014) to 4,138,000 gallons per month in June 2013. Production during calendar year 2013 was anomalously high, with a maximum monthly production of up to 4,138,000 gallons during June 2013.

Production began to be more consistent and at more typical rates beginning in January 2014, and this trend has held fairly steady through June 2021 (without the wide swings in production reported during 2013). Between the years 2014 and 2021, the maximum annual production was the 12,972,000 gallons withdrawn in 2019. During the period from January 2014 through June 2021, the average monthly production has ranged between approximately 571,000 gallons in May 2014 to 1,417,000 gallons in June 2014. Since January 2014, monthly production has averaged approximately 900,000 gallons per month (30,000 gallons per day).

We used the monthly production records between years January 2014 and June 2021 to estimate the following system water demands and design flows (the calculations, definitions, and regulatory citations are included in Attachment A):

Permitted Production Volume	396,000 gpd (each well)
Maximum Annual Production	12,972,000 gallons (2019)
Average Day Demand	29,641 gallons
Average Day Demand (rounded)	30,000 gpd
Maximum Monthly Production	1,417,000 gallons (June 2014)
Maximum Day Demand	47,233 gallons
Peaking Factor	2.0
Design Flow	60,000 gpd
Peak Flow	240,000 gpd
10% Design Flow	6,000 gallons

The current demands on the West Swanzey Water sources are as follows:

Average Daily Demand is	30,000 gpd, or	8%	of well capacity.
Design Flow is	60,000 gpd, or	15%	of well capacity.
Peak Flow is	240,000 gpd, or	61%	of well capacity.

The hydropneumatic storage tank has a capacity of 10,000 gallons. Design of small public water supply systems in New Hampshire requires that hydropneumatic storage tanks have at least 10 percent of the system's design flow. For West Swanzey Water, the tank's capacity of 10,000 gallons does conform to the requirement for the current level of service (without Avanru's water demands).

Proposed Residential Development

Avanru Development Group, Ltd. is proposing to construct and operate a workforce housing development off West Swanzey Road and Perry Lane in Swanzey, New Hampshire. The residential development would consist of two separate 3-story apartment buildings with ancillary facilities (access driveways, parking lots, stormwater management facilities, and landscaped areas).

Each of the residential buildings would have a footprint of approximately 15,000 square feet (45,000 gross square footage each). The design water demand will be based on the numbers of bathrooms per residential unit. We understand that at total buildout the development would have 84 residential units with the following distribution of bedrooms and bathrooms:

Bedrooms per Unit	Bathrooms per Unit	Number of Units	Total Number of Bedrooms
1	1	36	36
2	2	36	72
3	2	12	36
		Total Number of Bedrooms	144

We understand that water for fire suppression will be provided by other sources, and our evaluation will address only the anticipated potable water needs of the proposed development.

In accordance with New Hampshire Code of Administrative Rules Env-Dw 405.10 (Table 405-1), the anticipated design flow for residential apartments is 150 gallons per day per bedroom. Using this required flow, the design water demand for potable water for the Avanru development is 21,600 gallons per day (gpd), which would equate to 15 gallons per minute (gpm) at a constant pumping rate.

Water Demands with Avanru

West Swanzey Water must be able to deliver 21,600 gallons of water per day to satisfy the design demands of the Avanru development. With the additional 21,600 gpd demand, West Swanzey Water's demand factors will be:

Permitted Production Volume	396,000 gpd
Average Day Demand	51,600 gallons
Peaking Factor	2.0
Design Flow	103,200 gpd
Peak Flow	206,400 gpd
10% Design Flow	10,320 gallons

With the addition of Avanru's proposed water demand of 21,600 gpd, the new water demands will be:

New Average Day Demand is	13% of well capacity
New Design Flow is	26% of well capacity
New Peak Flow is	52% of well capacity

Note that we have been advised by Mr. Franks that his West Swanzey development will be constructed with a significant number of water-conservation features within each unit, as has reportedly been typical for Avanru's other recent residential developments. Measures to conserve water will further reduce Avanru's water demand (and the resulting load on West Swanzey Water's system), making the development's actual water consumption even less than those used in our analysis.

Findings

Based on our evaluation, it is our opinion that West Swanzey Water should be able to produce Avanru's design water demand of 21,600 gpd with no diminution to the rest of the system's water users.

However, under the new operating scenario, storage in the hydropneumatic tank will not strictly conform to the current regulatory design standards with the additional expected design water demand from Avanru: NHDES's "10% rule", Env-Dw 405.18 (d) mandates that hydropneumatic tank capacity must be at least 10% of the design flow (or, 10,320 gallons of storage capacity are needed versus the 10,000 gallons of storage that are available, an overage of about 3%). Based on our evaluation, it is also our opinion that there is enough conservatism in the DES design demand factor of 150 gpd/bedroom, in the peaking factor of 2.0 used in the analysis, and in our analysis itself, that the calculated 3% overage in the hydropneumatic tank is not a significant obstacle to approving Avanru's proposed development and its likely water demands.

Miller Engineering & Testing, Inc. is pleased to be of service to West Swanzey Water Company. Please contact me at kmilender@millerengandtesting.com or (603) 668-6016 if you have questions regarding this report or if we can provide additional information.

Very truly yours,
MILLER ENGINEERING & TESTING, INC.

DRAFT FOR CLIENT REVIEW AND COMMENT

Kenneth W. Milender, P.G., P.E.
Senior Environmental Engineer

cc. (via email) J. Franks (Avanru Development)
M. Houghton (E.E. Houghton)

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

March 29, 2024

SARAH BROWN
WEST SWANZEY WATER CO
2 S WINCHESTER STREET
WEST SWANZEY NH 03469

Subject: PWS West Swanzey: West Swanzey Water Company (2301020)
Sanitary Survey 2023

Dear Ms. Brown:

On September 27, 2023, the New Hampshire Department of Environmental Services, Drinking Water and Groundwater Bureau (NHDES) performed a sanitary survey on the public water system under your control in West Swanzey. The purpose of the survey was to review the capacity of the water system's source, treatment, distribution, and management to continually produce safe drinking water. Pursuant to 40CFR142.16(o)(2)(i), the NHDES is required by the U.S. Environmental Protection Agency to review regulated public water systems (PWS) once every three years. I would like to thank Chief Operator, Mark Houghton, for his assistance in conducting the survey.

SUMMARY

Water quality monitoring records show that the system is complies with current standards including compliance with bacterial standards, and action levels for lead and copper. The current operators continue to provide a high level of service to the customers. We commend them for this effort. This sanitary survey did not identify any significant deficiencies.

We note that all the recommendations made in the last sanitary survey have been implemented including installation of VFD motor drives, installing a SCADA monitoring system, and electronic map and inventory and commend the management for supporting these improvements. As a small water system, it is challenging to maintain this level of service and invest major capital without substantially impacting water rates.

While at the time of this inspection the system complies with all current standards, the materiel condition of the water system infrastructure can only be described as "tired".

The following is a list of issues that we recommend the managers of the water system consider continuing to comply with and maintain an acceptable level of service to the system's customers.

- Once again, it is strongly recommended that you investigate and apply for asset management grants so that a comprehensive evaluation of the system can be made, and recommendations developed to ensure its long-term viability. It was noted that the material condition of the pump houses appears to be degrading rapidly and significant investment in the system will be needed soon.
- Identify and report the location of all lead service lines by October 16th, 2024, (see enclosed flyer).
- Assess the vulnerabilities that could exist with remote access telemetry of the system.

- The long-term capital improvement plan should include evaluations for water main, hydrant, and gate valve replacement. By identifying the most critical assets, replacement could be accomplished over a longer period. For example, if all the hydrants need to be replaced, the managers could budget for several hydrants each year for replacement. For more information regarding asset management plans and grant opportunities, see the recommendations below.
- This system relies on the yield of the wells that supply the system. The system severely lacks in storage that will provide resilience to the system in the event one or both well pumps become inoperative or there is a long-term power outage. There should be a strategy to develop more storage capacity for the system.

SYSTEM DESCRIPTION

The West Swanzey Water Co. provides domestic water to approximately 83 service connections serving an estimated population of 430 people. The significant portion of the population served by this system live in 84-unit apartment complex that was completed in 2023. The reported average daily demand in 2023 was 31,500 gallons per day, a significant increase from 10 years ago. The West Swanzey Water Company serves a franchise area of the Town of Swanzey. The water system was originally constructed to serve the Homestead Woolen Mills complex. In 1988, the West Swanzey Water Company purchased the water system and the entire water infrastructure.

The water system is comprised of two gravel wells, associated piping and distribution system, and a 10,000-gallon hydropneumatic storage tank.

Water Supply Sources and Pumping Facilities:
The wells are summarized as follows:

Well	DES Data Base 2301020-	Depth	Location	Current Pumping Capacity / Safe Yield (gpm)
1	001	76	Well pumphouse	350
2	002	77	Well pumphouse	350

The gravel packed wells are located off West Street, along a gravel drive. Gravel Packed well # 1 was installed in 1967 and is 76 feet deep with an estimated yield of 350 gpm. The well is located within a walk-in concrete building housing the vertical turbine, motor, electrical controls, chemical feed systems, hydropneumatic storage tank, and associated piping and valves. The chemical feed systems include the addition of polyorthophosphate and soda ash with a chemical feed pumps and day tanks. The system made a change to the polyorthophosphate in 2017 to increase the amount of orthophosphate in the blend and help with corrosion control. The system currently uses the following chemical feed systems:

- Soda Ash
- CP 718 OrthoPolyphosphate (28% Ortho / 10% Poly Blend)

Gravel packed Well # 2 is located approximately 50 feet south in an identical building. Well #2 was installed in 1967 and is 77 feet deep and has an estimated yield of 350 gpm. The building also houses the vertical turbine, motor, and associated piping and valves. The discharge from Well #2 is manifolded with Well #1 inside Well #1 pump house but has its own chemical injection (also inside Well #1 pump house) and has a diverted pipeline

leaving the Well #2 building that used to serve a small portion of the system. This pipeline is currently shut off from the system by a valve in the well house. The wells operate off a pressure sensor and alternate operation with each cycle.

Distribution System:
The distribution system is comprised of 6-inch and 8-inch diameter piping. Material of construction includes ductile iron and asbestos cement water mains. A map of the distribution system has been digitized and was provided to DES during the survey. According to the operator, the distribution system has a limited number of valves and hydrants. Each water user has an individual service water meter. Water loss is estimated to be very low (less than 5%) due to the recording of pump run time overnight. Distribution system is flushed twice each year.

Data Verification, Monitoring, and Reporting:
Current water quality data indicates the water system follows current standards. Chemical monitoring is a blended sample for treated water. The water system does not participate in the chemical monitoring waiver program. We encourage participation in this program to reduce your chemical monitoring costs. Please contact DES for more information regarding this program.

We note that a SCADA monitoring system has been implemented and provides continuous and alarm conditions for chemical addition and other parameters for the pump station.

Water System Management and Operations:
The operator indicated typically monthly communication with the owner.

Staffing and Operator Certifications
The West Swanzey Water Company requires a Grade I Treatment and Grade I Distribution operator. The current operator is qualified for operation of this water system. The following operator is listed for this system:

Operator	Certificate No.	Treatment Level	Distribution Level
Mark Houghton	1928	2	2

ACKNOWLEDGEMENTS

The following are among the positive features which were noted during this survey and for which we commend the managers:

1. Staff interviewed as part of this survey are competent and professional in the operation and maintenance of the water system.
2. Significant attention is being given to the implementation of protecting the controls of water systems from unwanted intrusion by unauthorized persons or entities. In that regard, the system was recently reviewed by Rick Rossi of the Cybersecurity and Infrastructure Security Agency (CISA), which is to be commended. If you haven't done so already, please make plans to implement his recommendations. Cybersecurity will become an increasing emphasis for all water systems in New Hampshire in the coming years.

ISSUES AND RECOMMENDATIONS

System Management and Operation

1. Our Asset Management Grant program was discussed as part of this survey. The NHDES Drinking Water Program offers a matching grant up to $20,000 for water systems to hire a consultant engineer to perform a system assessment and begin asset management initiatives. We recommend West Swanzey consider applying for this grant to help determine the priority of system upgrades required to maintain the desired level of service provided to customers. We would recommend you again consider applying for this grant to continue establishing a full system AMP. This will help determine the priority of system upgrades required to maintain the desired level of service provided to customers. NHDES will be holding a water infrastructure funding workshop on Wednesday April 10, 2024. A link to register for the workshop is contained here. You or your operator are strongly encouraged to sign up for the workshop and apply for funding this year.

Lead Service Line Identification and Replacement Planning

1. On December 6, 2023, the US EPA issued proposed rules called the National Primary Drinking Water Regulations for Lead and Copper improvements or (LCRI) which expands on the LCRR. Water systems will be required develop a plan to replace lead service lines identified during the LCRR process. Owners of water systems should be developing a strategy and planning for the eventual replacement of any lead service lines identified. Additional details on the requirements for the LCRI will be issued later this year. By now you should be working with our designated consultant, Hazen and Sawyer, in identifying and reporting the location of all service lines connected to the system.

   Also, on December 6, 2023, NHDES held a seminar on the LCRR requirements. The seminar was recorded. A link to the seminar is provided here for reference for review and consultation should you need it. Also, enclosed is documentation that summarizes funding opportunities for LSL replacement.

Pump House Material Condition

1. Both pump houses are constructed out of concrete block and built into an embankment. Over time the concrete block has weathered and is deteriorating from the outside in. There is evidence that water is seeping into both structures from the outside. It is recommended that both structures get evaluated to determine the source of the leakage and to rehabilitate the structures to make them water-tight once again.

Cybersecurity

1. Public water system operators throughout the country need to be increasingly aware of the threat posed to automated systems running water systems from actors wishing to do harm to them. Therefore, there's an increased emphasis being placed on proper cyber security procedures. Enclosed is an attachment from CISA that describes some of the steps that water system operators should take to protect their systems.

Long-Term Storage Needs

1. System storage relies on a single 10,000-gallon hydropneumatic tank and ability of the well pumps to provide water directly from the wells. The lack of storage makes the system vulnerable to long-term power outages and the lack of atmospheric storage limits flow rates if significant draws are needed from the handful of hydrants that are on the system. The lack of storage also hinders the ability of the system

to expand and add customers, thus limiting the opportunities for any economic development, should the Town of Swanzey make that a priority.

I can be reached at (603) 271-0779 or Thomas.H.Willis@des.nh.gov, if there are any questions regarding this letter.

Sincerely,

Thomas H. Willis, Jr., P.E.
Drinking Water and Groundwater Bureau

Encl: Cybersecurity procedures flyer
Lead Service Line Funding Opportunity Notice

cc : Mark Houghton, Primary Operator

ATTACHMENT B

Existing Conditions Work Plans

View Point Co-Op
~100 Mobile Homes

Well GPW 3

Potential Future
400' Sanitary
Protective Radius

Inactive
Water Main

Homestead
Woolen Mills

Potential Future
400' Sanitary
Protective Radii

Well GPW 1

Well GPW 2

Cutler
School

Workforce Housing
Development
(Under Construction)

108

109

CALIFORNIA STREET

SWANZEY

WEST

MAIN STREET

PERRY LANE

DENMAN THOMPSON HIGHWAY

ROUTE 10

HILL ROAD

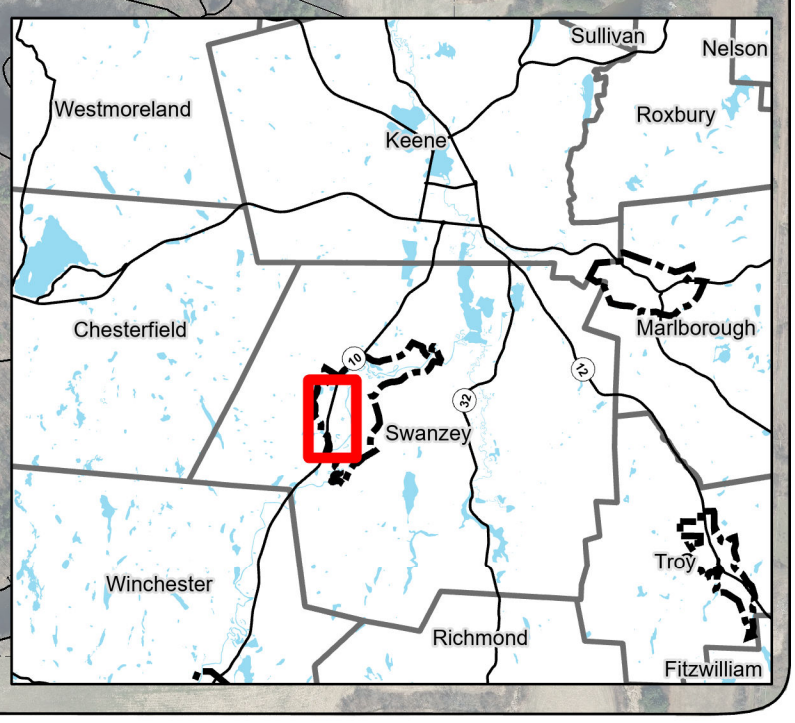
COBBLE HILL ROAD

SOUTH WINCHESTER STREET

CALIFORNIA (CLASS VI) STREET

Legend

- Well
- Hydrant
- Valve
- Water Line
- Water Line (Assumed Location)
- West Swanzey Census Designated Place



NOTES:
1. Block numbers (108 and 109) indicate the Assessors map sheet numbers for Swanzey, New Hampshire. Captured from the CAI Website 2*/28/2024.
2 Background imagery provided by NH Granite and are the 2021 6 inch Orthoimagery dataset.
3 Water System data provided by the Town of Swanzey December 2023.

N

500 250 0 500

Feet

1:6,000

DATE		FIG.
2/24	Existing Water System West Swanzey Water System Evaluation Swanzey, New Hampshire	B1
PROJECT 2960		

UNDERWOOD engineers
99 N State Street, Concord, N.H. 03301
Tel. 603-230-9898 Fax. 603-230-9899

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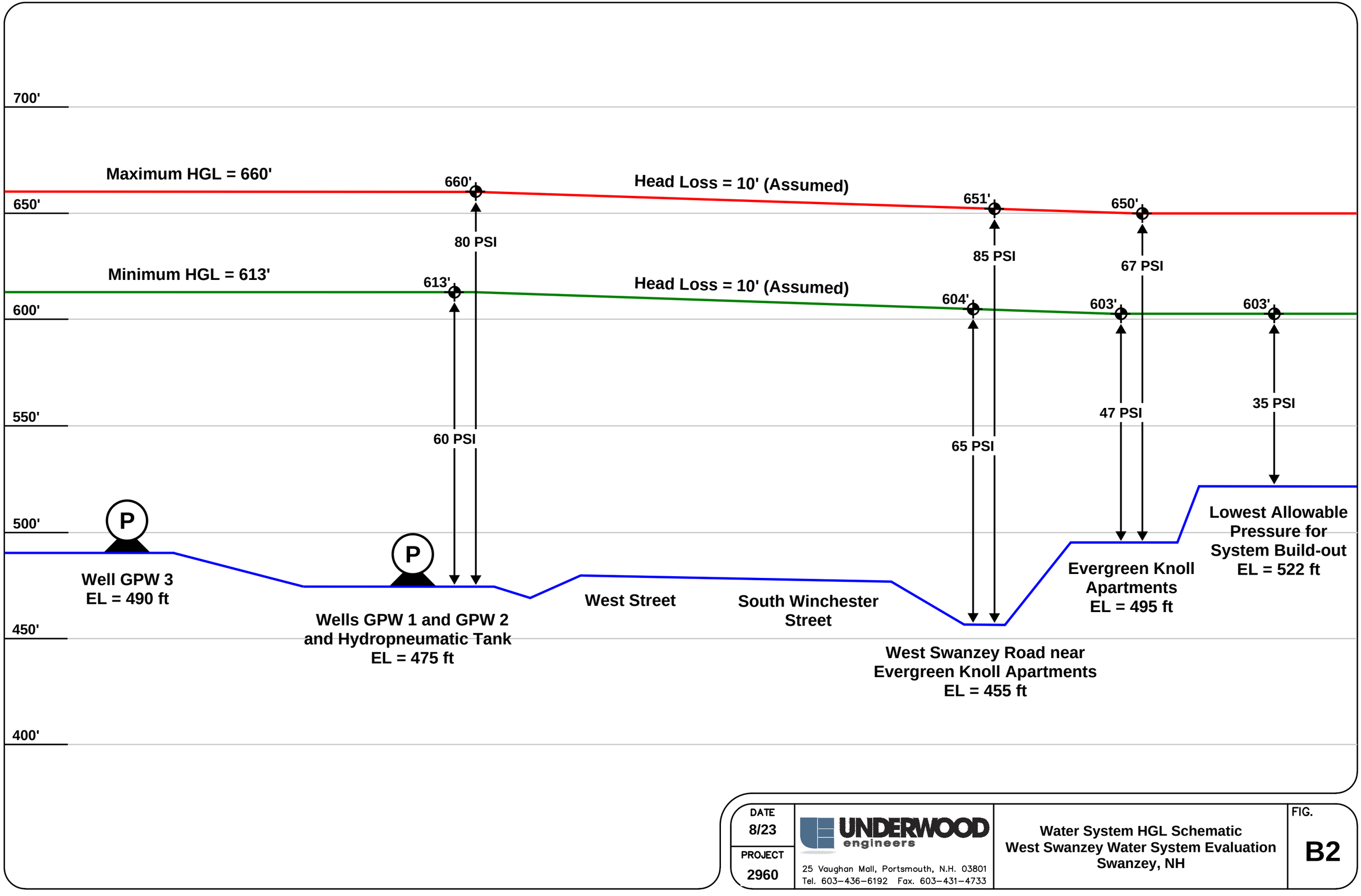


DATE 8/23

PROJECT 2960

UNDERWOOD engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

Water System HGL Schematic
West Swanzey Water System Evaluation
Swanzey, NH

FIG. B2

TO
DISTRIBUTION
SYSTEM

WELL GPW 1 PUMP HOUSE

SODA ASH
50 GAL.
DRUM

PHOSPHATE
50 GAL.
DRUM

WELL GPW 1
VERTICAL
TURBINE PUMP
(350 GPM)

FM

HYDROPNEUMATIC TANK
10,000 GAL.

WELL GPW 2 PUMP HOUSE

WELL GPW 2
VERTICAL
TURBINE PUMP
(350 GPM)

DATE 8/23 PROJECT 2960	UNDERWOOD engineers 99 N State Street, Concord, N.H. 03301 Tel. 603-230-9898 Fax. 603-230-9899	**Existing Well Pump Houses West Swanzey Water System Evaluation Swanzey, NH**	FIG. **B3**

ATTACHMENT C

Site Visit Photos

Site Visit Photos
West Swanzey Water System
Swanzey, NH

Photo 1 – Site of existing Wells GPW 1 and GPW 2 viewed from site entrance. Taken 6/27/23

Photo 2 – Existing Well GPW 1 pump house. Taken 6/27/23

Photo 3 – Existing pump for Well GPW 1. Taken 6/27/23

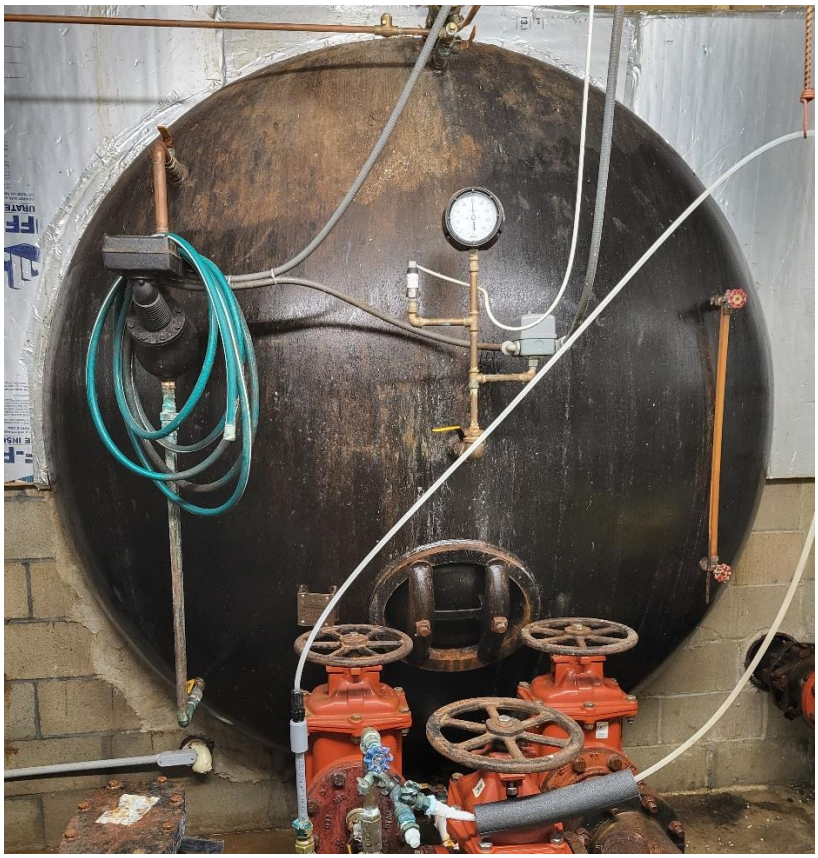


Photo 4 – Existing hydropneumatic storage tank in Well GPW 1 pump house. Taken 6/27/23

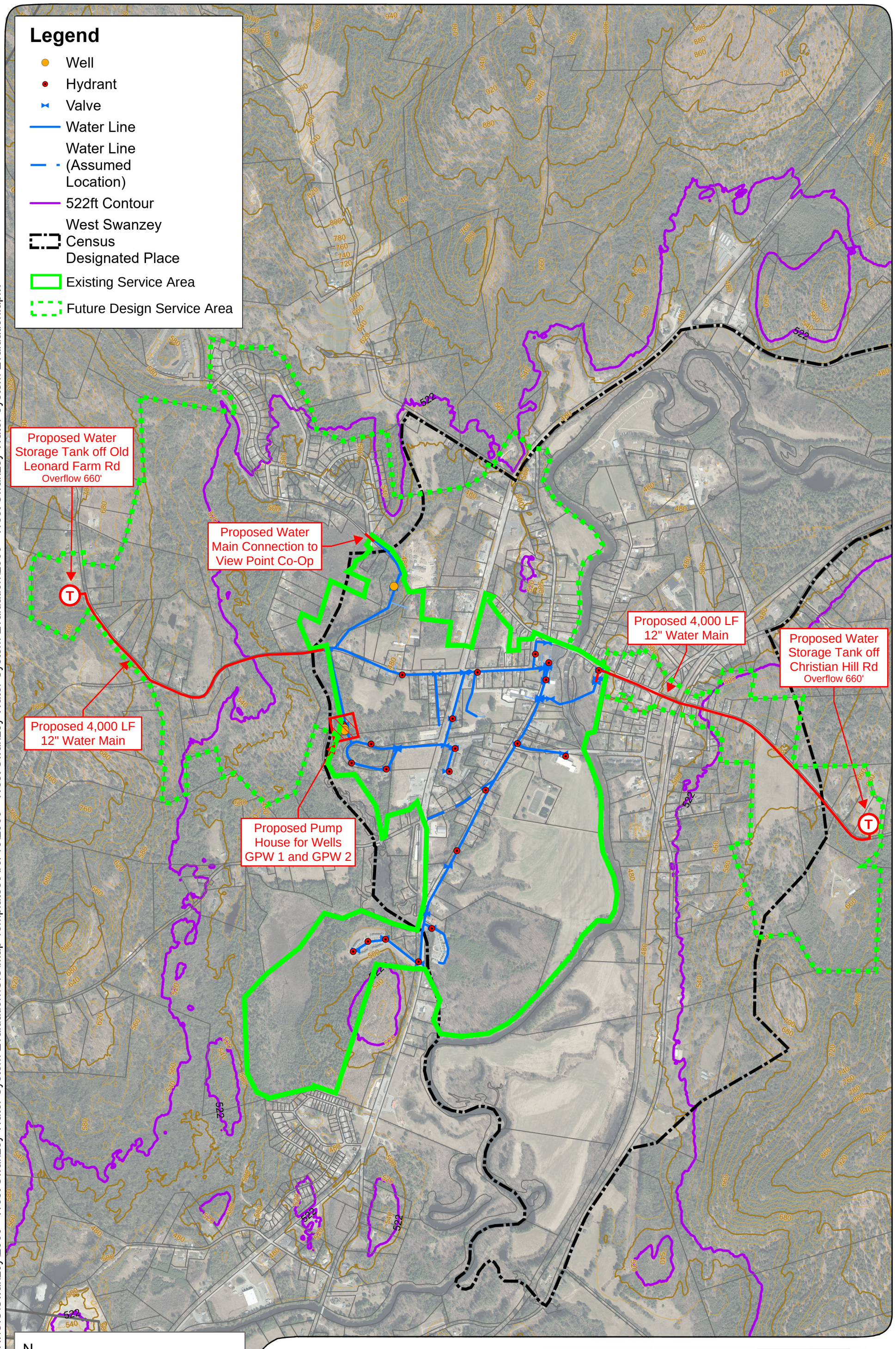
Photo 5 – Existing chemical feed equipment for Wells GPW 1 and GPW 2 in Well GPW 1 pump house. Taken 6/27/23

Photo 6 – Existing SCADA panel in Well GPW 1 pump house. Taken 6/27/23

Photo 7 – Existing Well GPW 2 pump house. Taken 6/27/23

ATTACHMENT D

Proposed Conditions Work Plans



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DATE		FIG.
2/24	**Proposed Water System Imp. West Swanzey Water System Evaluation Swanzey, New Hampshire**	D1
PROJECT 2960	

UNDERWOOD engineers
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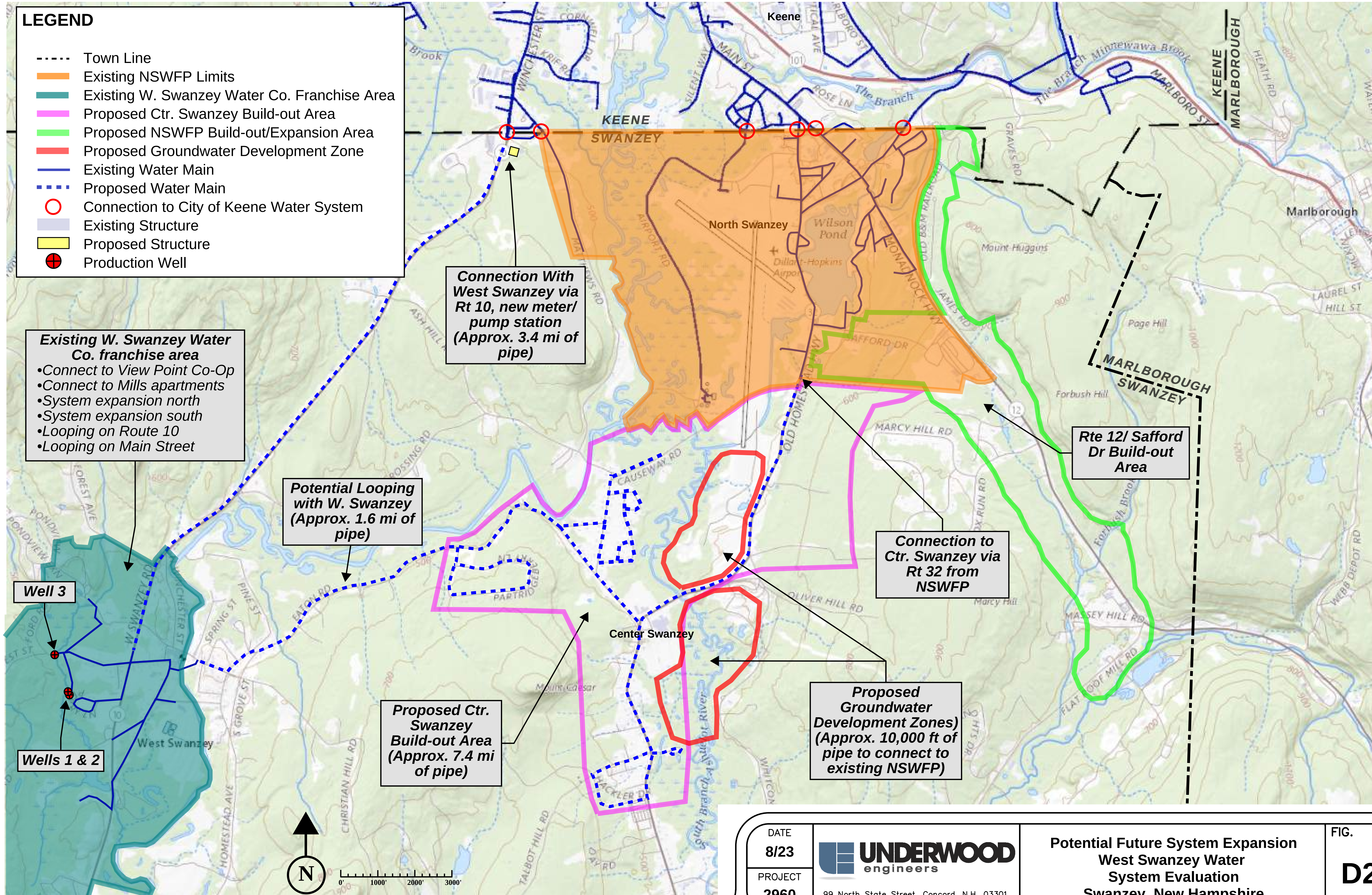
Tel. 603-230-9898 Fax. 603-230-9899



DATE
8/23

PROJECT
2960

UNDERWOOD engineers

99 North State Street, Concord, N.H. 03301
Tel. 603-230-9898 Fax. 603-230-9899

Potential Future System Expansion
West Swanzey Water
System Evaluation
Swanzey, New Hampshire

FIG.
D2

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ATTACHMENT E

Preliminary Asset Management Summary Worksheets

Asset Management Worksheet

West Swanzey Water System Evaluation, Swanzey, New Hampshire

Date Worksheet Updated	4/5/2024

1. Inventory, Condition, and Criticality

Current Year	2024

1. Inventory of Assets				2. Condition of Assets							3. Criticality Assessment and Asset Prioritization		
ID#	Category	Group	Asset Name	Capacity	Condition	Year Installed	Typical Useful Life (Years)	Age	Remaining Useful Life (Years)	Remarks	Probability of Failure	Consequence of Failure	Risk Score
1	Storage	Tank	Hydropneumatic Tank	10,000 gallons	Good	2004	80	20	60	Located in Well GPW 1 Pump House. Pressure setpoints of 60 and 80 psi.	2	5	10
2	Supply	Well 1	Well GPW 1	396,000 gpd		1967	50	57	0		5	5	25
3	Supply	Well 1	Well GPW 1 Pump	350 gpm		1967	10	57	0	25 HP pump. VFD installed between 2017 and 2020.	5	5	25
4	Supply	Well 1	Well GPW 1 Pump House		Poor	1967	60	57	3	Deficiencies include no separate metering, no groundwater level monitoring, no ATS for generator, chem feed not up to industry standard, access door has daylight along bottom, no screen on drain piping	4	5	20
5	Supply	Well 2	Well GPW 2	396,000 gpd		1967	50	57	0		5	5	25
6	Supply	Well 2	Well GPW 2 Pump	350 gpm		1967	10	57	0	25 HP pump. VFD installed between 2017 and 2020	5	5	25
7	Supply	Well 2	Well GPW 2 Pump House		Poor	1967	60	57	3	Metering, generator, and chem feed shared with Well GPW 1. No groundwater level monitoring and no screen on drain piping. Door is boarded up and inaccessible.	4	5	20
8	Supply	Well 3	Well GPW 3	Inactive and not permitted for use		1967	50	57	0	Previous safe yield of 694 gpm per 2022 NHPUC Report	5	1	5
9	Supply	Well 3	Well GPW 3 Pump	Inactive		1967	10	57	0	40 HP pump. Has not provided supply in decades due to reported damage to pump ouput line.	5	1	5
10	Distribution	Pipe	Pipe - AC			1970	80	54	26	6,864 LF of 8" AC (79% of all pipe). Assumed to have been installed circa system's establishment in 1967.	2	2	4
11	Distribution	Pipe	Pipe - DI and PVC			2000	100	24	76	1,280 LF of 8" DI (15% of all pipe), 500 LF of 6" DI (6%), 60 LF of 4" PVC (1%). Assumed to have been installed circa 2000.	2	2	4
12	Distribution	Meters	Meters			1967-Present	15	0-57	0-15	Assumed to have been installed between 1967 and 2023.	1 to 5	1	1 to 5

Asset Management Worksheet

West Swanzey Water System Evaluation, Swanzey, New Hampshire

Date Worksheet Updated	4/5/2024

1. Inventory of Assets				4. Life Cycle Costs and Planning					5. Long Term Replacement/Renewal Costs - by Decade									
ID#	Category	Group	Asset Name	Replacement Cost	Year Action Required	Reoccurrance of Action (Years)	Action Required Next 1 to 10 Years	Remarks	2024	2034	2044	2054	2064	2074	2084	2094	2104	2114
1	Storage	Tank	Hydropneumatic Tank	$3,300,000	2024	80	YES	Replace underzied hydropneuamtic tank with new reservoir tank at high elevation or elevated tank in central location. Cost estimated based on previous work.	$3,300,000									
2	Supply	Well 1	Well GPW 1	$600,000	2034	50		Replacement cost estimated based on previous work.		$600,000								
3	Supply	Well 1	Well GPW 1 Pump	With Well GPW 1 Pump House	2024	10	YES	Replace existing pumps and pump houses for Wells GPW 1 and 2 with new pumps and combined pump house. Replacement cost estimated based on previous work.										
4	Supply	Well 1	Well GPW 1 Pump House	$2,500,000	2024	60	YES	Replace existing pumps and pump houses for Wells GPW 1 and 2 with new pumps and combined pump house. Replacement cost estimated based on previous work.	$2,500,000									
5	Supply	Well 2	Well GPW 2	$600,000	2034	50		Replacement cost estimated based on previous work.		$600,000								
6	Supply	Well 2	Well GPW 2 Pump	With Well GPW 1 Pump House	2024	10	YES	Replace existing pumps and pump houses for Wells GPW 1 and 2 with new pumps and combined pump house. Replacement cost estimated based on previous work.										
7	Supply	Well 2	Well GPW 2 Pump House	With Well GPW 1 Pump House	2024	60	YES	Replace existing pumps and pump houses for Wells GPW 1 and 2 with new pumps and combined pump house. Replacement cost estimated based on previous work.										
8	Supply	Well 3	Well GPW 3	$600,000	NA	NA		Replacement cost estimated based on previous work.										
9	Supply	Well 3	Well GPW 3 Pump	$30,000	NA	NA		Replacement cost estimated based on previous work.										
10	Distribution	Pipe	Pipe - AC	$20,000 per year	Annually Starting 2050	Annually		Replacement cost includes replacing 1% of existing pipe with new 12" DI pipe per year starting in 2050.			$80,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
11	Distribution	Pipe	Pipe - DI and PVC	$5,000 per year	Annually Starting 2100	Annually		Replacement cost includes replacing 1% of existing pipe with new 12" DI pipe per year starting in 2100.								$20,000	$50,000	$50,000
12	Distribution	Meters	Meters	$2,500 per year	Annually Starting 2024	Annually	YES	Replacement cost includes replacing 5 meters per year (85 existing meters per 2022 NHPUC Report).	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000

ATTACHMENT F

Preliminary Rate Evaluation Summary Worksheets

West Swanzey Water System Evaluation - Rate Design - EARLY ESTIMATES
Preliminary tabulation of water users and rates for a sustainable system
Underwood Engineers

WSWC Average Annual Bill	*$582*	*per year (4,500 gallons per month)*	*Per NHDES Rates Dashboard*
State Average Annual Bill	*$550*	*per year (4,500 gallons per month)*	*Per NHDES Rates Dashboard*
Typical Household	*150*	*gpd*	*Based on 4,500 gallons per month*

		PROPOSED IMPROVEMENTS	
	Purchase WSWC + Supply and Storage Improvements	**Purchase WSWC + Supply and Storage Improvements**	**Purchase WSWC + Supply and Storage Improvements**
	Variable Rate	Variable Rate	Variable Rate
Target Rate			
Funding Participation, % of Cost for Purchase and Improvements	20%	30%	40%
Rate Impact	336%	309%	283%
Capital Reserves			
Suggested Amount per Year	**$80,000**	**$80,000**	**$80,000**
Loan Terms			
Existing System Assets	$600,000	$600,000	$600,000
Proposed System Improvements	$5,800,000	$5,800,000	$5,800,000
Grants, Loan Principal Forgiveness, and General Town Funds	$1,280,000	$1,920,000	$2,560,000
Total Principal Amount	$5,120,000	$4,480,000	$3,840,000
Interest Rate	3.125%	3.125%	3.125%
Term, years	30	30	30
Annual Payment, Principal, and Interest (Amortized)	**$265,457**	**$232,275**	**$199,093**
Revenues - Domestic Sales and Fire Protection			
Existing Domestic Demand, average, gpd	30,000	30,000	30,000
Proposed Domestic Demand, average, gpd	10,800	10,800	10,800
Assumed Non-Revenue Water	20%	20%	20%
Consumption (sales), gpd	32,640	32,640	32,640
Flow per EDU, gpd	150	150	150
Total EDUs	218	218	218
Total Domestic Revenue	$424,973	$391,680	$358,605
Misc Revenues	$0	$0	$0
Fire Protection Service Charges Revenue	$16,600	$16,600	$16,600
Total Revenues	**$441,573**	**$408,280**	**$375,205**
Summary of Expenses and Income			
Number of EDU's	218	218	218
Capital Reserve Contributions	$80,000	$80,000	$80,000
Debt Service for Capital Improvements	$265,457	$232,275	$199,093
Operations (contract ops, admin, repairs)	$86,000	$86,000	$86,000
Total Revenues (from above)	$441,573	$408,280	$375,205
Net Income	**$10,116**	**$10,005**	**$10,112**

Proposed Improvements	Purchase + Pumphouse + Tank
Total Capital Cost	**$6,391,800**

System Purchase	**$600,000**

New pumphouse for Wells 1 and 2	**$2,460,000**
Well pumphouse	$800,000
Well pumps and pitless adapters (x2)	$140,000
100 LF 12" water main ($250/LF)	$25,000
Electrical improvements	$100,000
Electrical generator	$100,000
SCADA and controls	$75,000
Utility allowance	$100,000
Sitework allowance	$200,000
Well inspections, cleanings, and pump test allowance	$100,000
Construction Total	$1,640,000
Contingency (25%)	$410,000
Engineering (25%)	$410,000

New water storage tank	**$3,331,800**
General conditions, mobilization and demobilization	$121,000
Sitework + additional 4,000 LF 12" DI water main ($250/LF)	$698,000
0.4 MG pre-stressed concrete tank	$722,000
Building/valve vault	$221,000
Electrical	$89,000
Inflation 2020 to 2023 (20%)	$370,200
Construction Total	$2,221,200
Contingency (25%)	$555,300
Engineering (25%)	$555,300

ATTACHMENT G

Preliminary System Development Charge Summary Worksheet

Town of Swanzey
System Development Charge
Swanzey, New Hampshire
EQUITY BUY-IN METHOD
Prepared by Underwood Engineers, Inc.
April 9, 2024

Total Net System Value[1]	$255,828
System average day capacity, less unmetered demand[2] (gpd)	24,000
Existing Asset per Gallon capacity ($/gpd)	$10.66
EDU (gpd)[3]	150
Existing Asset per EDU ($/EDU)	$1,599

Notes:

1. Total WSWC net assets reported in Fiscal Year 2022
2. Existing ADF of 30,000 gpd per Water System Evaluation Letter by Miller Engineer and Testing dated October 14, 2021
   Reduced by 20% to account for non-revenue water
3. Assumed average EDU usage is 200 gpd (6,000 gal/month)