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REPORT

March 2025 - FINAL

TOWN OF
Pelham
New Hampshire

Water Expansion Study

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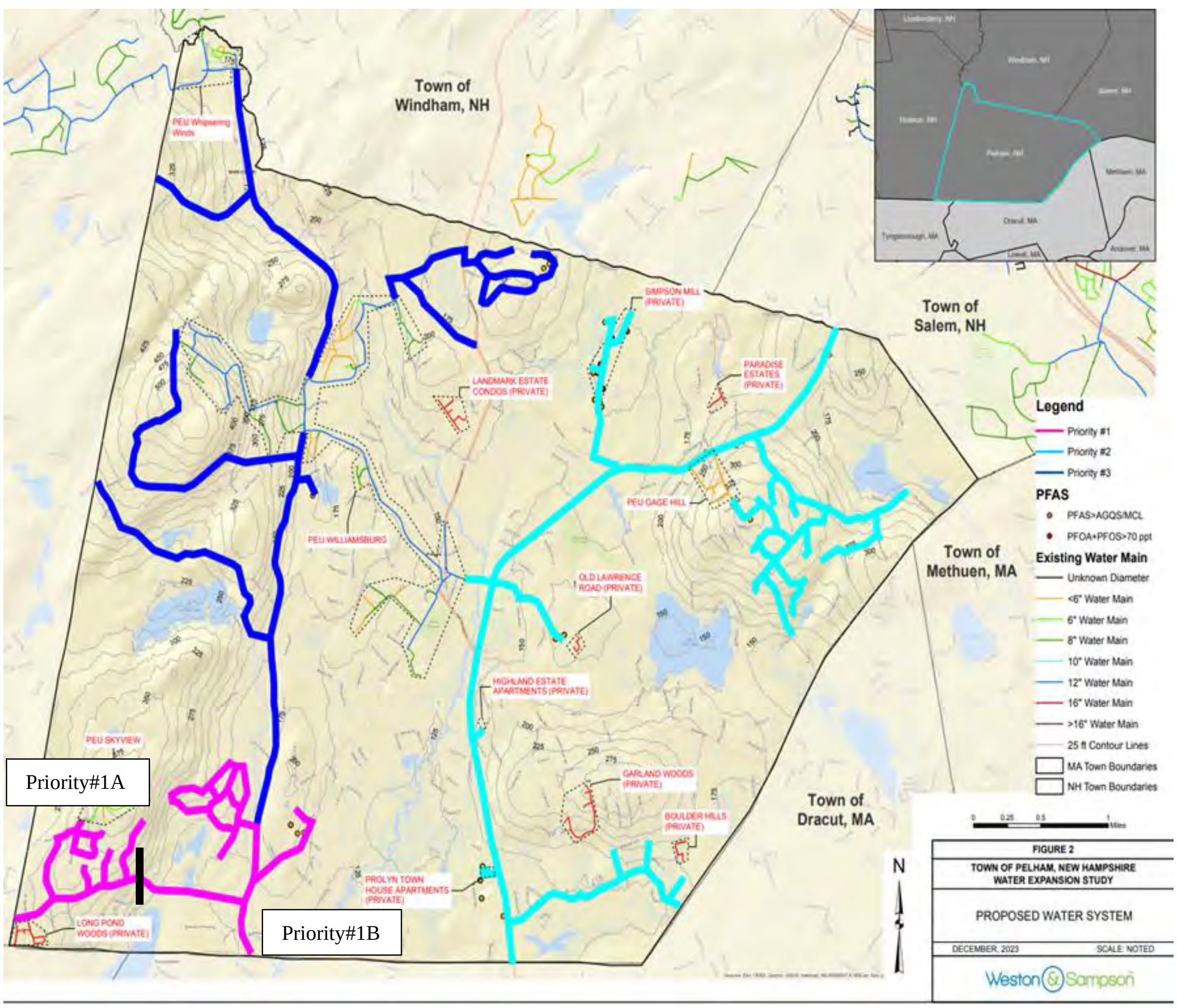
EXECUTIVE SUMMARY

This report assessed the build out of a contiguous public water system throughout a portion of the town in areas identified by the town at the start of the study. In addition to an assessment of the hydraulic requirements to deliver public drinking water to all areas identified in the study, potential water supply options were also assessed to meet the projected water demand of a built-out system. The purpose of the report is to provide a summary of our findings and to provide recommendations for next steps the town can consider. The report is funded by the New Hampshire Department of Environmental Services (DES) MTBE Remediation Bureau and through a Strategic Planning grant funded under the American Rescue Plan Act (ARPA).

The following is a summary of the work that was performed under this study:

At the start of the project, the Pelham Water Commission provided information on the specific areas in town that would be reviewed for public drinking water service. The following depicts the location of those areas by priority.



Upon defining those priority areas as shown above, domestic water demand estimates (maximum day demands) were established for all properties that abutted the proposed water main routes. The projected water demands in the three priority areas were added to the existing water demands that are present in the existing public water systems within Pelham to ascertain the total domestic water demand estimate that would be needed if all potential water customers connect to the system. The breakdown of domestic water demands is as follows:

Existing or Proposed	Location	Maximum Day Demand (gallons per day)
Existing	Gage Hill	6,431
	Whispering Winds	74,960
	Sky View Estates	16,735
	Williamsburg	120,869
Proposed	Priority #1 Area	207,405*
	Priority #2 Area	275,271*
	Priority #3 Area	203,756*
Total		**905,427***

*At full build-out

Once domestic water demands were established, an assessment of available water supply was conducted. Water supply availability was reviewed as follows:

- New groundwater supply within Pelham
- Existing water system supply availability in adjacent water systems

<u>Groundwater Site Screening Study</u>

The following was performed as part of the assessment of new groundwater supply options within Pelham:

i. Data collection and review
ii. Basemap generation with properties
iii. Groundwater exploration and water quantity feasibility assessment
iv. Groundwater exploration and contaminant threats feasibility assessment
v. Identification of the top five potential sites for bedrock wells and overburden wells
vi. Interim Map/Matrix
vii. Cost estimates for the top-rated bedrock and overburden well sites
viii. Recommendations

<u>Adjacent Public Water Systems Assessment</u>

In addition to a review of potential new groundwater sources in Pelham, an assessment was performed of the following existing water system sources adjacent to the proposed water system expansion:

- PEU Williamsburg: This water system is located within Pelham, is the largest public water system within Pelham and is owned and operated by Pennichuck East Utilities. Our findings for available water supply from this source are as follows:
  - Limited excess water supply available (approximately 195,900 gallons per day as of the writing of this report)
  - A significant amount of water main is necessary to transmit the Williamsburg water supply to the Priority #1A area; which is the first area of the proposed water system that would be built
- Salem Public Water System: This water system is located east of Pelham and would connect to the Priority #2 portion of the Pelham water system. Similar to Williamsburg, a significant amount of water main would be needed to furnish water supply to the Priority #1A area. Salem officials also stated that there is no excess water supply capacity available from Salem as of the writing of this report.
- Hudson Public Water System: This water system is located to the west of Pelham. The following summarizes our findings:
  - An existing interconnect with the Hudson public water system is present in the northwest part of Pelham. Water supplied by this interconnect would serve Priority Area #3.
  - A proposed extension of the Hudson public water system located near the southwest corner of Pelham would extend water supply to Priority Area #1A.
  - Water supply from Hudson is furnished by Pennichuck Water Works (PWW). Water supply for Pelham would be wheeled through the Hudson water system.
  - All of Pelham's domestic water demands could be served by the PWW water supply.

Hydraulic Assessment of Proposed Water System

We conducted a hydraulic assessment of the proposed water system using hydraulic modeling software. The proposed extents of the built-out Pelham water system were inserted into the modeling software and the projected domestic water demands were assigned accordingly throughout the system. The recommended water main sizes, pump station requirements and other pressure regulating components were identified through hydraulic analysis and used to develop planning level cost estimates for the water system full build out.

Planning Level Project Cost Estimates (December 2024 dollars)

As mentioned above, it is critical to understand the available water supply options when developing the overall water system concept. The three options that could supply enough water to meet all of Pelham's future, projected domestic demands are; Hudson Interconnection, a new municipal bedrock well within Pelham, or a new municipal overburden well in Pelham. The following table provides a budgetary cost estimate comparison of the three options.

	Hudson Interconnection	Pelham Bedrock Well	Pelham Overburden Well
Water Supply	$8,287,000*	$18,266,000*	$28,513,000*

*Costs in December 2024 Dollars

From a cost perspective, the Hudson Interconnection option is projected to be the least expensive water supply option for the town. As a result, we utilized that estimate to summarize what the projected costs would be to build the entirety of the water system beginning with the Priority #1A area through the Priority #3 area. The following table provides a summary of the projected costs.

	Priority 1A	Priority 1B	Priority 2	Priority 3
Water Supply**	$8,287,000	N/A*	N/A*	N/A*
Distribution**	$20,789,000	$18,957,000	$61,580,000	$56,506,000
Total**	$29,076,000	$18,957,000	$61,580,000	$56,506,000

*Water supply cost for Priority 1A would be used to furnish water to Priority 1B, 2 and 3
**Costs in December 2024 Dollars

1 OVERVIEW OF EXISTING WATER DEFICIENCY

1.1 Project Background

In 2022, the town of Pelham (through its Water Commission) engaged Weston & Sampson Engineers Inc. (Weston & Sampson) to conduct a feasibility study for developing drinking water infrastructure in the Sherburne Road area (presently known as the Priority #1A service area). The project was in response to several residents in the Sherburne Road area having private wells with water quality and/or water quantity concerns. On March 1, 2023, Weston & Sampson submitted a report to the town of Pelham entitled *Feasibility Study for Drinking Water Infrastructure – Phase 1* detailing preliminary projected water demands, opinion of hydraulic conditions, pipe routing options, and different interconnection options for water supply for the project area.

The project described herein is a continuation of the feasibility analysis that was started in 2022 for the town. In addition to the Sherburne Road area, the town identified several areas within Pelham that they wanted included in a town-wide water system feasibility buildout analysis. Weston & Sampson, on behalf of the town, engaged with New Hampshire Department of Environmental Services (NHDES) and inquired about the opportunity for grant funds to conduct this study. NHDES notified Weston & Sampson and the town that funding was available through the Strategic Planning Grant (SPG) program. As a result, Weston & Sampson submitted an application to NHDES for a Strategic Planning Grant (SPG) on behalf of the town on December 9, 2022. The grant request was for $50,000 to fund the cost of conducting additional engineering assessment of water supply and distribution needs and options for the town of Pelham. On February 17, 2023, NHDES notified the town and Weston & Sampson that the grant would be awarded to the town, for the full amount applied of $50,000.

In addition to the SPG funds, NHDES notified Weston & Sampson and the town that additional monies were available through the Methyl tert-butyl ether (MtBE) Settlement Fund to assist Pelham with their water supply needs. On July 12, 2023 Weston & Sampson submitted an application to the MtBE Settlement Fund on behalf of the town with additional scope and fee for engineering assessment of water supply and distribution needs and options for Pelham. In August 2023, NHDES informed the town and Weston & Sampson that the grant was awarded to the town, for the full amount applied of $100,000.

1.2 Existing PEU Franchise Area

The town of Pelham currently does not own a municipal public water system. However, small public water systems, owned and operated by Pennichuck East Utility (PEU), provide a portion of town with public drinking water supply, as depicted in Figure 1.1, Appendix A. In addition to PEU owning small water systems within Pelham, PEU also owns the water franchise rights for the entire town of Pelham.

If Pelham were to develop and own a public water system within their town, PEU would first need to relinquish their rights in the area that Pelham wishes to develop a public water system. Subsequently, if Pelham wishes to purchase an existing PEU water system, the two sides would need to establish a mutually agreed upon cost and work with the Public Utilities Commission (PUC) to finalize the agreement. Upon owning a public water system, Pelham would need to employ or outsource staff to operate and maintain the water infrastructure and provide billing services to administer the water bills.

Subsequently, the town can work with PEU to establish water infrastructure as described within the body of this report. Public and/or private funding that is coordinated through the town to finance the cost of the water infrastructure would then be transferred into PEU's name for PEU to own, operate and manage.

2 EVALUATION OF WATER SUPPLY NEEDS

2.1 Priority Area Development

To initiate the project, Weston & Sampson first met with the town to discuss areas of greatest need for domestic water service in Pelham. From this meeting and through additional correspondences with the town, three priority areas were identified in which the development of dedicated public water systems would be beneficial. These areas are depicted on a map included in Appendix B (Figure 2.1). The proposed water system expansion was established based on resident feedback, known Perfluoroalkyl and polyfluoroalkyl substances (PFAS) contamination, and projected future developments as shared with Weston & Sampson.

The Priority #1 area is split into two parts; Priority #1A and #1B. Priority area #1A is located in the southwestern region of town within the previously identified Sherburne Road area. Priority area #1B continues along Sherburne Road to Mammoth Road and extends into the Westfall Road Neighborhood. The Priority #2 area is located within the eastern region of Pelham, following closely with Route 38 through the major commercial area of town. The proposed water main would also extend from Route 38 into the Jericho Road area, Mulberry Estates/Wellsley Drive area, and the Simpson Mill Road area. The Priority #3 area is located within the northwestern region of town along Route 128, extending into Bush Hill Road, Jeremy Hill Road, Keyes Hill Road, Hayden Road, and the Gordon Heights neighborhood.

2.2 Water Demand Development

2.2.1 Existing Demand

PEU provided Weston & Sampson with 2023 maximum daily demand (MDD) water usage for the existing PEU water systems in Pelham. Table 2.1 presents the existing water system MDD for PEU systems in gallons per day (GPD).

Table 2.1: Existing 2023 PEU Water System Demands	
PEU Small System	MDD (GPD)
Gage Hill	6,431
Whispering Winds	74,960
Sky View Estates	16,735
Williamsburg	120,869
Total	218,994

2.2.2 Future Demand

Upon establishing the limits of each priority area, Weston & Sampson developed projected domestic water demands to serve the residents and businesses in each area. Utilizing the town assessor's database and other property information furnished by the town, the bedroom count for each household and estimations of employee count at each business within the priority areas was obtained and utilized to develop water demand estimates. To establish MDD estimates, Table 1008-1 (Unit Design Flow Figures) in Chapter Env-Wq 1000 - Subdivision and Individual Sewage Disposal System Design Rules of the New Hampshire Code of Administrative Rules was referenced to assist in assigning MDD to each type of dwelling and business in the project area. The results are presented in Table 2.2 in GPD. Please note, the estimated demand listed below is inclusive of only new, potential water system customers and does not include existing customer demand listed in Table 2-1.

Table 2.2: NH Code Unit Design Flow	
Priority Area	Unit Design Flow (GPD)
#1A/#1B	207,405
#2	275,271
#3	203,756
Total	686,432

2.3 Fire Flow Evaluation

In addition to domestic demand estimates, Weston & Sampson was tasked with review of fire flow availability throughout the town. Weston & Sampson met with the town and the town's Interim Fire Chief on March 8, 2024, to discuss the fire flow requirements for the different areas in town. Interim Chief of Department, Dr. Anthony Stowers, stated that the town of Pelham should have approximately 2,250-3,500 gallons per minute (gpm) of water supply for fire suppression for three hours in all commercial/industrial areas, and approximately 1,000 gpm of water supply for fire suppression for two hours in all other areas, including residential. Additionally, fire hydrants should be spaced 500 feet apart from each other.

In a subsequent meeting with the Town Administrator on July 23, 2024, Weston & Sampson was informed that furnishing domestic water supply to the priority areas as described above is the top priority of the water system analysis. As a result, Weston & Sampson reviewed the water system build out concept to ensure domestic demand can be transmitted throughout the proposed water system while meeting minimum hydraulic standards. Upon completion of the domestic demand analysis to review if minimum hydraulic standards can be met via the proposed water system, Weston & Sampson conducted an assessment to ascertain how much fire flow could be furnished to all areas within the proposed water system using only the proposed water system that was established under the domestic demand hydraulic analysis. Further detail of the domestic and fire flow analysis is provided in Chapter 4.

3 WATER SUPPLY INVESTIGATION

3.1 Groundwater Site Screening Study

As part of this study a town-wide site screening evaluation using publicly available data to explore and identify areas within town boundaries for the development of viable potential groundwater supplies was conducted. The spatial analysis was guided and prioritized by the evaluation of water quantity (potential yield), water quality (potential contamination sources), and permitting requirements. The surficial geologic deposits within town boundaries were deposited in the Pleistocene as the continental ice sheet advanced and retreated across the land surface. This advancement and retreat left behind thin layers of till (poorly sorted mixture of clay sized particles to large boulders) in the higher elevations, deposits associated with a former glacial lake (Glacial Lake Beaver Brook) consisting of sand with thin beds of silt, and thick glacial stream deposits in the center of the valley that trends north-north-east to south-south-west across the center of town. The glacial stream deposits have relatively high transmissive capacity and generally provide for a favorable source for groundwater development of high yield overburden wells for public drinking water supply.

The underlying bedrock geology across town is primarily identified as the Silurian Berwick Formation (Sb), composed of a biotite-plagioclase-quartz granofels with minor schist and calc silicate rocks. These rocks are often relatively low yield (<10 gallons per minute) and typically require treatment for naturally occurring constituents such as iron, manganese, arsenic, radon, and hardness.

This section of the report details this planning level analysis through GIS-based spatial analyses used to identify specific parcels that may have the potential for development as a municipal groundwater supply source. This report discusses the work performed, the methodology involved, screening results, and subsequent recommendations.

3.1.1 Work Performed

Weston & Sampson assessed the availability and relevance of hydrogeologic data on the subject area. The following documents were determined to be of value and were acquired and reviewed:

- *Water Well Inventor*y, New Hampshire Department of Environmental Servies
- K. W. Toppin, *Hydrogeology of stratified-drift aquifers and water quality in the Nashua Regional Planning Commission Area, south-central New Hampshire (USGS)*, 1987
- Clark S.F., Jr. Moore R.B, Ferguson E.W., Picard M.Z., *Criteria and Methods for Fracture Trace-Analysis of the New Hampshire Bedrock Aquifer*, 1996
- Moore, RB, Schwarz, G.E., Stewart, F.C., Walsh, G.F., and Degnan, J.R., *Fractures Related to Well Yield in the Fractured-Bedrock Aquifer of New Hampshire (USGS)*, 2002

3.1.2 Spatial Analysis

As a result of increasing demand on existing private water supplies from population growth and decreasing supply from recent water quality and quantity challenges, the Town has contracted Weston & Sampson to investigate potential new sources of groundwater within the Town limits. Weston & Sampson has worked to identify viable potential groundwater supplies by evaluating water quantity, natural water quality, potential contamination sources, and new source approval permitting requirements.

The GIS-based approach described herein helps to minimize impacts to source water quality and allows a first cut analysis of land availability for a municipal well location. The most productive municipal wells are often located in permeable material with adequate saturated thickness and sufficient long-term recharge. Sand and gravel deposits hydraulically coupled to surface water bodies are often the first choice for municipal aquifers in the northeast. With such aquifers, recharge is furnished not only by precipitation on the sand and gravel itself, but also by induced infiltration from an adjacent pond, lake, stream, or river. Understanding the importance of locating a source of water for this project, Weston & Sampson has also considered the potential for siting a source within the bedrock aquifer. Bedrock aquifers represent another potential source of groundwater supply in the region. Bedrock wells rely on intersecting fracture flow within the bedrock. These fractures are sufficiently abundant in this region and may provide enough water as a secondary source.

Many of the factors that make a site promising for withdrawals from sand and gravel aquifers are also indicative of promising bedrock well sites. For that reason, much of the GIS-based, town-wide site screening evaluation was conducted concurrently for both surficial aquifer and bedrock well sites. The first step in that evaluation is to conduct a preliminary screening, removing portions of the study area from consideration that are not viable due to regulatory or physical constraints. The second step is to evaluate the areas that remain after preliminary screening and rank them based on a series of criteria that are important for the successful development of a new source of groundwater supply. A summary of the methodology and results is described below.

3.1.2.1 Data Collection & Review

Weston & Sampson compiled appropriate datasets from existing records to perform a town-wide spatial analysis and focus our investigation on the most favorable areas for groundwater development. Data was primarily obtained from the NH Department of Environmental Services (NHDES), NH GRANIT GIS Database, the United States Geologic Survey (USGS), and records provided by the Town of Pelham. GIS vector and raster data compiled are listed under the appropriate task of this report. These datasets included:

- Existing and Proposed Utility Maps (Town of Pelham and Weston & Sampson)
- Pollution Sources (and potentials)
- Groundwater Hazards Inventory
- Topographic Maps
- Stratified-Drift Aquifer Maps
- Bedrock and Surficial Geology Maps
- USGS Hydrogeologic Reports
- Hydrography
- Water Supply Infrastructure Data
- Roadway Centerlines

The collection and review of relevant GIS data under this task culminated in the development of a base map from which we began the screening process.

3.1.2.2 Base Map

The Base Map (Figure 3.1, see Appendix C) was developed as a framework for a series of Geographical Information System (GIS) maps to display and query all future data to be collected. The Base Map (Infrastructure) Data layers used are listed below:

- Political Boundaries of Pelham and nearby municipalities
- Transmission Corridors and Pipelines
- Highways, Local Roads, and Railways
- National Hydrography Data
- Town Owned Parcels

Weston & Sampson compiled these various data sources and developed GIS compatible base maps that depicted both political (property, roadways) boundaries and hydrogeologic (stream, wetland, aquifer) boundaries.

3.1.2.3 <u>Preliminary Screening</u>

GIS-based spatial analyses were conducted to screen out non-viable portions of the study area and then evaluate the remaining areas with respect to potential water quantity, potential contamination sources, permitting requirements, and cost considerations.

Preliminary screening was conducted to remove portions of the study area from consideration that are unlikely to produce sufficient water supplies of acceptable quality or that would be unfeasible due to regulatory or cost concerns. The New Hampshire Drinking Water Program requires that public water suppliers own and control a minimum of 400 feet around their water supply wells, the sanitary protective radius. The sanitary protective radius is designed to protect the drinking water supply well from land uses inconsistent with water supplies. For that reason, all portions of the study area within 400 feet of prohibited land uses (transportation infrastructure, pipelines, etc.) were eliminated from consideration. Preliminary screening also eliminated areas that would be difficult or impossible to permit due to their proximity to a variety of regulatory setbacks and sensitive receptors. In this case, all areas located within inland surface waterbodies and wetlands (National Hydrography Dataset and the National Wetland Inventory) were eliminated from further consideration.
Following this site screening process, approximately 5.1mi^2 (19.12%) of the Town of Pelham's 26.67-mi^2 land area was evaluated further for potential groundwater sources of supply. Those remaining areas are shown in Figure 3.2 in Appendix C.

3.1.3 Ranking System

Once the permittable areas within town were delineated, a variety of hydrogeologic, engineering, and permitting constraints criteria were used to rank each of the sites. Considering the determination of favorable criteria for a surficial (sand and gravel) well is different than a bedrock well, these rankings were conducted independently. The criteria used to rank the surficial sites are summarized in Table 3.1 with their corresponding sources.

Table 3.1: Overburden Ranking Criteria		
Type	Criteria	Source
Hydrogeologic	Aquifer Transmissivity	NH GRANIT GIS Clearinghouse
	Aquifer Recharge	Calculated using LiDAR from NH GRANIT GIS Clearinghouse
Engineering	Distance to Distribution System	Town of Pelham
	Parcel Ownership	NH GRANIT GIS Clearinghouse
Regulatory	Number of Surrounding Parcels within 400 feet	NH GRANIT GIS Clearinghouse
	Distance to Potential Contamination Sources	NH GRANIT GIS Clearinghouse and NHDES
	Distance to Wetlands	NH GRANIT GIS Clearinghouse
	Number of Private Wells within 1,500 feet	NHDES

The criteria used to rank the bedrock sites had similar engineering and regulatory criteria but the hydrogeologic criteria was adjusted to be specific to bedrock properties (Table 3.2).

Table 3.2: Bedrock Ranking Criteria		
Type	Criteria	Source
Hydrogeologic	Lineaments	USGS
	Average Yield of Private Wells	NHDES
	Probability of Yield > 40 gpm	USGS
Engineering	Distance to Distribution System	Town of Pelham
	Parcel Ownership	NH GRANIT GIS Clearinghouse
Regulatory	Number of Surrounding Parcels within 400 feet	NH GRANIT GIS Clearinghouse
	Distance to Potential Contamination	NH GRANIT GIS Clearinghouse and NHDES
	Distance to Wetlands	NH GRANIT GIS Clearinghouse
	Number of Private Wells within 1,500 feet	NHDES

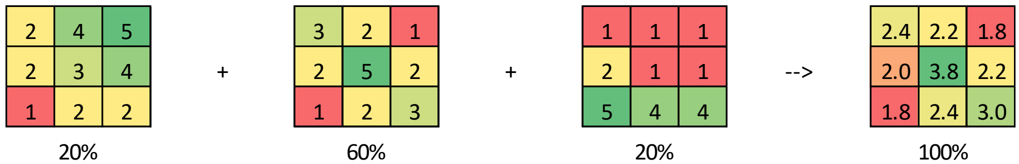
The following subsections describe this effort in detail.

3.1.3.1 Ranking Methodology

To evaluate the remaining 5.1 mi^2 of the study area against each criteria, a weighted overlay approach was used, in which the entire town was discretized into 25-foot by 25-foot grid cells. Each cell was assigned an integer score, 1 through 5, with 5 being superior and 1 being inferior, for each criterion. Each criterion was assigned a weight based on its relative importance, and then a total weighted score was calculated for each grid cell as follows:

$$S_T = \sum_{k=1}^{12} S_k W_k = S_1 W_1 + S_2 W_2 + \cdots + S_{12} W_{12}$$

Visually, this weighted overlay approach is shown schematically in the image below:



3.1.3.2 Ranking Criteria

The rationale for using, the data sources used, and the scoring metrics used for each of the criteria are discussed in the following subsections.

3.1.3.3 Surficial (Sand and Gravel) Sites

In an effort to identify the most favorable location for a high yield drinking water supply well within town boundaries, several hydrogeologic, engineering, and regulatory requirements were assessed for the remaining permittable areas (Figure 3.2, see Appendix C).

Aquifer Transmissivity

The transmissivity of surficial aquifer is a function of the hydraulic conductivity of the stratified drift and the saturated thickness of the aquifer. The aquifer property can be thought of as a volume of water flowing through a cross-sectional area of an aquifer. For this evaluation, the aquifer transmissivity criteria was designed to represent the total area of aquifers overlain by the parcel, but also the expected quality of the aquifer material. Based on USGS Water-Resources Investigations Report 86-4358 and New Hampshire Statewide stratified drift aquifers (NH GRANIT), the aquifers within the town boundaries were delineated into potential ranges of transmissivity. To prioritize sites with large aquifer areas and those overlaying higher yield aquifers which corresponds to higher transmissivity values, each cell was assigned a score between 1 and 5 based on the estimated transmissivity values (Figure 3.3, see Appendix C).

Table 3.3: Aquifer Transmissivity Scoring

Score	Aquifer Transmissivity, ft^2/day
1	<999
2	1,000-1,999
3	2,000-2,999
4	3,000-4,000
5	>4,000

Recharge Area

The upgradient drainage area is an important consideration for siting groundwater withdrawals from surficial deposits to ensure any groundwater withdrawal is sustainable. The safe yield of a sand and gravel well is directly proportional to the recharge of the aquifer, which is, in turn, is related to the size of the drainage area over which precipitation and streamflow infiltrate. Initially, the drainage area to each 25x25-foot grid cell was calculated by delineating the watersheds from LiDAR using a series of geospatial tools available through ArcGIS's Spatial Analyst toolkit. This approach, however, resulted in small drainage areas associated with grid cells that were located in the floodplains of rivers and streams with much larger drainage areas. In practice, sand and gravel deposits located in close proximity to surface waterbodies are likely to experience recharge rates much greater than their upgradient subbasin might suggest. Therefore, each grid cell was assigned a score based on the highest drainage area of any cell within a 300-foot radius. The table below summarizes how this criterion was scored, and Figure 3.4 (see Appendix C) shows the distribution of the Recharge Area criterion's scores across the study area. Note that this criterion was not used in ranking bedrock well sites because the zones of recharge to bedrock wells often have no relationship to surface topography or surficial drainage basins.

Table 3.4: Recharge Area Scoring	
Score	Recharge Area, Acres
1	<500
2	500-20,000
3	20,000-30,000
4	30,000-49,500
5	>49,500

Distance to Distribution System

In siting future groundwater supplies, it is useful to consider the relative cost associated with connecting the new source to the existing drinking water distribution system. Newly developed sources located a long distance away from the distribution system can be cost prohibitive. A GIS-based analysis was conducted on water main locations, provided by the Town, and proposed water main priority areas, developed by Weston & Sampson for this study (see section 2.1), to determine the shortest distance from each potential site to existing and proposed mains. The table below summarizes how this criterion was scored, and Figure 3.5 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.5: Distance to Distribution System Scoring	
Score	Distance to Distribution System, feet
1	>2,000
2	1,200-2,000
3	800-1,200
4	400-800
5	<400

Distance to Potential Contamination Sources

In an effort to ensure the source water developed as a result of this study has the highest quality of drinking water, it is necessary to consider the presence of known contaminated sites in siting future groundwater supplies as they can directly affect the quality of the source water and the cost of treatment. To better understand potential sources of contamination within the study area, Weston & Sampson queried NHDES's OneStop Database and Data Mapper, the clearinghouse for environmental site information in New Hampshire, to identify any potential contamination sources (PCS) located within and surrounding the Town boundary. The databases accessed included sources of potential contamination from:

- The NHDES Groundwater Hazards Inventory

- Underground Storage Tanks (USTs)
- Aboveground Storage Tanks (ASTs)
- Resource Conservation Recovery Act (RCRA) Sites
- Remediation Sites
- NPDES Discharge Locations
- Solid Waste Facilities
- Local Potential Sources of Contamination (Hazardous Waste Generators)
- Asbestos Disposal Sites

This returned 262 known sites of potential contamination sources within ½ mile of the study area (town boundaries). The table below summarizes how this criterion was scored, and Figure 3.6 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.6: Distance to Potential Contamination Scoring	
Score	Distance to Potential Contamination Sources, feet
1	0-400
2	400-600
3	600-800
4	800-1,000
5	>1,000

<u>Town Owned Parcels</u>
Permitting requirements for siting a new drinking water source requires the applicant to have full ownership of the sanitary protective area. For this study, each grid cell was evaluated to identify the potential for acquiring land ownership of the parcels. This evaluation was binary, meaning that Town owned parcels were scored as the highest for this criterion since parcels that are town-owned are already available and the other parcels would need to be acquired, adding complexity and cost to the project. The table below summarizes how this criterion was scored, and Figure 3.7 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.7: Parcel Ownership Scoring	
Score	Town Owned Parcel?
1	No
2	–
3	–
4	–
5	Yes

<u>Parcel Density</u>
The Parcel density criterion was included to focus on parcels or portions of parcels that were sufficiently large to contain the full sanitary protective radius, at least 300 feet for sources greater than 75 gpm, and minimize the cost of land acquisition or easements on neighboring parcels. A GIS-based analysis was conducted on parcel boundaries, based on the New Hampshire parcel data from NHGRANIT, to determine how many parcels were located within 300 feet of each potential site. The table below

summarizes how this criterion was scored, and Figure 3.8 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.8: Parcel Density Scoring	
Score	Parcel Density
1	5 or more parcels
2	4 parcels
3	3 parcels
4	2 parcels
5	1 parcel

Distance to Wetlands

Proximity to wetlands is both a benefit (to yield) and a challenge (to water quality) with regard to ranking potential groundwater withdrawal sites. Wells located in close proximity to wetlands typically have higher yields but may also require additional permitting as a result of an impact due to a water withdrawal. The distance of each potential site to wetlands was based on a review of the National Hydrography Dataset and the National Wetland Inventory. The table below summarizes how this criterion was scored, and Figure 3.9 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.9: Distance to Wetlands Scoring	
Score	Distance to Wetlands, feet
1	50-100
2	100-200
3	200-300
4	300-400
5	>400

Number of Private Wells

The number of private wells within 1,500 feet of each grid cell were evaluated to determine the density of private wells that could potentially be impacted if a new groundwater well were to be developed. The greater the numbers of private wells that are impacted, the more challenges and potential cost due to mitigation of those impacts associated with the withdrawal. The table below summarizes how this criterion was scored, and Figure 3.10 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.10: Distance to Private Well Scoring	
Score	Number of Private Wells within 1,500 feet
1	>15
2	11-15
3	6-10
4	1-5
5	0

Final Weighted Ranks

As noted above, a weighted overlay approach was used to identify potential groundwater well sites in overburden aquifers. Using this approach, the entire town was discretized into 25 by 25-foot grid cells, and each cell was assigned 8 scores, one for each of the 8 criteria described in the preceding section.

A single aggregated score was calculated for each grid cell by applying a weighted average to each of the 8 criteria. Some criteria are more essential than others in identifying potential groundwater well sites. For instance, while it can be costly, a new water supply can be successfully located across multiple parcels or far from the existing distribution system, but a well is unlikely to be successfully sited in an area with poor hydrogeologic conditions. For this reason, each of the criteria scores were assigned different weights to reflect their relative importance. The criteria and their assigned weights for surficial well sites are shown in Table 3.11 below.

Table 3.11: Final Weighted Ranks – Overburden		
	Criteria	Weight
Hydrogeologic (55%)	Transmissivity	25%
	Recharge Area	20%
Engineering (15%)	Distance to Distribution System	5%
	Town Owned Parcel	10%
Regulatory (40%)	Parcel Density	15%
	Distance to Potential Contamination	10%
	Distance to Wetlands	5%
	Number of Private Wells	10%

3.1.3.4 Bedrock Well Sites

A similar analysis was conducted for potential aquifer sources of supply for the town. The available area to be investigated for a bedrock well was not constrained to mapped sand and gravel deposits as described in previous sections for the overburden analysis. The hydrogeologic ranking criteria was modified for the bedrock sites but the engineering and regulatory criteria remained the same. The hydrogeologic criteria considered for the bedrock analysis were as follows:

1) Number of intersecting lineaments mapped with the site area,
2) Average yield of existing residential and commercial wells located within 1,500 feet of the site, and
3) Probability of a 40 gpm well at 400 feet

Bedrock Lineaments

Since, a bedrock well is entirely dependent on intersecting bedrock fractures, the potential for groundwater occurrence in hard rock areas is influenced by the presence of lineaments, which may act as conduits for groundwater movement due to increased secondary porosity. Geomorphotectonic structures (e.g., bedding planes, foliations, and faults) in bedrock occur as linear features (i.e., lineaments) on the land surface, which can be detected by remotely sensed imagery, identified as contrasting pixel patterns in the imagery. Lineament or fracture trace maps created and described by the US Geologic Survey in Open File Report 96-479 were overlaid within the site area. Intersecting lineaments increase the probability of success with respect to finding a high yield bedrock well for municipal supply. The greater the number of lineaments intersecting with each other, the higher probability of success. The criteria used to rank each site is tabulated below, and Figure 3.11 (see Appendix C) shows the distribution of this criterion across the study area.

Table 3.12: Bedrock Lineaments Scoring	
Score	Number of Lineament Intersections
1	<1
2	1-3
3	3-5
4	5-6
5	>6

Average Yield of Private Wells

The variability in bedrock well yields is significantly greater than in sand and gravel aquifers due to the reliance on fracture flow. For that reason, significant weight was given to sites in close proximity to existing bedrock wells that were recorded to have relatively high yields in the NHDES Water Well Inventory. The table below summarizes how this criterion was scored, and Figure 3.12 (see Appendix C) shows the distribution of this criterion across the study area. Note that because so few surficial deposit wells are located within the study area, according to the Well Database, this criterion was only used in the ranking of bedrock well sites.

Table 3.13: Average Yield of Private Well Scoring	
Score	Average Yield of private Wells within 1,500 feet, gpm
1	<20
2	20-40
3	40-50
4	50-60
5	>60

Probability of a 40 gpm well at 400 feet

USGS Professional Paper 1660, *Fractures Related to Well Yield in the Fractured-Bedrock Aquifer of New Hampshire* authored by Moore, RB, Schwarz, G.E., Stewart, F.C., Walsh, G.F., and Degnan, J.R. in 2002 included a map showing well yield probabilities in fractured bedrock that are greater than 40 gpm for wells drilled to 400 feet. The probabilities developed in the above referenced report were also used in this evaluation to assess the favorability of study areas using the following criteria (Figure 3.13, see Appendix C):

Table 3.14: Probability of a 40 gpm Well at 400-feet Scoring	
Score	Probability of a 40 gpm Well at 400 feet
1	<8%
2	8-12%
3	12-18%
4	18-25%
5	>25%

Final Weighted Ranks

As noted above, the same weighted overlay approach was used to identify potential groundwater well sites in bedrock aquifers. Using this approach, the entire town was discretized into 25 by 25-foot grid cells, and each cell was assigned 9 scores, one for each of the 9 criteria described in the preceding section.

A single aggregated score was calculated for each grid cell by applying a weighted average to each of the 9 criteria. The criteria and their assigned weights for surficial well sites are shown in Table 3.15 below.

Table 3.15: Final Weighted Ranks – Bedrock		
	Criteria	Weight
Hydrogeologic (45%)	Lineaments	20%
	Average Yield of Wells	10%
	Probability of yield >40 gpm	15%
Engineering (15%)	Distance to Distribution System	5%
	Town Owned Parcel	10%
Regulatory (40%)	Parcel Density	15%
	Distance to Potential Contamination	10%
	Distance to Wetlands	5%
	Number of Private Wells	10%

3.1.4 GIS Analysis Results

Using the data generated from the tasks described in the sections above, a final list of both potential surficial and bedrock sites were identified and ranked. These sites are presented and discussed further in this section along with final recommendations for future geophysical work to be conducted on the most favorable locations. Summary maps (Figures 3.14 and 3.15, see Appendix C) presenting the top ranked sites were also developed provided herein.

Due to the Town's proximity to potential sources of PFAS contamination, there is concern for the local groundwater aquifers to be impacted by this emerging contaminant. Therefore, the top ranked sites were evaluated against PFAS sampling results provided by NHDES. The four PFAS compounds currently regulated by the NHDES are perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorononanoic acid (PFNA) and perfluorohexanesulfonic acid (PFHxS) with maximum contaminant levels (MCL) of 12, 15, 18, and 11 parts per trillion (ppt), respectively. NHDES has created an interactive map that allows the user to access PFAS water quality data that exist in the NHDES Environmental Monitoring Database (EMD). The PFAS sampling map displays waste sites where groundwater has been sampled for PFAS. Weston & Sampson obtained the PFAS sampling data from NHDES for Pelham and the surrounding communities such that an evaluation of the risk of PFAS contamination to the five highest ranked sites could be evaluated. The risk factors considered include the resultant concentration of samples collected and whether the location for the samples was up, down, or cross gradient of the favorable sites (S1-S5). This evaluation is qualitative and completed separately from the spatial analysis described above.

3.1.4.1 Final Surficial Geologic Site Rankings

Figure 3.14 (see Appendix C) shows the distribution of final aggregated scores across the study area for potential withdrawals from surficial deposits. While total aggregate scores could theoretically range from a minimum of 1 to a maximum of 5, in this study area, the lowest and highest scores of any grid cell were 1.3 and 4.05, respectively. The top five sites are discussed in additional detail in the subsections below. The top five sites were identified as Site S1 (located east of Mammoth Road near Moon Shadow Drive), S2 (in the southern part of town northeast of Site S1 and west of Pulpit Rock Road), S3 (located north of Sites S1 and S2, east of Windham Road), S4 (located east of Site S3), and S5 (east of Site S1 and south of Site S2, just north of the Massachusetts border). These sites are all shown on Figure 3.16 (see Appendix C) and tabulated in Table 3.16 below with information regarding parcel ID, address, parcel area, ownership, drainage area, risk of PFAS contamination and distance to proposed/existing water mains (see section 2.1 for priority area locations).

Table 3.16: Top Five Ranked Overburden Sites

Site ID/Rank	Parcel ID	Address(s)	Parcel Area (Acres)	Town Owned?	Drainage Area (Sq. Mi)	Supporting Watershed Recharge (gpm)	Risk of PFAS Contamination	Distance to Proposed Water Main (feet)	Proposed Priority Area
S1	039-006-181	Mammoth Road	52	Yes	81.35	27,940	Medium	2,500 to Mammoth Road	Priority #1B
S2	040-006-166 and 040-006-157	Pulpit Rock Road and Dracut Line	27 and 40	Yes	77.87	26,655	Medium	4,600 to Bridge Street	Priority #2
S3	022-008-206	Windham Road Off	38	No	18.48	6,982	High	1,700 to Windham Road	Existing
S4	015-008-086 and 022-008-085	Tina Avenue Off and 579 Bridge Street	38	No	18.43	6,970	High	1,500 to Bridge Street	Priority #2
S5	040-006-172 and 040-006-171	Dracut Line	8 and 15	Yes	3.19	1,194	Medium	4,300 to Mammoth Road	Priority #1B

Site S1

Site S1 is displayed on Figure 3.17 (see Appendix C). This site is located at parcel 039-006-181 (town owned), east of Mammoth Road. The site is composed of mostly wooded and agricultural property. Site S1 is the highest ranked site with a maximum aggregated score of 3.65. This area is underlain by aquifer deposits categorized with a transmissivity value of less than 2,000 ft^2/day and a supporting recharge area of the underlying aquifer is larger in comparison to the other areas with an approximate area of 81.35 mi^2. A stream and associated wetland are adjacent to the site. It is possible that an overburden well at this site would benefit from induced recharge from the nearby surface water sources, increasing its potential yield.

Most of the high-ranking area in this site, is located within a single parcel, streamlining land acquisition and the establishment of a sanitary protective radius. The site is greater than 1,000 feet from most of the mapped contaminated sites. Although this site scores well with regard to a number of criteria the site is located downgradient of multiple PFAS detections north of the site. PFOA concentrations range from 6.46 to 30.2 ppt, PFOS concentrations range from 1.58 to 9.97 ppt, PFHxS concentrations range from 4.4 to 29.08 ppt and PFNA concentrations range from 0.65 to 1.32 ppt. A brief review of the publicly available aerial imagery shows these samples were taken near what appears to be an Automobile Junkyard Business, located at 16 Pulpit Rock Road #2, east of S1.

Site S2

Site S2 is displayed on Figure 3.18 (see Appendix C). This site is located at parcels 040-006-166 and 040-006-157 (town owned), east of Patriot Drive and west of Pulpit Rock Road. The site is composed of mostly wooded and wetland property. Site S2 is the second highest ranked site with a maximum aggregated score of 3.6. This area is underlain by aquifer deposits categorized with a transmissivity value of greater than 4,000 ft^2/day and a supporting recharge area of the underlying aquifer is larger in comparison to the other areas with an approximate area of 77.87 mi^2. A stream and associated wetland are adjacent to the site. It is possible that an overburden well at this site would benefit from induced recharge from those surface water sources, increasing its potential yield.

Most of the high-ranking area in this site, is located within two adjacent town owned parcels, streamlining land acquisition and the establishment of a sanitary protective radius. The site exhibits a shallow slope and is far from most of the mapped contaminated sites. Although this site scores well with regard to a number of criteria, the site is located downgradient and cross-gradient of multiple PFAS detections north and west of the site. PFOA concentrations range from 4.55 to 30.2 ppt, PFOS concentrations range from 1.58 to 9.97 ppt, PFHxS concentrations range from 4.4 to 29.08 ppt and PFNA concentrations range from 0.47 to 1.6 ppt. A brief review of the publicly available aerial imagery shows these samples were taken near the Automobile Junkyard Business discussed above (north of the site) and a variety of industrial and commercial businesses (auto and medical related) to the west of the site.

Site S3

Site S3 is displayed on Figure 3.19 (see Appendix C). This site is located at parcel 022-008-206 (privately owned), east of Patriot Drive and west of Pulpit Rock Road. The site is composed of mostly wooded and wetland property. Site S3 is the third highest ranked site with a maximum aggregated score of 3.5. This area is underlain by aquifer deposits categorized with a transmissivity value of greater than 4,000 ft^2/day and a supporting recharge area with an approximate area of 18.48 mi^2.

Most of the high-ranking area in this site would require the purchase of at least one privately owned parcel to own and control the sanitary protective area. The site is closer to multiple contaminated sites in comparison to S1 and S2, raising the risk with respect to the need for treatment. Additionally, this site appears to be downgradient of multiple very high PFAS detections north of the site. PFOA concentrations range from 1.2 to 900 ppt, PFOS concentrations range from 1.6 to 3,100 ppt, PFHxS concentrations range from 7.36 to 368 ppt and PFNA concentrations range from 0.64 to 170 ppt. A brief review of the publicly available aerial imagery shows these samples were taken near a closed landfill.

Site S4

Site S4 is displayed on Figure 3.20 (see Appendix C). This site is located at parcel 015-008-086 and 022-008-085 (privately owned), north of Tina Avenue and west of Inwood Circle. The site is composed of mostly wooded and open space property. Site S4 is the fourth highest ranked site with a maximum aggregated score of 3.45. This area is underlain by aquifer deposits categorized with a transmissivity value of greater than 4,000 ft^2/day and a supporting recharge area with an approximate area of 18.43 mi^2.

Most of the high-ranking area in this site would require the purchase of at least one privately owned parcel but potential two in order to own and control the sanitary protective area. Weston & Sampson has been in contact with the owner (William Renaud, President of The Reno Companies) of parcel 022-008-085 and is aware his property may be of interest in the future siting of water supply development. The site is a similar distance to the contaminated sites near S3. Additionally, this site is downgradient from the same PFAS detections as S3, near the closed Pelham Landfill.

Site S5

Site S5 is displayed on Figure 21 (see Appendix C). This site is located at parcels 040-006-166 and 040-006-157 (town owned), east of S1 and south of S2. The site is composed of mostly wooded and wetland property. Site S5 is the fifth highest ranked site with a maximum aggregated score of 3.4. This area is underlain by aquifer deposits categorized with a transmissivity value of greater than 4,000 ft^2/day and a supporting recharge area of the underlying aquifer is larger in comparison to the other areas with an approximate area of 3.19 mi^2. A stream and associated wetland are adjacent to the site. It is possible that an overburden well at this site would benefit from induced recharge from those surface water sources, increasing its potential yield.

Most of the high-ranking area in this site, is located within two adjacent town owned parcels, streamlining land acquisition and the establishment of a sanitary protective radius. The site is a similar distance to the contaminated sites near S2. Additionally, this site is downgradient from the same PFAS detections as S2, the Automobile Junkyard Business and a variety of industrial/commercial businesses.

3.1.4.2 Final Bedrock Geologic Site Rankings

Figure 3.15 (see Appendix C) shows the distribution of final aggregated scores across the study area for potential withdrawals from bedrock fractures. While total aggregate scores could theoretically range from a minimum of 1 to a maximum of 5, in this study area, the lowest and highest scores of any grid cell were 1.2 and 4.25, respectively. Those top ten sites are discussed in additional detail in the subsections below. The top five sites were identified as Site B1 (located just north of Aspen Drive and Windridge Circle), B2 (in the northern part of town west of Mammoth Road and), B3 (located north of Site B1 and south of Gumpas Pond), B4 (located south of Arlene Drive and west of Simpson Mill Road), and B5 (north of Sherburne Road and south of Site B1). These sites are all shown on Figure 3.22 (see Appendix C) and tabulated in Table 3.17 below with information regarding parcel ID, address, parcel area, ownership, drainage area, risk of PFAS contamination and distance to proposed/existing water mains (see section 2.1 for priority area locations).

Table 3.17: Top Five Ranked Bedrock Sites							
Site ID/Rank	Parcel ID	Address(s)	Parcel Area (Acres)	Town Owned?	Risk of PFAS Contamination	Distance to Proposed Water Main (feet)	Proposed Priority Area
B1	002-005-071	Baldwin Hill Road	98	Yes	Low	1,600 to Keyes Hill Road	Priority #3
B2	039-001-159 and 039-001-050	Sherburne Road	126	Yes	Medium	1,200 to Sherburne Road	Priority #1B
B3	027-002-065	76 Spaulding Hill Road	94	Yes	Low	2,700 to Mammoth Road	Priority #1B
B4	027-002-081	Tower Hill Road	87	Yes	Medium	3,800 to Mammoth Road	Priority #3
B5	008-009-065 and 009-009-068	Arlene Drive and Simpson Mill Road	50 and 73	Yes/No	Medium	950 to Arlene Drive	Priority #3

Site B1

Site B1 is displayed on Figure 3.23 (see Appendix C). This site is located at parcel 002-005-071 (town owned), south of Keyes Hill Road and east of Gibson Road (Town of Hudson). The site is composed of mostly wooded property. Site B1 is the highest ranked site with a maximum aggregated score of 4.0. The site is located atop the Berwick Formation and is surrounded by moderate to low yields, based on existing well records from NHDES and the USGS study evaluating well yield probabilities in fractured bedrock that area greater than 40 gpm at 400 feet. The southern portion of the site has multiple intersections of two bedrock lineaments, mainly orientated in the NE-SW direction, which makes the site more likely to produce a higher yield if a well was sited at one of these intersections.

Most of the high-ranking area in this site, is located within a single parcel, streamlining land acquisition and the establishment of a sanitary protective radius. The site is a considerable distance from the mapped contaminated sites but located downgradient from PFAS detections in the overburden. PFOA concentrations range from 0.27 to 6.2 ppt, PFOS concentrations range from 0.21 to 1.8 ppt, PFHxS concentrations range from non-detect to 8.96 ppt and PFNA concentrations are non-detect. Overall, contamination risk is medium to low at this site.

Site B2

Site B2 is displayed on Figure 3.24 (see Appendix C). This site is located at parcel 039-001-159 and 039-001-050 (town owned), north of Sherburne Road and south of B3. The site is composed of mostly wooded property. Site B2 is the second highest ranked site with a maximum aggregated score of 3.8. The site is located within the Ayer Granodiorite and is surrounded by moderate to low yields, based on existing well records from NHDES and the USGS study evaluating well yield probabilities in fractured bedrock that area greater than 40 gpm at 400 feet. The entire site has multiple intersecting bedrock lineaments NW-SE and NE-SW, which makes the site more likely to produce a higher yield.

The high-ranking area in this site, is mostly split between two parcels, both town-owned, streamlining land acquisition and the establishment of a sanitary protective radius. The site is a considerable distance from the mapped contaminated sites. This site is downgradient from low PFAS detections in the overburden. PFOA concentrations range from non-detect to 1.76 ppt, PFOS concentrations range from non-detect to 0.623 ppt, PFHxS concentrations range from non-detect to 3.276 ppt and PFNA concentrations are non-detect. Overall, contamination risk is low at this site.

Site B3

Site B3 is displayed on Figure 3.25 (see Appendix C). This site is located at parcel 027-002-065 (town owned), east of Spaulding Hill Road and south of Gumpas Hill Road. The site is composed of mostly wooded property. Site B3 is the third highest ranked site with a maximum aggregated score of 3.6. The site is located within the Berwick Formation and is surrounded by moderate yields, based on existing well records from NHDES and the USGS study evaluating well yield probabilities in fractured bedrock that area greater than 40 gpm at 400 feet. A majority of the site has multiple intersections of two bedrock lineaments in a variety of orientations, which makes the site more likely to produce a higher yield if a well was sited at one of these intersections.

Most of the high-ranking area in this site, is located within a single parcel, streamlining land acquisition and the establishment of a sanitary protective radius. The site is a considerable distance from the mapped contaminated sites but located downgradient from the same PFAS detections as B2. PFOA concentrations range from non-detect to 1.76 ppt, PFOS concentrations range from non-detect to 0.623 ppt, PFHxS concentrations range from non-detect to 3.276 ppt and PFNA concentrations are non-detect. Overall, contamination risk is low at this site.

Site B4

Site B4 is displayed on Figure 3.26 (see Appendix C). This site is located at parcel 002-005-071 (town owned), north of B3 and Gumpas Hill Road. The site is composed of mostly wooded property. Site B3 is the third highest ranked site with a maximum aggregated score of 3.6. The site is located within the Berwick Formation and is surrounded by moderate to low yields, based on existing well records from NHDES and the USGS study evaluating well yield probabilities in fractured bedrock that area greater than 40 gpm at 400 feet. The center of the site has one bedrock lineament-oriented NE-SW, which makes the site more likely to produce a higher yield. Although, intersecting lineaments are preferred.

Most of the high-ranking area in this site, is located within a single parcel, streamlining land acquisition and the establishment of a sanitary protective radius. The site is a considerable distance from the mapped contaminated sites but located downgradient from the same PFAS detections as B3. PFOA concentrations range from non-detect to 1.76 ppt, PFOS concentrations range from non-detect to 0.623 ppt, PFHxS concentrations range from non-detect to 3.276 ppt and PFNA concentrations are non-detect. Overall, contamination risk is low at this site.

Site B5

Site B5 is displayed on Figure 3.27 (see Appendix C). This site is located at parcel 008-009-065 (town owned) and 009-009-068 (privately owned), south of Arlene Drive and north of Christopher Lane. The site is composed of mostly wooded property. Site B5 is the fifth highest ranked site with a maximum aggregated score of 3.45. The site is located within the Berwick Formation and is surrounded by moderate to low yields, based on existing well records from NHDES and the USGS study evaluating well yield probabilities in fractured bedrock that area greater than 40 gpm at 400 feet. The center of the site has one bedrock lineament-oriented NW-SE, which makes the site more likely to produce a higher yield. Although, intersecting lineaments are preferred.

The high-ranking area in this site, is mostly split between two parcels, one privately owned, and the other town owned. Therefore, this site would require the purchase of at least one privately owned parcel or some type of easement to own and control the sanitary protective area The site is a surrounded by multiple mapped contaminated sites including downgradient from PFAS detections in the overburden. PFOA concentrations range from non-detect to 26 ppt, PFOS concentrations range from non-detect to 3.4 ppt, PFHxS concentrations range from non-detect to 7.2 ppt and PFNA concentrations are non-detect. Overall, contamination risk is medium at this site.

3.1.5 Groundwater Site Recommendations

This study was successful in identifying and ranking the top five most favorable overburden (surficial) and bedrock well sites within town boundaries using publicly available data. In order to advance this process to confirm a sites potential with respect to yield and water quality, Weston & Sampson recommends pursuing site-specific hydrogeologic investigations at the top five sites identified in this study. The investigation should focus on the highest ranked overburden sites first. Further testing can include non-intrusive geophysical evaluations followed by test well drilling to better define potential yield and water quality treatment needs.

If the Town would prefer to proceed with one of the Bedrock Sites, Weston & Sampson recommends conducting geophysical surveys that uses methods to determine the locations and orientations of potential bedrock fractures as sources of water.

3.2 Water Supply Interconnections

3.2.1 Interconnection with Hudson, NH

Hudson currently receives water from two sources, Pennichuck Water Works (PWW), and their own groundwater source, Weinstein Well, located in the neighboring town of Litchfield, NH. As of the date of this report, the other two wells also located in Litchfield, Dame and Ducharme, are offline due to exceedance of PFAS maximum contaminant levels (MCLs). Weinstein Well is also being monitored closely due to PFAS levels and is scheduled to be removed from service within the next five years once the current Environmental Protection Agency (EPA) PFAS standards take effect. If water were to be supplied to Pelham from PWW, the supply would need to be wheeled through Hudson's water system to serve Pelham. Discussions with Hudson indicated a willingness to explore a second interconnection with Pelham.

As of the date of this report, a separate study is also ongoing; the Hudson Regional Water Study. This study is evaluating the feasibility of supplying towns around Hudson (including Pelham) with water from the PWW Water Treatment Plant in Nashua, NH. The Hudson Regional Water Study is reviewing potential upgrades necessary to bring water from Nashua, through Hudson, and to the south-central parts of New Hampshire.

3.2.2 Interconnection with Salem, NH

Salem's primary water source is Canobie Lake and Arlington Mill Reservoir (operating alternatively throughout the year) and receives supplementary water supply from the Southern New Hampshire Regional Water System (supplied by Manchester Water Works). As of the date of this report, Salem does not have excess water capacity that they are able to sell to Pelham.

3.2.3 Interconnection with PEU Williamsburg Supply

PEU Williamsburg obtains its water from two gravel packed wells located adjacent to the Mount Vernon Drive Pump Station. Wells 1 and 2 have a safe yield of 110 gpm each. After taking into consideration the MDD of current residents/customers (120,869 GPD, see Table 2.1), Williamsburg system has an excess supply of approximately 195,931 GPD (136 gpm).

As of the date of this report, a new water main project is also being designed along Route 38 to connect the Highland Estate Apartments and a proposed 65 Unit Apartment Building at 579 Bridge Street. This further reduces the available excess water supply to 168,601 GPD (117 gpm). Based on the estimated future demands for the system expansion extents and as outlined in Table 2.2, Williamsburg would need to be combined with additional source(s) in order to fully satisfy the future demand requirements.

Additionally, water quality reports available on One Stop indicate that Williamsburg is in exceedance of current EPA regulations for PFAS (published in April 2024). Specifically, the EPA's MCL for Perfluorooctanoic acid (PFOA) is 4 ppt, and sampling results on 1/03/2024 measure PFOA at 8.44 ppt. Williamsburg is under the MCL for Perfluorohexane Sulfonic Acid (PFHxS), Perfluorononanoic Acid (PFNA) and Perfluorooctane Sulfonic Acid (PFOS), also regulated by the EPA. Should the Williamsburg Wells remain online, an increase in project capital costs may occur due to the PFAS treatment that is required to be implemented by 2029, as ruled by the EPA. It should be noted, though, that Pennichuck has indicated they are not planning to add water treatment for their Williamsburg supply due to the high capital and operating cost of a PFAS treatment system. Therefore, it is highly likely that the Williamsburg water supply will not be available after 2029 and PEU will seek alternative water sources to meet its customer demand.

3.2.4 Brief Water User Rate Analysis

The following is a brief summary of anticipated water user rates for new water customers in Pelham:

- The existing PEU user rate Pelham residents pay (Williamsburg, Skyview Estates, Gage Hill and Whispering Winds) is $9.50 per 100 cubic feet (CCF) of water usage.
- Additional fees include a monthly account charge, qualified capital project adjustment charge, rate case and other recoupment fees.
- As an example of total water cost for a residential customer that uses 4 CCF of water per month, the anticipated total expense (including the additional fees) for that level of water consumption is $69/month.
- It should be noted that Pennichuck is proposing a consolidation of its PWW and PEU businesses and as a result, a modification in its water rate structure. Most PEU customers (including PEU's Pelham customers) would likely see a reduction in their current water rate (and in some cases a significant reduction). However, some customers that use little water (1 CCF/month as an example) could see an increase in their water rates. The rate case is being reviewed by the PUC with anticipated rate adjustments being finalized in 2025, subject to final approval. Since the entirety of Pelham is PEU franchise area, the water rate that PEU would charge to any new customers in Pelham, via the expanded water system concept presented in this report, would be the same as the water rate charged to existing PEU customers in Pelham.

4 WATER SYSTEM DEVELOPMENT

4.1 Hydraulic Model Development

An ArcGIS file of the existing PEU public water systems in Pelham was first obtained from Pennichuck. Weston & Sampson then utilized the shapefiles to develop an initial hydraulic model of the existing public water systems in the hydraulic software platform Infowater by Innovyze. The model attributes were populated with MDD estimated demands (as described in section 2.2), ground elevation data, and existing water system assets (e.g. water storage tanks, pump stations, pressure reducing valves) as detailed in the following subsections. After checking the hydraulic model of the existing water systems for accuracy, the proposed water system (constructed as extensions of the existing water systems) was created to form a contiguous, conceptual, town-wide water system. Upon confirmation that the conceptual water system ran without errors, the overall assessment of the proposed water system expansion commenced. The following sections provide further detail.

4.2 Existing System Connections

The town of Pelham has four PEU small systems (Williamsburg, Gage Hill, Whispering Winds and Skyview) and nine private small systems (not owned or operated by PEU). Per the concept water system build out described herein, all four PEU small systems would be connected to the newly expanded town-wide water system. Three of the nine private systems would also form a part of the new town-wide water system due to PFAS contamination (as requested by the town).

4.2.1 PEU Small Systems

Williamsburg

The largest, existing PEU water system in Pelham is Williamsburg located in the western section of Pelham and spanning the eastern and western sides of the Mammoth Road/Route 128 corridor. Per the expansion concept outlined in this report, Williamsburg would act as the main "connector" between the three priority areas in Pelham as previously described in this report.

Williamsburg's water supply consists of groundwater wells located on Mt Vernon Drive. The total safe yield of the wells, per PEU, is approximately 220 gpm (110 gpm per well). Water is supplied from the Mt. Vernon Drive source and distributed into the Williamsburg system to three different three different service areas with associated hydraulic grade lines (HGLs). The northern portion of the Williamsburg water system operates at a 353-feet HGL, the western portion operates at a 546-feet HGL, and the southeastern portion operates at a 370-feet HGL. Williamsburg is served by a 350,000-gallon Natgun tank located at the end of Collins Way. The Meadowview pump station located at the intersection of Holstein Drive and Monument Hill Road lifts water from the 370-foot service area and fills the tank to a predetermined water level. When that level is reached, the pumps in the station turn off and the tank begins to drain allowing it to serve the entire Williamsburg system. Currently, there are pressure reducing valves between each of the pressure zones (the 546-foot HGL service area reduces to the 370-foot HGL service area and the 370-foot HGL service area reduces to the 353-foot HGL service area). These existing PRV's are integrated into the proposed water system expansion and serve as the proposed gradeline for the applicable priority areas described in this report.

Gage Hill

In addition to the Williamsburg water system, the Gage Hill water system is also proposed for interconnection within the contiguous water system concept. Gage Hill is comprised of Wellesley Drive, Vassar Drive, and Radcliffe Drive. The existing service area is located off Bridge Street/Route 38 in the designated Priority #2 area of the proposed water system expansion. The existing Gage Hill water mains would connect to the proposed water mains in the Priority #2 area. Unlike Williamsburg, the existing Gage Hill water supply is proposed for abandonment due to PFOA levels above the EPA MCL of 4.0 parts per trillion (ppt). As a result, the existing pump house would also be decommissioned and replaced with a new pump station to transmit water supply from the 370-foot HGL service area to the 432-foot gradeline that Gage Hill currently operates at.

Whispering Winds
Whispering Winds is located in Pelham and Windham. Whispering Winds, in Pelham, is comprised of Tennessee Drive, Industrial Drive, and Dick Tracy Drive (Priority #3). Water is currently supplied to this section of Pelham from the town of Hudson through their Windham Road service area. Water is transmitted along Sullivan Road in Hudson to a cross-country connection into Pelham along Industrial Park Drive. At the interconnection is the Sullivan Road Meter Pit, a back pressure sustaining valve assembly and a pressure reducing valve assembly. Currently, a hydraulic grade line of 382 feet is maintained within the Industrial Park area in Pelham. As water passes into Windham along Mammoth Road, a second PRV is present that reduces the gradeline to 362 feet.

The proposed Priority #3 area would conceptually connect to the Whispering Winds water system and the Williamsburg water system via a new water main located in Mammoth Road between Industrial Drive and Mt Vernon Drive. Water supply from Hudson would be transmitted into the proposed Priority #3 area in Pelham to supplement the existing Williamsburg water supply as the Priority #3 area builds out over time. Modification of the Industrial Park PRV would be necessary to align the HGL's of the Whispering Winds and Williamsburg systems (from 382 feet to 370 feet).

Sky View Estates
Sky View Estates is located in the southwest corner of Pelham in the Sherburne Road area. The water system is comprised of Majestic Avenue, Powderhorn, and Aspen Drive. The Sky View water system has its own water source but does not maintain any extra capacity to serve new customers in Pelham.

The Sherburne Road area is located in the proposed Priority #1A section of the conceptual water system. As a result, the conceptual water system would include an emergency interconnect with the Sky View system should Sky View require emergency water supply. The current hydraulic grade line in Sky View is 574 feet. The proposed HGL for the Priority #1A area in the vicinity of the proposed emergency interconnect with Sky View is 450 feet. Temporary pumping would need to be furnished to transmit water from the Priority #1A area into Sky View under this scenario.

4.2.2 Private Small Systems
In addition to the four PEU small systems described above, there are also nine private (non-PEU) water systems within the town of Pelham as follows:

- Boulder Hills
- Garland Woods
- Highland Estate Apartments
- Landmark Estate Condos
- Long Pond Woods
- Old Lawrence Road
- Paradise Estates

- Prolyn Town House Apartments
- Simpson Mill

Of the nine private water systems, Highland Estate Apartments, Prolyn Town House Apartments, and Simpson Mill are included in the conceptual water system build out described in this report due to known PFAS contamination in each respective water supply. The remaining six private systems (without any known PFAS concerns in their water supplies) would remain private water systems under the proposed water system concept build out.

4.3 Interconnection Alternatives

Three interconnection locations (with adjacent public water systems) were assessed as part of the water expansion study; an interconnection with Hudson, with Williamsburg and with Salem. The following sections describe our findings.

4.3.1 Hudson Water System Interconnections

There are two interconnection concepts with the town of Hudson's water system. The first interconnection concept is a new, proposed interconnect in the southwest section of Pelham along Sherburne Road. The second interconnection concept is an expansion of the existing connection with Hudson in the northwest section of Pelham at the Industrial Park. The following sections provide additional detail of each concept.

Hudson Water System Southwest Interconnection – Dracut/Sherburne Road

The Hudson water system currently ends with a 12-inch water main at the intersection of Dracut Hill Road and Sand Hill Road in the southwest section of Hudson. To extend water service to the Pelham town line, approximately 7,400 linear feet of water main would need to be installed along Dracut and Sherburne Road. This area of Hudson is served by Hudson's Main Service System which operates at an HGL of 310'. In order to transmit water from this section of the Hudson water system into Pelham (along Sherburne Road) a pump station is necessary to lift the water to an appropriate HGL that would serve the higher elevation area in this section of Pelham. It should be noted that this area of Pelham is within the Priority #1A area.

Under the Phase 1 assessment of the Sherburne Road area, Weston & Sampson conducted a brief hydraulic review to assess a recommended HGL for the area. In a letter dated March 1, 2023, an HGL of 465 feet was recommended based on the highest elevations to be served public water in that area while maintaining a minimum operating pressure of 40 psi under all normal conditions of flow. As a result, a pump station was conceptualized on Dracut Road in the town of Hudson that would maintain minimum suction pressures while the pump station is in operation. An additional pump station siting analysis will need to be conducted under a separate study to ascertain the exact location this pump station should be located.

Hudson Water System Northwest Interconnection – Sullivan Road/Industrial Drive

An existing interconnection with the Hudson water system exists in the northwest section of Pelham at the industrial park. Potable water is transmitted into Pelham via Hudson's Windham Road high service area. At the interconnection between the Hudson water system and the PEU water system (Whispering Winds), between Sullivan Road in Hudson and the Pelham Industrial Park, is a 12-inch water main with an inline back pressure sustaining valve, meter pit and pressure reducing valve assembly to establish limitations on allowable flow into Pelham, to properly track and meter water consumption within

Whispering Winds and to reduce the HGL of the Windham Road service area (~500 foot HGL) to an HGL of 382 feet. It should be noted that the Priority #3 area would connect near the Mammoth Road/Industrial Drive intersection.

In addition to the Pelham Industrial Park, the Whispering Winds water system continues north along the Mammoth Road corridor to serve residential and commercial areas in the town of Windham and terminates near the Mammoth Road/Route 111 intersection in Windham. An additional PRV is located along this section of the water system and reduces the HGL from 382 feet to 362 feet.

4.3.2 Salem Water System Interconnection – Route 38

An interconnection with the neighboring town of Salem was briefly investigated and discussed with the town of Salem. The Salem water system currently terminates near the intersection of Route 38 and Quill Lane in Salem. At the time of this study, Salem is actively overseeing the design of a water main extension that would bring municipal water to the intersection of Route 38 and Brady Avenue. At this location, approximately 2,800 feet of water main would be needed to extend the water system to the Pelham town line along Route 38. However, as mentioned earlier, the Salem water system does not have extra water supply capacity to offer to the town of Pelham at this time. If additional water supply should become available in the future, the town of Pelham should consider reengaging the town of Salem, even if it results in only an emergency interconnection between the water systems.

The HGL in this section of the Salem water system is approximately 340 feet. At an HGL of 340 feet, water service (at no less than 40 psi working pressure) could be provided by Salem into Pelham along Route 38 up until the intersection with Ledge Road in Pelham. At this intersection, a pump station would be necessary to continue to provide water service westerly along Route 38. This portion of Pelham is defined as Priority area #2. The proposed HGL in this section of the conceptual water system is 458 feet. Since it is unknown if a Salem interconnection would ever materialize, a pump station located at the intersection of Route 38 and Ledge Road is not a part of the water system build out concept presented in this study.

4.3.3 Williamsburg Interconnection

As mentioned previously, Williamsburg is an existing PEU small public water system located in the center of Pelham. The water system is served by two groundwater wells, a water storage tank, a booster station to fill the storage tank and two PRV stations to reduce pressure in certain areas across the water system. The existing 350,000-gallon storage tank is located off Collins Way in Pelham and provides a maximum HGL of 549 feet in this area of the Williamsburg system. Meadowview pump station, located near the intersection of Holstein Drive and Monument Hill Road, also houses a PRV assembly. The pumps in the station lift water from an HGL of 370 feet to 549 feet in order to fill the storage tank. When water level in the tank reaches a high-water level, the pumps turn off and the PRV opens to allow water to flow from the high service area back into the low service area. A second PRV is located near the intersection of Mount Vernon Drive and Monticello Drive and lowers the HGL from 370 feet to 353 feet.

As mentioned earlier in the report, the Williamsburg water supply has approximately 168,600 gallons of available supply to furnish to a Pelham water system expansion concept. If the Williamsburg water supply was utilized to satisfy future domestic demand in Pelham, it would need to be combined with additional source(s) in order to fully satisfy the future demand requirements. The Williamsburg water system is located in the area of Pelham designated as Priority Area #3. However, due to its proximity in the center of town, water main extensions can be established to furnish water supply to both Priority

Area #1B and #2. An interconnection with Priority Area #1B would require approximately 11,885 feet of water main installed along Mammoth Road, starting at the intersection with Nashua Road, and ending just after the intersection with Bowley Drive. It should be noted that the entire length of water main in Mammoth Road, as described above, is located in Priority Area #3. At the intersection with Bowley Drive begins the proposed Priority #1B area.

An alternative to utilizing Mammoth Road to connect the Williamsburg water system with Priority area #1B is installing approximately 6,085 feet of water main on Marsh Road starting at the intersection with Michellle Avenue and ending at the intersection with Wilshire Lane. While this alternate water main route is approximately 50% shorter, it was not identified at the start of this project by the town as an area to extend water through. Under the scope of this study, our hydraulic assessment included the longer water main route along Mammoth Road. However, the town should consider the alternate Marsh Road route under future efforts as the water system concept matures.

Under this water system expansion concept, an interconnection with Priority area #2 is proposed near the intersection of Main Street and Woodbury Avenue. As mentioned earlier in the report, a water main extension project is currently being designed in this area of Pelham in order to extend water service from the Williamsburg water system to Bridge Street. As a result of this water extension, public water will be present in the Priority #2 area to enable future expansion. However, the availability of water supply will need to be confirmed prior to any future water system expansions (including the availability of Williamsburg water supply after 2029 if water treatment for PFAS is not installed and PEU chooses to discontinue use of the wells).

4.3.4 Interconnection Feasibility

Water supply interconnection with existing public water supplies was assessed under this expansion study using water supplied by the town of Hudson and the Williamsburg water system. Figure 4.1 in Appendix D depicts the infrastructure necessary for the interconnection.

The following interconnection locations would be used to serve each section of Pelham:

Table 4.1: Water Supply Interconnection	
Interconnection Location	Priority Area
Interconnection with Hudson, Southwest	Priority #1A/#1B
Interconnection with Hudson, Northwest	Priority #3
Interconnection with Williamsburg	Priority #2

Priority Area #1A/#1B

Under Supply Scenario 1, Priority area #1A/#1B would be served water supply by the Hudson water system via the Dracut Road/Sherburne Road water system extension described earlier in the report. In this assessment, the Hudson water system is the best alternative for furnishing water to this area of Pelham in the short term and under a long-term full Pelham system build out concept. As listed in Table 2.2, the projected MDD in Priority Area #1A/#1B at full build out is 207,405 gpd.

The amount of water main required to extend water service into Priority Area #1A is shorter with the Hudson alternative than other alternatives presented in this study. In addition, the area of highest need for water supply is located in the western portion of Sherburne Road (#1A); where the Hudson interconnection would occur.

As the Priority #1A area builds out from west to east, the existing ground elevations in this area decrease. As a result, a reduction in hydraulic gradeline is warranted. Near the intersection of Sherburne Road and Scenic View Drive (the interface between Priority area #1A and #1B), we have modeled a PRV to lower the HGL from 465 feet to 370 feet. This gradeline adjustment keeps available water pressures to the east of the PRV within acceptable industry standard limits and aligns with the proposed HGL's at the connection points in Priority Areas #2 and #3 as the water system expands towards each priority area.

Priority Area #2

As mentioned earlier, a water main extension from the Williamsburg water system is actively being designed to furnish water supply into the Priority #2 area along Bridge Street. The estimated MDD that would be served along the proposed Bridge Street water main extensions in Priority Area #2 is 27,331 gpd. Therefore, approximately 247,900 gpd of water supply would need to be supplied at full build out in Priority Area #2 to meet the remaining estimated MDD. If all remaining Williamsburg supply (168,600 gpd) were used to satisfy the remaining Priority Area #2 MDD, there would be a supply deficit of approximately 79,300 gpd. Therefore, additional water supply to Priority Area #2 would be needed from Hudson through a connection with Priority Area #1B and/or Priority Area #3.

The HGL from the connection point with either Priority Area #1B or Priority Area #3 (both HGL's equal to 370 feet) would match the HGL (370 feet) at the connection point with Priority Area #2. The 370-foot gradeline would serve a majority of the Priority #2 area except for the Gage Hill and eastern most area of Priority #2 (east of the Bridge Street/Vassar Drive intersection). The water system concept includes a pump station at that intersection to raise the HGL from 370 feet to 458 feet to provide water service to the higher elevation areas in this part of Pelham.

Priority Area #3

Priority Area #3 has a connection with the Hudson water system in the northwest part of Pelham at the Pelham Industrial Park. As Priority Area #3 builds out, along the Mammoth Road corridor, the demand can be met from Hudson's water system (via the Windham Road high service area). As described above, the HGL in the Pelham Industrial Park would be adjusted to 370 feet. This HGL is the proposed gradeline as the water system expands down Mammoth Road and connects with the existing Williamsburg water system (at the intersection of Mammoth Road and Mount Vernon Road). Depending on the rate of expansion of Priority Area #2, the Williamsburg water supply may have available water to serve Priority Area #3. However, by definition, Priority Area #3 would be the last area to be built out and long term, any available Williamsburg supply would already be used to meet Priority Area #2 demand.

In addition to the Mammoth Road corridor, Priority Area #3 includes the Jeremy Hill Road and Bush Hill Road corridors in the western portion of Pelham. Higher ground elevation is present in these areas and as a result, the expansion of the existing 545-foot HGL Williamsburg service area is proposed to serve these areas of Priority Area #3. The Hudson water supply would be transmitted down Mammoth Road and combine with the Williamsburg supply. The existing Meadowview pump station would boost Hudson and Williamsburg water supply into the high service zone to fill the Williamsburg tank. Expansion of the existing Williamsburg water system into the Jeremy Hill Road and Bush Hill Road corridors would ultimately transmit water from both the Williamsburg tank and the Meadowview pump station to serve the Priority Area #3 demand in these areas.

Along Bush Hill Road, between the intersections of Vista Drive and Hinds Lane, the water system concept identified the need for a PRV to reduce the HGL from 545 feet to 444 feet. Ground elevation from west to east along Bush Hill Road steadily decreases leading to the recommendation to reduce water pressure in this area.

4.4 Water Main Sizing Assessment & Model Results

Assigning domestic water demand is essential to performing hydraulic modeling for a distribution system. As a result, the following criteria was used in assessing the proposed water main diameters:

All conditions of normal domestic service should be furnished while meeting the following criteria as set by AWWA M32 – Computer Modeling of Water Distribution Systems, Fourth Edition:

- Maintain headloss less than or equal to 10 feet per 1,000 feet of pipe in water mains with diameter of less than 16-inches.
- Maintain velocities of 4.0 feet per second or less in all water mains.
- Maintain pressures greater than 35 psi under all normal conditions of flow.

Our review found that the proposed water system was able to maintain headloss and velocities in all pipes within the criteria stated. However, where there is elevated ground elevations, pressures were not able to be maintained greater than 35 psi under all conditions of normal flow. Specific locations of where this occurs are Jeremy Hill Road and Keyes Hill Road. It is recommended that smaller booster stations be considered in these areas to achieve 35 psi.

While domestic water service is critical to determining the sizing of water mains in a water system, it is not the primary method used for sizing new water mains. Because the proposed water mains would also be used to transmit fire flow for fire suppression purposes, the fire supply demands for the system primarily govern the sizing of the water mains. As a result, the pipeline sizing was adjusted as necessary to accommodate fire flows.

The Insurance Services Office (ISO) is an independent organization that provides ratings for town insurance pricing on systems providing fire protection. The ISO estimates needed fire flow requirements at representative locations throughout communities and publishes their methodology and guidance for calculating needed fire flow for individual buildings in their "Guide for Determination of Needed Fire Flow." Typically, a minimum of 750 gpm is recommended for residential areas with sufficient spacing (greater than 30 feet) between buildings.

All water mains assessed in the three priority areas were within residential and commercial areas with residences spaced at or greater than 30 feet apart. A fire flow simulation was conducted within the hydraulic model to ascertain how much fire flow is present during a MDD event at each node in the three priority areas while not reducing residual pressures below 20 psi to any point in the contiguous water system throughout the duration of the fire event.

As stated earlier, a minimum fire flow of 1,000 gpm is desired to all points in the expanded Pelham water system. However, since the primary purpose of the water system is deliverance of water supply to meet domestic demand, available fire flow was reviewed through 12-inch transmission lines, 8-inch distribution mains, and with the existing Williamsburg storage tank and proposed fire pumps located in the Dracut Road and Bridge Street/Gage Hill pump stations present to provide fire flow. Figure 4.2 in Appendix D depicts the modeling results of our fire flow analysis via a color-coded map that displays the range of available fire flow at 20 psi residual to all points within the system.

According to the hydraulic model, a majority of the proposed system is able to receive a fire flow of 1,000 gpm or greater under MDD conditions. However, some areas in town are only able to achieve a fire flow of between 500 – 1,000 gpm (see Figure 4.2 in Appendix D for the location of those areas). There are also a few select areas of town that had available fire flow of less than 250 gpm, specifically along Jeremy Hill Road and Keyes Hill Road. Both of those areas are in Priority Area #3 and require additional assessment to determine the best means for improving available fire flow beyond the proposed infrastructure presented in this study.

5 ALTERNATIVES MATRIX AND COST ESTIMATE

5.1 Alternatives Analysis Matrix of Water Supply Options

The matrix developed in this section examines the water supply alternatives discussed within this report and provides an evaluation of the economic, environmental, and political factors that would be involved with implementing each alternative. Matrix categories include environmental/permitting, capital costs, impacts to distribution system, and overall owner preference. The primary water supply alternatives examined within this report are listed below:

1. New Groundwater Source (Section 3.1)
2. Interconnection with Hudson, NH (Section 3.2.1)
    a. Southwest, Dracut/Sherburne Road
    b. Northwest, Sullivan Road/Industrial Drive
3. PEU Williamsburg (Section 3.2.3)

A decision matrix analysis is used to prioritize the recommended alternatives. An explanation of the scoring categories for the matrix is described below. All categories were ranked on a level from 5 to 1, with level 5 being the most advantageous. Therefore, the higher the score, the more advantageous the alternative. Similarly, the weighting factor for each category is from 4 to 1, with 4 representing a more important category. The advantages and disadvantages of each alternative described in this report were used to determine the scoring of each alternative.

5.1.1 Estimated Capital Cost

The estimated planning level capital costs as detailed in Section 5.2.

5.1.2 Owner Preference

The "Owner Preference" category describes the alternatives which the town of Pelham believes would be in the best interest of the town to provide supplemental supply.

5.1.3 Impacts to Pelham Water System

The "Impacts to Distribution System" category describes the relative impacts that the potential alternative may cause to the existing water distribution system. Lower scores indicate increased anticipated impacts. Factors contributing to this score include:

- Long term viability of the supply alternative – higher scores indicate sustainable, long-term supply
- Reliable volume of water available to the town
- The potential issues that could occur when mixing water supplies (differing water qualities, reliability of source, etc.)
- Direct impacts to system operational capabilities (reduced pressures, increased headloss', supply disruption, storage tank capacities and turnover)

5.1.4 Summary and Conclusion

See Table 5.1 for results of the alternatives matrix. Further discussion with Pelham is required to complete the Owner Preference section.

Table 5.1: Alternatives Matrix for Water Supply Options						
No.	Alternative Description	Rating / Score	Estimated Capital Cost	Owner Preference	Impacts to Pelham Water System	TOTAL
WEIGHT			4	3	2	
1	New Groundwater Source	RATING	1	3	4	-
		SCORE	4	9	8	**21**
2A	Interconnection with Hudson, Southwest	RATING	3	5	5	-
		SCORE	12	15	10	**37**
2B	Interconnection with Hudson, Northwest	RATING	3	4	5	-
		SCORE	12	12	10	**34**
3	PEU Williamsburg*	RATING	2	2	1	-
		SCORE	8	6	2	**16**

* PEU Williamsburg cannot supply the entirety of the proposed Pelham water system.

RATING 5-highly advantageous, 1- least acceptable
WEIGHT 4-most important, 1-least important
SCORE = WEIGHT X RATING (The higher the total score, the more advantageous the alternative.)

5.2 Planning Level Cost Estimate

Table 5.2 is a summary of the appropriation-level capital cost estimate for the water mains and water infrastructure to distribute water within Pelham. This includes pump stations, pressure reducing valves and private service connection costs. Costs also include engineering, design, and construction administrative costs (25%) and contingency (30%), in December 2024 dollars.

Table 5.2: Cost of Water Distribution and Connection Costs in Each Priority Area	
Priority #1A	Priority #1A Cost
8" DI Water Main, 10,170 LF	$3,174,000
12" DI Water Main, 9,730 LF	$4,398,000
Private Service Connections to Properties, Internal Plumbing, and Well Decommissioning, 292 Properties	$5,840,000
Subtotal	*$13,412,000*
Engineering, Design, and Construction Administration (25%)	$3,353,000
Contingency (30%)	$4,024,000
Total Priority #1A Capital Costs	$20,789,000
Priority #1B	Priority #1B Cost
8" DI Water Main, 14,565 LF	$4,545,000
12" DI Water Main, 9,358 LF	$4,229,000
Proposed Pressure Reducing Valve on Sherburne Road	$536,000
Private Service Connections to Properties, Internal Plumbing, and Well Decommissioning, 146 Properties	$2,920,000
Subtotal	*$12,230,000*
Engineering, Design, and Construction Administration (25%)	$3,058,000
Contingency (30%)	$3,669,000
Total Priority #1B Capital Costs	$18,957,000
Priority #2	Priority #2 Cost
8" DI Water Main, 46,611 LF	$14,546,000
12" DI Water Main, 33,316 LF	$15,057,000
Proposed Bridge Street Pump Station	$1,606,000
Private Service Connections to Properties, Internal Plumbing, and Well Decommissioning, 426 Properties	$8,520,000
Subtotal	*$39,729,000*
Engineering, Design, and Construction Administration (25%)	$9,932,250
Contingency (30%)	$11,918,700
Total Priority #2 Capital Costs	$61,579,950
Priority #3	Priority #3 Cost
8" DI Water Main, 44,705 LF	$13,950,000
12" DI Water Main, 30,687 LF	$13,869,000
Proposed Pressure Reducing Valve on Bush Hill Road	$536,000
Private Service Connections to Properties, Internal Plumbing, and Well Decommissioning, 405 Properties	$8,100,000
Subtotal	*$36,455,000*
Engineering, Design, and Construction Administration (25%)	$9,113,750
Contingency (30%)	$10,936,500
Total Priority #3 Capital Costs	$56,505,250

Table 5.3 is a summary of the appropriation-level capital cost estimate for the water infrastructure to supply water to Pelham. This includes additional water mains, pump stations, meter pits, and water treatment plants. Costs include engineering, design, and construction administration (25%) and contingency (30%), in December 2024 dollars.

Table 5.3: Cost of Water Supply	
Hudson Water Supply Interconnection	Cost
12" DI Water Main to bring Hudson Water System to Pelham town line, 7,087 LF	$3,204,000
Proposed Dracut Road Pump station (in Hudson)	$1,606,000
Proposed Meter Pit at town line of Hudson & Pelham	$536,000
Subtotal	*$5,346,000*
Engineering, Design, and Construction Administration (25%)	$1,336,500
Contingency (30%)	$1,603,800
Total Capital Costs	**$8,286,300**
Utilizing Overburden Well (S1)	Cost
Overburden Well New Source Development	$1,034,000
Water Treatment Plant*	$16,111,000
12" DI Water Main to connect Water Treatment Plant to Water System, 2,500 LF	$1,250,000
Subtotal	*$18,395,000*
Engineering, Design, and Construction Administration (25%)	$4,598,750
Contingency (30%)	$5,518,500
Total Capital Costs	**$28,512,250**
* Water Treatment Plant to include treatment for PFAS, Iron, and Manganese.	
Utilizing Bedrock Well (B1)	Cost
Bedrock Well New Source Development	$532,000
Water Treatment Plant*	$10,452,000
12" DI Water Main to connect Water Treatment Plant to Water System, 1,600 LF	$800,000
Subtotal	*$11,784,000*
Engineering, Design, and Construction Administration (25%)	$2,946,000
Contingency (30%)	$3,535,200
Total Capital Costs	**$18,265,200**
* Water Treatment Plant to include treatment for Iron and Manganese.	

6 FUNDING STRATEGY AND SCHEDULE

6.1 Funding Sources

The NHDES administers several loan and grant programs throughout the calendar year. Their programs also assist groups in obtaining funding for projects from a myriad of sources. Pelham should consider available outside funding and grant opportunities for future funding of the water system. Table 6.1 lists NHDES grant/loan sources that may be available to Pelham pending application and approval.

Table 6.1: NHDES Grant/Loan Funding Sources				
Funding Program	Who's Eligible	What Can Be Funded	Terms	Application Timeframe
Drinking Water State Revolving Fund (DWSRF) Loan	Community (publicly & privately owned) and non-profit, non-transient water systems	Capital improvements for drinking water infrastructure (design and construction)	Below-market interest rates. No closing costs. Up to 30-years for disadvantaged applicants	Spring
MtBE Remediation Fund	Public & private water systems impacted by MtBE contamination	Design & installation of drinking water infrastructure in areas with MtBE contamination	100% reimbursement of eligible costs	Any time
PFAS Remediation Grant and Loan Fund	Community Water System, non-profit non-transient non-community water systems (i.e., public schools) or municipality with raw water PFAS contamination	Drinking water infrastructure projects to address per-and-polyfluoroalkyl (PFAS) maximum contaminant level (MCL) exceedances	Low interest loan rates/ Up to 30-year term for disadvantaged applicants. Up to 50% contingent reimbursement. Grants at $1.5M or 30% of the total cost of the project, whichever is greater.	Any time
Construction Project Assistance Loan and Grant Program	Public Water Systems & Municipalities	Drinking water infrastructure improvements	Loan and grant program	Fall-Funding applications

The town should also consider applying for the Drinking Water and Groundwater Trust Fund (DWGTF). Prior to applying for this funding, the town should test for PFAS above regulatory limits in groundwater sources in the Priority #1A area. If PFAS is found above regulatory limits, the town could request funding from the DWGTF and request funding assistance to furnish an alternative water source for the area. The town should anticipate applying for a loan/local funding to grant ratio of 75%:25% of the total DWGTF funding request. This ratio would likely be viewed and scored more favorably than a grant request exceeding 25% of the total funding request.

In addition to NHDES funding, additional funding sources may be available to the town. Table 6.2 lists other grant/loan sources that may be available to Pelham pending application and approval.

Table 6.2: Other Grant/Loan Funding Sources				
Funding Program	Who's Eligible	What Can Be Funded	Terms	Application Timeframe
Housing & Public Facilities Grants (Community Development Fund for New Hampshire)	Municipalities, counties, and non-profit associations and districts, if endorsed by a local government entity. * At least 51% of project beneficiaries must be of low to moderate income	Infrastructure repair or construction that results in improved community facilities and services	Pub facilities grant fund up to $500,000 per year per municipality 100% (1:1) match required	January & July of each year
Planning Grants (Community Development Fund for New Hampshire)	Municipalities, counties, and non-profit associations and districts, if endorsed by a local government entity. * At least 51% of project beneficiaries must be of low to moderate income	Preliminary engineering design, income surveys, etc.	Up to $12,000 per year for municipality	April & October of each year
New Hampshire Municipal Bond Bank	Local governmental units (towns/counties/ school/water/fire/village districts)	Capital Improvement (design & construction projects)	Competitive interest rates. Terms based on lifespan of asset.	Applications due in April & November

6.2 Schedule

An approximate timeline for grant/loan applications, design, bidding and construction of the Pelham Priority #1A water system, the Hudson interconnection and anticipated project milestones is presented in Table 6.3 below. Scheduling of the additional priority areas (#1B, #2 and #3) would look similar to the schedule presented in Table 6.3 below. However, the timing of when Priority Areas #1B, #2 and #3 get funding, designed and constructed is uncertain as of the writing of this report.

Table 6.3: Project Milestones – Priority Area #1A
Grant/Loan Opportunities
Apply for DWSRF loan with NHDES: Applications due June 1, 2025
Test private wells in the Sherburne Road area for PFAS contamination
If PFAS groundwater contamination is found, apply for the DWGTF; Fall 2025
Develop town warrant article based on loan amounts requested in DWSRF loan application and DWGTF loan request: Draft article in October 2025
Submit warrant article to be voted on by Pelham voters: March 2026
Estimated Approved Funding Results By: April 2026
Design (est. start July 1, 2026)
Design Priority #1A water distribution system including water mains, water services and decommissioning private wells
Design South Hudson water supply interconnection including water mains, pump station and meter pit at the town line
Estimated Design Completion Date: December 31, 2027
Bidding (est. start January 1, 2028)
Bid period for four weeks
Review bids and award contract
Estimated Bidding Completion Date: March 31, 2028
Construction (est. start June 1, 2028)
Install all water mains for supply and distribution
Install pump station in Hudson and meter pit at town line
Install service lines to each house, perform internal plumbing modifications and decommission private wells
Estimated Construction Completion Date: December 31, 2030

7 SUMMARY AND RECOMMENDATIONS

Summary

The town of Pelham expressed an interest in expanding the areas of town that could be served by a public water system. While the Sherburne Road area has demonstrated recent water quality and/or quantity concerns (Priority #1A area) the remaining areas of Pelham that were assessed under this study (Priority areas #1B, #2 and #3) were identified by the town as areas that could also benefit from a public water system.

Weston & Sampson reviewed the three priority areas and assigned a projected domestic water demand to each parcel that abuts a proposed water main. It should be noted that, in addition to new water customers, the proposed water system would connect several existing public water systems in Pelham as follows:

- Gage Hill
- Whispering Winds
- Williamsburg
- Skyview (emergency interconnection)

At full build out, the total volume of water needed to meet projected domestic maximum day demands was estimated to be approximately 900,000 gallons per day. In order to meet the projected demands, a source (or sources) of water supply needed to be identified. While the Williamsburg water system has excess capacity, an additional water supply would be needed to satisfy the projected water demand balance of the built out Pelham water system. Additionally, the Williamsburg supply has detections of PFAS contamination and will likely need treatment in the future to continue as a viable water source (contingent upon water quality regulations). New groundwater sources in Pelham may be available. However, water treatment is likely necessary with any new groundwater source (which increases the capital cost of that water supply). Developing an interconnect with the adjacent public water system in Hudson would provide the water supply necessary to meet all projected domestic demands in Pelham.

The primary focus of this study was to assess the infrastructure needed to support domestic water demands. Upon calculating the projected quantity and location of the water demand and identifying a viable water source to meet that demand, a computerized hydraulic model was developed to assess the size of water mains and to identify any other hydraulic systems necessary (e.g. pump stations, pressure reducing valves, etc.) to transmit water throughout the water system. After the water system was developed and checked for hydraulic viability to transmit water supply for domestic demand purposes, the hydraulic model was used to assess the quantify of fire flow that could be transmitted throughout the water system. The results of the modeling analysis indicated that a majority of the water system could receive 1,000 gpm of fireflow while maintaining residual pressures in the water system at greater than 20 psi (a regulatory standard).

Recommendations

Pelham officials have identified an area of town that has been designated as the top priority area for developing a public water system due to historic water quality and/or quantity concerns in the private water supplies. Priority Area #1A, located along the western portion of the Sherburne Road area from the townline with Hudson to Scenic View Drive, would be the first area in town to receive public water supply. Having an alternative water supply available would allow for individual private wells in the area to be removed from service for potable use.

In Table 5.1, a water supply alternatives matrix was developed to assess a ranking of importance of the available water supplies. Working in concert with Pelham to complete the scoring of the segments of the matrix, the interconnection with the Hudson water system in the southwest part of Pelham (Priority Area #1A) ranked as the most favorable water supply alternative to initially pursue. As a result, Pelham should consider the following 'next steps' to develop a public water system in Priority Area #1:

- Engage the town of Hudson and begin to formalize an approach and schedule to extending the water system in Hudson to the Pelham town line, as described in this report.
- Discuss the project with PEU and coordinate any PEU-specific requirements in developing a public water system in PEU's drinking water franchise area.
- Submit a DWSRF loan pre-application to NHDES for the June 1, 2025 deadline. This does not obligate Pelham with using the funding if the project were selected by NHDES.
- Conduct a testing program in Priority Area #1A to test for the presence of PFAS in private wells above regulatory limits.
- Consider applying for DWGTF funding in Fall 2025. The terms of the funding request will be influenced by the outcome of the DWSRF funding decision and the outcome of the PFAS testing. It is recommended that the funding request be no less than 75% loan and 25% grant to align with the current understanding of how the DWGTF selection committee scores funding applications.
- Review other funding possibilities as listed in Tables 6.1 and 6.2 and decide if the town wants to pursue any of those funding sources.
- Develop a warrant article in October 2025 that requests authorization to borrow based on the value of loan(s) that have been awarded to Pelham. The warrant article would be voted on at town meeting in March 2026.
- Based on the results of the town meeting vote, proceed with design of the project as stated in the recommended schedule presented in Table 6.3.

APPENDIX A

Existing Water System Figure

FIGURE 1.1

TOWN OF PELHAM, NEW HAMPSHIRE
WATER EXPANSION STUDY

EXISTING WATER SYSTEM

DECEMBER, 2024 SCALE: NOTED

Weston & Sampson

APPENDIX B

Priority Areas Figure

FIGURE 2.1

TOWN OF PELHAM, NEW HAMPSHIRE
WATER EXPANSION STUDY

PRIORITY AREAS

DECEMBER, 2024 SCALE: NOTED

Weston & Sampson

APPENDIX C

Groundwater Site Screening Study Figures

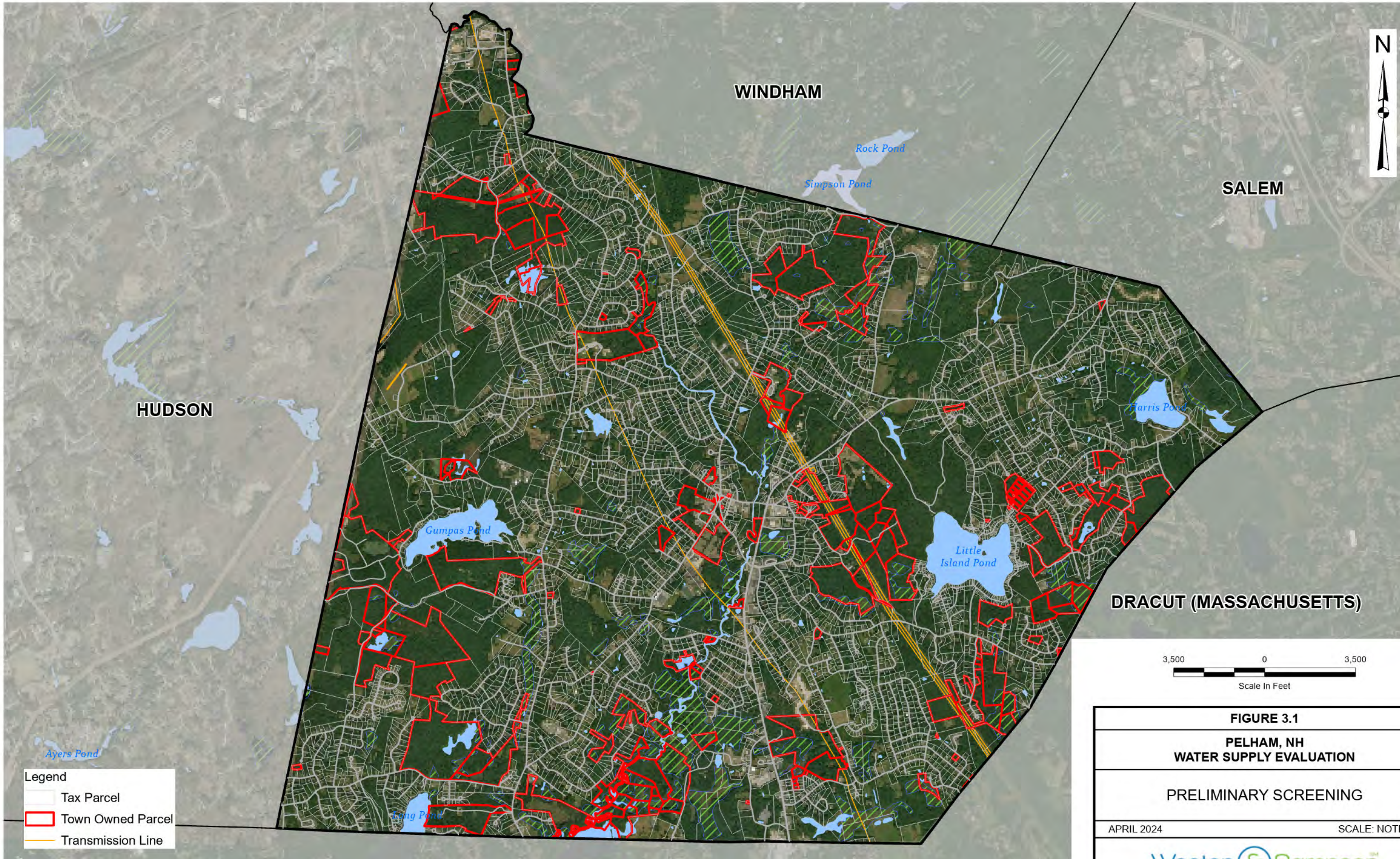


FIGURE 3.1

PELHAM, NH
WATER SUPPLY EVALUATION

PRELIMINARY SCREENING

APRIL 2024 SCALE: NOTED

Weston & Sampson

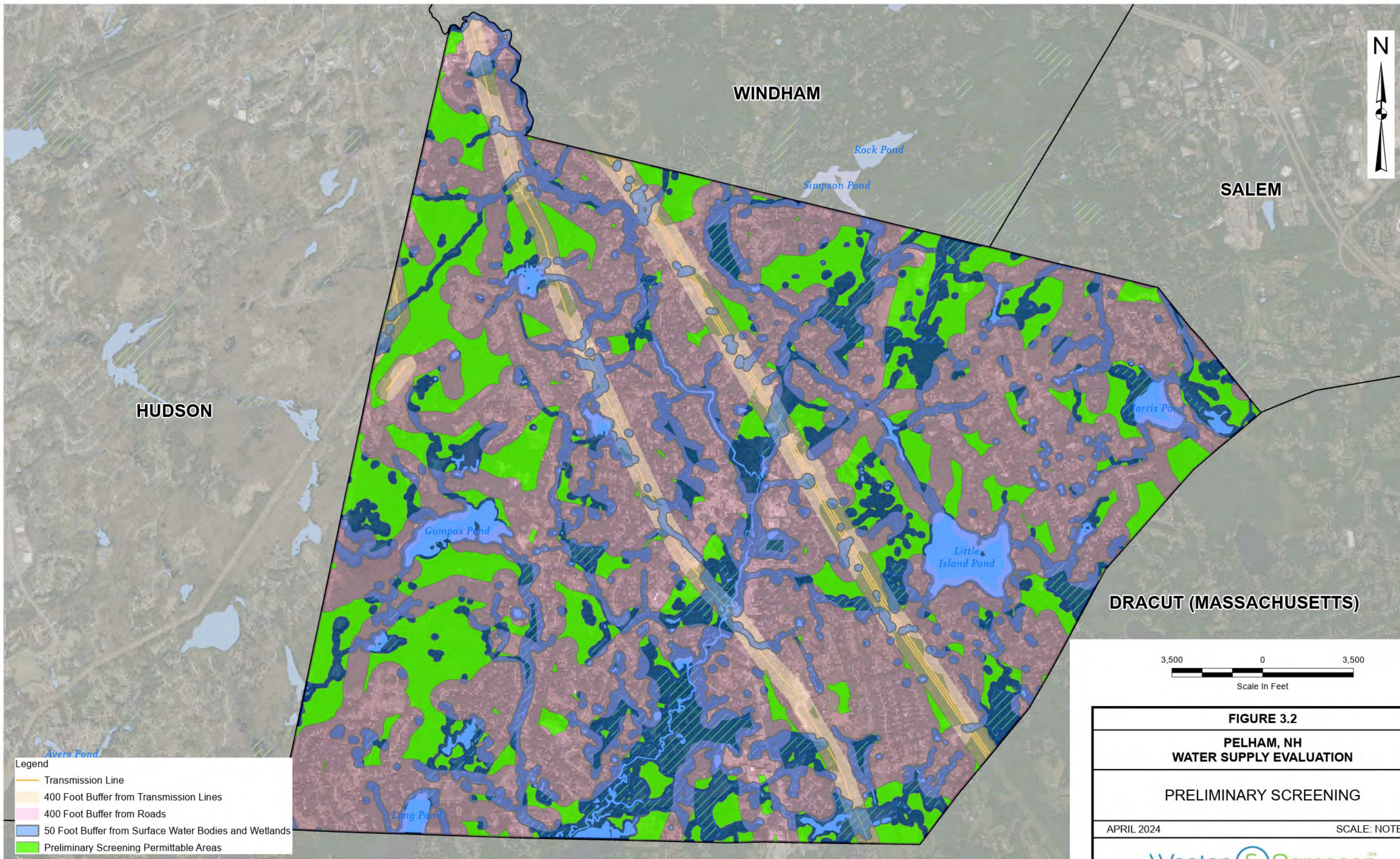


FIGURE 3.2

PELHAM, NH
WATER SUPPLY EVALUATION

PRELIMINARY SCREENING

APRIL 2024 SCALE: NOTED

Weston & Sampson

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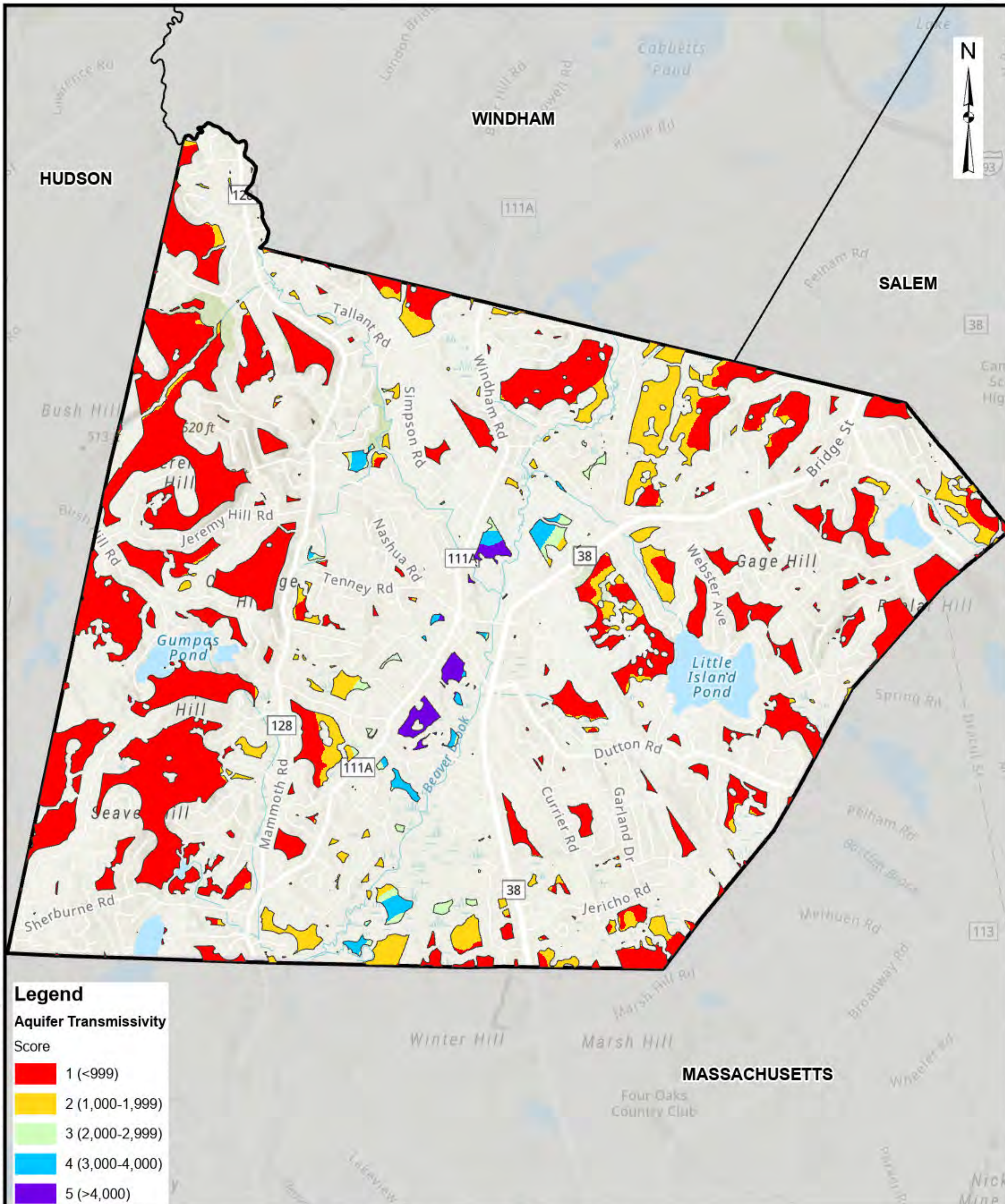

FIGURE 3.3
PELHAM, NH
WATER SUPPLY EVALUATION (OVERBURDEN)

AQUIFER TRANSMISSIVITY

3,500 0 3,500

Scale In Feet

Weston & Sampson

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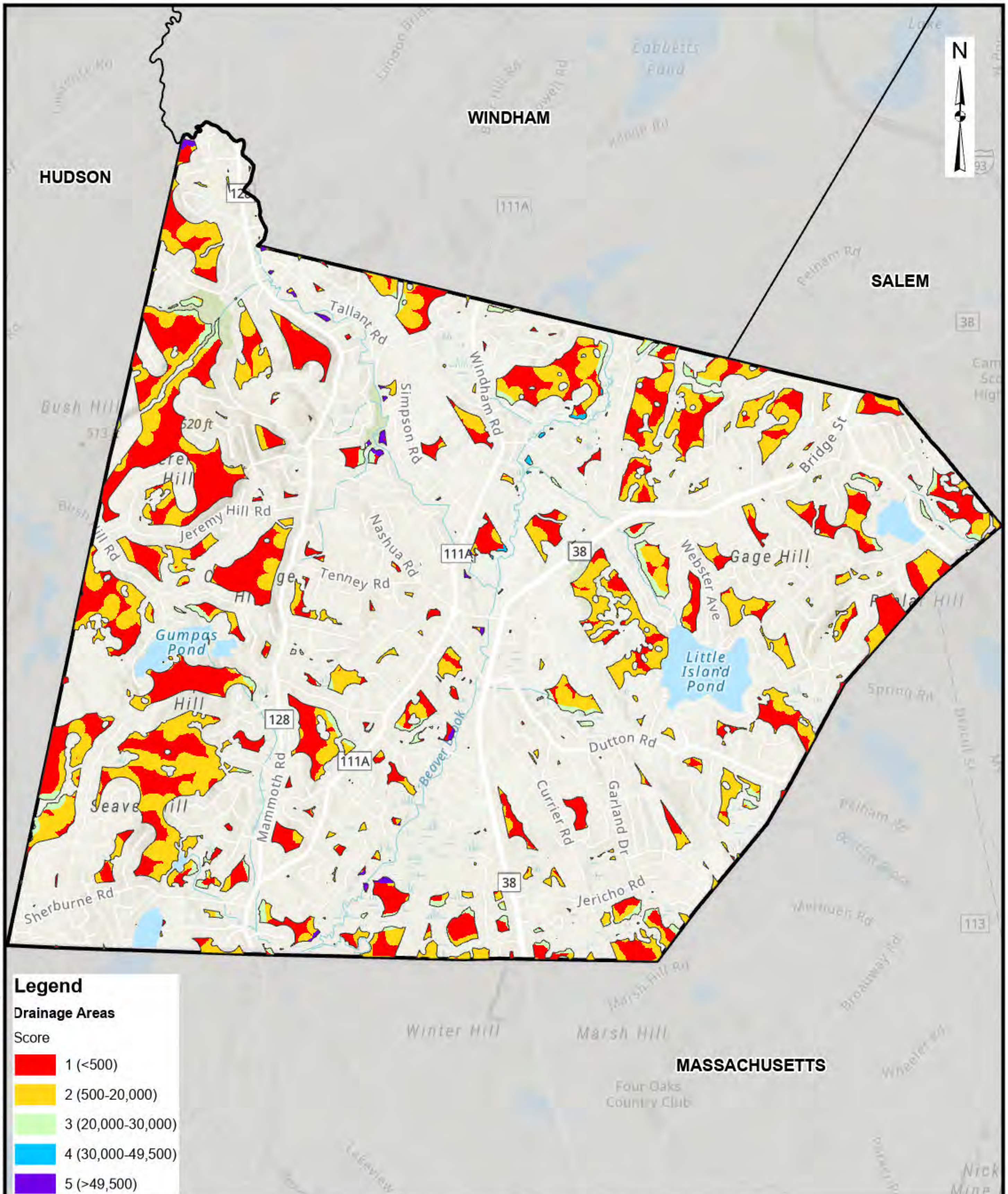

FIGURE 3.4
PELHAM, NH
WATER SUPPLY EVALUATION (OVERBURDEN)

DRAINAGE AREAS

3,500 0 3,500
Scale In Feet

Weston & Sampson

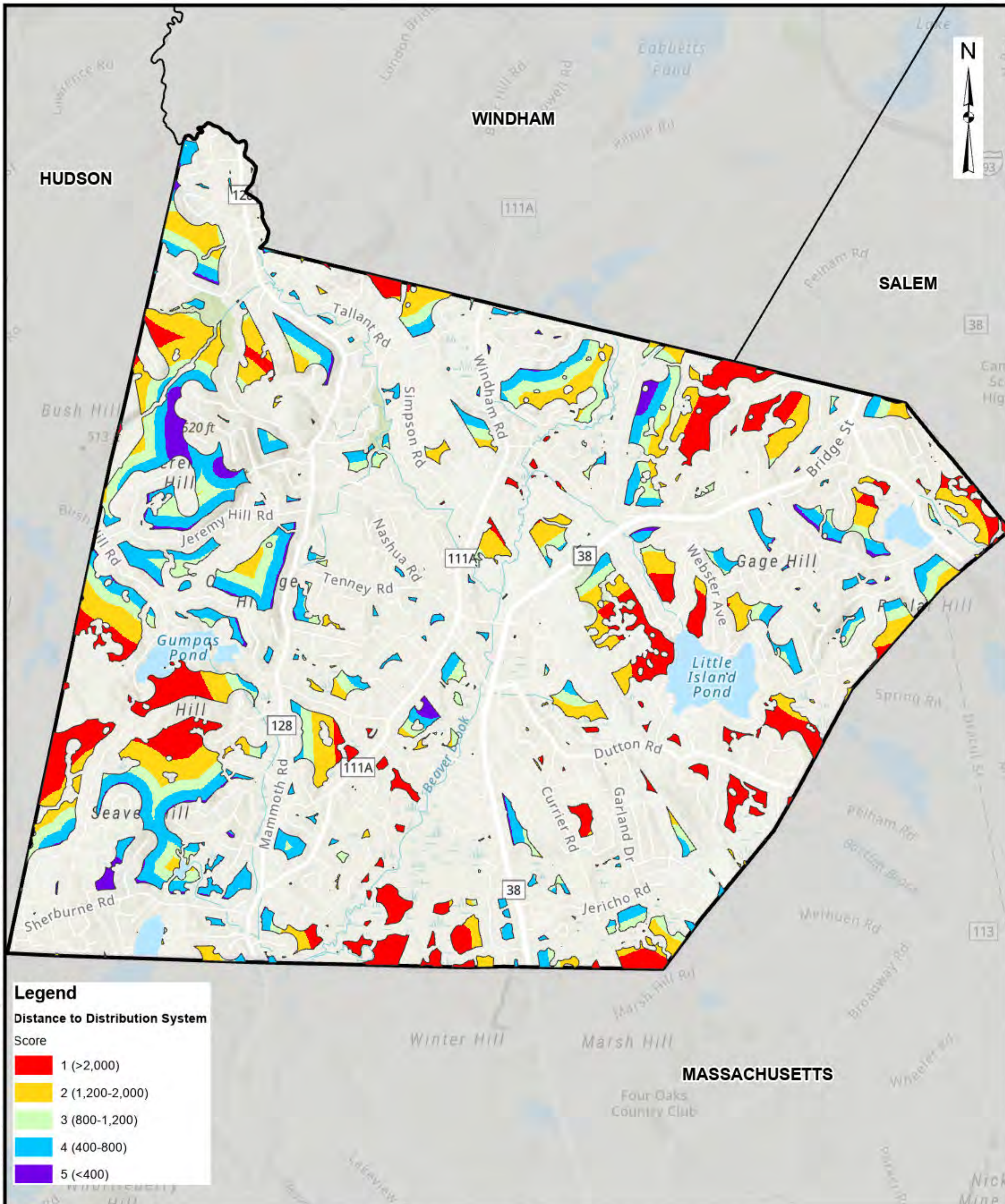

FIGURE 3.5
PELHAM, NH
WATER SUPPLY EVALUATION

DISTANCE TO DISTRIBUTION SYSTEM

3,500 0 3,500

Scale In Feet

Weston & Sampson

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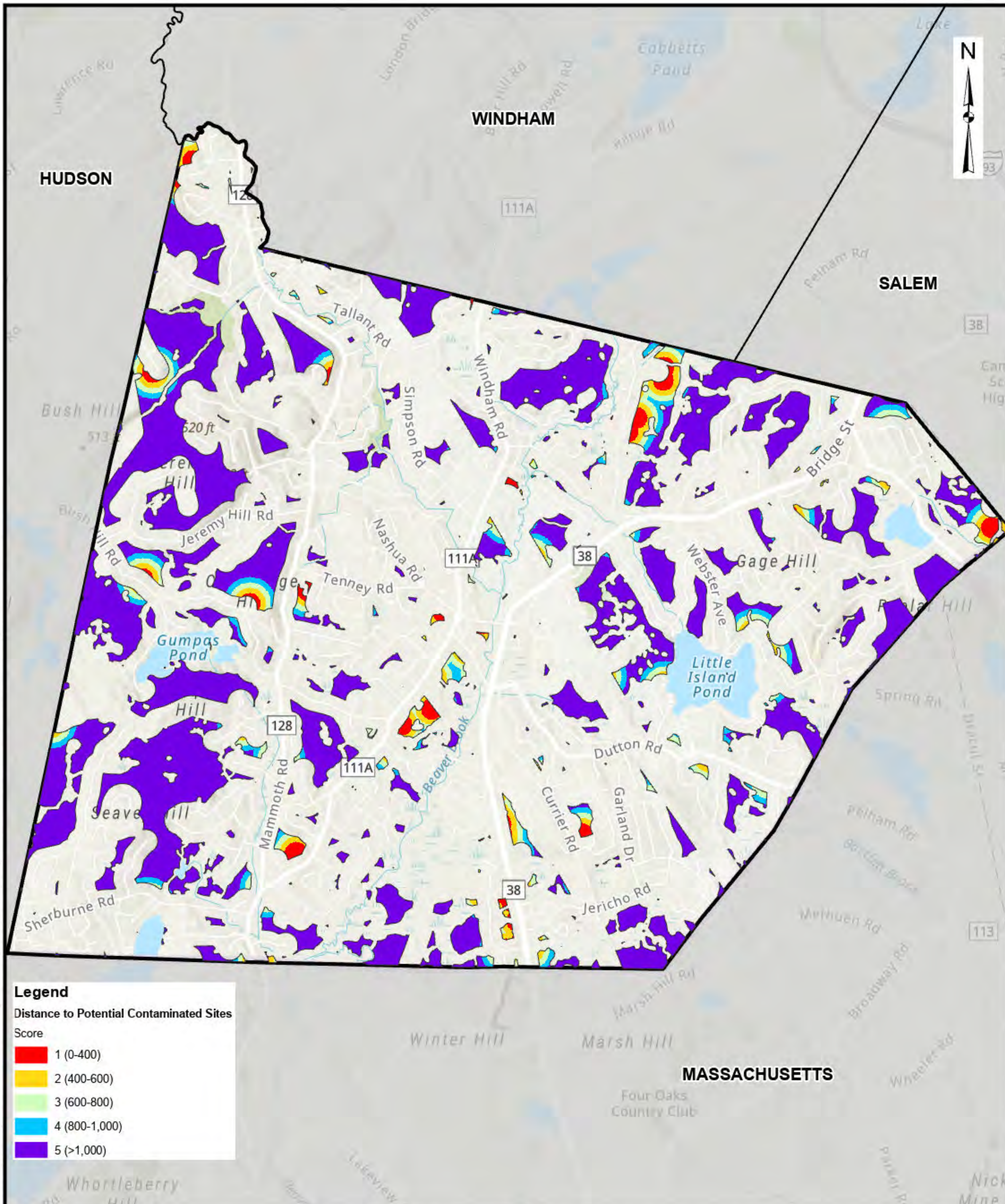

FIGURE 3.6
PELHAM, NH
WATER SUPPLY EVALUATION

DISTANCE TO DISTRIBUTION SYSTEM

3,500 0 3,500

Scale In Feet

Weston & Sampson

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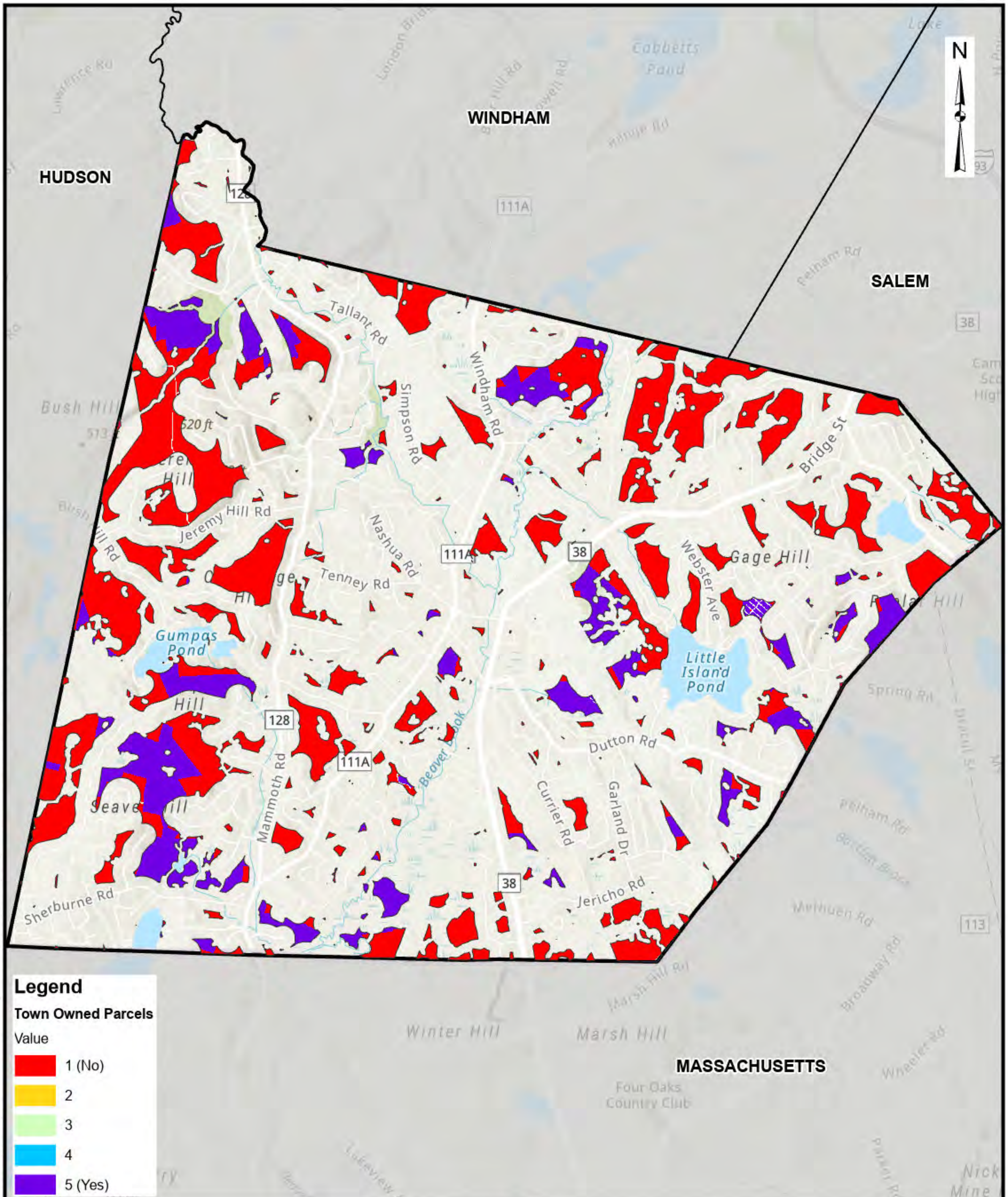

FIGURE 3.7
PELHAM, NH
WATER SUPPLY EVALUATION

TOWN OWNED PARCELS

3,500 0 3,500

Scale In Feet

Weston & Sampson

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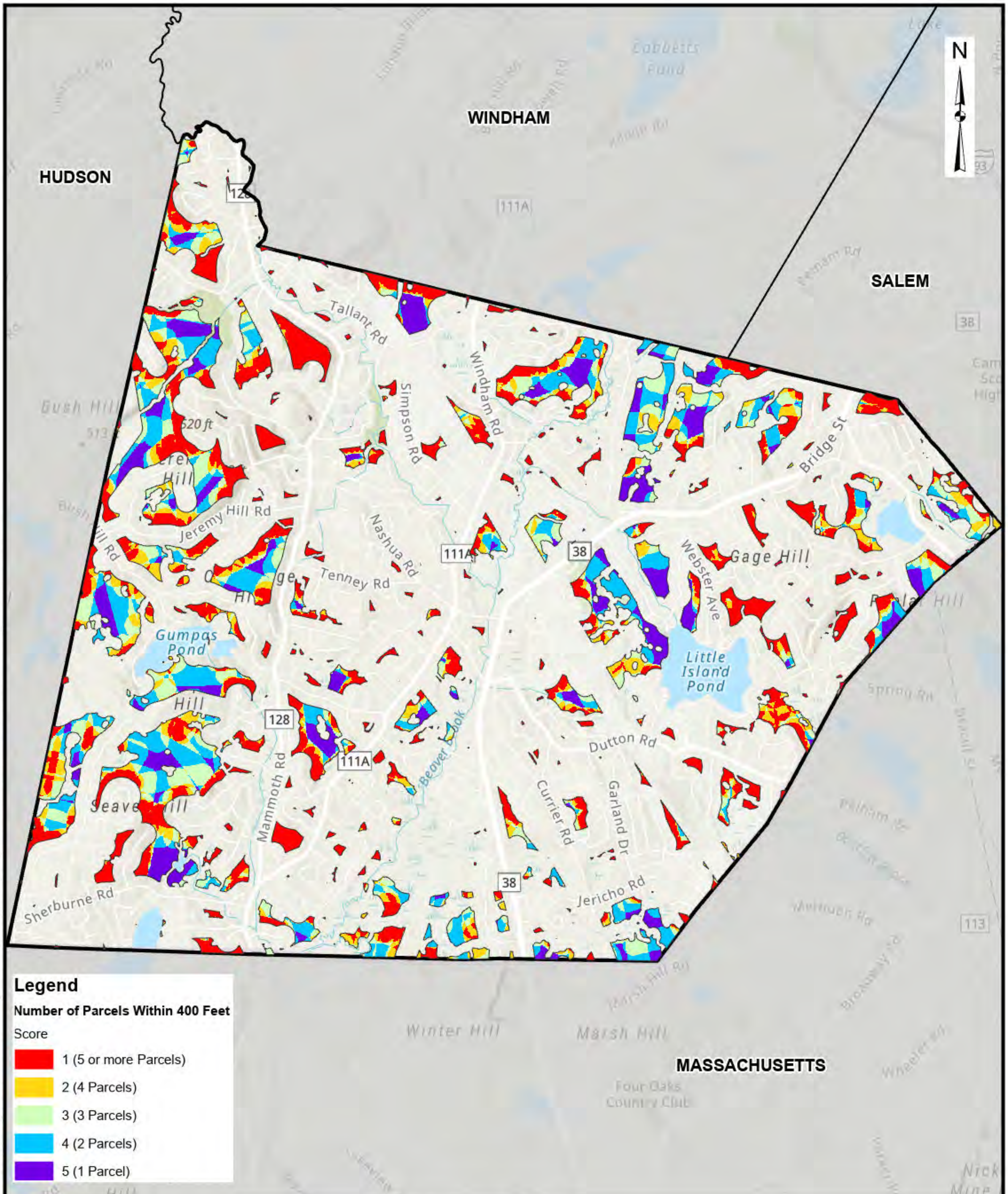

FIGURE 3.8
PELHAM, NH
WATER SUPPLY EVALUATION

PARCEL DENSITY

3,500 0 3,500

Scale In Feet

Weston & Sampson

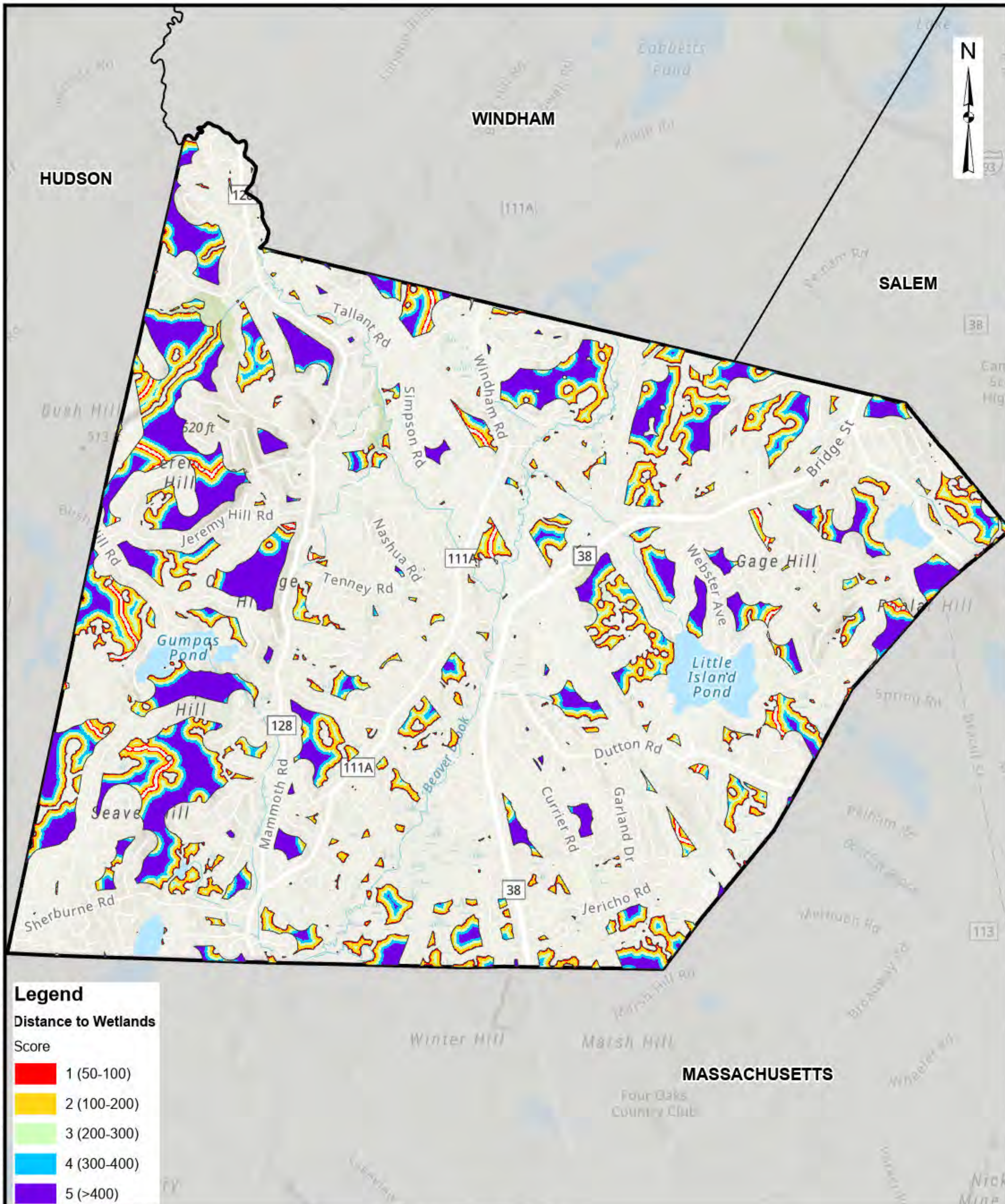

FIGURE 3.9
PELHAM, NH
WATER SUPPLY EVALUATION

DISTANCE TO WETLANDS

3,500 0 3,500

Scale In Feet

Weston & Sampson

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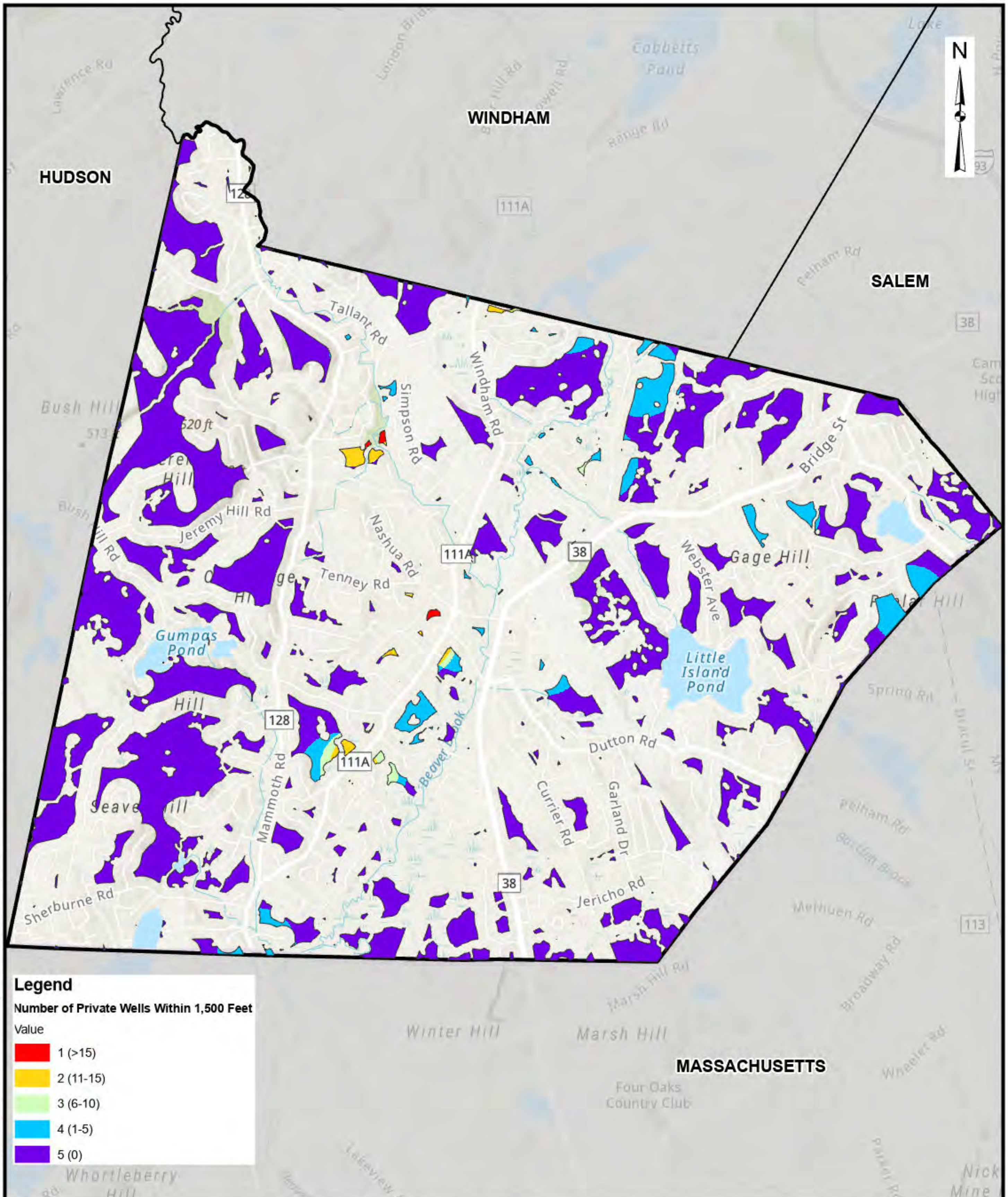

FIGURE 3.10
PELHAM, NH
WATER SUPPLY EVALUATION

NUMBER OF PRIVATE WELLS

3,500 0 3,500

Scale In Feet

Weston & Sampson

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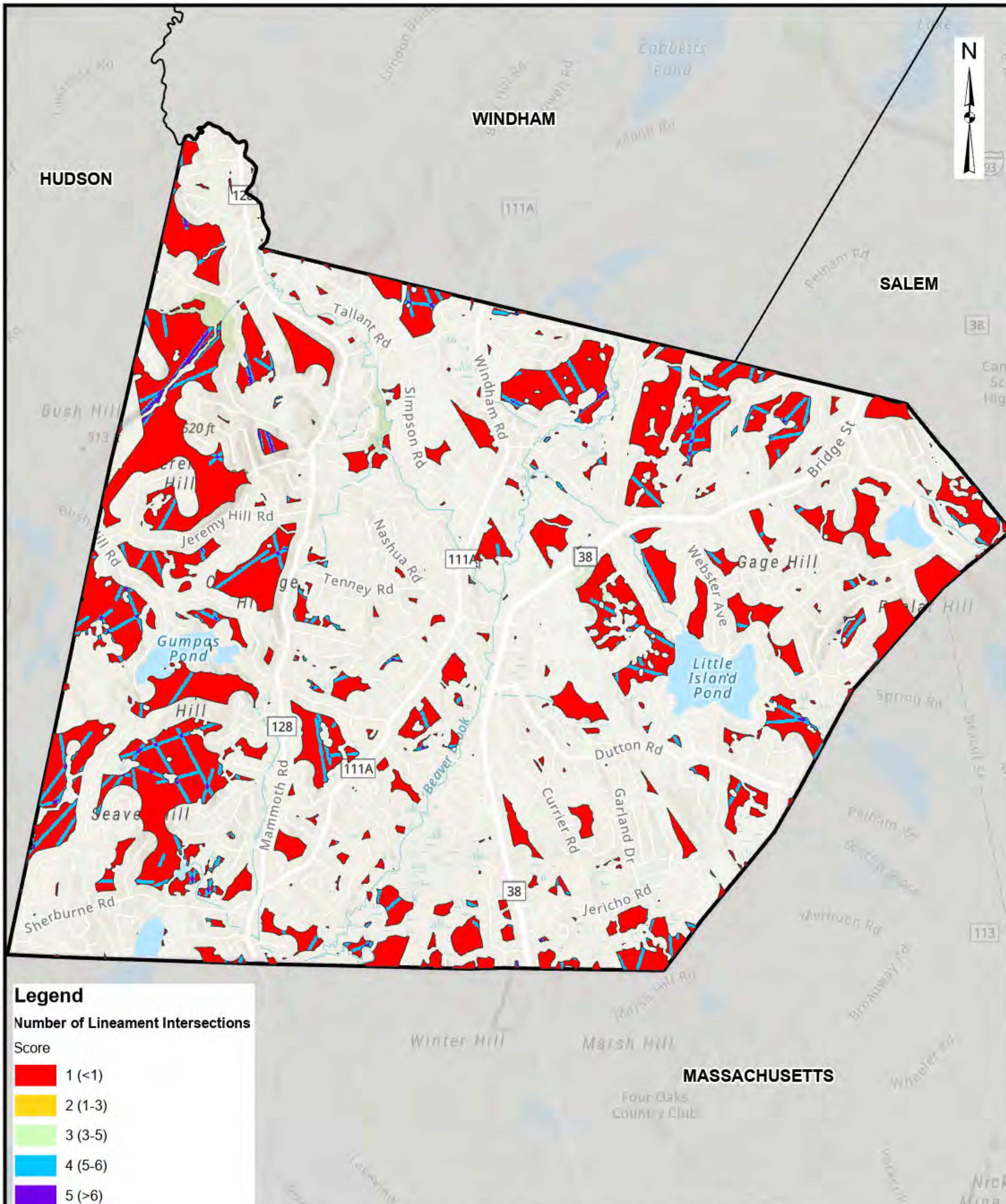

FIGURE 3.11
PELHAM, NH
WATER SUPPLY EVALUATION (BEDROCK)

BEDROCK LINEAMENTS

3,500 0 3,500

Scale In Feet

Weston & Sampson

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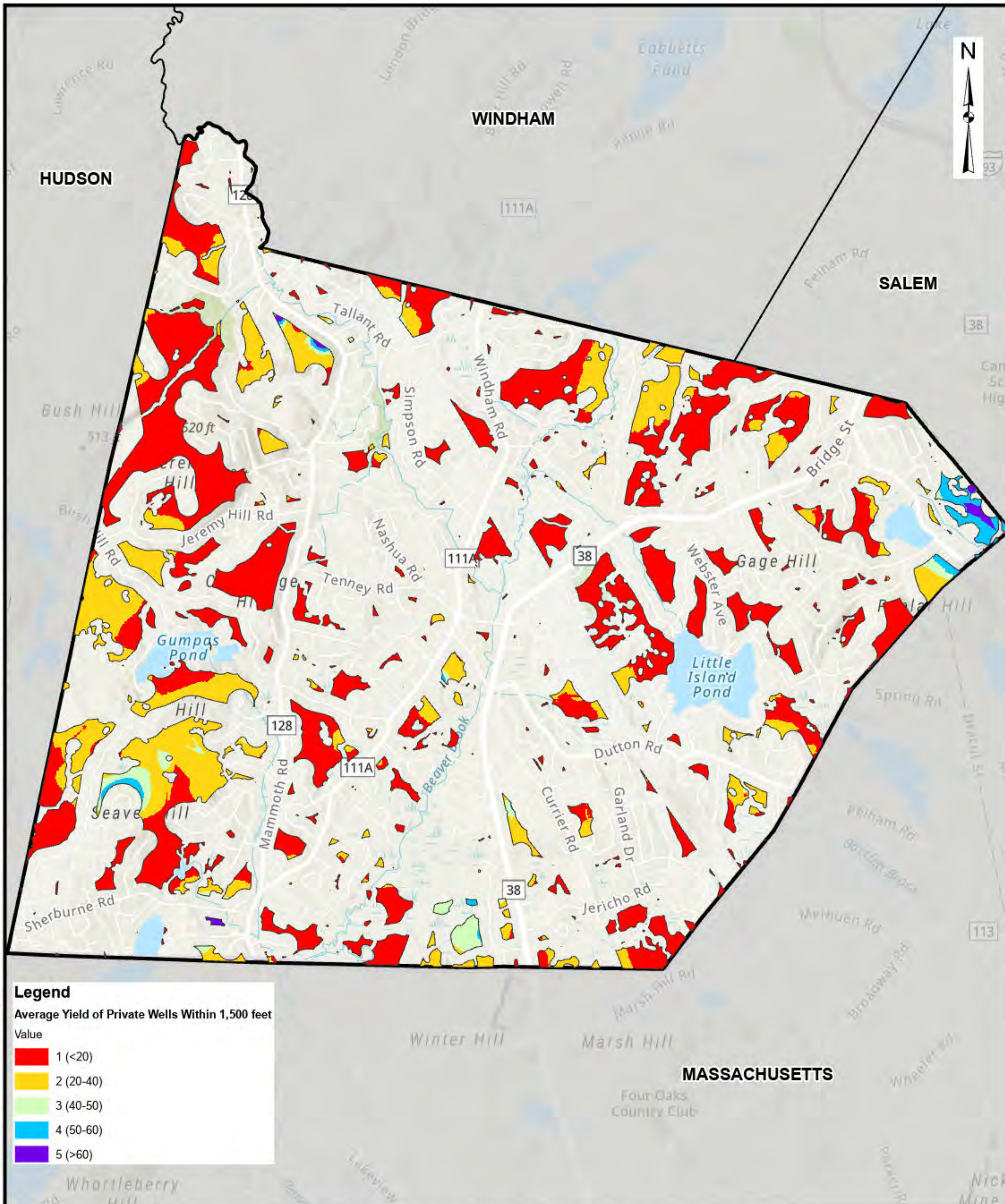

FIGURE 3.12
PELHAM, NH
WATER SUPPLY EVALUATION (BEDROCK)

AVERAGE YIELD OF PRIVATE WELLS

3,500 0 3,500
Scale In Feet

Weston & Sampson

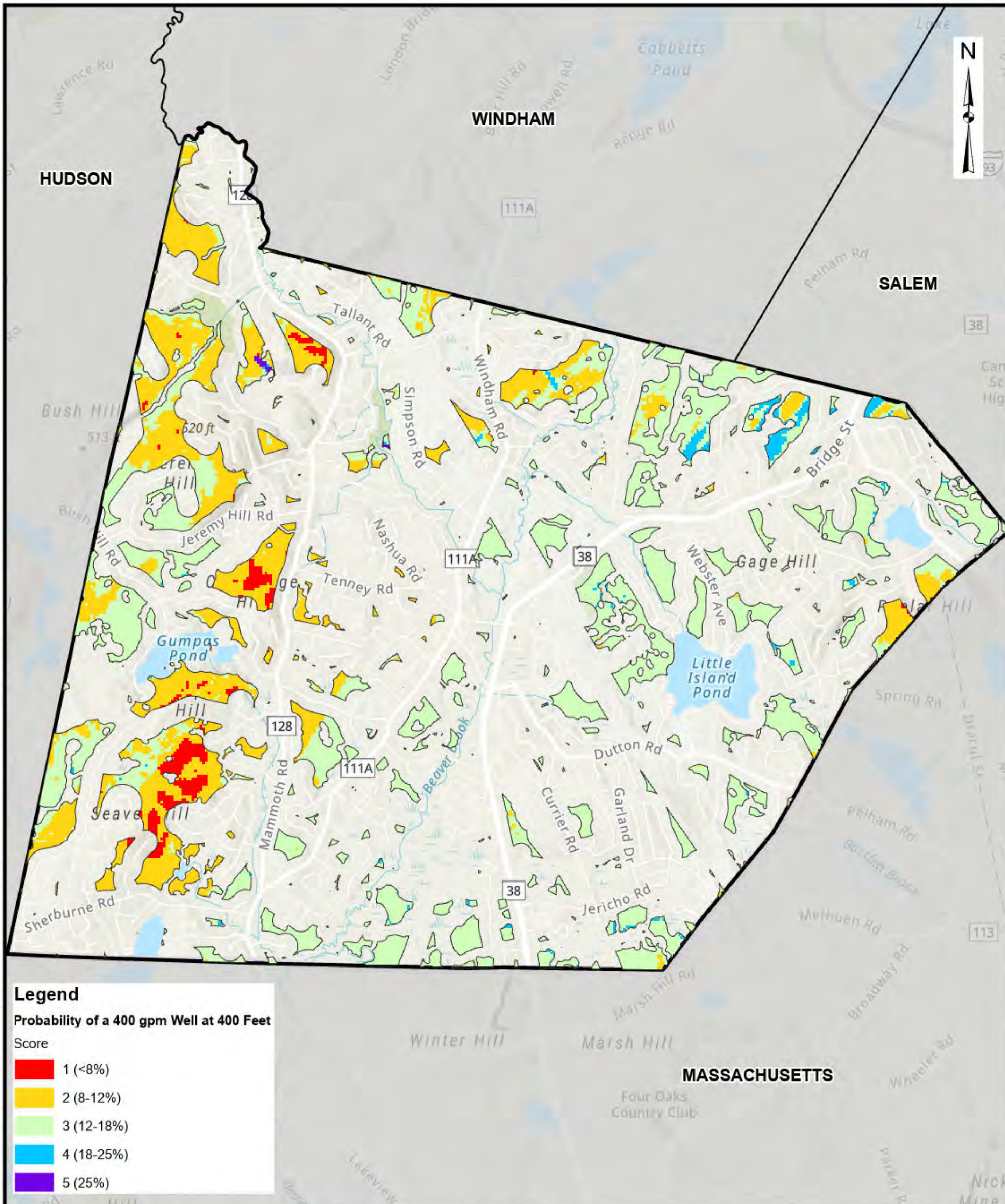

FIGURE 3.13
PELHAM, NH
WATER SUPPLY EVALUATION (BEDROCK)

PROBABILITY OF A 40 GPM WELL at 400 FEET

3,500 0 3,500
Scale In Feet

Weston & Sampson

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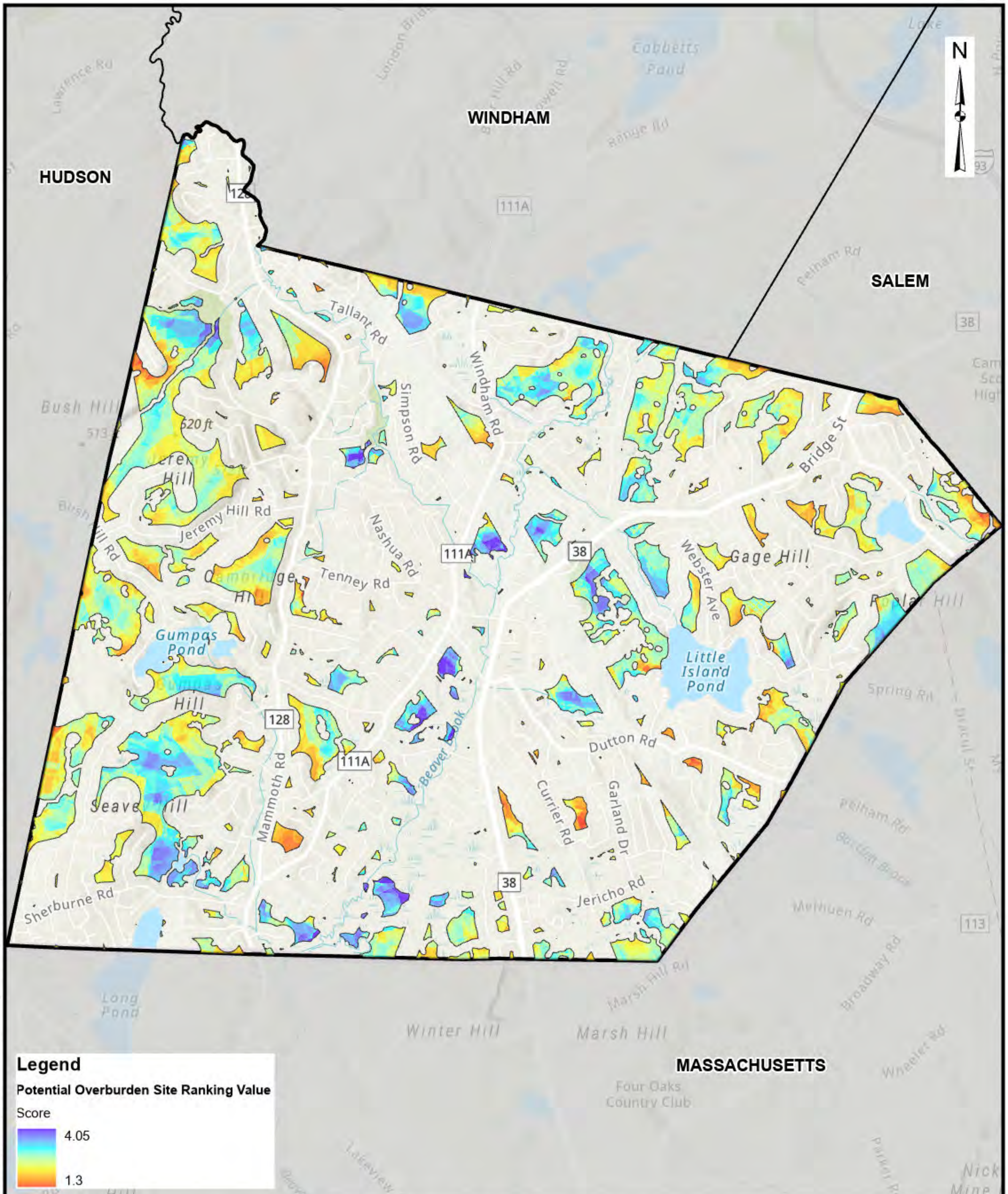

FIGURE 3.14
PELHAM, NH
WATER SUPPLY EVALUATION

OVERBURDEN SCORES

3,500 0 3,500

Scale In Feet

Weston & Sampson

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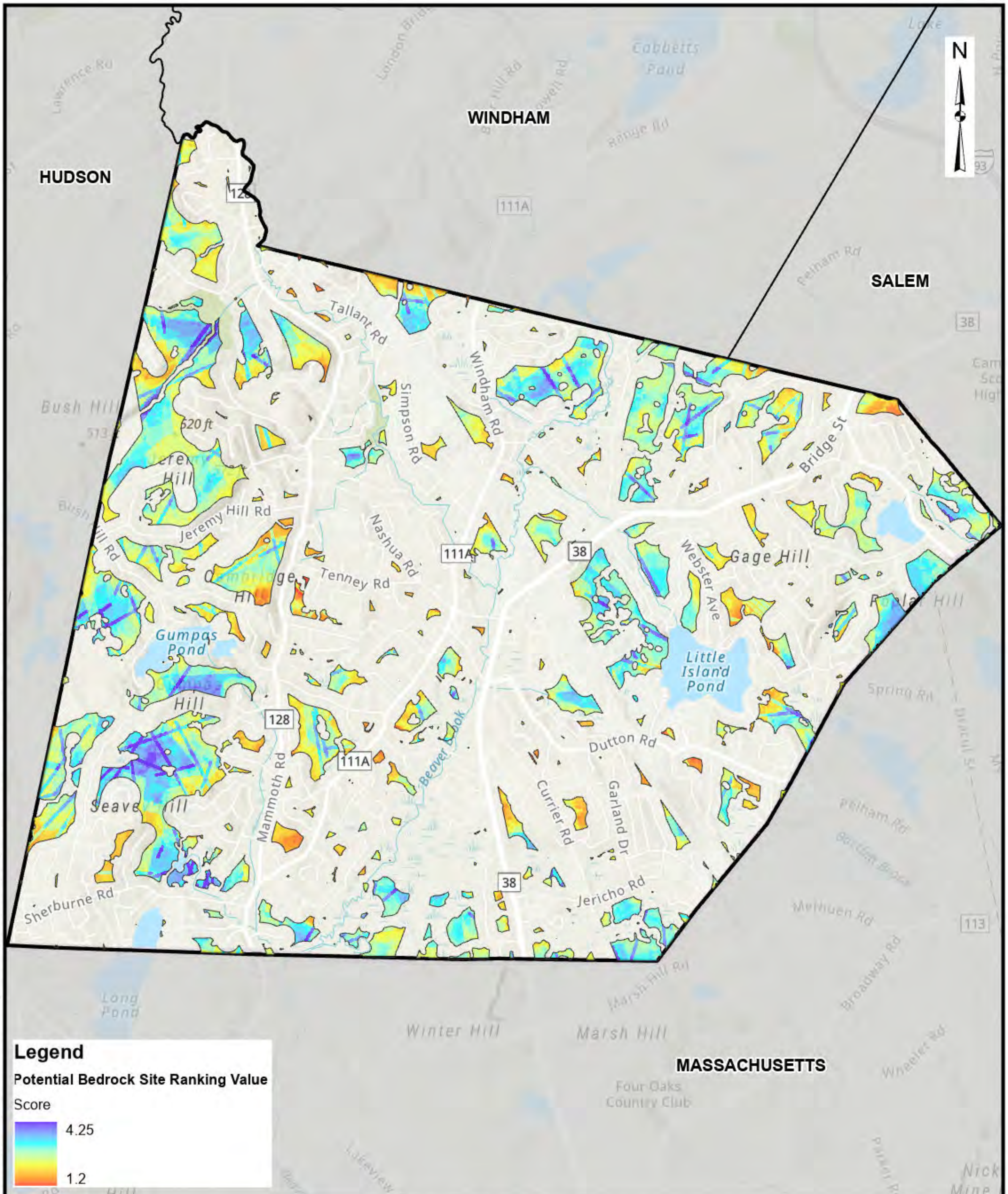

FIGURE 3.15
PELHAM, NH
WATER SUPPLY EVALUATION

BEDROCK SCORES

3,500 0 3,500

Scale In Feet

Weston & Sampson

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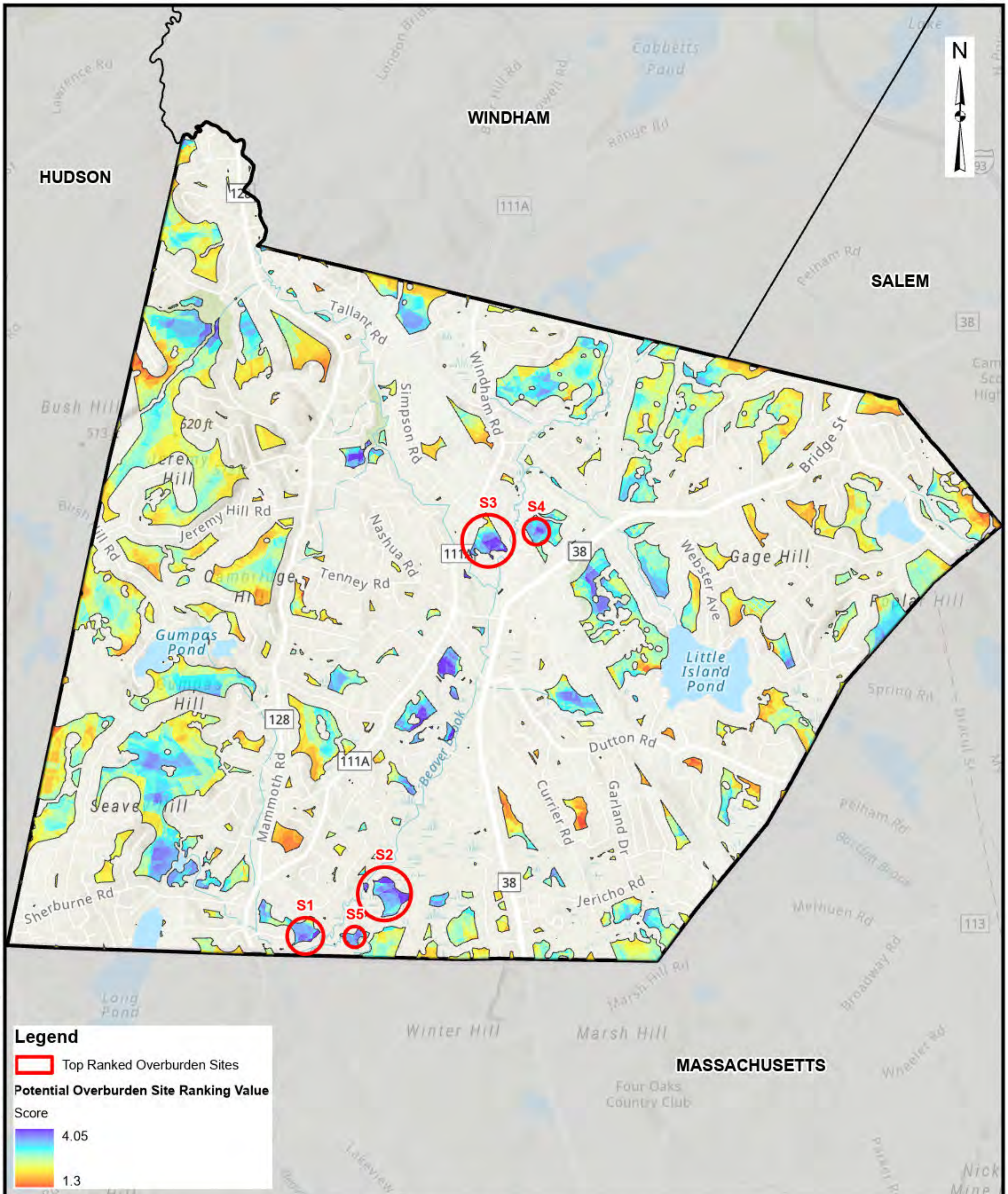

FIGURE 3.16
PELHAM, NH
WATER SUPPLY EVALUATION

TOP 5 RANKED OVERBURDEN SITES

3,500 0 3,500

Scale In Feet

Weston & Sampson

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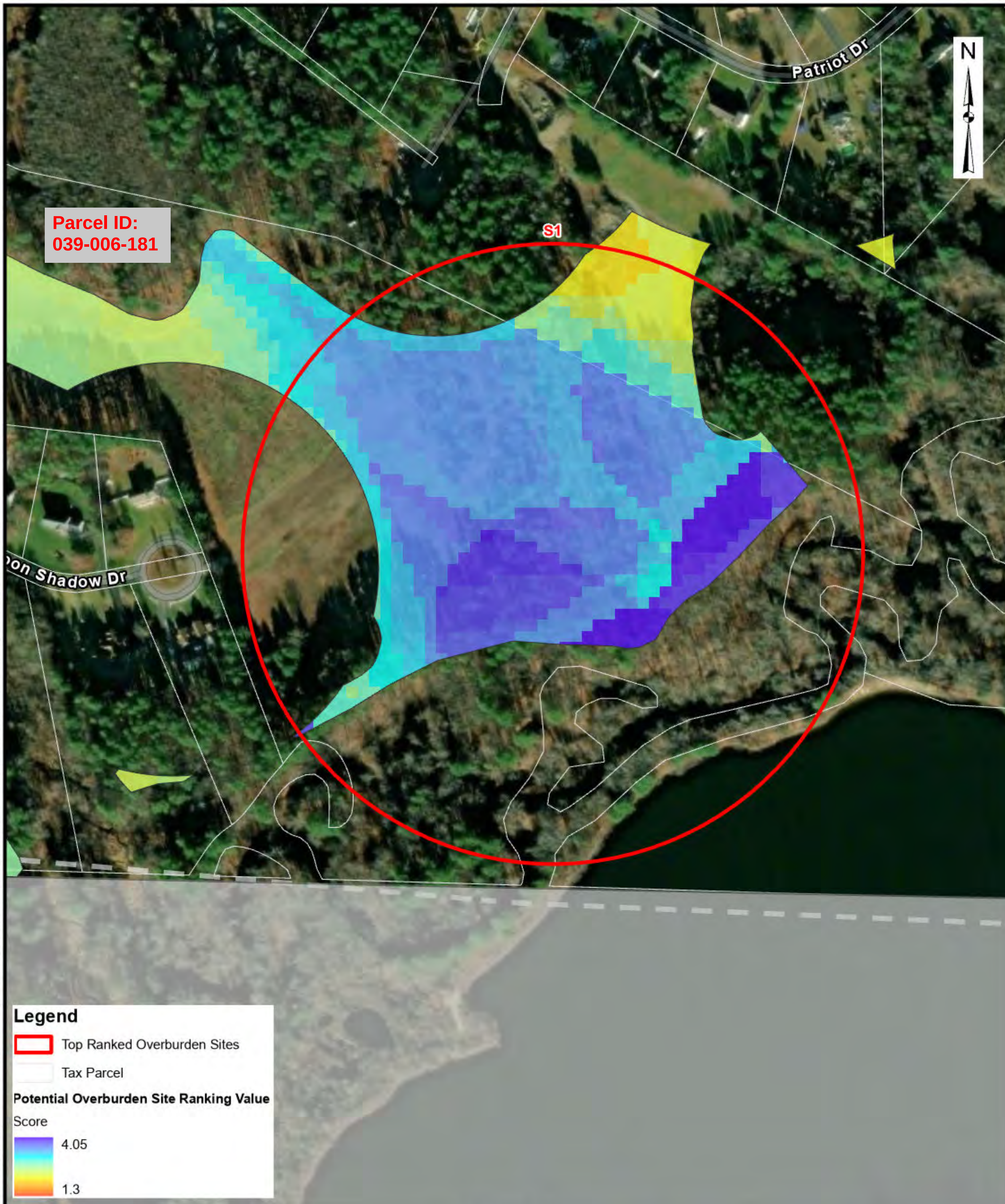


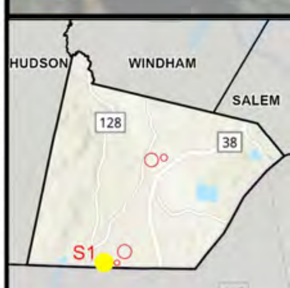


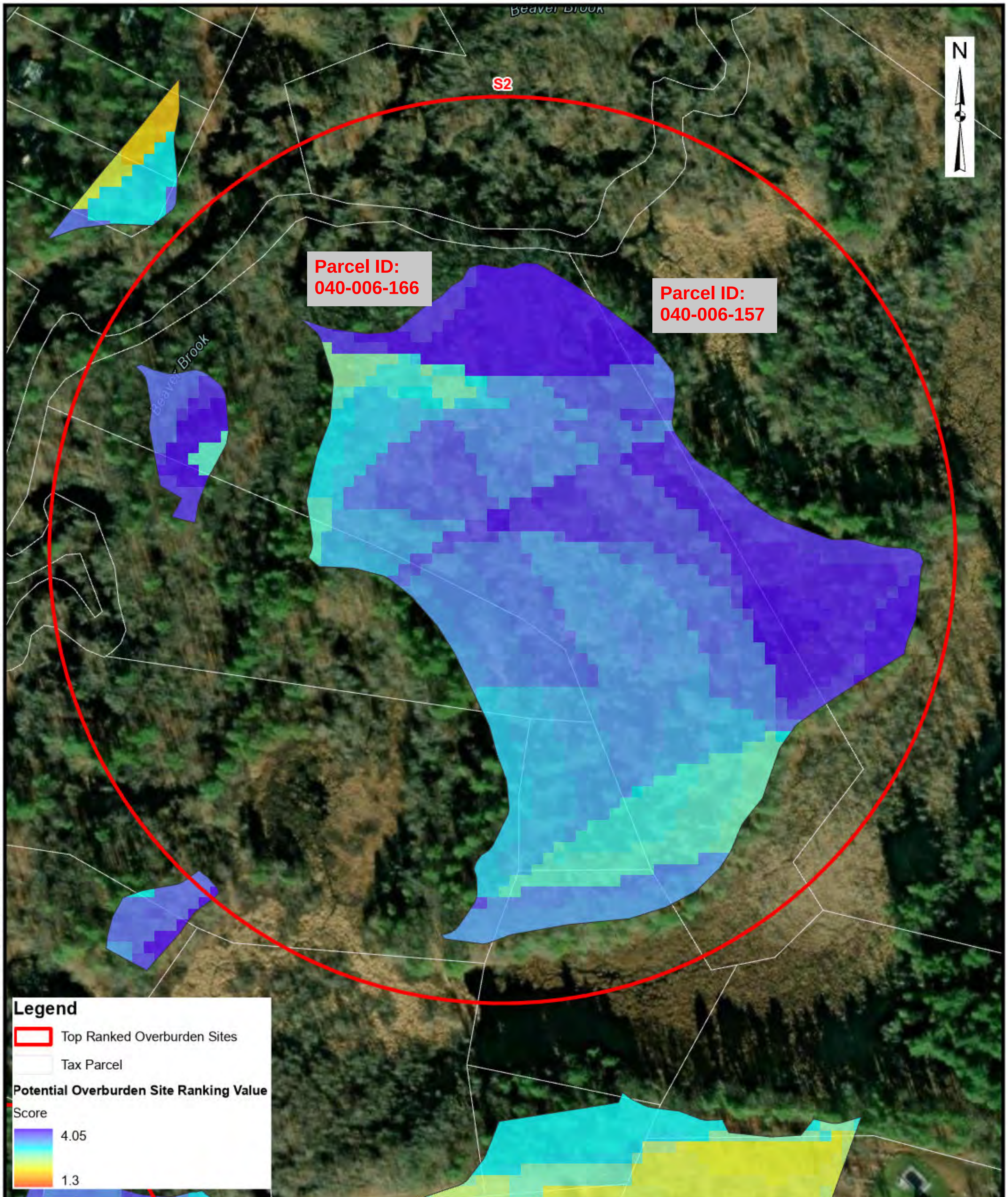
FIGURE 3.17
PELHAM, NH
WATER SUPPLY EVALUATION

SITE S1

300 0 300

Scale In Feet

Weston & Sampson



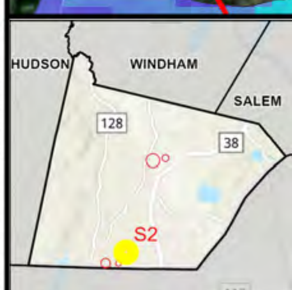


FIGURE 3.18
PELHAM, NH
WATER SUPPLY EVALUATION

SITE S2

300 0 300
Scale In Feet

Weston & Sampson

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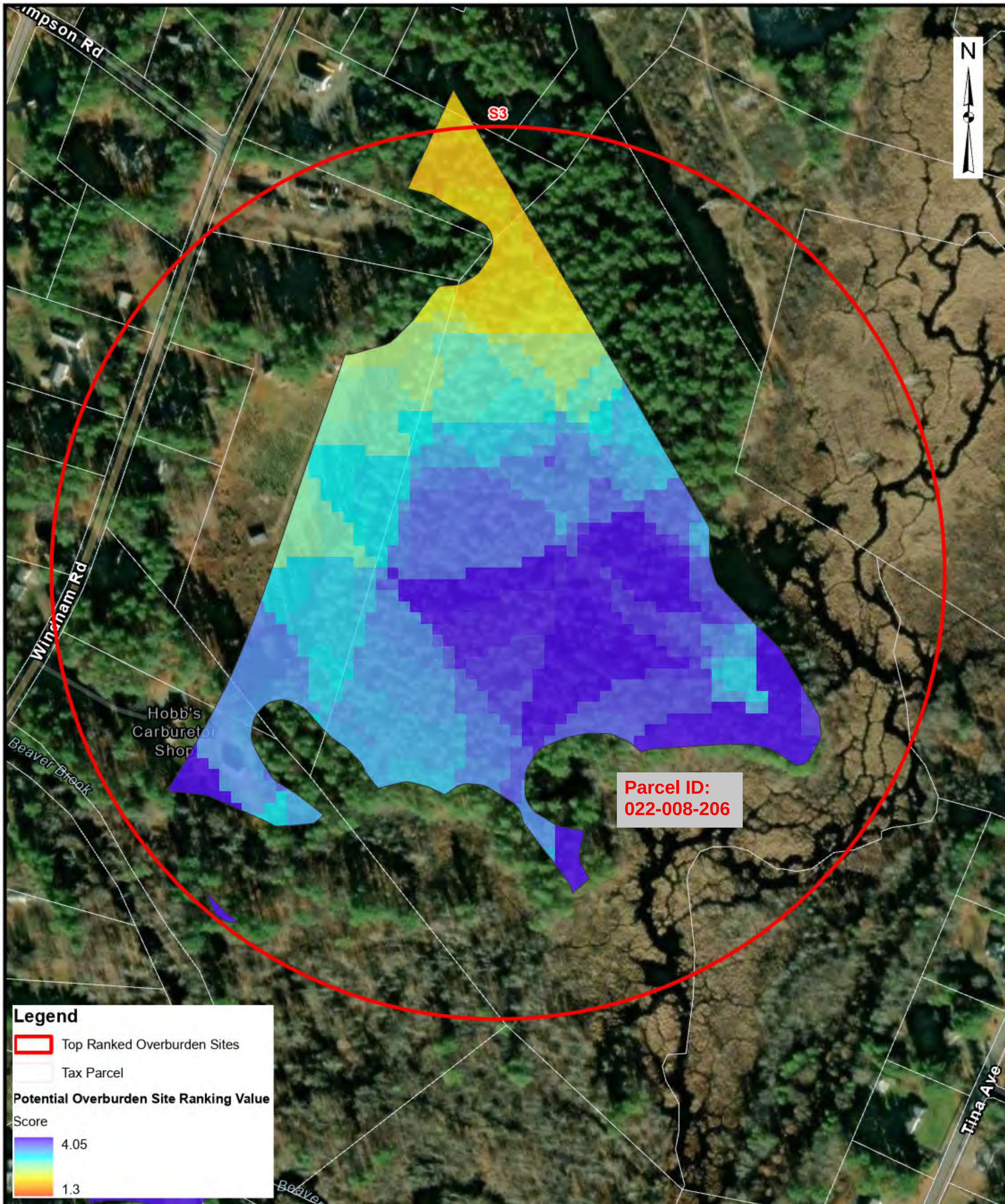

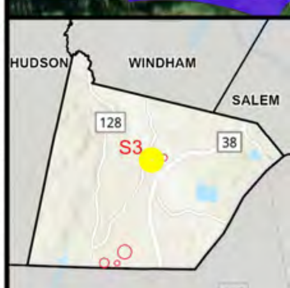

FIGURE 3.19

PELHAM, NH

WATER SUPPLY EVALUATION

SITE S3

300 0 300

Scale In Feet

Weston & Sampson

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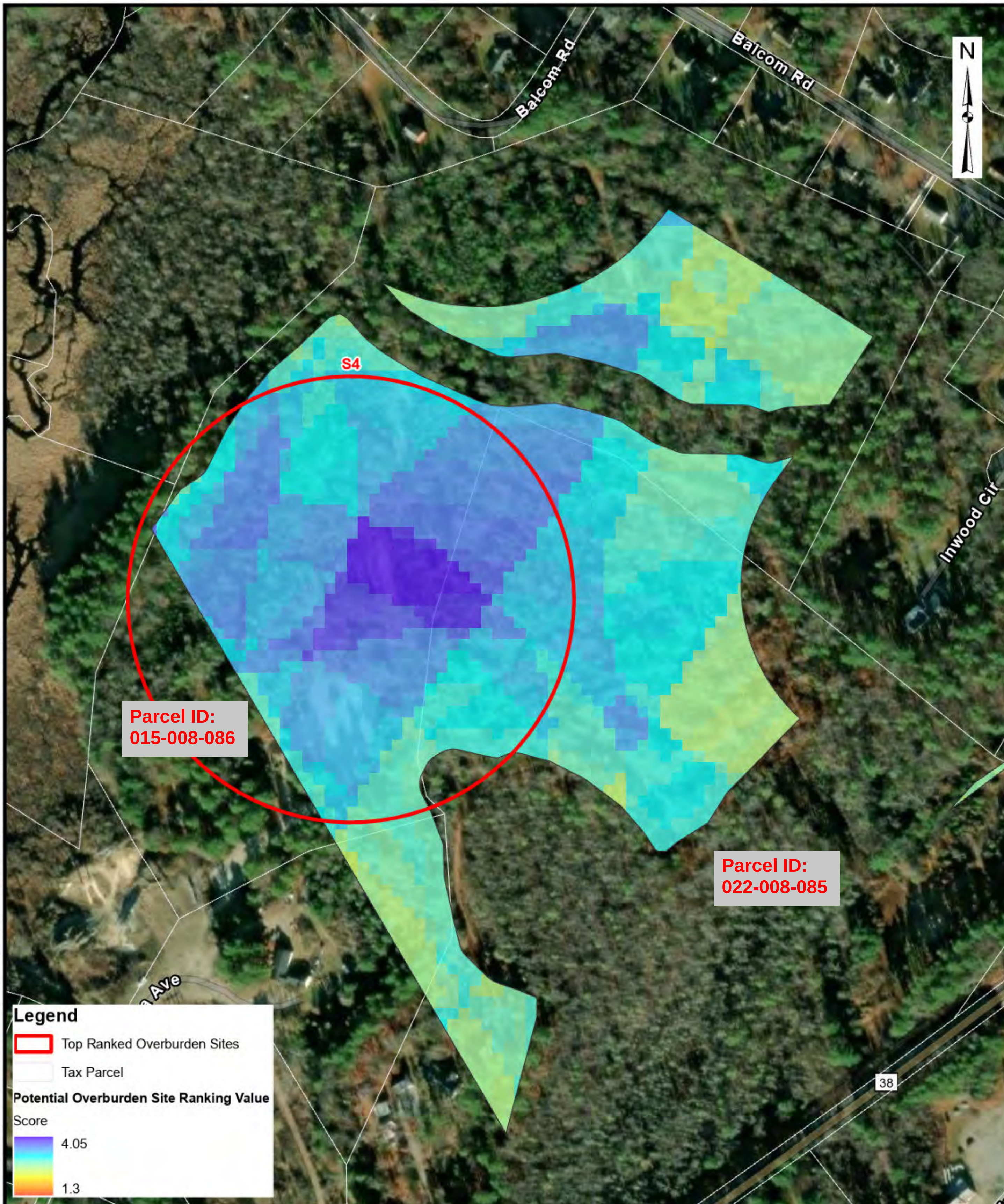

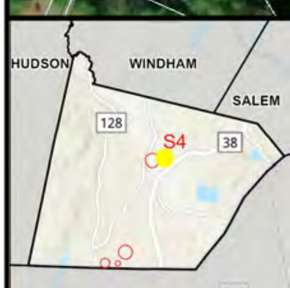

FIGURE 3.20
PELHAM, NH
WATER SUPPLY EVALUATION

SITE S4

300 0 300

Scale In Feet

Weston & Sampson

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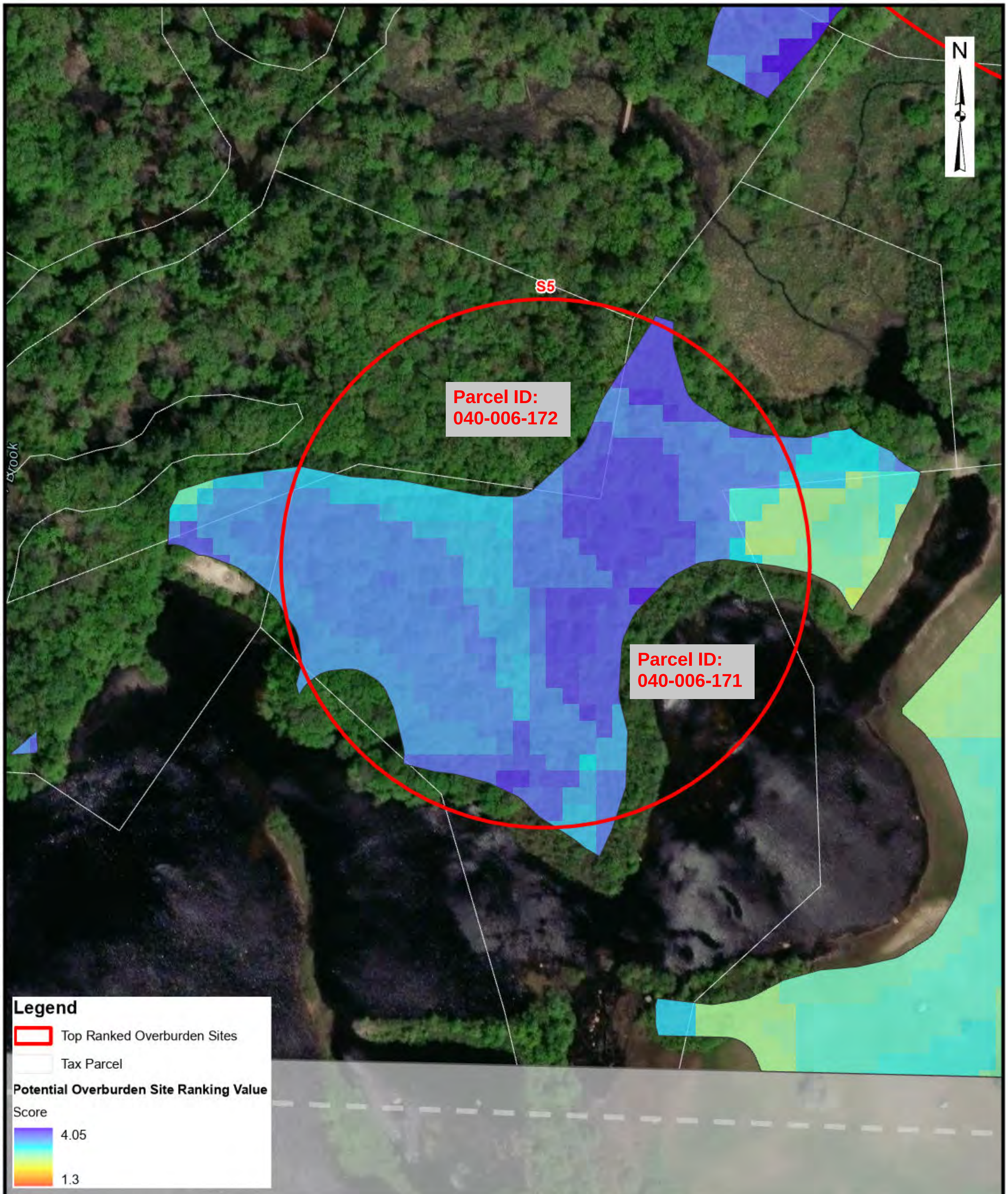

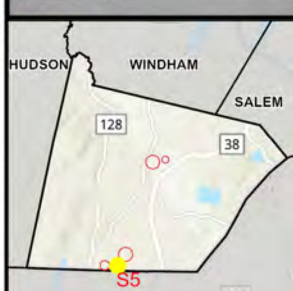

FIGURE 3.21
PELHAM, NH
WATER SUPPLY EVALUATION

SITE S5

200 0 200
Scale In Feet

Weston & Sampson

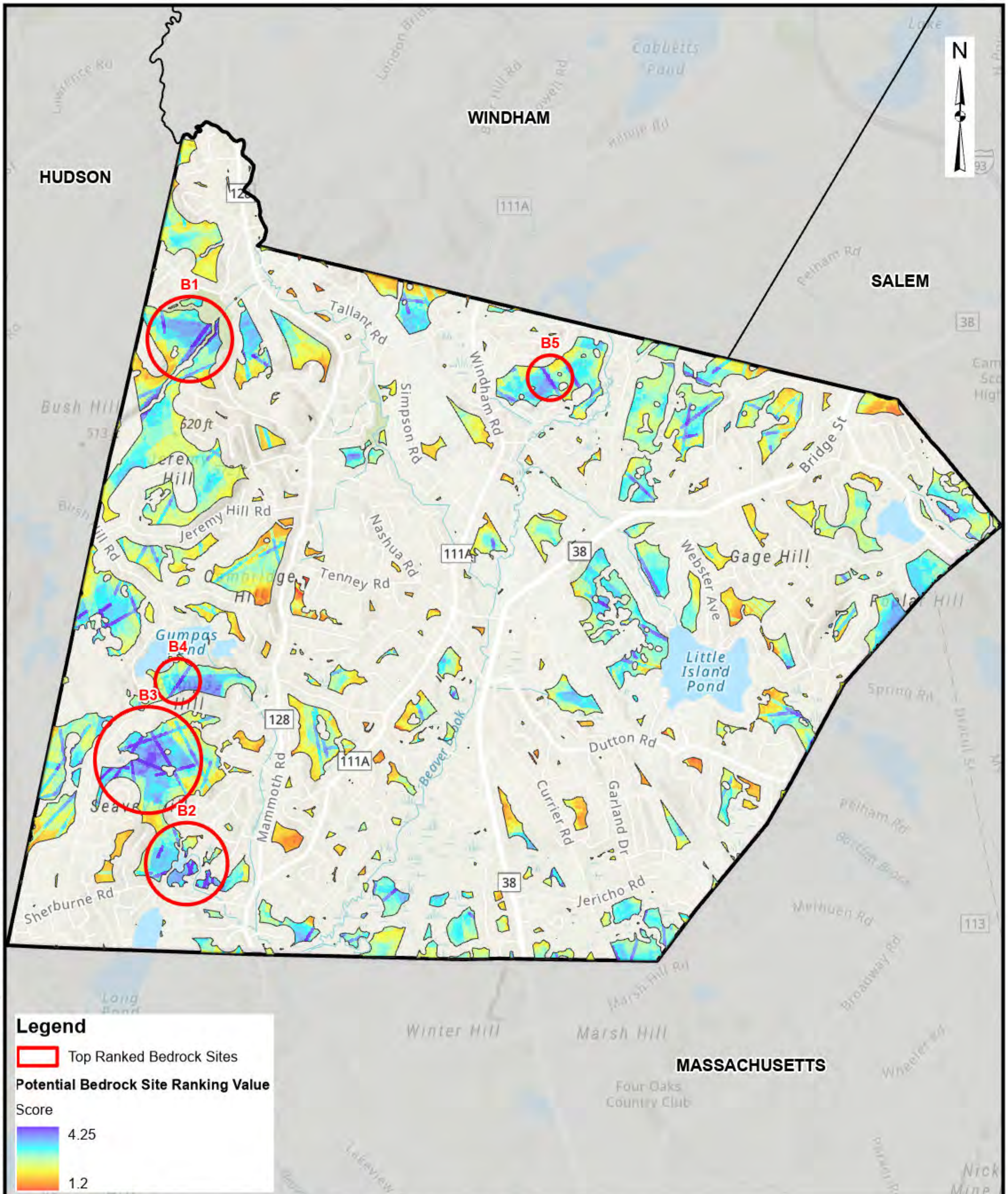

FIGURE 3.22
PELHAM, NH
WATER SUPPLY EVALUATION

TOP 5 RANKED BEDROCK SITES

3,500 0 3,500

Scale In Feet

Weston & Sampson

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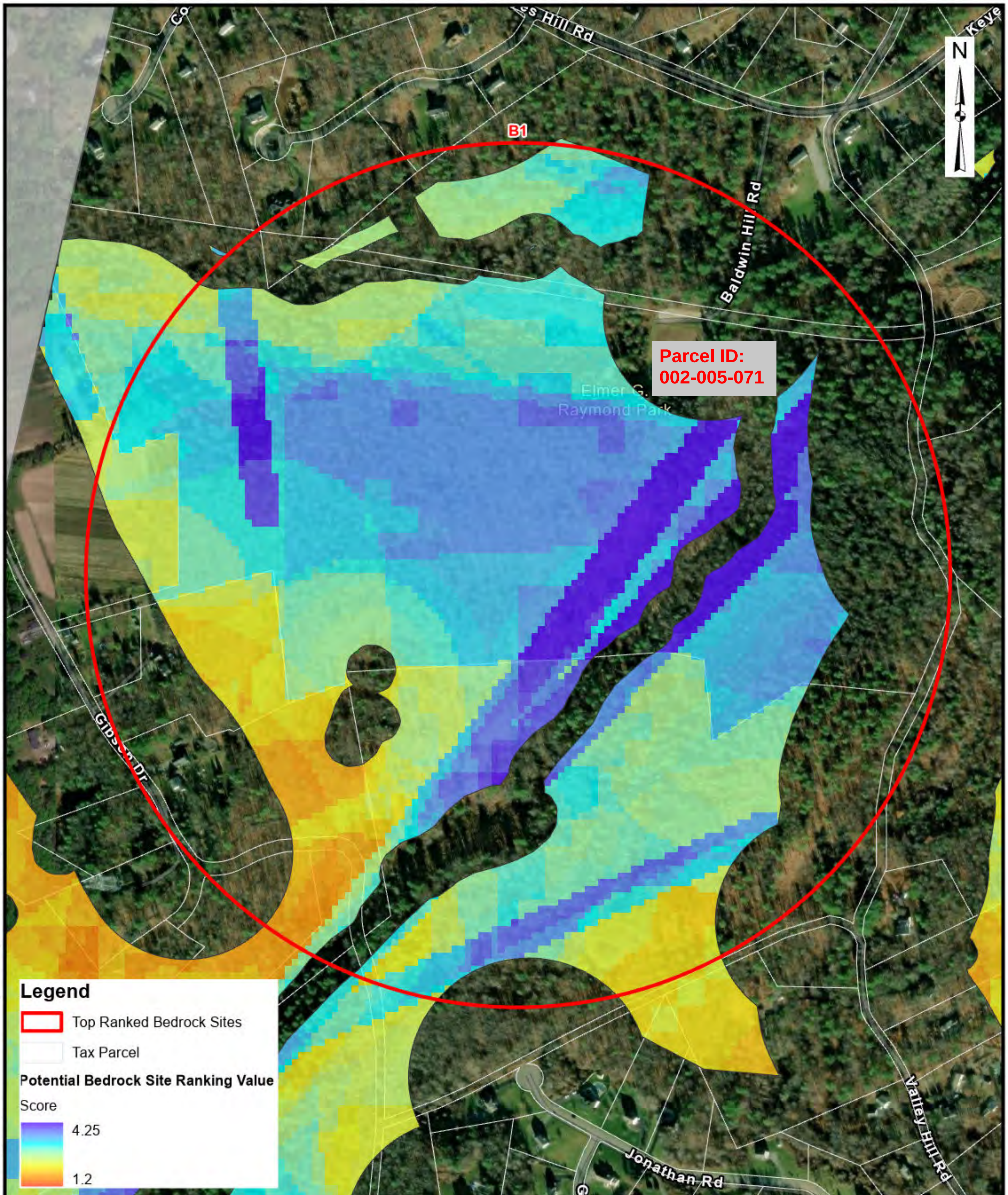


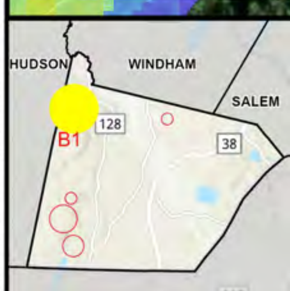


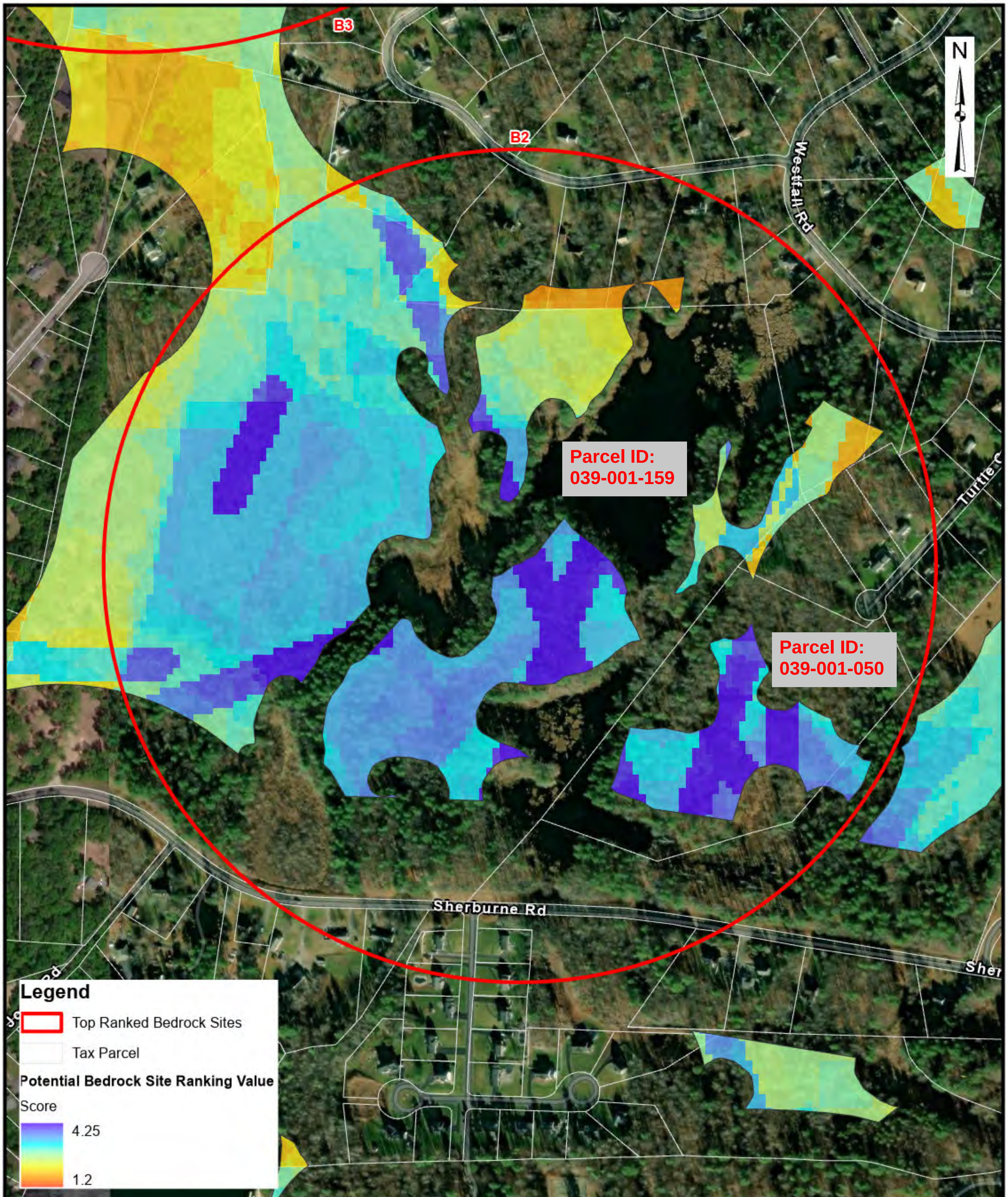
FIGURE 3.23
PELHAM, NH
WATER SUPPLY EVALUATION

SITE B1

500 0 500

Scale In Feet

Weston & Sampson



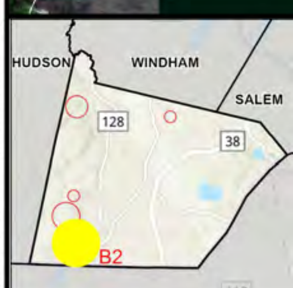


FIGURE 3.24
PELHAM, NH
WATER SUPPLY EVALUATION

SITE B2

500 0 500
Scale In Feet

Weston & Sampson

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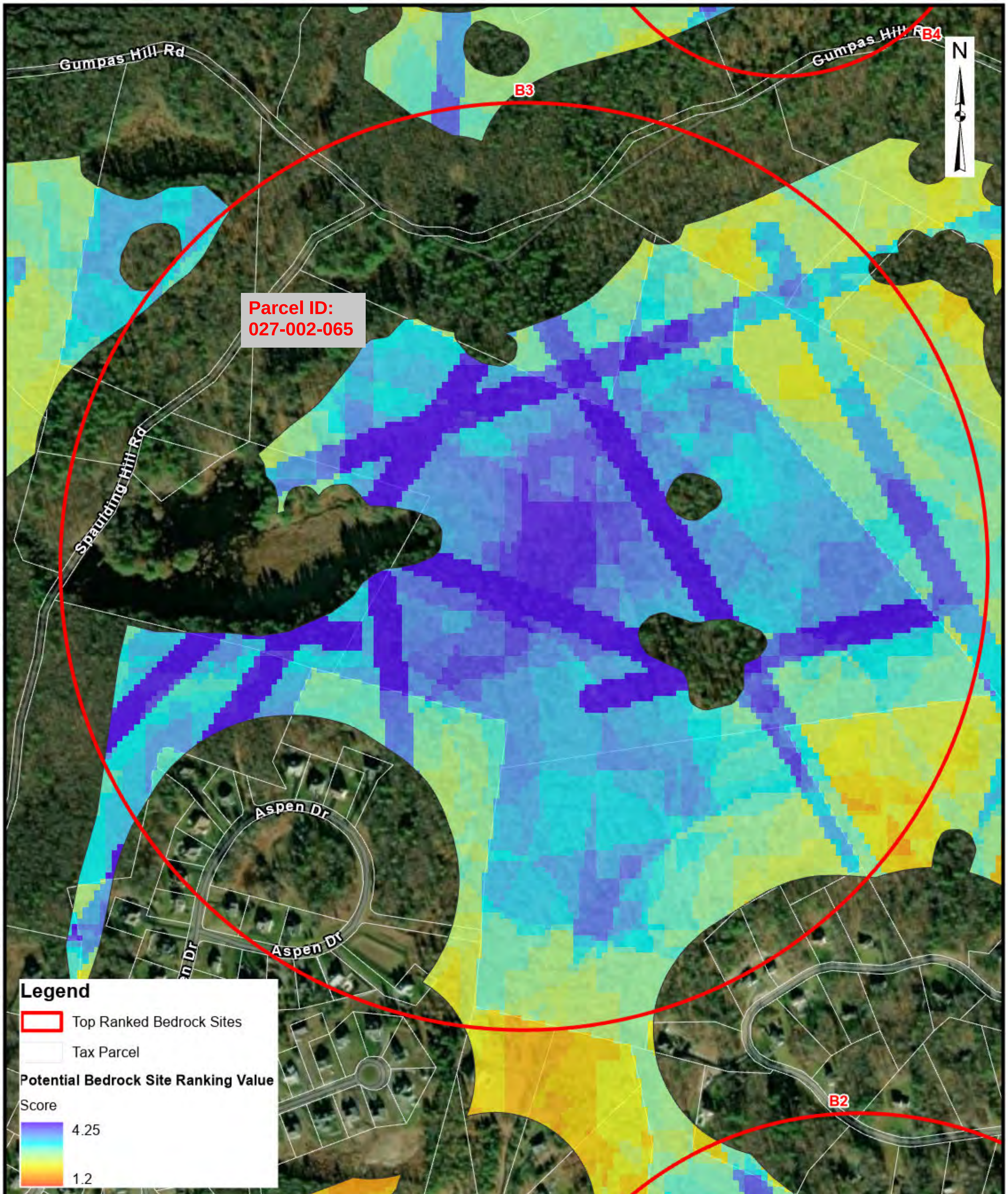

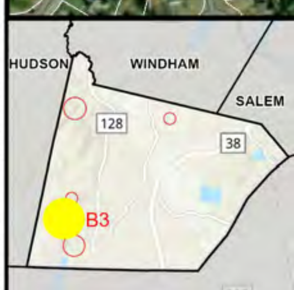

FIGURE 3.25
PELHAM, NH
WATER SUPPLY EVALUATION

SITE B3

500 0 500

Scale In Feet

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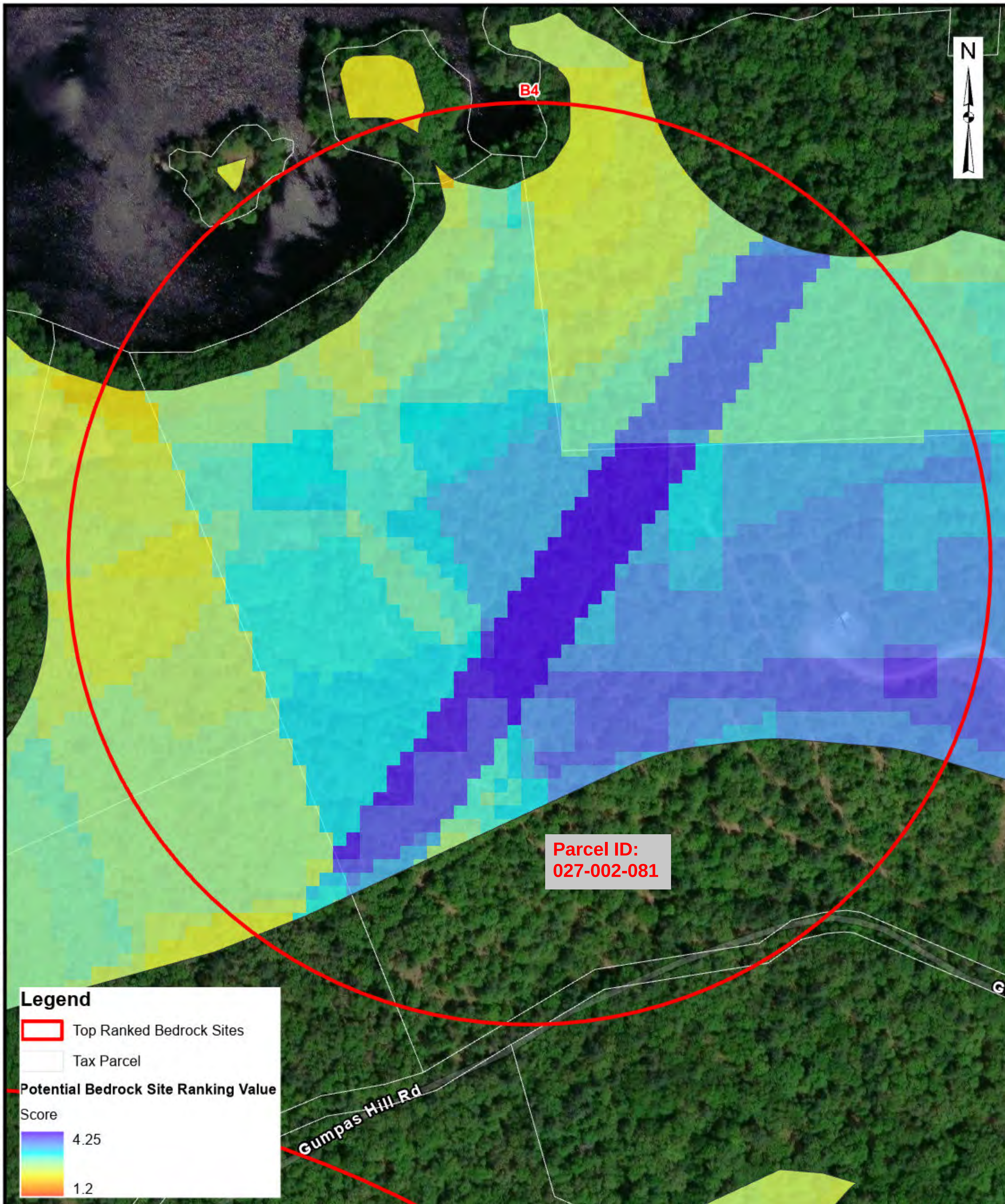

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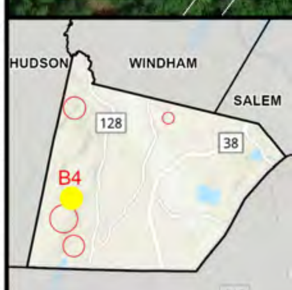
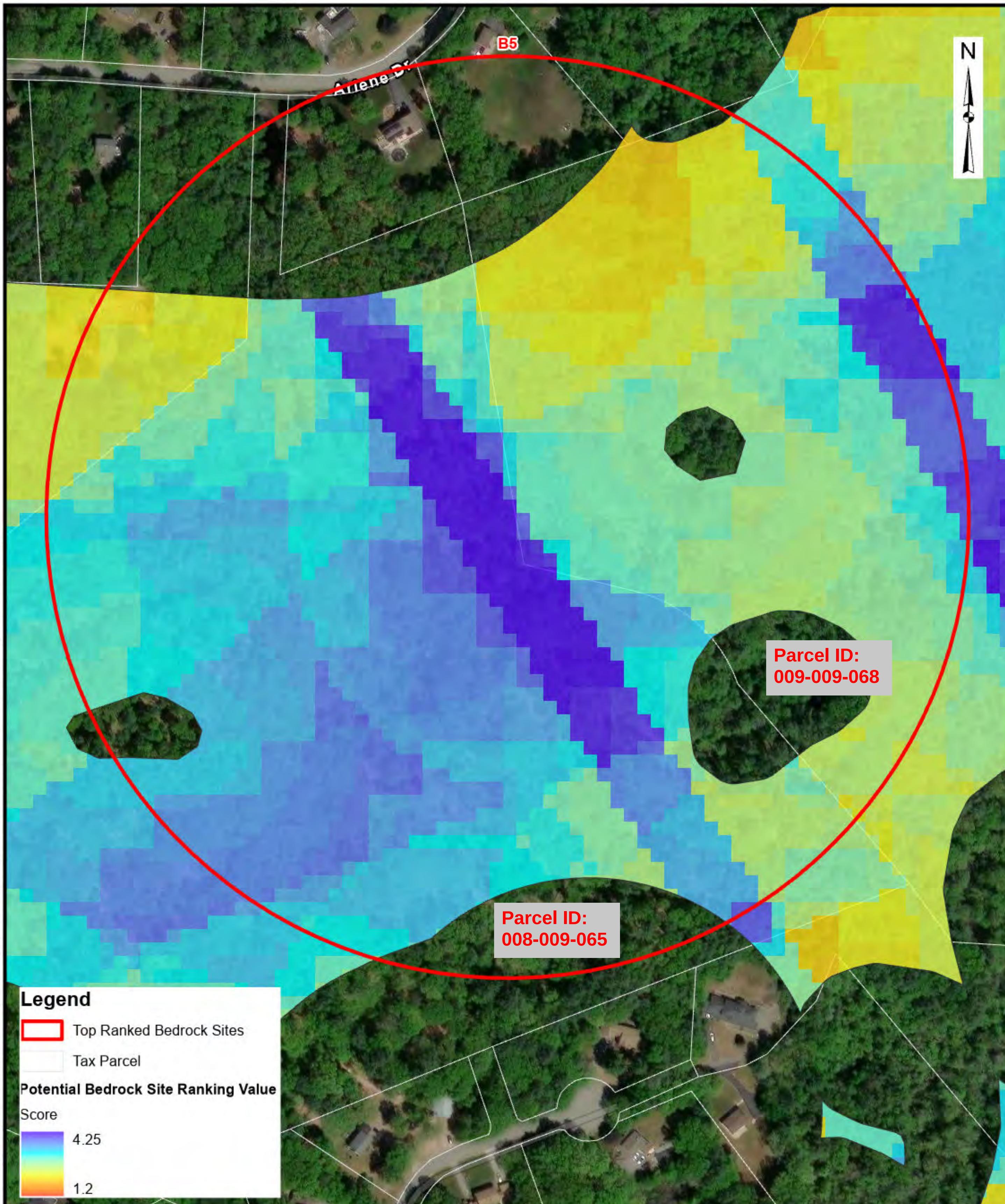


FIGURE 3.26
PELHAM, NH
WATER SUPPLY EVALUATION

SITE B4

250 0 250
Scale In Feet

Weston & Sampson



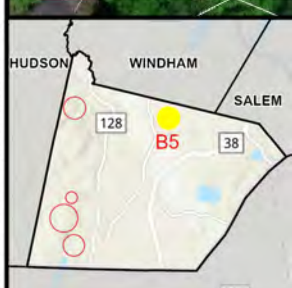


FIGURE 3.27
PELHAM, NH
WATER SUPPLY EVALUATION

SITE B5

250 0 250
Scale In Feet

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Path: P:\NH\Pelham\ENG23-2845 Water Expansion Study (MTBE)\GIS\Pelham GW Screening\Pelham Figures.aprx **Map:** Map **User:** GetchellJ **Saved:** 5/22/2024 3:57 PM **Opened:** 5/22/2024 5:31 PM

APPENDIX D

Interconnection Alternative Figures


Scenario #1, Priority #3
Water Supply from Hudson
PEU WHISPERING
WINDS
Dick Tracy Drive
Pressure Reducing Valve
Town of
Windham, NH
B1, Proposed
Bedrock Well Site
Mt. Vernon Pump
Station & Wells (2) &
Pressure Reducing
Valve
B5, Proposed
Bedrock Well Site
Town of
Salem, NH
Meadowview Pump
Station & Pressure
Reducing Valve
Collins Way
Water Storage Tank
SIMPSON MILL
(PRIVATE)
PARADISE
ESTATES
(PRIVATE)
LANDMARK ESTATE
CONDOS (PRIVATE)
PEU WILLIAMSBURG
S3, Proposed
Overburden Well Site
S4, Proposed
Overburden Well Site
Proposed Bridge
Street Pump Station
PEU GAGE HILL
Town of
Hudson, NH
Proposed Pressure
Reducing Valve on
Bush Hill Road
Scenario #1, Priority #2
Water Supply from PEU
Williamsburg
Proposed 65 Unit "Market Rate"
Apartment Building & Interconnection
579 Bridge Street
B4, Proposed
Bedrock Well Site
OLD LAWRENCE
ROAD (PRIVATE)
B3, Proposed
Bedrock Well Site
Waterline Interconnection -
Highland Estate Apartments
(CSA Environmental Consultants)
HIGHLAND ESTATE
APARTMENTS (PRIVATE)
Scenario #1, Priority #1
Water Supply from Hudson
Aspen Drive Pump
Station & Wells (2)
GARLAND WOODS
(PRIVATE)
PEU SKY VIEW
ESTATES
Proposed Dracut
Road Pump Station
BOULDER HILLS
(PRIVATE)
Proposed Meter
Pit at town line of
Hudson & Pelham
PROLYN TOWN
HOUSE APARTMENTS
(PRIVATE)
Interconnection
Water Main to
bring Hudson
Water System to
Pelham town line
Town of
Dracut, MA
Proposed Pressure
Reducing Valve on
Sherburne Road
B2, Proposed
Bedrock Well Site
S2, Proposed
Overburden Well Site
Town of
Tyngsborough, MA
LONG POND
WOODS (PRIVATE)
S1, Proposed
Overburden Well Site
S5, Proposed
Overburden Well
Site
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan
Windham, NH
Salem, NH
Hudson, NH
Pelham, NH
Methuen, MA
Tyngsborough, MA
Dracut, MA
Andover, MA
Legend
Water System Assets
Meter Pit
Proposed Meter Pit
Pressure Reducing Valve
Proposed Pressure Reducing Valve
Pump Station
Proposed Pump Station
Water Storage Tank
Well
Proposed Water Main
8" Water Main
12" Water Main
Existing Water Main
Unknown Diameter
<6" Water Main
6" Water Main
8" Water Main
10" Water Main
12" Water Main
16" Water Main
>16" Water Main
Town Boundary
Priority #1A
Priority #1B
Priority #2
Priority #3
0 0.25 0.5 1 Miles
N
FIGURE 4.1
TOWN OF PELHAM, NEW HAMPSHIRE
WATER EXPANSION STUDY
WATER SUPPLY INTERCONNECTION
DECEMBER, 2024
SCALE: NOTED
Weston & Sampson

Legend

Junction

Fire Flow Available (gpm)

- Less than 250.00
- 500.0 - 1000.00
- 1,000.0 - 2,000.00
- 2,000.00 - 3,000.00
- 3,000.00 - 3,500.00

0 0.125 0.25 0.5 0.75 1 Miles

N

FIGURE 4.2

TOWN OF PELHAM, NEW HAMPSHIRE
WATER EXPANSION STUDY

FIRE FLOW RESULTS FROM MODEL

DECEMBER, 2024 SCALE: NOTED

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