

TOWN OF WILMINGTON, VERMONT

Route 9 Water and Wastewater Feasibility Study

RF1-242

WPL-306

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1. EXECUTIVE SUMMARY

At the Town of Wilmington's request, this study evaluates the feasibility of expanding the existing water and sewer infrastructure along Route 100 and Route 9 from approximately The White House Inn to Ballou Hill Road and approximately 600 feet south on Route 100 from the Route 9 intersection. The purpose of this expansion to promote development along the sizable properties located in this new service area.

Currently the Town of Wilmington owns and operates the wastewater utilities, however, drinking water utilities are owned and operated by the Wilmington Water District. The Town and District voted on November 3rd, 2020 to transition ownership of the drinking water utility to the Town. It is anticipated that this acquisition will be approved by the State Legislature, so by July 2021, the Wilmington Water District can be dissolved.

It is recommended that the proposed project is approached in multiple phases rather than one large construction project. Expansion projects such as this typically face funding challenges in the initial years due to a limited user base and fees. By phasing the project, the debt service can be spread over time allowing development and user fees to increase to close the funding gap.

For the drinking water utility expansion, a new 8" waterline would be extended approximately 3,200' from the edge of the Wilmington Water District to the area of VT Route 9 and Route 100 as shown on Figure 8 in Appendix A.

For the wastewater utility expansion, a new sewer collection system will be constructed in the area of VT Route 9 and Route 100 as shown on Figure 8 in Appendix A. Approximately 3,900' of new 8" PVC gravity sewer will be constructed in the Town Right-of-Way. Additionally, a new wastewater pump station, approximately 1,600' of new forcemain, and upgrades to the existing East Main Street ejector station #1 will be required.

Cost estimates put the total project cost at \$2,900,000. Two funding alternatives were evaluated and estimate the total annual debt service to be between \$48,000 and \$62,000 annually paid for through property taxes and/or user fees. If the Town wishes to pursue this project, the following steps are recommended 1) further evaluate the potential funding sources and eligibility, 2) further evaluate potential development opportunities along the proposed service area, 3) obtain ownership of the Wilmington Water District's drinking water utility.

2. INTRODUCTION

2.1 Purpose

The Town of Wilmington retained Aldrich + Elliott, PC to perform preliminary engineering services to develop the Town of Wilmington Route 9 Water and Wastewater Study. The Town is interested in the feasibility to extend public water and wastewater utilities east along Route 100 and Route 9 from approximately The White House Inn to Ballou Hill Road and approximately 600 feet south on Route 100 from the Route 9 intersection. The Town is seeking to use this study to evaluate the need, feasibility, cost, and available funding sources as an initial step in extending these utilities.

2.2 Location and Background

The Town of Wilmington is located in Windham County, in southeastern Vermont, and abuts the Towns of Searsburg, Marlboro, Whitingham, and Dover. The study area is located in the eastern quadrant of town, approximately one mile from the Town center. A location map showing the overall location of the study area is included in Figure 1 in Appendix A.

The Wilmington Water District currently owns and operates the Wilmington water system (WSID #5310). The Town and District voted on November 3rd, 2020 to transition ownership of the drinking water utility to the Town. It is anticipated that this acquisition will be approved by the State Legislature, by July 2021, the Wilmington Water District can be dissolved. It is assumed that prior to the start of design for any projects developed through this study shall occur after the water system has been acquired by the Town.

The Wilmington Wastewater Collection System is owned and operated by the Town of Wilmington. The Town's Wastewater Treatment Facility is authorized to operate under Discharge Permit No. 3-1281.

The Town of Wilmington is a small community that consists mainly of residential and commercial properties. Many of the commercial properties house service industries to support the Town's large tourist population who visit to enjoy the many outdoor activities, including Mount Snow.

The area of focus for this study is the minimally developed land around the Route 9 and 100 intersection. The municipal wastewater system terminates approximately 1,600 feet west of this intersection and the water system about 3,200 feet. The Town believes a lack of publicly available water and wastewater utilities in this area is the main reason this land

has largely remained vacant and underutilized. As a result, the Town wishes to evaluate the feasibility of extending the two municipal utilities in order to promote future development.

2.3 Scope of Study

The scope of this study is to evaluate the feasibility of expanding the existing water distribution and wastewater collection systems in order to service the defined study area and encourage development. This study consists of the following tasks.

- Perform a kick-off meeting and gather existing information
- Define the expanded service area based on Town input
- Develop and distribute a property owner questionnaire to evaluate potential future development and water and wastewater needs
- Perform GIS mapping to evaluate impacts to various environmental resources, including feasibility of on-site septic for future development
- Develop preliminary engineering criteria
- Develop expansion alternatives for the water and wastewater systems
- Evaluate alternatives and develop a recommended plan
- Conduct review meetings
- Finalize the report

2.4 Reference Documents

The following documents were used to support this study.

- Town of Wilmington, Wastewater Facilities 20 Year Evaluation Inspection Report, March 2013 by Aldrich + Elliott
- Permit to Operate for Wilmington Water District, a Public Community Water System in Wilmington, VT WSID# VT0005310, July 10, 2019
- Sanitary Survey, Wilmington Water District, Public Community Water System, Wilmington, VT WSID #5310, November 29, 2016

3. SERVICE AREA

3.1 Description

The service area is generally described as located along Route 100 and Route 9 from approximately The White House Inn to Ballou Hill Road and approximately 600 feet south on Route 100 from the Route 9 intersection. The existing water distribution system ends at the limit of the Wilmington Water District (near the bank) and the wastewater collection system terminates at approximately the White House located 1,600 feet to the west of the Route 100 and Route 9 intersection.

Approximately twenty-six (26) properties were identified by the Town as potential sites for future development to be included in the expanded service area. Approximately eight (8) properties (31%) are undeveloped, and eight (8) only have a residential structure on the lot. The remaining ten (10) properties consist of large parcels with small to medium sized commercial buildings and are zoned commercial/residential adjacent to Route 9 and 100. The overall study area consists of approximately 272 acres; however, the final expanded service area may be smaller. Of this area, approximately 137 acres (50.2%) are vacant, and the average lot size is 11.34 acres. Figure 2 in Appendix A of this report indicates the study area following the Town zoning districts as shown in Appendix B.

It is worth noting that many of the properties within the project area are deep and extend far from Route 9. These properties also see large increases in elevations that approach the operating levels in the Wilmington Water District reservoir. This feasibility study only looks at expanding the Wilmington Water System within the Public Right-of-Way along VT Route 9 and 100.

3.2 Environmental Resources

The water resources were mapped for the project area and are shown on Figure 3 in Appendix A. Several streams meander through the project area, the largest is Beaver Brook, which flows west to east. A Vermont State wetlands area was mapped to the east along Route 9 but is outside the project area. Several private wells were identified that serve existing development and these are shown on several properties adjacent to VT Route 9 and 100 south.

Other environmental resources were mapped that could impact the development of this area and are shown on Figure 4 in Appendix A. Most of the area adjacent to VT Routes 9 and 100 are mapped as prime agricultural soils, and a large area north of VT Route 9 is noted as a deer wintering area.

4. EXISTING WATER AND WASTEWATER SYSTEMS

4.1 Water System

4.1.1 Description

The water system (WSID #5310) supply, storage, and distribution is currently owned and operated by the Wilmington Water District but after the November 2020 vote, the Town plans to take over the water system by July 2021. The system's most recent Permit to Operate (#5310-19.0) was issued on July 10, 2019 and is included in Appendix C.

The system received a Sanitary Survey on November 29, 2016. Within that survey, several deficiencies were identified. However, it is worth noting that these deficiencies did not prevent the issuance of the new Permit to Operate. A copy of this Sanitary Survey can be found in Appendix D.

4.1.2 Source

The Wilmington Water System draws raw water from five (5) different spring sources. These sources include springs under the direct influence of surface water (GUDI), a permitted surface water supply source, and a permitted groundwater source. All permitted supply sources combine into a single raw water transmission pipe that conveys water from the permitted sources to the water system's treatment and storage facility.

4.1.3 Water Treatment and Storage

Combined raw water is transported via the transmission main from the multiple sources to the Water Treatment Plant (WTP). The Wilmington WTP is a two-step process that includes filtration, chemical disinfection and PH adjustment.

Driven via gravity, raw water first enters a three-bank membrane treatment system that progressively filters raw water down to one (1) micron. Filtered water is then transported through a pipe line to the Ray Hill Reservoir. A hypochlorite solution is added to this pipeline for disinfection treatment, and a soda ash solution is added to this pipeline to adjust the pH of the filtered water for corrosion control treatment. Disinfection contact time is provided by the Ray Hill Reservoir. Table 4.1 below summarizes key characteristics of the Ray Hill Reservoir.

Finished water is first stored in the Ray Hill Reservoir. This reservoir is an 810,000-gallon concrete tank, and is the only water storage tank on the Wilmington Water System that provides storage for both domestic and fire flow demands.

Table 4.1
Ray Hill Reservoir

Characteristics	
Material	Concrete
Volume (gallons)	810,000
Dimensions	50' x 170'
Approx. Operating Water Level	1758' - 1762'

4.1.4 Distribution System

There are no booster pump stations servicing the Wilmington Water System. Finished water is distributed via gravity flow to all users on the system. The Water System's distribution pipe network includes cast iron pipe installed from 1900 to the 1950s, which ranges in size from 4-inch to 6-inch diameter pipe; and ductile iron pipe installed from the 1970s to 2018, ranging in size from 8-inch to 12-inch diameter pipe.

The existing 12" waterline on VT Route 9 ends in front of the Walgreen's Pharmacy as shown on Figure 2 in appendix A. A hydrant flow test was done at the last fire hydrant on June 10, 2020 with the assistance of Town and Water District staff. The static pressure was recorded at 105 psi and ground elevation is 1521.8' at this location. When flowing, a fire flow of 1,500 gpm was measured at a residual pressure of 80 psi.

4.1.5 Fire Protection

The Water System was designed to provide fire flow protection and has approximately 36 fire hydrants installed throughout the distribution system. Eight of these hydrants (located on Winter Haven Drive, Lisle Hill Road, Church Street, and Castle Hill Road) do not include steamer nozzles and are operated as flushing hydrants. Two hydrants located on North Main Street and Fairview Avenue, are directly connected to 4-inch diameter distribution mains. These hydrants are not capable of providing the minimum fire flows.

4.1.6 Existing Water Capacity

According to the 2019 Permit to Construct, the Wilmington Water System serves a year-round residential population of approximately 700 people, as well as a transient (or seasonal) population of an estimated additional 700 people through 263 service connections. The Water System is authorized for a Maximum Day Demand (MDD) of 203,040 gallons per day (gpd), and an average daily demand (ADD) of 103,040 gpd.

Based on data provided by the Wilmington Water District for January 2019 through December 2019, current ADD is approximately 76,725 gpd, with an observed MDD of 114,000 gpd. Approved capacity and demand for the Wilmington Water System are summarized in Table 4.2.

Table 4.2
Wilmington Water Capacity

	State Approved	Current	Available Capacity @ 90%⁽¹⁾
Maximum Day Demand (MDD)	203,040 gpd	114,000 gpd	68,736 gpd

Notes:

1. The available capacity is based on 90% of the State approved capacity at the maximum day demand.

Based on the information above, the Town of Wilmington's Water System has up to 68,736 gpd of maximum day capacity available for future development. To utilize this additional capacity, it may require the use of Haystack Pond as a source which would increase the treatment costs.

It is important to note that although the water system has some available capacity, the Wilmington Water District permitted service area does not extend before the last existing fire hydrant on Route 9. Under the current Water District, the system cannot expand into the study area unless the Town of Wilmington is able to acquire the water system, and the Wilmington Water District is dissolved.

4.2 Wastewater System

4.2.1 Wastewater Treatment Facility

The Wilmington Wastewater Treatment Facility (WWTF) underwent a major renovation and upgrade in 2015 when the facility's clarigester was abandoned and demolished. Today, wastewater is delivered from Pump Station No. 2 (PS2), Influent Pump Station adjacent the Control and Lab building. A hydraulically operated muffin monster located in the influent channel grinds the material in the influent flow. Two (2) vertical 5 hp non-clog centrifugal pumps lift the flow to the Primary Treatment Building. The pumps are operated via a duplex pump control panel located in the Office/Lab Building. Variable frequency drives automatically control the flow rate based on the liquid level in the wet well.

The Primary Treatment Building receives the flow from PS2. Flow entering this building passes through a rotating bed filter system for primary treatment. In times of heavy flows, influent can bypass the belt filter through a separate channel and bar rack controlled by a slide gate.

Flow from the Primary Treatment Building continues to a splitter box and can be sent to one or both Rotating Biological Contactor (RBCs) units normally operated in parallel. Biological treatment of the wastewater is performed by a fixed film process. Effluent from the RBCs then continues to aerated lagoon #1 and then lagoon #2 as normal operation

is to run in series. Each lagoon is approximately 52' wide by 150' long and operates at a water depth of about 11.58'. Mixing and aeration is provided by floating aeration laterals. For disinfection, liquid chlorine is added to the lagoon effluent and contact time is provided by a 36" diameter pipe with a total length of about 114'. Dechlorination is provided by the addition of sodium bisulfite. Treated flow is metered by a 90 degrees V-notch weir and discharged to the North Branch of the Deerfield River.

4.2.2 Pump Stations

The Town of Wilmington owns and maintains four (4) pump stations and (3) pneumatic ejector stations located within the sewer service area.

- Pump Station #1: West Main Street
- Pump Station #2: WWTF Influent
- Pump Station #3: Route 9 West
- Pump Station #4: Woffenden Road
- Ejector Station #1: East Main Street
- Ejector Station #2: Bowling Alley
- Ejector Station #3: Alpine Rentals

4.2.3 Wastewater Collection System

Wilmington's wastewater collection system provides service to the original Village area, designated as downtown. A majority of the flow to the north and east of the river passes through Pump Station #1 located on West Main Street. To the north, sewer service extends along Route 100 to the Twin Valley Elementary School, and east along East Main Street (Route 9) just past Whites Road. To the west, sewer service is provided along West Main Street (Route 9) to Town Farm Road, and gravity sewers extend southwest along Castle Hill Road to about Cattin Drive.

On Vt Route 9, the gravity sewerline ends as shown on Figure 2 in Appendix A.

4.2.4 Existing Wastewater Capacity

Operating under Permit No. 3-1281, Wilmington's WWTF is permitted for an annual average daily flow of 135,000 gallons per day (gpd). Based on data provided by the Town on the State WR-43 monthly reports, the current (2019) average daily flow is 80,700 gpd. Existing capacity flows are summarized in Table 4.3 below.

Table 4.3
Wilmington Wastewater Capacity

	Permitted Capacity	Current ADF	Committed Capacity	Available Capacity⁽¹⁾
Average Daily Flow (ADF)	135,000 gpd	80,700 gpd	42 gpd ⁽²⁾	27,300 gpd

Notes:

1. Available capacity is based on 80% of permitted ADF.
2. Provided in gallons per day.

Based on the information above, the Town of Wilmington's WWTF has approximately 20% of the permitted flow capacity available for future development.

Finally, Ejector Station #1 (ES1) is located on East Main Street located just west of 87 East Main Street (Jolley Gas Station). In 2019, ES1 saw an average monthly flow of approximately 3,500 gallons per day (gpd), and a maximum monthly flow of 6,157 gpd. Although the existing capacity is unknown, it can reasonably be assumed that any new incoming flow from the larger sewer service area will exceed the station's available capacity. Because the station services a small number of users, it is likely Wilmington will have to upgrade this pump station.

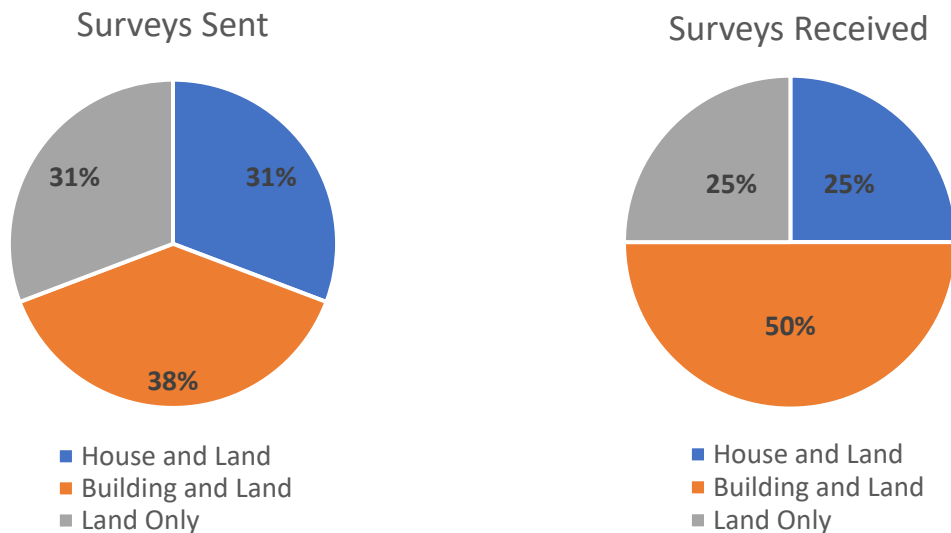
5. NEEDS ASSESSMENT

5.1 Description

As part of this study, a survey questionnaire was sent via mail to property owners in the study area. The study asked property owners and tenants detailed questions about their existing water supplies and wastewater disposal systems as well as their interest in connecting to municipal water and sewer infrastructure. The survey questionnaire is included in Appendix B.

A total of 26 surveys were mailed, and a total of 9 responses were received, for an overall response rate of 35%, though some responses were incomplete. Figure 5.1 shows the distribution of surveys sent and received by ownership interest and property use, respectively.

Figure 5.1
Surveys Sent

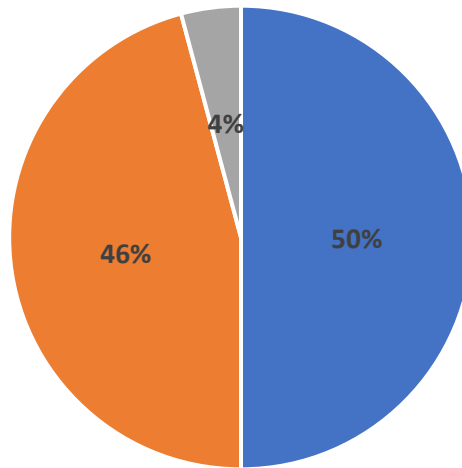


5.2 Existing Water Systems

Figures 5.2 and 5.3 summarize the type and condition of respondent's water supplies. Approximately half of the respondent's did not answer these questions. Of the remaining respondents, the majority use individual drilled wells and approximately 19% reported having issues with their water supplies, such as poor quality or unreliable yields.

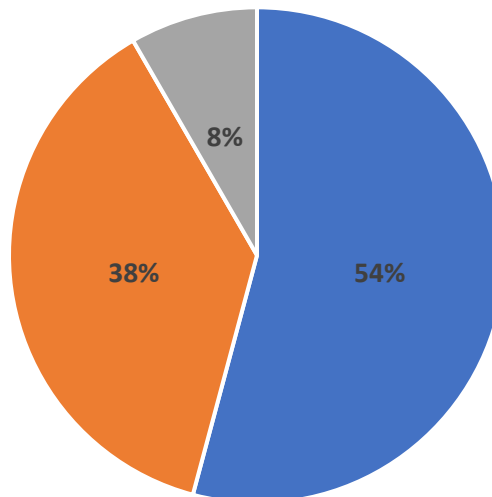
Installing additional on-site water supplies may interfere with the isolation zones of existing on-site disposal systems, especially for expansion or in-fill development on currently developed sites.

Figure 5.2
Water Supply Type



■ NA ■ Individual drilled well. ■ Community (shared) drilled well.

Figure 5.3
Water Supply Failures or Problems



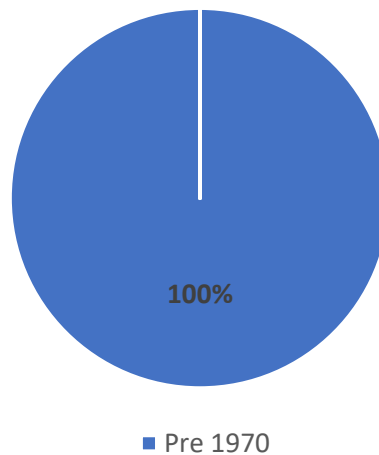
■ NA ■ No ■ Yes

5.3 Existing Wastewater Systems

Figure 5.4 summarizes the ages of respondent's wastewater disposal systems. For the residents that had wastewater disposal systems, all of the disposal systems date before the 1970's. The data suggests that the majority of the disposal systems in the study area are approaching the end of their expected 50-year lifespans. No disposal systems in the study area were reported to have experienced failures.

Figure 5.4
Age of Existing Septic System (year constructed)

Age of Existing Septic System



Given the generally good condition of the wastewater disposal systems in the area and generally favorable soils, on-site disposal systems are currently capable of meeting the study area's wastewater disposal needs based on current uses. Municipal wastewater infrastructure will help reduce impediments for future development. Additionally, developed commercial properties may not have space for either replacement wastewater disposal systems or new wastewater disposal systems necessary for expansion or in-fill development.

5.4 User Interest

Figures 5.5 and 5.6 summarize user interest in and willingness to pay for municipal water and wastewater service. Slightly less than half of respondents indicated that they were not interested in municipal water or wastewater service, approximately one quarter of respondents indicated that they were, and the remainder did not respond. On average, respondents indicated they would be willing to pay approximately \$500 per year for municipal water and sewer service. Based upon the survey there was more interest in municipal sewer supply infrastructure, though several comments indicated that they

would be interested in connecting to a municipal water system.

Figure 5.5
Interest in Municipal Water/Wastewater

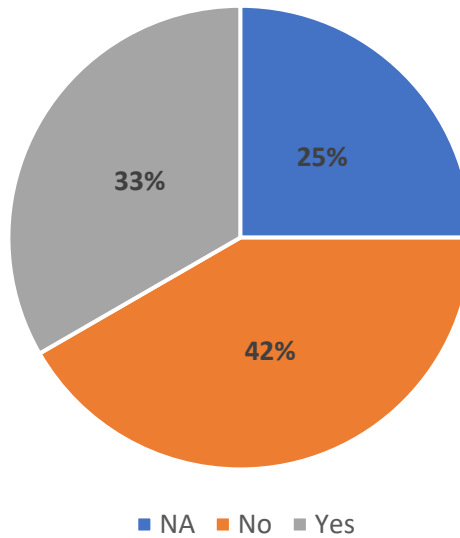
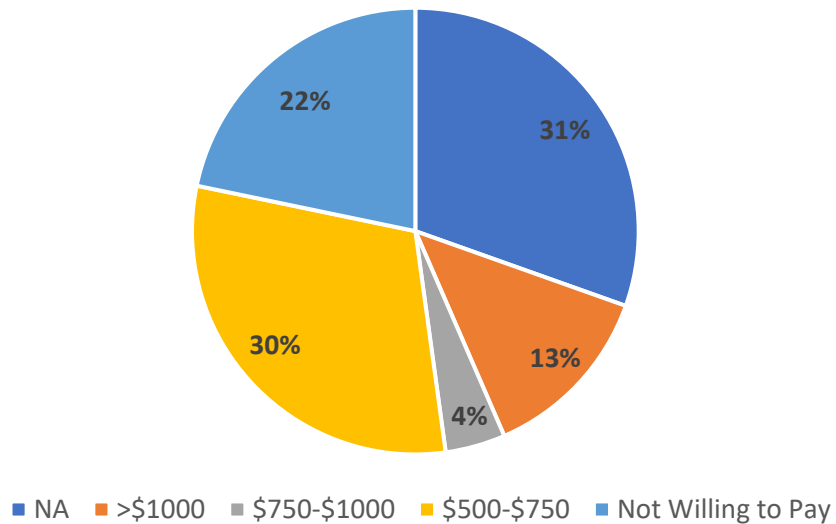


Figure 5.6
Willingness to Pay for Municipal Water & Sewer (per year)



5.5 Other Comments

The survey also included space on which respondents could provide additional written information about their property and wastewater needs. These comments were reviewed and are summarized below.

- 4 survey respondents stated they would be interested in connecting to Town water and wastewater utilities.
- 1 survey respondent stated they would be interested in connecting to the Town wastewater utility, but not water.
- 6 survey respondents said they would be interested in pursuing a commercial or mixed-use development if Town water and wastewater utilities were available.
- 2 respondents stated they would be interested in constructing a single-family residence if Town water and wastewater utilities were available.
- 1 respondent stated they do not anticipate pursuing any future development

6. EVALUATION OF ALTERNATIVES - WATER

The following alternatives were evaluated in detail to provide municipal water.

- Alternative No. 1 – Municipal Extension
- Alternative No. 2 – New Public Community Water System
- Alternative No. 3 – Do Nothing

6.1 Alternative No. 1 – Municipal Extension

6.1.1 Description

For this approach, a new 8" waterline would be extended from the edge of the Wilmington Water District east to the area of VT Route 9 and Route 100 as shown on Figure 5 in Appendix A. This municipal extension will include the following:

- Approximately 6,000' of 8" PVC C900 waterline.
- Two (2) jack and bore crossings of Vt Route 9
- Fire hydrants every 500'
- Gate valves at intersections
- Provisions for approximately 10 water services

6.1.2 Preliminary Design Criteria

The static pressure at the end of the existing waterline on Route 9 is about 105 psi, and ground elevation at this location is approximately 1,522'. As the new waterline extends east along Route 9, the ground elevation rises to about elevation 1608' near the Inn and then decreases down to about 1598' near the intersection of Route 9 and 100 south. Maintaining adequate static pressure above 35 psi for domestic demands is not an issue at the existing hydraulic grade line, and minimum fire flow can be supplied at 500 gpm while maintaining a minimum of 20 psi.

In the initial year, the average day water demands are anticipated to be less than 2,500 gpd. This will be contingent on which existing properties connect on at the initial year. The waterline sizing and related infrastructure are more than adequate to meet the water demands for the design year.

6.1.3 Technical Analysis

A summary of the advantages and disadvantages of this approach are summarized below in Table 6.1. This technical analysis is based on the Town taking over the water system.

Table 6.1
Alternative No. 1 – Municipal Extension

Advantages	Disadvantages
<ul style="list-style-type: none"> • The Town has control over the water allocation • Provides domestic and fire flow without pumping • Lowest O&M cost for the Town • Lowest long term cost as most of the new infrastructure is waterline which has a useful life greater than 50 years • More reliable as it uses the existing Water District supply • Most of the infrastructure improvements are within the public right of way and do not require any land acquisition 	<ul style="list-style-type: none"> • Concerns about water quality with the long dead line and limited usage in the initial years. • Could require the Water District to use other sources of water which are more costly to treat

6.2 Alternative No. 2 – New Public Community Water System

6.2.1 Description

The Town requested that an alternative be evaluated to provide a separate community water system to serve this area. As this approach would include its own supply, storage, and distribution it would be defined as a public community water system. By definition, this water system could have more than 15 connections and would serve residents year around.

The well logs were reviewed in this area for the private wells and provided some good information on the quantity of water available. Most of these private wells were drilled in the early 1970's or 1990's, so they range from 30 to 50 years old. The wells near the intersection of Vt Routes 9 and 100, and east on Route 9 produce good yields. The overall depth of the wells range from about 100' to 220', and depth to ledge ranges from 50' to 100'. The drillers yields range from 10 to 100 gpm. A sufficient quantity of water at relatively shallow depths for these drilled wells appears to be available but no water quality data is available. One well drilled in the late 1960's owned by Brown is about 150' deep and had a yield of 100 gpm. One option would be for the Town to purchase an existing well if it could be approved by the State or land acquired in this area for development of a new source.

As shown on Figure 6 in Appendix A, this public water system would include the following components:

- A drilled well located in the vicinity of the Vt Route 9 and Ballou Hill Road area to supply the water.
- An 80,000 gallon storage reservoir to supply domestic demands and fire flows at about elevation 1761 and located north of Ballou Hill Road.
- Transmission mains to interconnect the well and storage reservoir to the distribution system.
- Approximately 3,300' of 8" PVC waterline
- Fire hydrants every 500'
- Gate valves at intersections
- Provisions for approximately 10 water services

6.2.2 Preliminary Design Criteria

For this approach, a new water source would need to be developed and approved by the State for use as a public community water system. A minimum yield of 25 gpm is preferred to supply an average day demand up to 18,000 gpd at the design year. Based on the existing well logs in the area, this is a realistic yield and the well would be about 200' deep and require approximately 100' of casing to refusal. No data is available on the water quality, so treatment requirements will be dependent on the source.

A new reservoir with a volume of 80,000 gallons would supply both the domestic and fire flow demands. A fire flow of 500 gpm is provided for up to 2 hours and approximately 20,000 gpd is available for average day domestic demands.

The reservoir will be located at about elevation 1761 so that a minimum pressure of 50 psi can be maintained with the proposed service area.

6.2.3 Technical Analysis

A summary of the advantages and disadvantages of this approach are summarized below in Table 6.2. This technical analysis is based on the Town being responsible for this water system.

Table 6.2
Alternative No. 2 – New Public Community Water System

Advantages	Disadvantages
<ul style="list-style-type: none"> • Extension of the waterline to this service area would be eliminated. • Provides both domestic and fire flow demands if a separate storage reservoir is provided • The existing private wells appear to have sufficient yields based on the well logs 	<ul style="list-style-type: none"> • Land purchase would be required for a new well and storage reservoir. • New separate driveways will be required to access the new well and storage which will be in different locations. • Construction of a new storage reservoir will be required for supplying fire protection • Electric service will need to be extended to the well and storage reservoir • Additional testing and monitoring will be required for this separate water supply. • The Town and/or water district would have to operate and maintain 2 separate public water systems • Increases the O&M costs to operate a second water system • Most costly long- term approach • Depending on the source water quality, treatment may be required

6.3 Alternative No. 3 – Do Nothing

If either the municipal waterline are not extended or a new public community water system developed to serve this area, then the status quo would continue. Developed properties would continue to use the existing drilled wells and depending on the available quantity and water quality for specific lots, this could limit the redevelopment of these commercially zoned properties. In addition, no fire flow is currently provided to help reduce the insurance rating of the residential and commercial buildings in this service area.

6.4 Estimated Costs

Estimated construction costs were developed for the water system alternatives but a cost was not developed for Alternative No. 2. Creating a new public water system when a reliable municipal supply is close by is not cost effective or practical long term for the Town. This new system would also require land purchase for a new well and storage reservoir.

As the existing sewerline is along the north side of VT Route 9, the plan is to construct the new waterline along the south side of the roadway. This will provide adequate separation from a new sewerline constructed on the north side of the roadway.

A review of the soil maps for this area indicate a range of loamy and sandy loams. Some areas indicate the soils to be very bouldery, so a quantity of rock and boulder removal was included in the cost estimates. However, until subsurface investigation is performed these quantities can not be confirmed.

The estimated construction cost is provided below in Table 6.3 and a more detailed breakdown is in Appendix F .

Table 6.3
Water Alternatives
Estimated Construction Costs

Alternative	Estimated Construction Cost⁽¹⁾
No. 1 – Municipal Extension	\$975,000
No. 2 – New Public Community Water System	N/A

Notes:

1. ENR 11540 = October 2020

7. EVALUATION OF ALTERNATIVES – WASTEWATER

The following alternatives were evaluated in detail for the extension of municipal wastewater to the study area:

- Alternative No. 1 – Municipal Extension
- Alternative No. 2 – Do Nothing

7.1 Alternative No. 1 – Municipal Extension

7.1.1 Description

For this approach, a new sewer collection system will be constructed in the area of VT Route 9 and Route 100 as shown on Figure 7 in Appendix A. This municipal extension will include the following:

- A new sewer collection system consisting of approximately 3,900' of new 8" PVC gravity sewer. Manholes will be provided for maintenance at changes in alignment and grade and sewer services stubbed to the edge of right of way.
- At the low point near the intersection, a new wastewater pump station. This pump station will be a duplex submersible station with a 6' diameter wet well and separate valve pit.
- A new 4" sewer forcemain will extend approximately 1,600' west along VT Route 9 to convey the flow from the new pump station to the existing gravity sewerline.
- Upgrade of the existing East Main Street ejector station #1 near the Mobile Station. This upgrade will consist of a new duplex submersible station with a 6' diameter wet well and separate valve pit.

7.1.2 Preliminary Design Criteria

New gravity sewers will be a minimum of 8" diameter, and will include 4' diameter precast concrete manholes for maintenance. The new pump station will have a design capacity of 15,000 to 20,000 gpd.

7.1.3 Technical Analysis

A summary of the advantages and disadvantages of this approach are summarized below in Table 7.1.

Table 7.1
Alternative No. 1 – Municipal Extension

Advantages	Disadvantages
<ul style="list-style-type: none"> • The Town has control over the sewer allocation • Lowest O&M cost for the Town • Lowest long term cost as a majority of the new infrastructure is new sewerline and forcemain which has a useful life greater than 50 years • More reliable as it uses the existing sewer system • Most of the infrastructure improvements are within the public right of way and doesn't require any land acquisition. 	<ul style="list-style-type: none"> • Requires the upgrade of the existing Ejector Station #1

7.2 Alternative No. 2 – Do Nothing

If the municipal sewerline is not extended, then the status quo would continue. Developed properties would continue to use the existing soil based septic systems, and depending on the adequacy, this could limit the redevelopment of these commercially zoned properties.

7.3 Estimated Costs

Estimated construction costs were developed for the wastewater alternatives. The estimated construction cost is provided below in Table 7.2 and a more detailed breakdown is in Appendix F.

As the existing sewerline is along the north side of VT Route 9, the plan is to construct the new gravity sewerline along the north side of the roadway. This will provide adequate separation from a new waterline constructed on the south side of the roadway.

A review of the soil maps for this area indicate a range of loamy and sandy loams. Some areas indicate the soils to be very bouldery, so a quantity of rock and boulder removal was included in the cost estimates. However, until subsurface investigation is performed these quantities can not be confirmed.

Table 7.2
Wastewater Alternatives
Estimated Construction Costs

Alternative	Estimated Construction Cost⁽¹⁾
No. 1 – Municipal Extension	\$1,035,000
No. 2 – Do Nothing	N/A

Notes:

1. ENR 11540 = October 2020

8. PROPOSED PROJECT

8.1 Project Phasing

To better disperse costs over time, make better use of available funding sources, reduce financial risks associated with the project, and establish a user base before making additional investments, it may be necessary to finance and construct the water and wastewater infrastructure in separate phases, with the sewer infrastructure constructed first.

Having a municipal sewer extension has been identified as the higher priority utility, however, the Town Selectboard and other interested parties are in favor of constructing both utility improvements at the same time. This approach is possible but results in a much higher initial capital investment. Additionally, by dividing the project into phases the potential contractor bid pool will increase, resulting in a more competitive bidding environment. Finally, regardless of approach, construction will span multiple years resulting in no scheduling advantage to the overall project.

8.2 Water Extension

The proposed water extension includes construction of water infrastructure (previously identified as Alternative No. 1) to serve this area. The water infrastructure will be connected to and served by the Wilmington Water District municipal water distribution system. For this approach, a new 8" waterline would be extended approximately 3,200' from the edge of the Wilmington Water District to the area of VT Route 9 and Route 100 as shown on Figure 8 in Appendix A. This municipal extension will include the following:

- Approximately 6,000' of 8" PVC C900 waterline.
- Two (2) jack and bore crossings of Vt Route 9
- Fire hydrants every 500'
- Gate valves at intersections
- Provisions for approximately 10 water services

8.3 Wastewater Extension

The proposed wastewater project includes construction of sewer infrastructure (previously identified as Alternative No. 1) to serve this area. The sewer infrastructure will be connected to and served by the Town of Wilmington municipal sewer system.

For this approach, a new sewer collection system will be constructed in the area of VT Route 9 and Route 100 as shown on Figure 8 in Appendix A. This municipal extension will include the following:

- A new sewer collection system consisting of approximately 3,900' of new 8" PVC gravity sewer. Manholes will be provided for maintenance at changes in alignment and grade and sewer services stubbed to the edge of right of way.
- At the low point near the intersection, a new wastewater pump station. This pump station will be a duplex submersible station with a 6' diameter wet well and separate valve pit.
- A new 4" sewer forcemain will extend approximately 1,600' west along VT Route 9 to convey the flow from the new pump station to the existing gravity sewerline.
- Upgrade of the existing East Main Street ejector station #1 near the Mobile Station. This upgrade will consist of a new duplex submersible station with a 6' diameter wet well and separate valve pit.

8.4 Estimated Costs

Estimated construction costs are included in Appendix F and are summarized in Table 8.1 below. The combined construction cost is \$2,150,000 based on an ENR 12230 for July 2022.

Table 8.1
Estimated Construction Costs

Proposed Project	Estimated Construction Cost	
	ENR 11540⁽¹⁾	ENR 12230⁽²⁾
Water Extension	\$975,000	\$1,050,000
Sewer Extension	\$1,035,000	\$1,100,000
Total		\$2,150,000

Notes:

1. ENR 11540 = October 2020
2. ENR 12230 = July 2022

The total project cost of \$2,900,000 is summarized in Table 8.2 and shows the breakdown of the water and wastewater projects. Total project costs are based on the estimated construction costs presented in Table 8.1, but also include; engineering allowances, and administrative costs, as well as a 10% construction contingency.

Table 8.2
Total Project Cost Summary

Item Description	Water Estimated Cost	Sewer Estimated Cost	Total Estimated Cost
Construction			
Water Extension ⁽¹⁾	\$1,050,000	\$0	\$1,050,000
Sewer Extension ⁽¹⁾	\$0	\$1,100,000	\$1,100,000
Subtotal	\$1,050,000	\$1,100,000	\$2,150,000
Construction Contingency			
10% Construction Contingency	\$105,000	\$110,000	\$215,000
Subtotal	\$105,000	\$110,000	\$215,000
Step I – Preliminary Engineering			
Preliminary Engineering ⁽²⁾	\$9,500	\$13,400	\$22,900
Environmental Report	\$1,200	\$1,200	\$2,400
Bond Vote Assistance	\$1,500	\$1,500	\$3,000
Subtotal	\$12,200	\$16,100	\$28,300
Steps II – Final Design⁽³⁾			
Final Design Allowance	\$55,000	\$60,000	\$115,000
Special Services – Permitting	\$15,000	\$15,000	\$30,000
Subtotal	\$70,000	\$75,000	\$145,000
Step III – Construction Phase Engineering⁽³⁾			
Construction Phase Services Allowance	\$134,000	\$144,000	\$278,000
Subtotal	\$134,000	\$144,000	\$278,000
Other Costs			
Administration/Permit Fees	\$2,500	\$2,500	\$5,000
Easements	\$2,500	\$15,000	\$17,500
Legal and Fiscal	\$5,000	\$5,000	\$10,000
Short Term Interest	\$10,000	\$10,000	\$20,000
Subtotal	\$20,000	\$32,500	\$52,500
Estimated Total Project Cost	\$1,391,200	\$1,477,600	\$2,868,000
Use	\$1,400,000	\$1,500,000	\$2,900,000

Notes:

1. ENR 12230 = July 2022
2. Fees are based on the current engineering agreement.
3. Based on State curve allowance.

8.5 Projected Operation & Maintenance Costs

Operation and maintenance (O&M) of the proposed water and/or sewer infrastructure are not anticipated to be significant here for either utility. Extension of the waterline is not expected to increase the O&M costs to the Water District or Town. There will be some slight increase in O&M costs to the Town for the sewer infrastructure with the operation and maintenance of the new pump station. In the initial years, this should be limited to electrical and cleaning of the wet well.

8.6 Permitting Requirements

8.6.1 Drinking Water and Groundwater Protection Division

Because the project involves construction of more than 500 linear feet of new water main, a Permit-to-Construct issued by the State of Vermont Drinking Water and Groundwater Protection Division will be necessary.

8.6.2 State Highway Right-of-Way Work/Access

A State Highway Right-of-Way Work/Access Permit (1111 Permit) issued by the Vermont Agency of Transportation will be necessary for the infrastructure constructed within the Route 9 and Route 100 right-of-way.

8.6.3 Act 250 Land Use Permit

An Act 250 jurisdictional determination from the State of Vermont will be required for this project. With the extension of municipal water and sewer to this new service area, it is likely that an Act 250 permit will be required.

8.6.4 Archeological Resource Assessment

Most federal funding sources require an archeological investigation be completed as part of the National Environmental Protection Act (NEPA) environmental review process. As part of the grant for this study, an Archeological Resource Assessment (ARA) was completed, which is a preliminary process used determine whether additional archeological work is necessary. The ARA completed as part of this study notes that most of the proposed infrastructure improvements will take place in archeologically sensitive areas, and recommends that a Phase I site identification survey be completed.

8.7 Potential Funding Sources

Several potential funding options are discussed below. It is expected that funding for the project will be derived from a combination of funding sources.

8.7.1 State of Vermont Clean Water and Drinking Water State Revolving Fund Loan

For the sewer, the Clean Water Revolving Loan Fund (CWSRF) offers construction loans at a 20 or 30 year term and 2% administrative fee, and 50% loan subsidies on engineering costs up to \$100,000 per year. However, unless points of pollution from failed septic systems are identified with existing developed properties or this service area is identified as a growth center, then the sewer extension would not be eligible for CWSRF funding.

The Drinking Water State Revolving Fund (DWSRF) offers loans with up to a 30-year loan term and 0% to 3% interest rates. This project would be low on the priority list unless there is a documented drinking water health issues.

DWSRF and CWSRF Priority List applications are typically due in January of each year for the project to be on the Project Priority List.

8.7.2 USDA/Rural Development

The USDA/ Rural Development Program provides grant and loan funding for water and wastewater infrastructure projects in rural areas. Loan terms of up to 40 years and interest rates of 1.75% to 3% can be combined with additional grant funding, depending on the economic conditions in the area. As of 2020, the Town of Wilmington is eligible for up to 45% grant funding through this program. While USDA Rural Development and State of Vermont SRF programs share many similarities, USDA Rural Development funding is generally more suitable for infrastructure extensions. Funding applications for this program can be submitted anytime but are due in December of each year and a positive bond vote is required before a funding offer can be issued.

8.7.3 Northern Border Regional Commission Economic Infrastructure Development Grants

The Northern Border Regional Commission (NRBC) offers grants of up to \$1,000,000 for eligible infrastructure projects. This federally-funded program requires matching funds of up to 50%. Matching funds can be obtained through other funding programs but must include a minimum 20% non-federal match. Funding applications for this program are generally accepted in May of each year.

8.7.4 US Department of Commerce Economic Development Authority Grant

The US Department of Commerce provide grants through the Economic Development Authority (EDA) in amounts from \$100,000 to \$3,000,000. To qualify, the project must demonstrate alignment with EDA's investment priorities, which include construction of water and sewer infrastructure to support economic development and investment in Qualified Opportunity Zones.

Funding applications are accepted on an ongoing basis until that grant cycle's funds are depleted, with funding cycles typically beginning in the fall of each year.

8.7.5 State of Vermont Community Development Program

The State of Vermont's Vermont Community Development Program (VCDP) offers grants of \$5,000 to \$500,000 for economic or community development projects (including infrastructure projects), with a particular focus on projects that benefit low-income residents or support housing or critical services. Applications for these grants are accepted multiple times per year. These grants are relatively competitive and the proposed project may not be well suited to this program unless the benefit to low-income residents, housing or critical services can be documented. Typically, this grant must be supported by a firm commitment from a new business or tenant where new jobs are documented.

8.7.6 Vermont Municipal Bond Bank

The Vermont Municipal Bond Bank (VMBB) provides loans to municipalities for a wide range of purposes, including infrastructure projects that may not be eligible for other funding programs described above. While loan terms are generally more favorable than could be obtained from commercial lenders, loan forgiveness is not available and loan terms and interest rates are not as favorable as other funding programs described above. Typical loan term is 20 years and the interest rate is based on the current market rate. Therefore, it is not recommended that VMBB funding be pursued unless funding available from the other State and Federal programs described above is inadequate.

8.8 Project Funding Alternatives

Two funding alternatives for the proposed water and sewer projects are described below, and summarized Table 8.3.

8.8.1 Funding Alternative No. 1

Under Funding Alternative No. 1, approximately 50% of project costs would be funded by the Economic Development Authority grant. A Northern Borders Regional Commission grant at half the maximum allowable level of \$1,000,000 would also be used. Both of these are federal grants, so a Vermont Municipal Bond Bank loan covering the remaining 25% of project costs would be used to satisfy Northern Border's 20% non-federal matching requirement.

8.8.2 Funding Alternative No. 2

Like Funding Alternative No. 1, approximately 50% of project costs under Funding Alternative No. 2 would be funded by an Economic Development Authority grant. However, rather than seeking

a Northern Borders grants (which require a non-federal 20% match), the remaining project cost could be funded via a USDA Rural Development Program loan with a grant of up to 25%.

Table 8.3
Funding Alternatives Comparison – Proposed Water & Sewer Project

Funding Alternative No. 1		Funding Alternative No. 2	
Funding Source	Estimated Funding	Funding Source	Estimated Funding
Economic Development Authority Grant	\$1,450,000	Economic Development Authority Grant	\$1,450,000
Northern Borders Regional Commission Grant (up to 25% of total project costs; requires 20% non-federal match; \$1,000,000 limit)	\$ 500,000	Northern Borders Regional Commission Grant (up to 25% of total project costs; requires 20% non-federal match; \$1,000,000 limit)	\$0
Local Share		Local Share	
VMBB Loan 20-year Loan Term @ 2.5% \$61,140 Annual Payment	\$ 950,000	USDA Rural Development 30-year Loan Term @ 1.875% Interest; 25% Grant Annual Payment \$47,900	\$1,087,500 \$362,500
Total Estimated Funding	\$2,900,000		\$2,900,000

8.9 Projected User Rates

Under the funding alternatives evaluated above, approximately \$48,000 or \$62,000 in debt service will be necessary each year. Two potential revenue sources to support this debt are described below.

Town of Wilmington General Fund / Property Taxes

A portion of the project's debt service could be paid using Town-wide property taxes. This approach would require a town-wide assessment of Wilmington's grand-list and a determination of tax on the assessed value sufficient to cover the annual debt service.

User Fees

For most water and sewer infrastructure projects a substantial portion of the project's debt service and operation and maintenance costs are paid via user fees. Since it is assumed that operation and maintenance costs would be covered as part of the Town water and sewer user fees, additional user fees would be needed to cover debt service.

To maintain affordability, annual user fees should generally not exceed approximately \$1,000 each for sewer and water service for a three-bedroom single-family residence if possible. A user of the proposed water and sewer infrastructure would have to pay some additional amount to cover debt service associated with the project. As part of the preliminary engineering phase, more detailed impacts to user fees can be determined based on final project scope and phasing.

8.10 Project Schedule

A preliminary schedule for implementing the proposed water and sewer projects is shown in Table 8.4, below.

Table 8.4
Project Schedule – Proposed Water and Sewer Projects

	2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Finalize Feasibility Study				X												
Submit Funding Applications																
Bond Vote (November)								X								
Final Design and Permitting																
Bid Advertisement										X						
Construction																

9. CONCLUSIONS & RECOMMENDATIONS

9.1 Conclusions

Construction of water and sewer infrastructure to the proposed service areas is technically feasible, but will be challenging to implement economically. Key challenges are the limited existing user base in the initial years over which to distribute costs, as well as lag from initial installation of the proposed infrastructure and new development in the proposed service area.

9.2 Recommended Next Steps

Should the Town of Wilmington decide to move forward with the proposed project, the following steps are recommended:

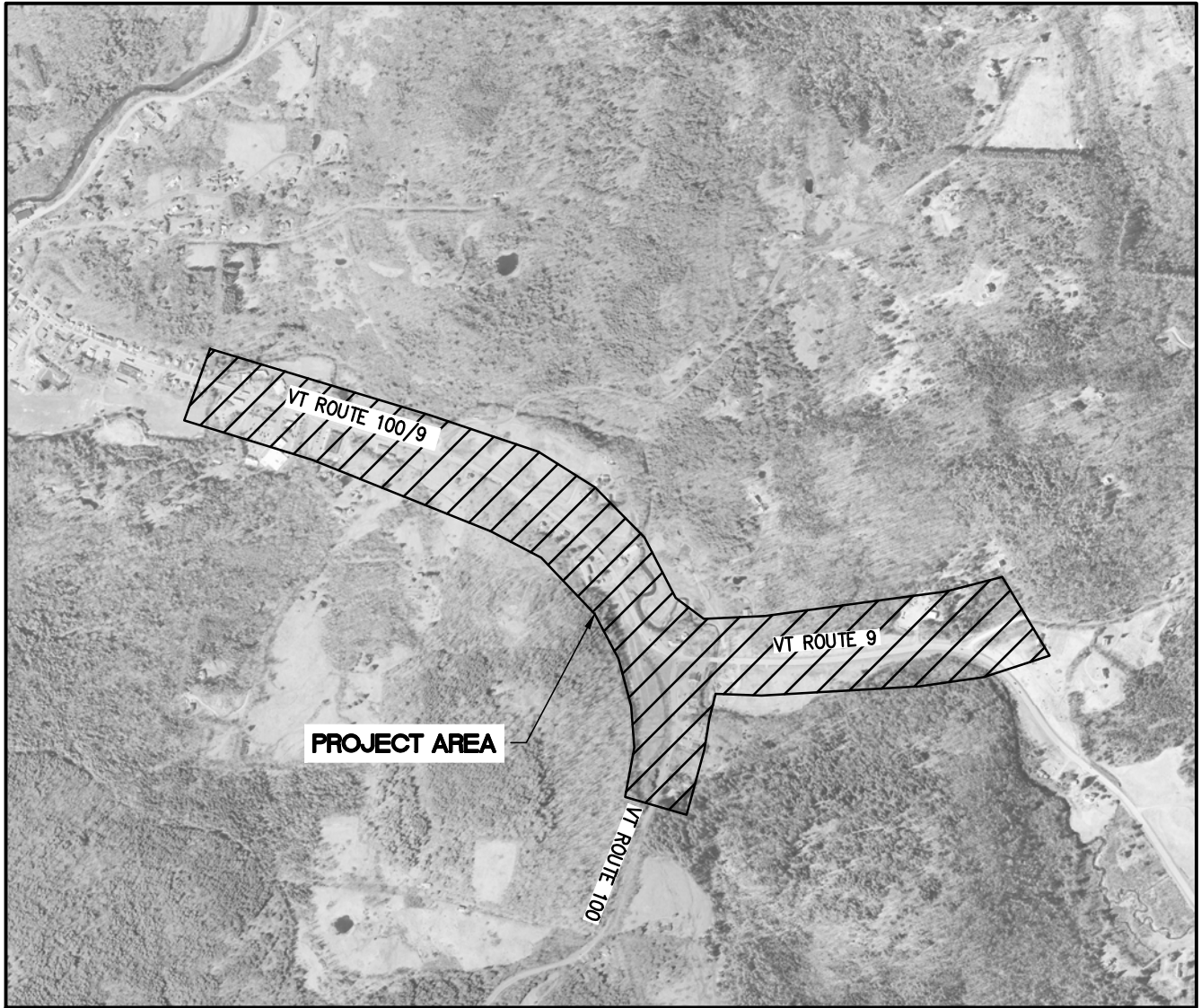
1. The Town of Wilmington should discuss the project with the funding programs described above and begin pursuing available funding sources. Key topics of discussion should be the eligibility of the project for funding and key project development goals necessary to acquire funding.
2. The Town of Wilmington should also assess in more detail the potential development within the proposed service area. This assessment would prove beneficial in developing an overall phasing and funding plan to encourage development and avoid “over-building” new Town infrastructure.
3. The Town of Wilmington should obtain final approval from the State Legislature and formally acquire the drinking water utility prior to pursuing expansion of the water system.

Pending favorable outcomes from these steps, the Town of Wilmington will need to begin preparation of funding applications, prepare bond documents, hold public informational meetings, and pass a Town-wide bond vote in order to secure loan funding.

APPENDIX A

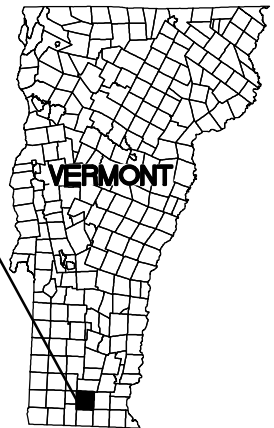
FIGURES

Y:\19008-WILMINGTON\STEP 1\19008-FIG 1.dwg, 1/4/2021 9:44:46 AM



LOCATION MAP

SCALE: 1"=1,250'



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LOCATION MAP

ROUTE 9
WATER AND WASTEWATER FEASIBILITY STUDY

TOWN OF WILMINGTON

WILMINGTON

VERMONT

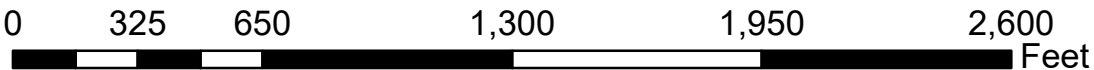
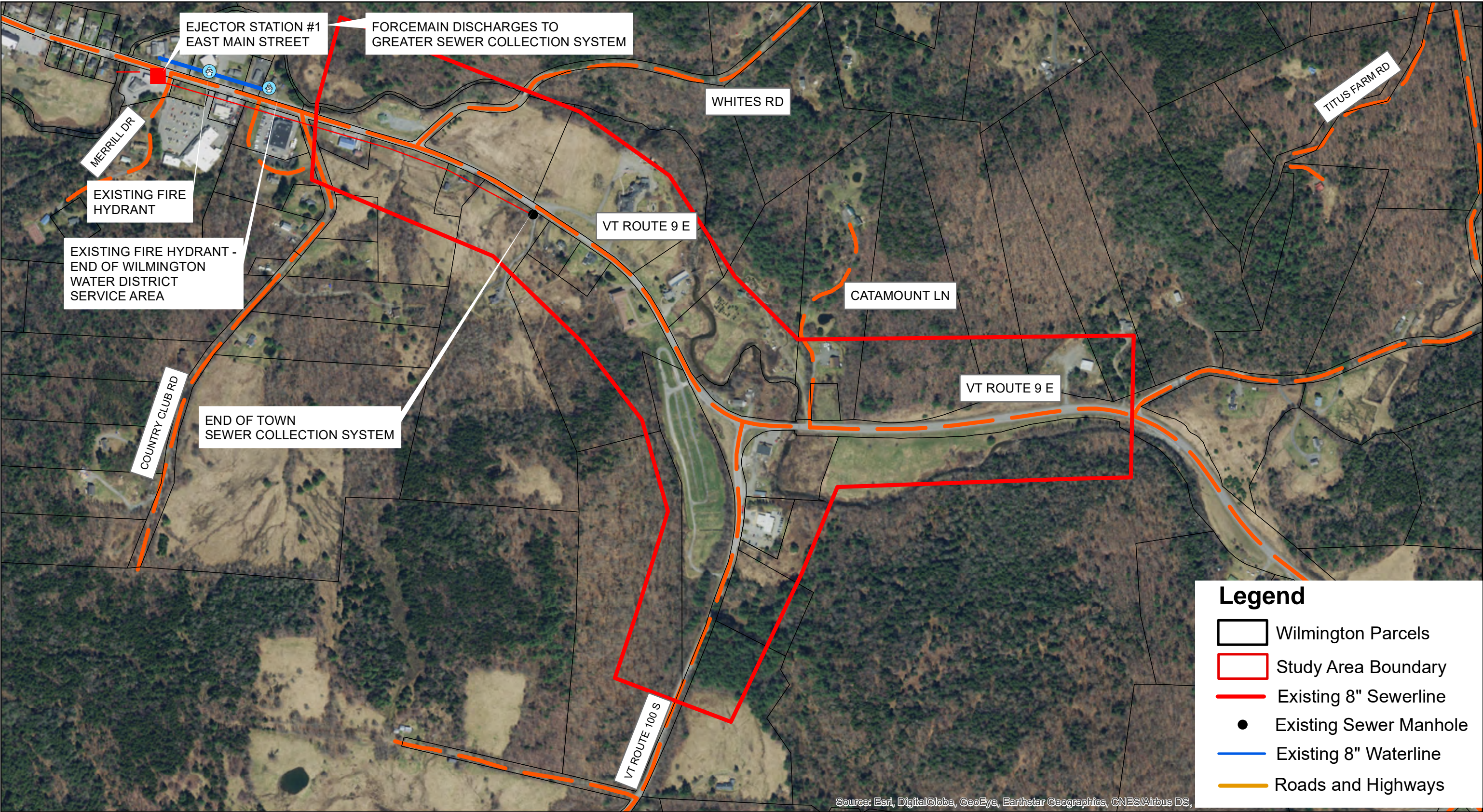
DESIGNED JSK
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CHECKED (PM) WAE
CHECKED (PE) WAE
SCALE AS NOTED
DATE DEC. 2020

PROJECT NO.

19008

FIGURE NO.

1



1" = 217'



STUDY AREA AND
EXISTING INFRASTRUCTURE

WILMINGTON RTE 9
WATER AND WW
FEASIBILITY STUDY
TOWN OF WILMINGTON

WILMINGTON

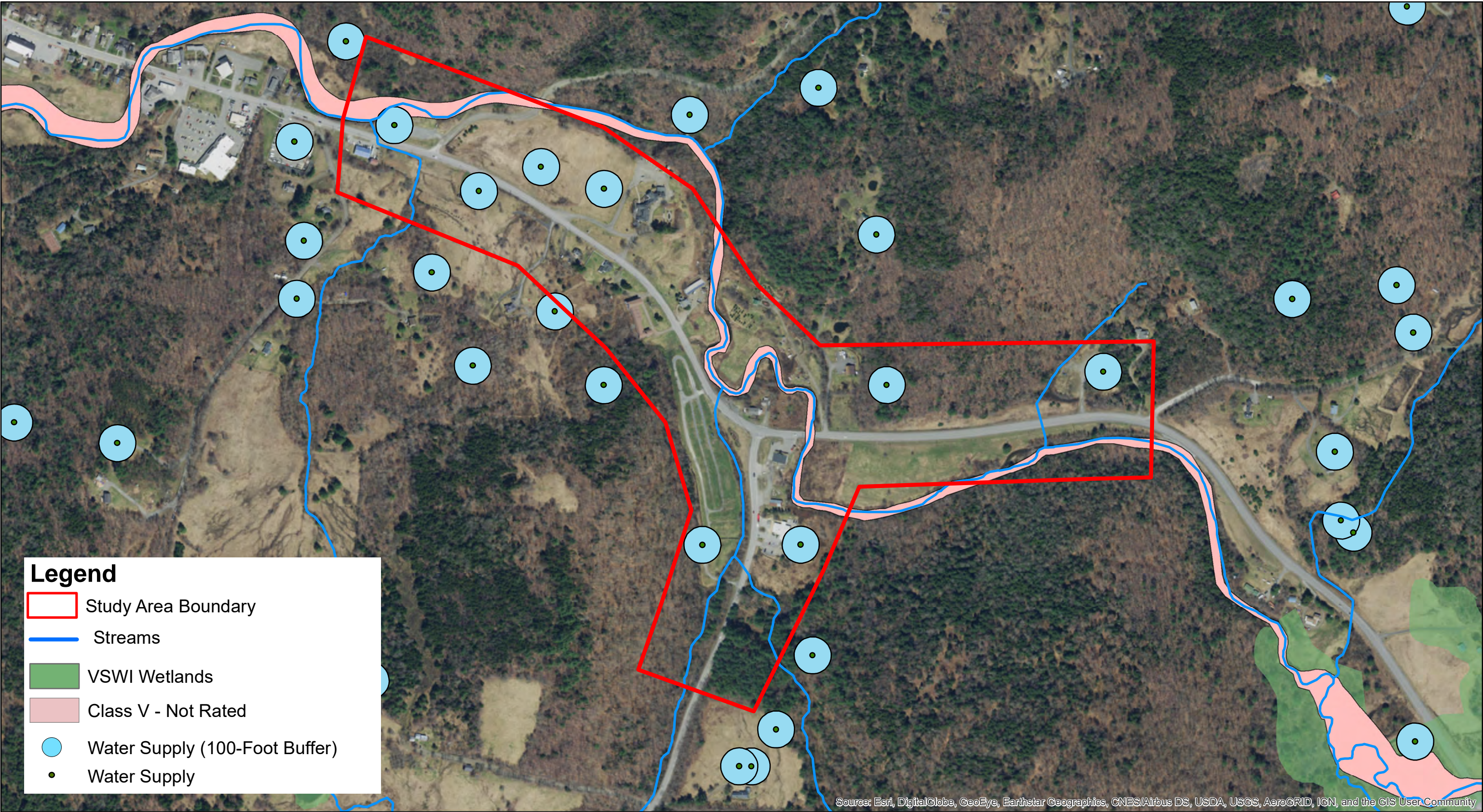
DESIGNED WAE	FIGURE NO. 2
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SCALE AS NOTED	
DATE DECEMBER 2020	

PROJECT NO.







19008

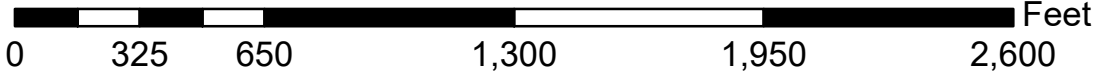
FIGURE NO.

2




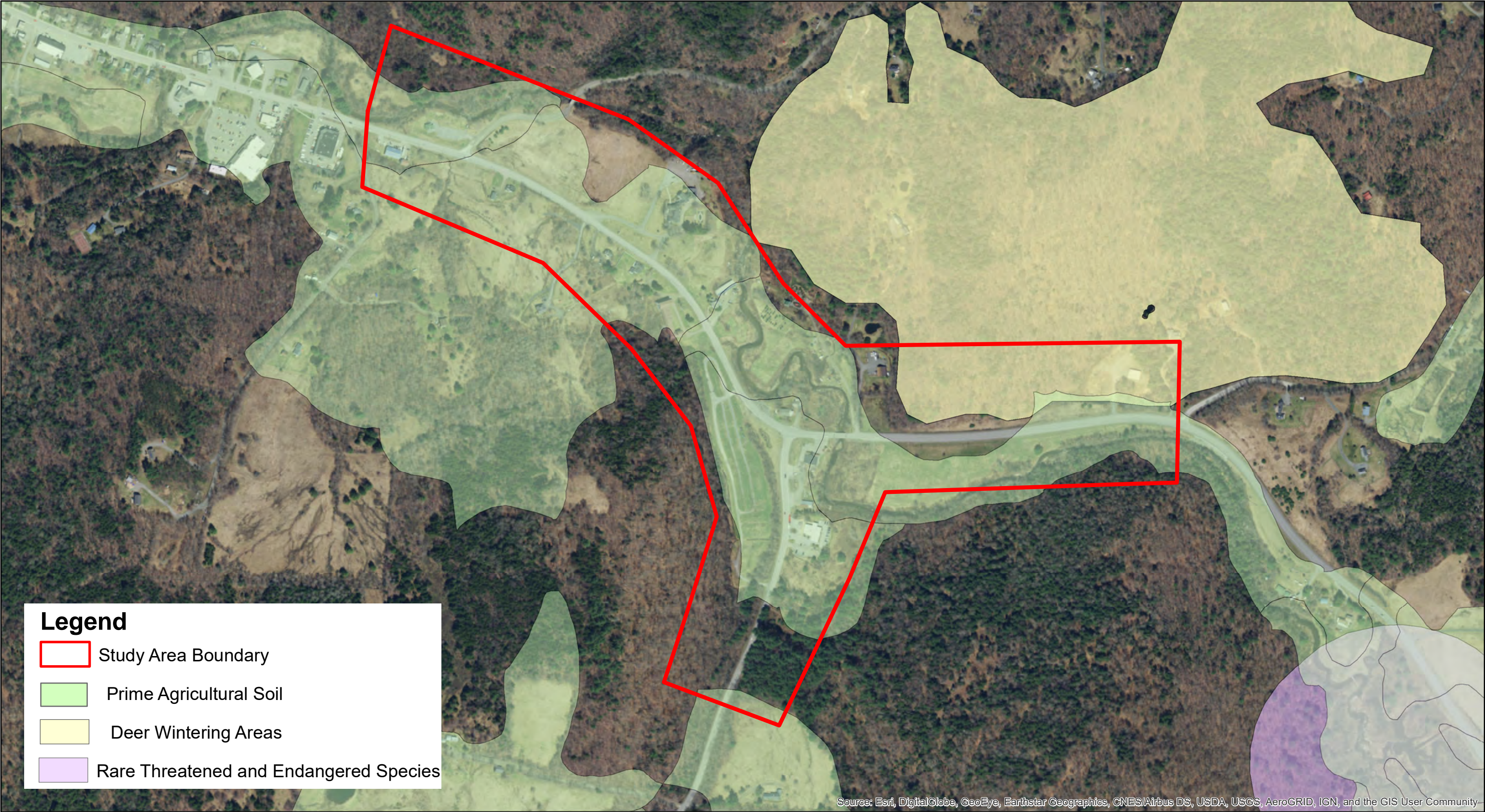
Legend

-  Study Area Boundary
-  Streams
-  VSWI Wetlands
-  Class V - Not Rated
-  Water Supply (100-Foot Buffer)
-  Water Supply



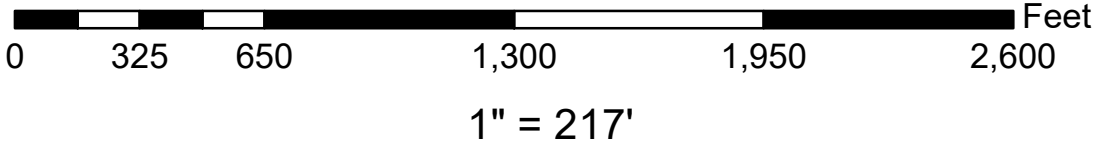
1" = 217'


	WATER RESOURCES		DESIGNED WAE	PROJECT NO. 19008
			DRAWN MG	
	WILMINGTON RTE 9 WATER AND WW FEASIBILITY STUDY TOWN OF WILMINGTON		CHECKED (PM) WAE	FIGURE NO. 3
			CHECKED (PE) WAE	
WILMINGTON		VT		SCALE AS NOTED DATE DECEMBER 2020



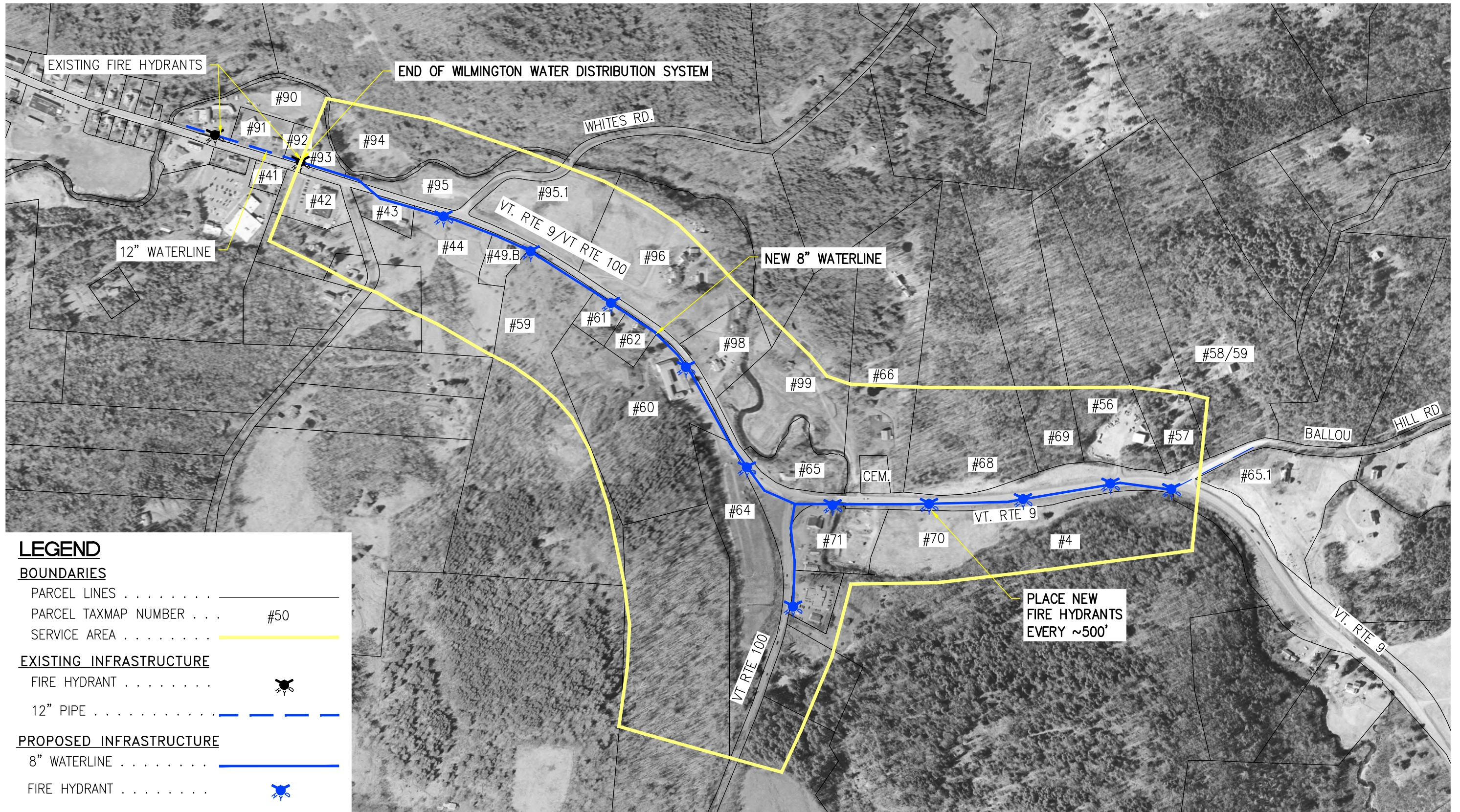
Legend

-  Study Area Boundary
-  Prime Agricultural Soil
-  Deer Wintering Areas
-  Rare Threatened and Endangered Species



	ENVIRONMENTAL RESOURCE MAP	DESIGNED WAE	PROJECT NO. 19008
		DRAWN MG	
	WILMINGTON RTE 9 WATER AND WW FEASIBILITY STUDY	CHECKED (PM) WAE	FIGURE NO. 4
	TOWN OF WILMINGTON WILMINGTON VT	CHECKED (PE) WAE SCALE AS NOTED DATE DECEMBER 2020	

Y:\19008-WILMINGTON\STEP 1\19008-FIG 5.dwg, 10/16/2020 10:49:27 AM



LEGEND

BOUNDARIES

PARCEL LINES

PARCEL TAXMAP NUMBER . . . #50

SERVICE AREA

EXISTING INFRASTRUCTURE

FIRE HYDRANT

12" PIPE

PROPOSED INFRASTRUCTURE

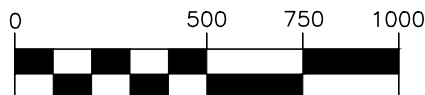
8" WATERLINE

FIRE HYDRANT

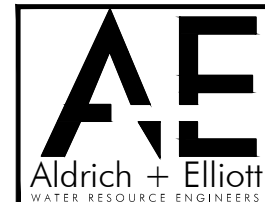


PLAN
SCALE: 1"=500'

GRAPHIC SCALE



(IN FEET)



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**WATER
ALTERNATIVE NO.1**

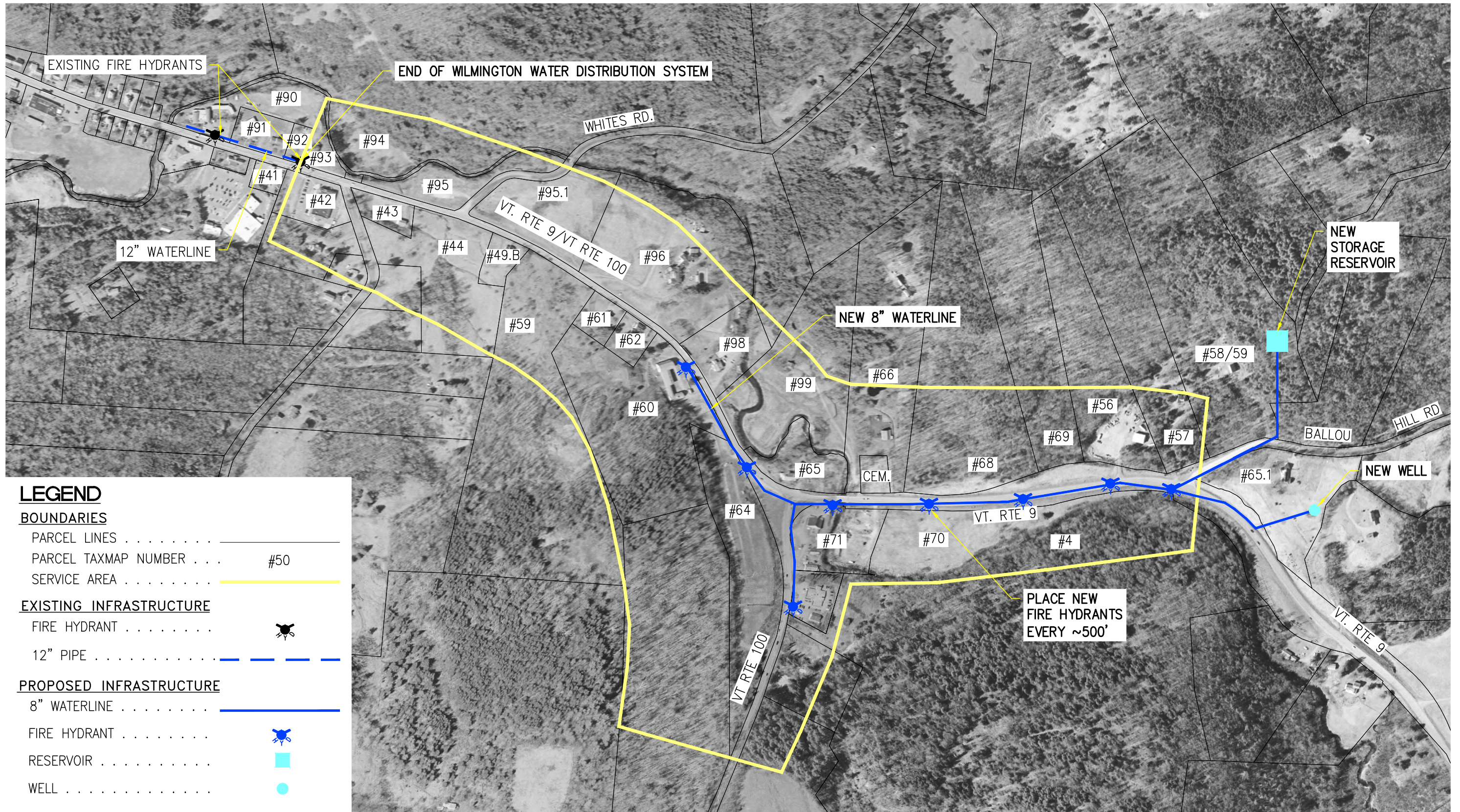
ROUTE 9
WATER AND WASTEWATER FEASIBILITY STUDY

WILMINGTON

VERMONT

DESIGNED JSK	PROJECT NO. 19008
DRAWN JEB	FIGURE NO. 5
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DATE DEC. 2020	

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LEGEND

BOUNDARIES

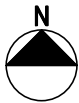
- PARCEL LINES
- PARCEL TAXMAP NUMBER . . . #50
- SERVICE AREA

EXISTING INFRASTRUCTURE

- FIRE HYDRANT
- 12" PIPE

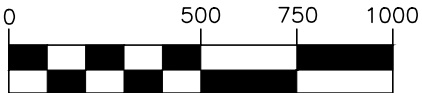
PROPOSED INFRASTRUCTURE

- 8" WATERLINE
- FIRE HYDRANT
- RESERVOIR
- WELL



PLAN
SCALE: 1"=500'

GRAPHIC SCALE



(IN FEET)



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**WATER
ALTERNATIVE NO.2**

ROUTE 9
WATER AND WASTEWATER FEASIBILITY STUDY

TOWN OF WILMINGTON

WILMINGTON

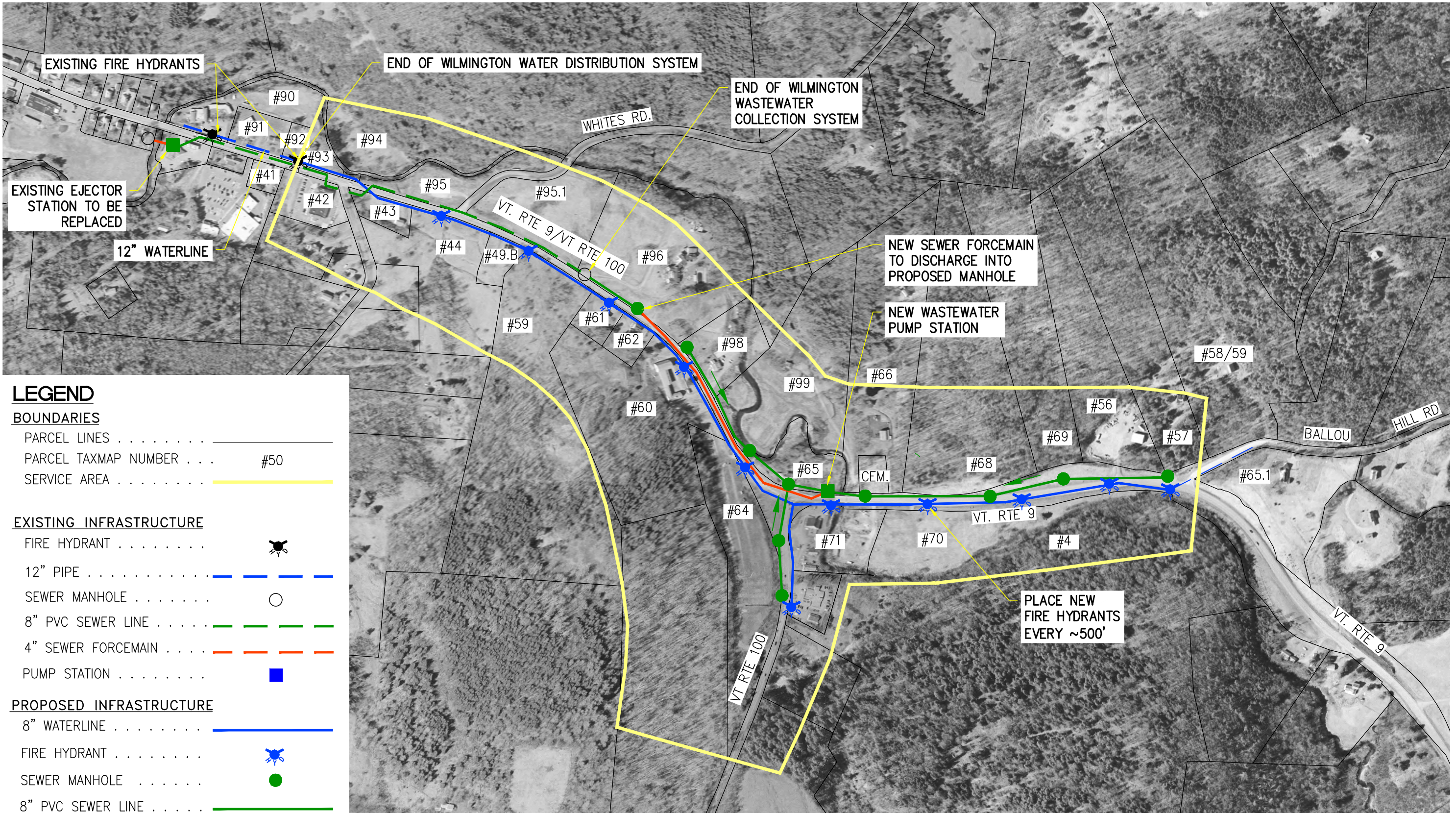
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SCALE AS NOTED
DATE DEC. 2020

PROJECT NO.
19008

FIGURE NO.
6

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LEGEND

BOUNDARIES

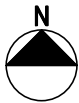
- PARCEL LINES
- PARCEL TAXMAP NUMBER . . . #50
- SERVICE AREA

EXISTING INFRASTRUCTURE

- FIRE HYDRANT
- 12" PIPE
- SEWER MANHOLE
- 8" PVC SEWER LINE
- 4" SEWER FORCEMAIN
- PUMP STATION

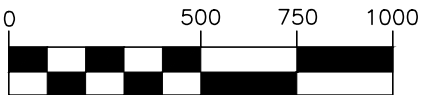
PROPOSED INFRASTRUCTURE

- 8" WATERLINE
- FIRE HYDRANT
- SEWER MANHOLE
- 8" PVC SEWER LINE
- 4" SEWER FORCEMAIN
- PUMP STATION



PLAN
SCALE: 1"=500'

GRAPHIC SCALE



(IN FEET)



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AEengineers.com

PROPOSED PROJECT

ROUTE 9
WATER AND WASTEWATER FEASIBILITY STUDY

TOWN OF WILMINGTON

WILMINGTON

VERMONT

DESIGNED
JSK
DRAWN
JEB
CHECKED (PM)
JSK
CHECKED (PE)
WAE
SCALE
AS NOTED
DATE
DEC. 2020

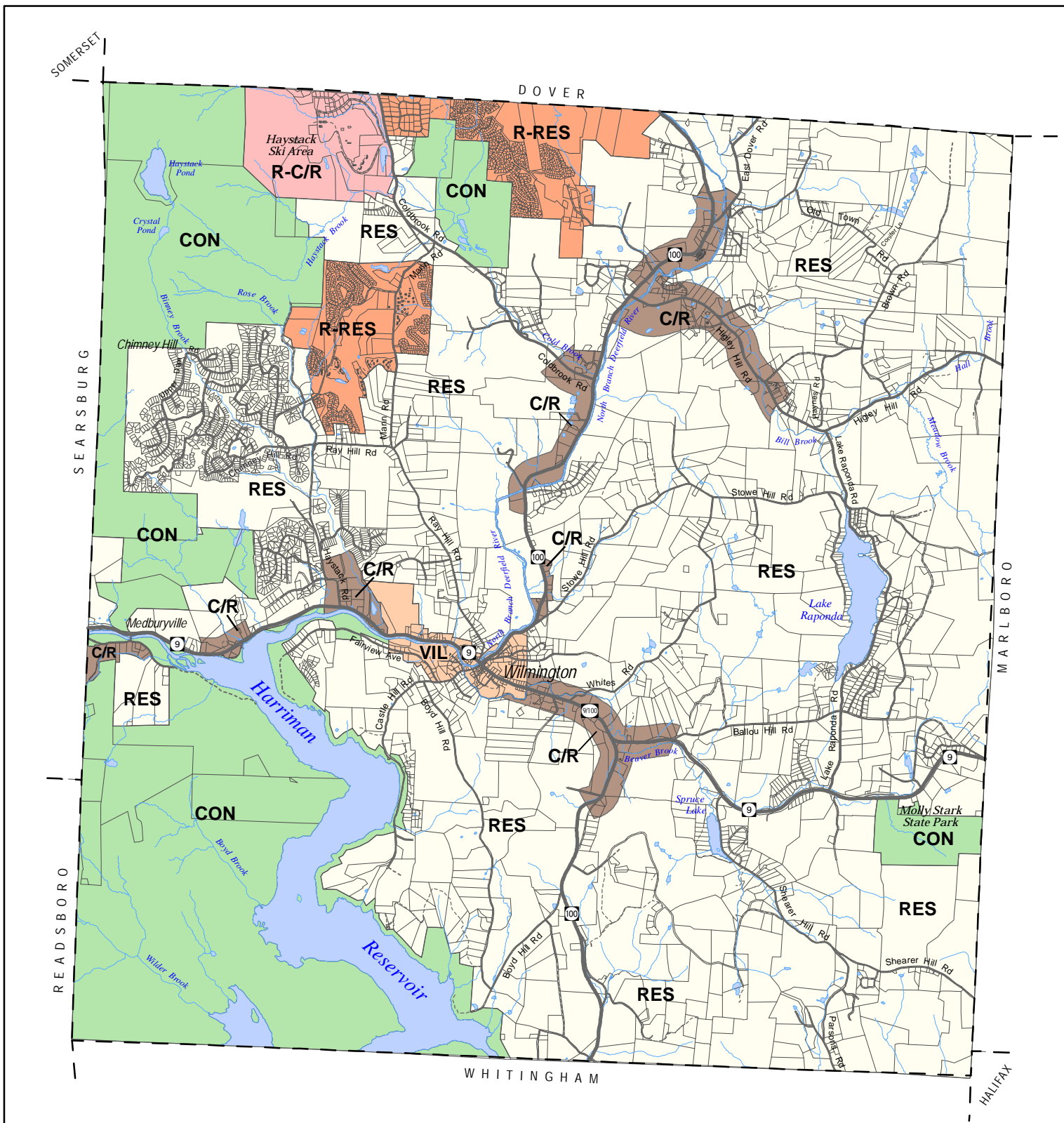
PROJECT NO.
19008

FIGURE NO.
8

APPENDIX B

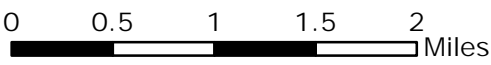
TOWN OF WILMINGTON

ZONING MAP



Town of Wilmington, Vt. Zoning Districts

adopted 7/20/2016



- R-C/R** Resort-Commercial/Residential
- R-RES** Resort-Residential
- C/R** Commercial/Residential
- VIL** Village
- RES** Residential
- CON** Conservation

APPENDIX C

WILMINGTON WATER DISTRICT PERMIT TO OPERATE



Vermont Department of Environmental Conservation
Drinking Water and Groundwater Protection Division
One National Life Drive - Main 2 [phone] 802-828-1535
Montpelier, VT 05620-3521 [fax] 802-828-1541
www.dec.vermont.gov/water

Agency of Natural Resources

July 10, 2019

Chris A Lavoy
Po Box 1927
Wilmington, VT 05363

Re: Permit to Operate for Wilmington Water District, a Public Community Water System in Wilmington, VT WSID# VT0005310.

Dear Mr. Lavoy,

Enclosed you will find a new permit to operate for the Wilmington Water District. Please notice that while this permit does not have an expiration date, this Division will amend the Permit as it deems necessary to direct the Water System toward compliance with the standards being administered under the Vermont Water Supply Rule, Chapter 21. The permit establishes general requirements that the water system is to adhere to. This operating permit is an amended permit that replaces Permit 5310-15.0 that was last issued by the Division on January 7, 2016. This amended permit contains updated information about the Water System's approved, permitted, infrastructure.

Please pay special attention to the requirements established in Section IV of this permit, which include the requirements for authorizing expansion of the Water System, and a requirement to provide a source protection plan update to the Division.

Please contact me directly with any questions regarding this permit. I may be reached directly by phone at 802-461-5661 or by email at patrick.smart@vermont.gov.

Sincerely,

A handwritten signature in cursive script that reads "Pat Smart".

Patrick Smart
System Operations Specialist
Drinking Water and Groundwater Protection Division

C: Ellen Parr Doering, Assistant Division Director, DWGWPD
Tim Raymond, Operations and Engineering Section Chief, DWGWPD
Rodney Pingree, Water Resources Section Chief, DWGWPD
Ben Montross, Compliance and Support Services Section Chief, DWGWPD
Patrick Smart, Operations Section Supervisor, DWGWPD
Terry Shearer, Springfield Regional Office, DWGWPD
John Fay, Permit Specialist, EAO
John Goodell, SVE Associates
WSID File VT0005310

Enc: Permit to Operate

**Agency of Natural Resources
Vermont Department of Environmental Conservation
Drinking Water and Groundwater Protection Division**

Public Community Water System Permit to Operate

PERMIT NUMBER: 5310-19.0

WATER SYSTEM IDENTIFICATION NUMBER: VT0005310

PIN #: NS96-0077

PERMITTEE (Owner): Wilmington Water District

WATER SYSTEM: Wilmington Water District

TOWN: Wilmington

DESIGNATED CONTACT PERSON: Chris A Lavoy

ADDRESS: Po Box 1927
Wilmington VT 05363

I. Authority

This Permit to Operate (Permit) a Public Community Water System, known as **Wilmington Water District** (Water System) is issued to **Wilmington Water District** (Permittee) by the Vermont Department of Environmental Conservation, Drinking Water and Ground Water Protection Division (the Division) on behalf of the Secretary of the Agency of Natural Resources (the Secretary). This permit is issued in accordance with 10 V.S.A. Chapter 56 and the Vermont Water Supply Rule (Rule). Because Vermont has primacy to implement the relevant provisions of the Federal Safe Drinking Water Act and the Rule adopted under that Act regarding public water systems, and because the Rule incorporates the relevant Federal requirements, this Permit is also issued under and implements the provisions of Federal Law.

II. Findings, Violations, and Compliance Schedule

Based on the findings from the sanitary survey conducted on October 27, 2016 and a review of the Division's records for the Water System, The Secretary finds that on the date this Permit is issued the Water System is in compliance with the Rule and does not constitute a public health hazard or a significant public health risk.

III. Water System Description

This Permit authorizes the use of the following components of the Water System, the permitted water system demand, and the other specified aspects of the design and operation of the Water System described below:

A. Sources: The Water System utilizes permitted supply sources that have been determined provide groundwater under the direct influence of surface water (GUDI), a permitted surface water supply source, and a permitted groundwater source. All permitted supply sources combine into a single raw water transmission pipe that conveys water from the permitted sources to the water system's treatment facility. The Water System is subject to the Rule, the Federal Surface Water Treatment Rule, 40 CFR 141.70-141.75; Long Term 1 Enhanced Surface Water Treatment Rule, 40 CFR 141.500-141.571; and the Long Term 2 Enhanced Surface Water Treatment Rule, 40 CFR 141.700 – 141.722. The following permitted sources are connected to and supply water to the Water System:

Source #	Source Name	Source Type	Source Yield (gpm)	Authorized MDD Rate (gpd)
WL001	Springs 4C, 5A, 5C, C7, 8, 9, 11, 12, 13, TA1 – TA9	Groundwater	63 (combined permitted yield)	203,040 (combined from all sources)
WL003	Spring 1	GUIDI	42 (combined permitted yield)	
WL005	Spring 16	GUIDI		
WL004	Spring 2	GUIDI		
IN002	Haystack Pond	Surface Water	70 (permitted)	

B. Permitted Water System Demand: The Water System serves a year-round residential population of approximately 700 people and a transient population of approximately 700 people through 263 service connections. The Water System is authorized for a Maximum Daily Demand (MDD) Rate 203,040 gallons per day, and an average daily demand (ADD) rate of 103,040 gallons per day. These authorized rates equate to a combined total flow rate of 141 gallons per minute when the sources and treatment facility are being operated for 24 hours to meet MDD or operated for 12 hours to meet ADD. Source yield and design limitations (ex: treatment capacity, pump size, storage volume, etcetera) of the Water System have been compared against the authorized MDD above to determine the adequacy of the infrastructure to meet the expected demand. Construction Permit C-3160-14.0, issued by the Division on May 12, 2016, documents an approved design capacity of 141 gpm for the Water System's treatment facility (TP001). Safe yield analyses for Springs TA1 – TA9 have not been completed as of the effective date of this permit. At which time the permitted safe yield for these supply sources has been determined, the permittee shall apply for an amended Permit to Operate for the Water System.

C. Source Protection and Isolation: Source isolation zones are prescribed by Appendix A, Part 3.3 of the Rule. Land uses within 200 feet of the Water System's permitted sources include forested land, hiking trails, and an access road. All identified land use activities within the sources' recharge areas are subject to a routine vulnerability assessment and are managed by the Water System through a Source Protection Plan Update that is subject to review and approval of the Secretary once every three years.

D. Treatment Components, Processes, and Capacity: The Water System's treatment facility (TP001) was designed and permitted (Construction Permit C-3160-14.0) to treat the water produced from all of the Water System's permitted supply sources. Water flows from each permitted source to the raw water transmission main via gravity flow. The raw water transmission conveys the blended raw water through the treatment facility and into the system's storage tank via gravity flow. TP001 includes filtration treatment via three banks of membrane filter elements with progressively smaller pore sizes, including a bank of filter elements that contain membranes with a maximum pore size of 1 micron (absolute). Filtered water flows via gravity from the filters, through a pipeline and into the Ray Hill Reservoir. A hypochlorite solution is added to this pipeline for disinfection treatment, and a soda ash solution is added to this pipeline to adjust pH of the filtered water and provide corrosion control treatment. Disinfection contact time is provided by the Ray Hill Reservoir (ST001).

E. Storage Components and Capacity: The Water System includes one storage tank, the Ray Hill Reservoir (ST001). The Ray Hill Reservoir is an 810,000-gallon concrete tank that receives water treated by TP001, provides disinfection contact time, and serves all of the system's 263 service connections via gravity flow from the tank to and throughout the distribution pipe network.

F. Pump Stations: The Water System does not include any booster pump stations. All water flows from the permitted sources, through treatment, into the storage tank, and throughout the distribution system via gravity flow.

G. Distribution System: The Water System's distribution pipe network includes cast iron pipe installed from 1900 to the 1950s, which ranges in size from 4-inch to 6-inch diameter pipe; and ductile iron pipe installed from the 1970s to 2018, ranging in size from 8-inch to 12-inch diameter pipe.

H. Fire Protection: The Water System was designed to provide fire flow protection and has approximately 36 fire hydrants installed throughout the distribution system. Eight of these hydrants (located on Winter Haven Drive, Lisle Hill Road, Church Street, and Castle Hill Road) do not include steamer nozzles and are operated as flushing hydrants. Two hydrants located on North Main Street and Fairview Avenue, are directly connected to 4-inch diameter distribution mains. These hydrants are not capable of providing the minimum fire protection flows required by Appendix A, Part 7.0.1 of the Rule without creating hydraulic pressure conditions in the distribution pipe network that do not meet the requirements of Appendix A, Part 8.1.1 of the Rule. The Permittee shall ensure that these two hydrants are removed from fire protection service via bagging or painting the hydrant bonnets a uniformed color code. The Permittee shall provide the local fire department(s) written notification that identifies the fire hydrants that are not capable of providing fire protection flows.

IV. Special Conditions, Requirements, and Restrictions

A. Reserve Capacity Demonstration: The Water System has sufficient permitted source, treatment, and distribution system capacities to provide for further expansion of the Water System. The Permittee is responsible for monitoring the Water System's water use. The Permittee shall ensure that water use allocations provided to new users, new consecutive systems, or as increased water use allocations to existing users do not exceed the Water System's permitted maximum daily demand flow rate identified in Section III.B of this Permit. The Permittee shall notify the Division immediately when the Water System's water use data exceed 90% of the permitted maximum day demand. Proposed improvements to the Water System are to adhere to the Vermont Water Supply Rule, Chapter 21, and the Vermont

Wastewater System and Potable Water Supply Rule, Chapter 1. The Permittee shall not authorize or provide allocations for any proposed new Service Line to be connected to the Water System unless the Permittee records documentation demonstrating that the proposed Service Line will meet the necessary water quality, quantity, and hydraulic pressure (at the foundation wall) requirements for all units being provided water. This documentation shall be retained in the Permittee's files for the Water System and shall be provided to the Secretary upon request.

A Safe Yield Determination shall be completed for supply sources TA1-TA-9 and the permitted sources capacity amended as necessary pursuant to Section III, B of the Permit.

B. Continuous Disinfection Required: The Permittee shall operate its chlorine disinfection system on a continuous basis. The Permittee must maintain measurable free chlorine residual concentrations throughout and to the ends of the distribution system.

C. Operation of Surface Water Filtration Treatment: The Water System's treatment facility includes filtration treatment via cartridge membrane filter elements. This filtration component includes three banks of filter elements installed in series; each bank contains filter elements with progressively smaller pore sizes. The pore sizes of filter elements used in the first two filter banks are to be adjusted operationally based on raw water quality; the filter elements in these banks shall not contain pore sizes that exceed 5 microns (nominal). The third bank of filter elements shall contain Harmsco-LT2 filter elements. The Permittee shall ensure the cartridge filtration is operated such that all water treated at this facility must flow through the filter bank containing Harmsco-LT2 filter elements.

D. Representative Samples Required: The Permittee shall ensure that routine samples collected from the Water System are representative of all permitted sources identified in Section III. A of this Permit. The Permittee shall develop standard operating procedures that describe typical operating conditions for each of the permitted sources identified in Section III. A of this Permit and the system's treatment facility. These procedures must describe variable conditions that occur seasonally during both periods of high production flows from the spring sources, and during periods of low spring production flows. The Permittee shall submit these procedures to the Division for review and approval as an update to the Water System's approved Operations and Maintenance Manual.

E. Source Protection Plan Update is Required: On or before August 31, 2019, the Permittee shall submit an update of the Water System's Source Protection Plan Update to the Division for review and approval.

V. General Conditions, Requirements, and Restrictions

A. Water Quality Monitoring.

1. Water Quality Monitoring Requirements: The Permittee shall comply with all of the Drinking Water Quality Monitoring Requirements set forth in the Rule at the frequency described in the Rule. The Permittee shall monitor for contaminants not listed in the Rule if the Secretary determines that the additional monitoring is necessary to protect human health and notifies the Water System of those additional monitoring requirements. The Secretary shall, on at least an annual basis, provide the Permittee with a monitoring schedule in order to assist the Permittee with its obligation to comply with the requirements of the Rule.

2. Notification of Water Quality Violations: The Permittee shall notify the Division immediately (and no later than 24 hours) following any test result greater than or equal to the Maximum Contaminant Levels (MCL), Maximum Residual Disinfectant Levels (MRDL), or turbidity levels as specified under 40 CFR, Part 141 (National Primary Drinking Water Regulations), or other water quality adopted by the Agency to protect public health.

3. Reporting of Water Quality Analytical Testing Results: The Permittee shall be responsible for the submission of all water quality monitoring analytical testing results in accordance with the reporting timeframes in the Rule.

B. Reporting Requirements.

1. The Permittee shall submit a signed report to the Division once a month, no later than ten (10) days following the end of the month, with the following information:

a) A summary of the Public Water System operation, including the total volume of water produced daily the system's permitted sources. Water production summaries shall contain metered data.

b) Daily disinfectant residual entering the distribution system for each day the treatment facility (TP001) is operational.

c) Results of all microbiological and turbidity analyses for raw and finished water. A daily high average should be reported based on either continuous monitoring or a minimum sample frequency every four hours.

d) Results of daily finished water pH analysis.

e) Calculated chlorination disinfection contact time values once per day for every day that TP001 is operational, prepared using the following data:

i. Pipe/storage volume for chlorine contact time prior to the first service connection; and

ii. Highest peak hourly flow/demand each day and the corresponding pH, temperature, and chlorine residual of finished water entering the distribution system.

2. If a chemical disinfectant is applied or if water within the distribution system may contain a chemical disinfectant, the Permittee must report disinfectant residual in the water system at a location and frequency corresponding to the approved total coliform sampling plan and verify the free chlorine concentrations (if no free chlorine is available, the Permittee must measure total chlorine concentration as well) on the laboratory reporting form.

C. Requirement for Certified Operator: The Water System is a Class 4B Water System as defined in the Rule. The Permittee shall ensure that the appropriate class of Vermont certified operator is placed in responsible charge of the Water System in accordance with Section 12.2.2 of the Rule. This designation shall be made in writing, signed by both the owner and the certified operator, and available to the Secretary upon request. The certified operator shall hold a valid certification equal to or greater than the classification of the Water System. For Water

Systems which only have one certified operator, the Permittee must notify the Division within 24 hours of changing their certified operator.

D. Notification of Change in Designated Contact: The Permittee shall notify the Secretary within 30 days of a change in the Designated Contact Person identified in this Permit. This notification shall include the new name, address, and telephone number of the individual who is authorized by the Permittee to act as the primary contact person for all matters related to the operation of the Water System.

E. Consumer Confidence Reports: The Permittee shall prepare and deliver to the customers of the Water System and the Secretary an annual consumer confidence report (CCR) on or before July 1 of each year. The Permittee shall comply with the requirements of 40 CFR Subpart O, including Appendix A, and Subchapter 10 of the Rule as it relates to the preparation, content, and distribution of the CCR.

F. Operation and Maintenance Manual: The Permittee shall operate the Water System in a manner consistent with the Water System's Operation & Maintenance (O&M) Manual, approved by the Secretary on April 25, 2019. The O&M Manual shall be amended as needed when significant changes are made to the infrastructure and operations of the Water System. All amendments to the O&M Manual shall comply with the Rule and be approved by the Secretary. The O&M Manual shall be kept in a location so that it is readily available to the Permittee and the operator(s) of the Water System. If the O&M Manual cannot be located during an inspection or sanitary survey by the Secretary, the Permittee shall prepare a new O&M Manual and submit an electronic copy to the Division for approval.

G. Water System Modification Prohibited Without Required Permits: The Permittee shall obtain all required Source and/or Construction Permits before proceeding with modifications to the Water System, including, but not limited to, Water System expansions that require a Public Water Supply Permit, source deepening, reconstruction, and new treatment systems.

H. Reporting of Non-Routine Operating Conditions: The Permittee shall report to the Division whenever atypical or non-routine operating conditions are experienced by the Water System, including but not limited to deviation from within normal operating distribution system pressure ranges, e.g., significant and unusual fluctuations in distribution system hydraulic pressure; hydraulic pressures of less than 35 psi in the distribution system; failure of critical Water System infrastructure components; water color or odor complaints/observations from system users; or any operating condition that does not meet the standards of Appendix A of the Rule and/or a condition that poses a significant health risk. When experiencing atypical or non-routine operating conditions, Permittee shall:

1. Notify the Division as soon as possible and within 12 hours of becoming aware of the Non-Routine Operating conditions.
2. Take appropriate action(s) to safeguard all users of the Water System, including notification to all users when the water supply becomes vulnerable to contamination (e.g., VT-Alert, Television, Radio, Hand delivery (door to door), other method as advised).
3. Follow all actions and provide all documentation as requested by the Division.

I. Use of Unpermitted Sources of Water: The Permittee shall not use or connect an unpermitted and/or unauthorized water source, including hauled bulk water and designated emergency sources, to the Water System unless an emergency operating condition exists. When

experiencing operating conditions that may require the use of an unpermitted or unauthorized source, the Permittee shall:

1. Notify the Division prior to utilizing the unpermitted or unauthorized source of Water.
2. Provide all public notice as recommended by the Division, which may include issuing a Boil Water, Do Not Drink, or a Do Not Use Notification to all users of the Water System. Notifications shall be provided within twelve hours of receiving the Division's recommendation or as otherwise directed by the Division in writing.
3. Follow all actions and provide all documentation as requested by the Division.
4. The unpermitted and/or unauthorized source shall be used for no more than 90 cumulative days unless the Permittee has submitted a written request to the Secretary for an extension and the Secretary has determined that there is good cause for granting an extension.

J. Maintenance and Periodic Update of Approved Plans: The Permittee shall comply with the plans approved by the Secretary for the Water System. In the event of significant structural or operational changes to the Water System, the applicable plans shall be revised and submitted to the Secretary for approval. In addition, the plans shall be updated when specified in the Rule. The approved plans for the Water System are:

1. Revised Total Coliform Rule Coliform Sampling Plan, approved by the Division on February 17, 2016;
2. Lead and Copper Sampling Plan, approved by the Division on April 19, 2018;
3. Disinfection Byproducts (DBP) Compliance Monitoring Sampling Plan, Stage 2, approved by the Division on May 15, 2018; and
4. Source Protection Plan, last update approved by the Division on April 6, 2018.

K. Posting of Permit: The Permittee shall post the current valid operating Permit in a conspicuous place at the public Water System headquarters or treatment plant.

L. Permit Modification: Based upon information received (e.g., findings of a facility inspection, or information submitted by the Permittee), the Secretary shall determine whether one or more of the following causes to modify a Permit exist. If cause exists, the Secretary may modify the Permit, and may request an updated application and/or administrative contacts information if necessary. When a Permit is modified, only the conditions subject to modification are reopened. Cause for modification includes, but is not limited to:

1. Material and substantial additions or alterations to the Water System, or the Water System's operations or any other change in conditions, that occurred after the issuance of the Permit that justify the application of conditions different or absent from this Permit;
2. The receipt of information that was not available when the Permit was issued which justifies the application of conditions different or absent from this Permit;
3. The statutes, standards or Rule, on which the Permit was based, were revised by

adoption or judicial decision after the Permit was issued and those revisions justify the application of conditions different or absent from this Permit;

4. A determination by the Secretary that other good cause exists for amendment, based on the need to protect human health or the environment; or

5. Cause exists for revocation of the Permit, but the Secretary determines that modification of the Permit is appropriate.

M. Permit Suspension or Revocation: This Permit may be suspended or revoked in accordance with the Rule.

N. Transfer of ownership or Control

1. This Permit is not transferable or assignable without prior written approval of the Secretary. All operating fees must be paid in full prior to any transfer or assignment of the Permit. In the event of a proposed change in control or ownership of the Water System, the Permittee shall provide a copy of this Permit to the prospective owner and/or operator and shall send written notification of the proposed change in ownership or control to the Secretary. The Permittee shall also inform the prospective owner and/or operator of their responsibility to make an application for transfer of this Permit.

2. Any request for transfer of ownership and/or control must, at a minimum, include:

- a. A properly completed application form provided by the Secretary including the Permit application fee and administrative contacts information;
- b. A written statement from the prospective owner or operator certifying:
 - i. The conditions of the operation of the Water System will not be materially different under the new ownership or control;
 - ii. The prospective owner or operator has read and is familiar with the terms of the Permit and agrees to comply with all terms and conditions of the Permit; and
 - iii. The prospective owner or operator has the technical, managerial, and financial capability to operate and maintain the Water System and remain in compliance with the terms and conditions of the Permit.
- c. The date of the sale or transfer; and
- d. Any other additional information the Secretary may require in light of the current status of the facility operation, maintenance, and Permit compliance.

O. Right of Access to the Water System: By acceptance of this Permit, the Permittee agrees to allow any duly authorized representative of the Secretary, upon presentation of the appropriate credentials, to:

- 1. Inspect or investigate any portion of the Permittee's property, fixtures, or other appurtenances belonging to or used by the Permittee for the operation and maintenance of the Water System;

2. Sample, monitor, or test the Water System; or
3. Gain access to and copy any records, reports or other documents related to the operation and maintenance of the Water System.

P. Fees: The Permittee shall pay the annual operating fees specified in 3 V.S.A. §2822.

Q. Compliance with the Rule and Other Laws: Compliance with this Permit does not relieve the Permittee of the need to comply with all applicable provisions of the Rule and all other applicable requirements of Federal, State, and Local laws.

R. Appeals: This permit may be appealed to the Environmental Division of the Superior Court within 30 days of the date the final decision is posted to the Environmental Notice Bulletin in accordance with 10 V.S.A., Chapter 220.

S. Enforcement: Pursuant to 10 V.S.A. Chapters 56, 201 and 211, any violation of the terms and conditions of this permit, including any compliance schedule, is grounds for the initiation of an enforcement action by the State against the Permittee.

T. Effective Date: This Permit becomes effective on the date of signing.

This Operating Permit for the Operation of the Water System located in Vermont is effective on July 10, 2019.

Emily Boedecker, Commissioner
Department of Environmental Conservation
Vermont Agency of Natural Resources

By Bryan J. Redmond
Bryan J. Redmond, Division Director
Drinking Water and Groundwater Protection Division

APPENDIX D

SANITARY SURVEY



VERMONT

**Vermont Department of Environmental Conservation
Drinking Water and Groundwater Protection Division**

One National Life Drive - Main 2

Montpelier, VT 05620-3521

<http://dec.vermont.gov/water>

[phone] 802-828-1535

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Agency of Natural Resources

November 29, 2016

Wilmington Water District

Attn: Chris Lavoy

PO Box 1123

Wilmington, VT 05363

Re: Sanitary Survey, Wilmington Water District, Public Community Water System, Wilmington, VT,
WSID #5310

Dear Mr. Lavoy:

A sanitary survey of the Wilmington Water District Water System (Water System) was conducted on October 27, 2016. Willie Nickerson and Heather Collins represented the Vermont Department of Environmental Conservation, Drinking Water and Groundwater Protection Division (Division); you represented the Water System. The Water System was issued a Permit to Operate (PTO) on January 7, 2016. The PTO does not have an expiration date, however, the completion of recent system improvements, including the installation of cartridge filtration and the results of this survey, necessitate an amendment to the PTO.

Cindy Parks, Division Engineer, is working to schedule a meeting between Water System representatives and the Division to discuss the status of ongoing improvement projects future actions regarding the Water System's approved sources. The considerations included in deficiency 1 below and in the development of additional spring capacity deserve a thorough discussion. The Water System's coordination with Cindy is appreciated.

Please pay attention to the response deadline at the end of this letter. Compliance deadlines in the PTO amendment will consider the dates specified in your response to this letter.

The following significant deficiencies were identified during the sanitary survey and must be corrected:

- 1. Representative Water Quality Monitoring (Haystack Pond Requirements):** Under Chapter 21 Section 6.3 of the Vermont Water Supply Rule (the Rule), *"All Public water systems that use surface water or ground water that is under the direct influence of surface water shall comply with the provisions of 40 CFR, Subpart T Sections 141.500-571 and Subpart W Sections 141.700-723. The purpose of the Long Term 2 Enhanced Surface Water Treatment (LT2) rule is to reduce disease incidence associated with Cryptosporidium and other pathogenic microorganisms in drinking water."* Initial *E. coli* monitoring from 2008 for LT2 Bin Classification applied to the GWUDI spring sources and did not include water from Haystack Pond, therefore, Haystack Pond is not in compliance with LT2. Because Haystack Pond has not been used as a drinking water source for approximately twenty years, the Water System's source sampling data for volatile organic compounds (VOC), synthetic

organic compounds (SOC), inorganic compounds (IOC), and radionuclides is not representative of Haystack Pond's current water quality. Though Haystack Pond is a permitted water source for the Water System, the lack of source water quality data and Bin Classification precludes water from Haystack Pond entering the treatment plant without meeting the following requirements:

- initiating *E. coli* sampling for Bin Classification;
- immediately taking source water quality data;
- returning to standard sampling frequency for lead and copper and disinfection-by-product monitoring.

E. coli sampling for Bin Classification consists of 12 months of bi-weekly samples which are analyzed using the approved enumeration method. The LT2 rule allows a water source being sampled for Bin Classification to provide water to the public. Results of the initial round of water quality sampling will determine whether water from Haystack pond can contribute to the drinking water system in a non-emergency capacity.

In addition, the Division recognizes that the characteristics of the Haystack Pond water may affect operation at the treatment facility which was piloted and designed without considering Haystack Pond water quality. The Division recommends that the Water System complete a demonstration test of the Haystack Pond water source to ascertain how this water will alter operation of the treatment plant. The Division recommends the following demonstration test parameters:

- The pressure loss across the filters.
- Filter run length before cartridge replacement.
- Grab samples taken routinely for turbidity prior to and after filters.
- Pilot filters to be operated from two to four weeks during the spring run-off or during rain events.
- Filter rate in gallons per minute (gpm) per square foot (sq. ft.) that is consistent with treatment plant operation with a maximum filter rate of 0.3 gpm/sq. ft.

Haystack Pond is considered an emergency source until initial source water sampling described below is completed.

1. The Division requests that an initial round of source sampling from Haystack Pond be completed immediately for enumerated *E. coli*, VOC, SOC, IOC, and radionuclides. The results of analyses should be sent to the Division immediately for enumerated *E. coli*, VOC, SOC, IOC, and radionuclides.
2. On or before June 1, 2017 the Division requests that the Water System complete demonstration testing of the Haystack Pond water source, submit a technical memo summarizing the results for Division review, update its O&M manual with operational procedures for using the Haystack Pond water source including, but not limited to, blending ratios, the valve settings to maintain blending, and a sampling plan that identifies sample locations and frequency for *E. coli*, lead and copper, and disinfection-by-products.

The following minor deficiencies were identified during the sanitary survey

2. **Inadequate Spring Box Construction – Paint Flakes:** Under Chapter 21, Appendix A Part 3.3.2.1.2 (f) of the Rule: "*Spring and shallow well site construction shall include the following: (f) a watertight sanitary cover.*" The hatch covers on the springs appear to be

flaking paint into the interior of the springs. The current Permit to Operate includes a compliance date to address this deficiency. New spring covers have been delivered and are awaiting installation. The Division understands the difficulty presented by attempting to install new hatches in a remote area during the winter months including logistic difficulty and anticipated sealant product temperature limitations. However, **the compliance date in the PTO (November 1, 2016) is overdue. The Division requests that the Water System respond to this letter with estimated proposed schedule of installation for the new covers (or repair of existing covers); this proposed schedule will be considered when the Division prepares an upcoming PTO amendment compliance schedule. In the absence of a request for the extension of the overdue compliance date, the Division may issue a Notice of Alleged Violation for not meeting the permitted compliance date.**

3. **Undersized Water Main for Fire Hydrants:** Under Chapter 21, Appendix A Part 8.1.2 of the Rule, *"The minimum size of water main for providing fire protection and serving fire hydrants shall be eight-inch diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in Appendix A Subpart 8.1.1."* One fire hydrant on Lisle Street has been identified as connected to a 4-inch water main and unable to meet the minimum required flow of 500 gallons per minute (gpm) with a residual system pressure of 20 pounds per square inch (psi) (Appendix A Part 7.01). The Division recommends clearly identifying hydrants on undersized mains by painting them black. The requirement for a yearly letter to the fire department that describes and identifies hydrant limitations will be incorporated into the Water System's upcoming PTO amendment. The yearly letter will serve as record of regular communication to the fire department of distribution system vulnerabilities until they are fixed. **On or before June 1, 2017 the Division requests that the Water System convert the fire hydrant to a flushing hydrant by:**
 - painting the hydrant black,
 - welding the 4 ½" nozzle shut and/or installing a lock on the operating nut,
 - notifying the local fire department, in writing, that the hydrant is not to be used as a fire hydrant,
 - and submit a plan to the Division describing either the removal of the hydrant, or hydraulic improvements to provide a minimum of 500 gpm flow with a residual system pressure of 20 psi.
4. **Transmission Main Replacement Compliance Item:** Under Section II.B.A. of the PTO, *"On or before June 1, 2016, the Water System is to begin construction in strict accordance with a Construction Permit issued by the Division for the transmission system upgrades – replacement of the lower transmission main to support the higher pressures required for cartridge filtration;"* The Water System has not begun construction in accordance with the Permit to Construct (#C-3160-14.0C) on the lower transmission main upgrades. **The compliance date is overdue. The Water System should respond to this letter with a request for a new compliance date.**
5. **Storage Tank Overflow Needs Improvement:** Under Chapter 21, Appendix A Part 7.0.8 of the Rule, *"All water storage structures shall be provided with an overflow which should terminate 12 to 24 inches above the ground surface, and discharges over a drainage inlet structure or a splash plate. No overflow may be connected directly to a sewer or storm drain. All overflow pipes shall be located so that any discharge is visible. (a) The overflow shall be constructed of metallic pipe open downward and be screened with 24 mesh non-corrodible*

screen installed within the pipe at a location least susceptible to damage by vandalism. The storage tank overflow terminates in a manhole with the tank perimeter drain. The overflow drain should be screened inside the manhole. Any future improvement to the storage tank should address relocation of the tank overflow in accordance with the Rule, including that the overflow does not terminate in a drainage manhole. **On or before June 1, 2017 the Division requests that the Water System screen the overflow pipe inside the existing manhole and submit photographic documentation to the Division.**

6. **Inadequate Spring Box Construction – Overflow:** Under Chapter 21, Appendix A Part 3.3.2.1.2 (b) of the Rule: *"Spring and shallow well site construction shall include the following: (b) screened openings."* The overflow screen associated with Spring 8 was observed to be damaged. **On or before June 1, 2017 the Division requests that the Water System repair the screen and submit photographic documentation to the Division.**
7. **Inadequate Backflow Prevention:** Under Chapter 21 Section 8.1.1 of the Rule, *"No physical connection, unless approved by the Secretary, shall be permitted between the distribution system of a Public or Non-Public water system and any pipes, pumps, hydrants, tanks or other water systems whereby contaminated or polluted water or other contaminating substances may be discharged or drawn into the Public and Non-Public water system. Any physical connection with a non-potable source of water shall include an adequate backflow prevention device which meets the requirements of American Water Works Association Standards.* During the survey, no backflow prevention device was observed on a treated water hose bib in the treatment plant that was connected to a hose used to provide make up water for the soda ash solution tank. **On or before January 31, 2017 the Division requests that the Water System install a backflow prevention device for the hose bib and submit photographic documentation to the Division.**

The following items are provided for the Water System's review, consideration, and comment:

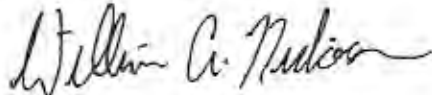
- **Backup Operator:** The Division recommends that a backup operator be identified. With only one operator, the Water System is vulnerable in the event that the Designated Operator is incapacitated. A backup operator should be trained in the operation of the system prior to there being a need.
- **Asset Management Strategy:** The Division recognizes that lack of funding is a significant barrier to completing identified Water System improvements. The Division recommends that the Water System use operator knowledge and information from recent engineering reports to develop a risk-based Capital Improvement Plan and Funding Strategy to help manage aging infrastructure in a cost-effective manner. The Water System should contact Jim Siriano of the Capacity Development Program (802-585-4889) for assistance.
- **Avoidance of Filtration Status:** The Avoidance of Filtration for the GWUDI water sources terminated with the installation of filtration. A Source Protection Plan Update (SPPU) is now required for all water sources, including Haystack Pond. The next SPPU is due on November 1, 2019. The Water System should contact Ben Montross, ben.montross@vermont.gov, 802-498-8981, or Amy Galford, amy.galford@vermont.gov, 802-585-4891, with any questions regarding Avoidance of Filtration requirements.

- **Source Blending:** Informal source blending from two identified ground water sources (Non-GDWUDI and GWUDI) is currently occurring due to varying source control valve settings. The two distinct spring locations produce water with varying pH and alkalinity. The blending of water from these distinct locations results in water characteristics that are responsive to pH adjustment through soda ash. Any changes in source blending due to the addition of new spring sources or the use of Haystack Pond as a water source must consider the pH and alkalinity characteristics of the blended water in relation to pH adjustment using soda ash as a corrosion control treatment.
- **Utilization of Haystack Pond:** Should the water system meet the requirements for and commence use of Haystack Pond there will be changes to the monitoring schedule for the system, including but not limited to: standard monitoring under the Lead and Copper Rule at twenty sites every six months for at least two six month periods, *E. coli* monitoring under LT2 as identified above, and Disinfection Byproduct Monitoring on a quarterly basis.

The Division requests that the Water System provide a written response to the items above by **December 31, 1016**. The written response should indicate that the compliance dates above are acceptable or propose alternative corrective actions and/or alternative compliance dates for review and approval. In the absence of a written response as requested, the Division may amend the PTO to include a compliance schedule to resolve these deficiencies.

I appreciate you meeting with me and Heather to conduct the sanitary survey of the Wilmington Water District Water System. If you have any questions or would like to discuss anything regarding the survey, please feel free to contact me by email at william.nickerson@vermont.gov or by phone at 802-505-8757.

Sincerely,



William Nickerson, P.E.
System Operations Specialist

- c. Tim Raymond, Operation and Engineering Section Chief, DWGWP
Patrick Smart, PE, Operations Section Supervisor, DWGWP
Heather Collins, System Operations Specialist, DWGWP
Cynthia Parks, PE, Senior Engineer, DWGWP
Ben Montross, Compliance and Support Services Section Chief DWGWP
Julie Hackbarth, Compliance and Certification Manager, DWGWP
Jeff Girard, Compliance Analyst, DWGWP
Amy Galford, Compliance Analyst, DWGWP
Ken Yelsey, Division Hydrogeologist, DWGWP
Jim Siriano, Capacity Development Program, DWGWP
Ashley Lucht, DWSRF Project Manager, FED
Tyson Bry, Construction Program, FED
John E. Goodell, P.E., SVE Associates

APPENDIX E

SURVEY QUESTIONNAIRE

PROPERTY OWNER SURVEY

The Town of Wilmington has retained Aldrich + Elliott, PC (A+E) to develop a Feasibility Study evaluating the potential for of expanding the existing municipal wastewater collection and water distribution systems along Route 9. The project area under consideration is on Route 9 from the Whites Road intersection to Ballou Hill Road, as well as, along Route 100 from the Route 9 intersection to the SVMC Health Deerfield Valley Campus.

This survey is for the Town to better understand the current water and wastewater needs of this project area along Route 9, and gain insight into desired or potential development by property owners. Your response is very important. Please, as soon as possible, return this survey in the self addressed stamped envelope to Aldrich + Elliott, PC, the Town's engineering consultant for this project. Alternatively, completed surveys may be dropped off at the Wilmington Administrative Offices, Second Floor located at 2 East Main Street.

Please return the survey by **January 10th, 2020**.

If you have specific questions regarding the survey, please feel free to reach out to one of the two contacts below.

Town of Wilmington
John Lazelle, Chief Operator
802-464-3862
jlazelle@wilmingtonvt.us

Aldrich + Elliott, PC
Joseph S. Krupa, P.E.
802-879-7733 x 107
jkrupa@aeengineers.com

If you are renting the property, please forward this survey to the owner as soon as possible.

Specific information by address will be confidential and will not be shared with the Town or State. The information will not be used to pursue any type of enforcement action relating to non-complying or failed septic systems.

All information gathered will be used for study purposes only. The information will be aggregated by Aldrich + Elliott, PC to evaluate potential future demand on the expanded systems, as well as adequacy of the existing infrastructure.

Thank you for your response!

Property Owner(s) Name: _____	Phone (Day): _____
Email: _____	Phone (Evening): _____
Mailing Address: _____ _____	
Location (Street No. and Name): _____	
Size of Lot: _____ square feet or _____ acres (please approximate if not sure)	

* **Please sketch** your building location, roads, driveway, septic tank, leachfield, and well, if any, on the last page. If your property is undeveloped please sketch a concept of potential future development you may be interested in pursuing if access to municipal sewer and water utilities was available.

Definitions of common terms can be found in Section IV of this survey.

1. YOUR EXISTING WASTEWATER TREATMENT AND DISPOSAL SYSTEM (If your property is undeveloped or does not have an on-site septic system, please skip to Section 3)

1. When was your septic system built?

_____ Before 1970	_____ 1990-1995	_____ 2002-Present
_____ 1970-1989	_____ 1996-2001	_____ Don't know

2. Please indicate the components of your septic system by checking one or more below (refer to the attached definitions page):

_____ Cesspool	_____ Wastewater Disposal System	_____ Dosing Pump Station
_____ Septic Tank	_____ Dry Well (Seepage Pit)	_____ Yes
_____ Concrete	_____ Absorption Trench	_____ No
_____ Metal	_____ Absorption Bed	If Yes, Is there a panel with
_____ Plastic	_____ At-Grade	an alarm light or horn?
_____ Fiberglass	_____ Mound	_____ Yes
_____ Other	_____ Other	_____ No

Advanced or Innovative/Alternative Treatment System

_____ Yes _____ No If Yes, please describe below under other (i.e. Manufacturer, type)

_____ Other: _____

3. How often is the septic tank pumped?

- Approximately every _____ years.
- Year that septic tank was last pumped: _____

4. How deep below the ground surface is your septic tank?

_____ 0-1 foot	_____ Greater than 3 feet	Is there an accessible cover at grade?
_____ 1-3 feet	_____ Don't know	_____ Yes _____ No

5. Has your wastewater disposal system (leachfield, drywell, etc.) experienced any of the following conditions? _____ Yes _____ No (If yes, please fill out below.)

_____ Surfacing sewage	_____ Overflow pipe to a ditch
_____ Seasonally?	_____ Sink holes near septic tank or leachfield
	_____ Sewage smell at or near leachfield
	_____ Ground surface is always wet

6. Do you have any design plans of your septic system and are you willing to provide these plans to A+E?

_____ Yes _____ No

7. Have you made any upgrades or repairs to your septic system within the last 10 years?

_____ No (If yes, please describe below.):

2. YOUR EXISTING WATER SUPPLY *(If your property is undeveloped, please skip to Section 3)*

1. Where is your water supply located?
_____ On my property _____ On property other than mine _____ I do not have a well
2. Which type of water system do you have?
_____ Individual drilled well
_____ Individual dug well/well point/spring
_____ Community (shared) drilled well
_____ Community (shared) dug well/spring
_____ Don't know
3. What is the capacity of your water system? _____ gallons/min
4. Which statement best describes the quality of the water from your source (i.e., in regard to clearness, color, taste, odor, and hardness):
_____ Always good quality _____ Poor quality seasonally _____ Always poor quality
_____ Generally good quality, but water quality declines on a seasonal basis
5. Have you ever run out of water?
_____ Yearly _____ Every few years _____ Never
6. Do you have any contamination issues with your source? _____ Yes _____ No
_____ Radium _____ Petroleum _____ Other If other, type: _____
_____ Bacteriological _____
_____ Sulfur Odor _____

3. POTENTIAL FUTURE WASTEWATER AND WATER NEEDS

The intent of this section is to gain insight into potential future development in the project area and estimate future demand on the expanded wastewater collection and water distribution systems.

1. Do you anticipate developing or having someone develop the property if there was access to municipal wastewater and drinking water systems.
_____ Yes _____ No
2. How do you envision the property may be developed in the future?
_____ Residential _____ Residential Apartments _____ Commercial
_____ Number of homes _____ Number of one bedroom _____ Offices
_____ Number of bedrooms per home _____ Number of two bedroom _____ Retail
_____ Number of one bedroom
3. Please provide a brief description if the property may be developed for commercial or industrial uses. For example, please include square feet per floor and the number of floors for commercial offices, or number a seats for a restaurant or commercial kitchen.

4. COMMENTS

1. Is there anything else that we should know about your property's water or wastewater systems?

2. Please comment on your interest, willingness or concerns for connecting to a municipal wastewater and water system.

3. What specific needs do you feel that your property as a whole has for water and/or wastewater?

4. Please comment on your properties current developed use, if any. For example, state if the property has a house with three bedrooms and two bathrooms, as well as a barn.

5. What uses in the future would you have for your property if you had more water and/or wastewater capacity? (i.e. No change, add a bedroom, subdivide, add an apartment, change use to commercial (type?))

6. How much would you be willing to pay per year for municipal water and wastewater?

	\$500 - \$750		\$750 - \$1,000		>\$1,000
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5. DEFINITION OF TERMS

WATERMAIN: The Town owned waterline supplying water to the development.

CESSPOOL: A holding tank for wastewater typically located below ground. Holds wastewater until pumped out.

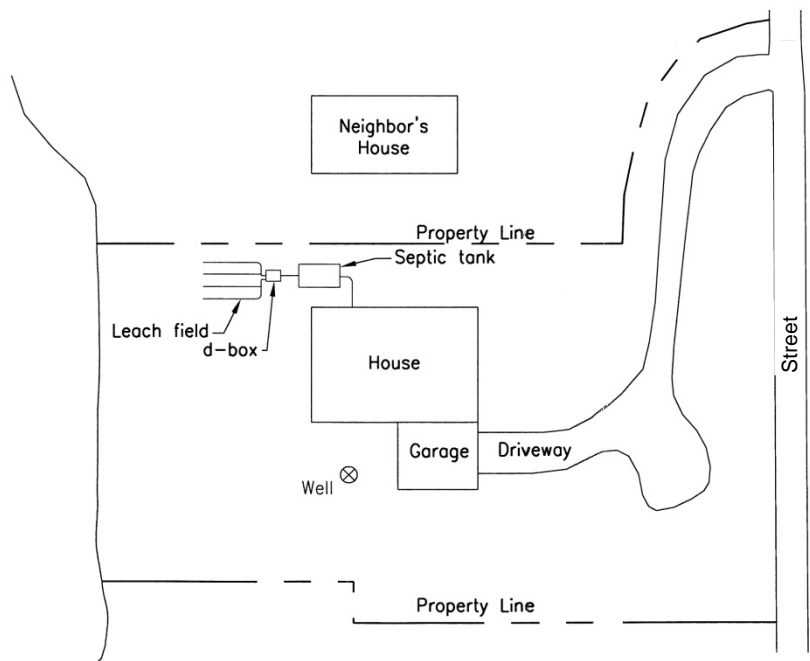
SEPTIC TANK: A tank, typically below ground, that collects wastewater prior to wastewater entering the property's disposal system.

WASTEWATER DISPOSAL SYSTEM: The final part of the overall "septic system" typically preceded by a distribution box and septic tank (e.g. a leachfield or absorption trench).

6. SKETCH OF PROPERTY

Please provide a sketch of your property on the next page with the location of your house, driveway, nearest road, septic tank, leachfield, waterline, and property line (see example). Any conceptual details as to how you may wish to develop the property would also be helpful.

SAMPLE
SKETCH



APPENDIX F

ESTIMATED CONSTRUCTION COSTS

Town of Wilmington Rt 9 Extension
Estimated Construction Cost - Water Alternative No. 1
Dec-20

Description of Item		Total Quantity	Unit	Unit Price	Cost ENR 11540
A - Sewer					
A- 1	8" C900 PVC Water Main	6,000	L.F.	\$ 90	\$ 540,000
A- 2	8" C900 PVC Water Main in 16" Sleeve	100	L.F.	\$ 500	\$ 50,000
B - Sewer Appurtenances					
B- 1	Fire Hydrant Branch Connections	12	EA.	\$ 4,500	\$ 54,000
B- 2	3/4" or 1" Corporation Stop	10	EA.	\$ 200	\$ 2,000
B- 3	3/4" or 1" Curb Stop	10	EA.	\$ 200	\$ 2,000
B- 4	3/4" or 1" CTS PE Water Service	300	L.F.	\$ 50	\$ 15,000
B- 5	3/4" or 1" CTS PE Water Service in 1-1/2" Sleeve	250	L.F.	\$ 80	\$ 20,000
B- 6	8" Gate Valve	8	EA.	\$ 2,500	\$ 20,000
B- 7	Booster Pump Station	0	EA.	\$ 125,000	\$ -
B- 8	Air Release Manhole	1	EA.	\$ 7,500	\$ 7,500
C - Earthwork					
C- 1	Rock Excavation	100	C.Y.	\$ 250	\$ 25,000
C- 2	Boulder Excavation	200	C.Y.	\$ 75	\$ 15,000
C- 3	Misc. Extra. Below Grade Excavation	50	C.Y.	\$ 40	\$ 2,000
C- 4	Exc. & Replace Unsuitable Material	50	C.Y.	\$ 50	\$ 2,500
D - Roadwork and Appurtenances					
D- 1	Bituminous Pavement Repair - Roads	150	S.Y.	\$ 75	\$ 11,250
D- 2	Bituminous Pavement Repair - Drives	200	S.Y.	\$ 60	\$ 12,000
D- 3	Road Shoulder Repair	2,000	L.F.	\$ 20	\$ 40,000
D- 4	Gravel Road and Driveway Repair	100	L.F.	\$ 25	\$ 2,500
E - Incidental Work					
E- 1	Class B Concrete	30	C.Y.	\$ 600	\$ 18,000
E- 2	Calcium Chloride	5	TON	\$ 650	\$ 3,250
E- 3	Rigid Trench Insulation	50	L.F.	\$ 15	\$ 750
E- 4	Silt Fence	1,000	L.F.	\$ 3	\$ 3,000
E- 5	Inlet Protection	4	EA.	\$ 175	\$ 700
E- 6	Uniformed Traffic Officers	200	HRS.	\$ 85	\$ 17,000
F - Lump Sum					
F- 1	Prep of Site and Misc Work (10%)	1	L.S.	\$ 86,345	\$ 86,345
F- 2	VTrans Inspection Allowance	1	L.S.	\$ 5,000	\$ 5,000
F- 3	Bonds (2%)	1	L.S.	\$ 19,096	\$ 19,096
TOTALS					\$ 973,891
USE					\$ 974,000

Notes:

1. ENR 11540 = October 2020

Town of Wilmington Rt 9 Extension
Estimated Construction Cost - Wastewater Alternative No. 1
Dec-20

Description of Item		Quantity	Unit	Unit Price	Cost ENR 11540
A - Sewer					
A- 1	8" PVC Gravity Sewer	3,900	L.F.	\$ 90	\$ 351,000
A- 2	6" PVC Sewer Service Stub	250	L.F.	\$ 70	\$ 17,500
A- 3	4" PVC Sewer Force Main	1,600	L.F.	\$ 60	\$ 96,000
A- 4	8" PVC Gravity Sewer in 20" Sleeve	40	L.F.	\$ 500	\$ 20,000
B - Sewer Appurtenances					
B- 1	48" Dia. Sewer Manhole	10	EA.	\$ 5,000	\$ 50,000
B- 2	Force Main Cleanout Manhole	1	EA.	\$ 5,000	\$ 5,000
B- 3	8" x 6" Service Wye	10	EA.	\$ 120	\$ 1,200
B- 4	Connection to Existing Sewer Manhole	1	EA.	\$ 2,000	\$ 2,000
C - Earthwork					
C- 1	Rock Excavation	100	C.Y.	\$ 250	\$ 25,000
C- 2	Boulder Excavation	100	C.Y.	\$ 75	\$ 7,500
C- 3	Misc. Extra. Below Grade Excavation	50	C.Y.	\$ 40	\$ 2,000
C- 4	Exc. & Replace Unsuitable Material	50	C.Y.	\$ 50	\$ 2,500
D - Roadwork and Appurtenances					
D- 1	Bituminous Pavement Repair - Roads	150	S.Y.	\$ 75	\$ 11,250
D- 2	Bituminous Pavement Repair - Drives	200	S.Y.	\$ 60	\$ 12,000
D- 3	Road Shoulder Repair	1,000	L.F.	\$ 20	\$ 20,000
D- 4	Gravel Road and Driveway Repair	200	L.F.	\$ 25	\$ 5,000
E - Incidental Work					
E- 1	Calcium Chloride	5	TON	\$ 650	\$ 3,250
E- 2	Rigid Trench Insulation	50	L.F.	\$ 15	\$ 750
E- 3	Silt Fence	100	L.F.	\$ 3	\$ 300
E- 4	Inlet Protection	4	EA.	\$ 175	\$ 700
E- 5	Uniformed Traffic Officers	200	HRS.	\$ 85	\$ 17,000
F -Lump Sum					
F- 1	Prep of Site and Misc Work (10%)	1	L.S.	\$ 64,995	\$ 64,995
F- 2	New Wastewater Pump Station	1	L.S.	\$ 150,000	\$ 150,000
F- 3	Ejector Station Upgrade	1	L.S.	\$ 150,000	\$ 150,000
F- 4	VTrans Inspection Allowance	1	L.S.	\$ 5,000	\$ 5,000
F- 5	Bonds (2%)	1	L.S.	\$ 14,299	\$ 14,299
TOTALS					\$ 1,034,244
USE					\$ 1,035,000

Notes:

1. ENR 11540 = October 2020