
DWSP2 Plan

Town of Machias Drinking Water Source Protection Program (DWSP2) Plan

Machias Town Water District

Prepared For

Town of Machias

3483 Roszyk Hill Road, Machias, NY 14101

October 2024



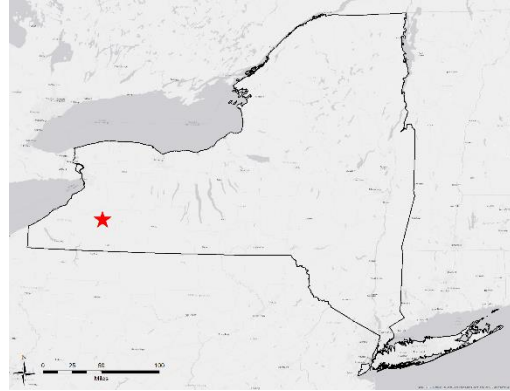
Department
of Health



Drinking Water Source Protection Program (DWSP2) Town of Machias

Executive Summary

The Town of Machias applied to New York State for free technical assistance to create a tailored, locally developed Drinking Water Source Protection (DWSP2) Plan that builds off previous work, helps align priorities, and fills gaps within these municipalities' current and future source water protection efforts. The Town was paired with a Technical Assistance Provider (TA Provider) from the New York State Department of Health (NYSDOH) to develop their DWSP2.



The work began with assessing current and future water quality concerns of Machias' drinking water sources, two groundwater wells and their contributing source water area. In preparation of the DWSP2 Plan, a stakeholder group provided local knowledge of the current conditions of their source water as well as some of their concerns regarding water quality. Together, the stakeholders and the TA provider interpreted water data, developed maps, identified potential sources of contamination, developed an actionable list of protection methods, and identified funding and partnership opportunities. The Town now has a comprehensive, step-by-step implementation plan that can be used to promote public health and safety, avoid preventable drinking water treatment costs, increase community confidence in drinking water, and strengthen community partnerships. Due to the dependency that the community has on its two wells, it is crucial to implement the identified strategies of protection for current and future generations.

Potential Contaminant Sources

Working together, the stakeholders and the TA provider compiled a list of current and potential concerns based on available data and updated mapping. The following list of concerns were identified as priorities for the Town to protect the quality and longevity of their drinking water sources.

- Future development and land use in the source water area.
- Direct contamination to the critical contributing area and groundwater.
- Regulated potential contaminant sources, including mineral extraction sites and bulk storage.
- Runoff and groundwater seepage from agricultural land activities.

Protection and Management Strategies

To address the identified concerns, the stakeholders and TA Provider determined strategies that can be implemented to prevent future contamination of the wells. The list below summarizes these strategies.

Land Use Tools and Methods

Potential contaminant sources can be mitigated through the implementation of both regulatory and non-regulatory land use tools. Steps the Town may take to reduce the concentrations of potential contaminants in the watershed is designating a Critical Environmental Area (CEA) and developing zoning to closely evaluate land use actions that negatively impact the source water. Additional steps the Town can take to limit direct contamination to the wellhead area is land acquisition of a minimum 100 feet.

Managing Regulated Potential Contaminant Sources

The stakeholders will make efforts to open communication between local facilities and regulatory agencies to increase knowledge of permits and historical or future concerns with regulated potential contaminant sources. If concerns are identified, appropriate partners will work together to determine best approaches to mitigate those concerns. For example, reviewing permits and discussing preventative measures to address potential risk of leaks or spills.

Outreach and Education for Agricultural Activities

The stakeholders will work to open communication channels between the Town, local agencies, and agriculture landowners. Through these partnerships the Town will work to create to provide educational materials on the impact that land and nutrient usage has on source water. Priority areas will be identified for project outreach. Local participation in best management practices can also help to build understanding of source water area issues and bring about a newfound commitment to stewardship.

Conclusion

The Town is making strides to protect its source water and its surrounding watershed area. To maintain the quality of their groundwater, the Town will move forward with the most important component of DWSP2: Plan Implementation. Potential funding sources and partnerships are listed in the full DWSP2 plan to aid the Town with DWSP2 implementation. For more information, please see a copy of the final DWSP2 plan.

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ABBREVIATIONS

AWQR	Annual Water Quality Report
BMP	Best Management Practice
DWSP2	Drinking Water Source Protection Program
GPD	Gallons per day
GPM	Gallons per minute
GIS	Geographical Information System
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
NYS	New York State
NYSAGM	New York State Department of Agriculture and Markets
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
PCS	Potential Contaminant Source
PMT	Plan Management Team
PWS-ID	Public Water System Identification Number
SPDES	State Pollutant Discharge Elimination System
SWAP	Source Water Assessment Program
TRI	Toxic Release Inventory
USGS	United States Geological Survey

INTRODUCTION

The purpose of this Drinking Water Source Protection Program (DWSP2) Plan is to improve and protect public water sources and the surrounding environment. The Town of Machias applied to New York State for free technical assistance to create a DWSP2 Plan (“the Plan”) that will build off previous work within the Town’s current and future source water protection efforts. The Town was paired with a Technical Assistance Provider (TA provider) from the New York State Department of Health (NYSDOH) to develop their Plan. The Town and partners will use this plan to guide their implementation efforts and progress forward with drinking water source protection.

To help guide municipalities and their TA providers in developing DWSP2 plans, representatives of key state agencies, including NYSDOH, New York State Department of Environmental Conservation (NYSDEC), New York State Department of State (NYSDOS), and New York State Department of Agriculture and Markets (NYSAGM), created a draft “Framework for Creating a Drinking Water Source Protection Program.”

The Plan will act as a guide for the Town and their partners to readily implement source water protection actions. Implementing the identified source water protection efforts can help the Town promote public health and safety, avoid preventable drinking water treatment costs, increase community confidence in their drinking water, and strengthen community partnerships.

BACKGROUND

In 2004 a Source Water Assessment Program (SWAP) was prepared for the Town by NYSDOH for Well #1 and Well #3. The SWAP included a delineation of the source water assessment area. The assessment area included two zones: an inner zone closer to the well which is more likely to contribute recharge to the ground water pumped by the well, and an outer zone, a broader area that could contribute recharge or overland flow to the well. The SWAP also included an inventory of potential contaminant sources and evaluated susceptibility to contamination to a specific well. This assessment was referenced and built upon for DWSP2.

This Plan focuses on the Town’s two wells and their contributing source water area. Machias recognizes the importance of maintaining a quality and reliable drinking water source for the long-term benefits of its residents. The source water is groundwater drawn from an unconfined aquifer, and operates as one system, Machias Town Water District. The system is assigned Public Water ID NY0400344. As reported in the Annual Drinking Water Quality Report (AWQR), the Machias Town Water District serves 700 people through 275 service connections.

The Town owns and operates two wells:

- Well #1 is 58 feet deep and was drilled in 1978.
- Well #3 is 68 feet deep and was drilled in 2004.

The Town’s Plan was developed with a local stakeholder group using the phases and key components of DWSP2 shown below (Table 0-1). The stakeholders were able to provide local knowledge of current conditions of the water supply and emerging concerns. In developing their DWSP2 plan, the stakeholders and their TA provider interpreted data, developed maps, identified potential sources of

contamination, developed an actionable list of source water protection methods, and researched funding and partnership opportunities.

Table 0- 1: Phases and Key Components

Phase 1. Stakeholder Group
1.1 Form a Stakeholder Group
1.2 Establish a Vision Statement and Goals
Phase 2. Drinking Water Source Assessment
2.1 Develop a Water System Overview
2.2 Prepare a Drinking Water Source Protection Map
2.3 Create a Potential Contaminant Source Inventory
Phase 3. Protection and Implementation Strategies
3.1 Identify Protection and Management Methods
3.2 Develop an Implementation Timeline
Phase 4. Progression and Maintenance
4.1 Designate a Plan Management Team
Phase 5. Implementation
5.1 Implement the Plan
5.2 Progress Reports

1.0 STAKEHOLDER GROUP

1.1. Form a Stakeholder Group

The first step in developing the Town’s DWSP2 was forming a stakeholder group. Stakeholders with different backgrounds, knowledge and work assignments assisted with the development of the plan. They include representatives from the Cattaugus County Department of Health, MDA Consulting Engineers, and the Town’s government. Members of the stakeholder group and their affiliations are listed in Table 1-1. The stakeholder group established monthly meetings with the TA Provider to work through the Framework and develop the DWSP2 Plan. Contact information for the stakeholders, a list of the scheduled meetings, and meeting summaries of the discussions are included in Appendix A.2. The stakeholder group assisted in creating a vision statement and goals for the Town. They also provided local knowledge and feedback during the drinking water source assessment phase and protection and implementation strategies phase. Finally, they made important decisions on individuals and groups that should be included in the Plan Management Team. As of December 2023, Town Supervisor Steve Cornwall was the point of contact for the group, but as of January 2024 a new Supervisor for the Town will be appointed. The Town of Machias ((716) 353-8207) will serve as the point of contact during this process. The plan’s point of contact will be updated once the new Town Supervisor is in office and is a member of the Plan Management Team.

Table 1- 1: Town of Machias Stakeholder Group

Name	Relevant Affiliation(s)
Steve Cornwall ¹	Town Supervisor
Timothy Zerfas	Cattaraugus County Department of Health
Caleb Henning	MDA Engineers
Derek Rule ²	MDA Engineers
<p>1 Former point of contact: Email: machias.supervisor@wny.twcbc.com Phone: (716) 353-8207</p> <p>2 Former stakeholder member.</p>	

1.2. Vision and Statement Goals

The stakeholder group met to formulate a vision and establish goals for the Town’s DWSP2 plan. The group developed five goals that emerged as most relevant to the challenges facing the town’s water supply. The goals will aid in Machias’ plan to achieve their vision.

1. Preserve and protect the Town of Machias’ drinking water sources in order to supply the community with safe and reliable drinking water in perpetuity.
2. Continue long-term efforts to identify potential contaminant sources surrounding drinking water wells.
3. Implement regulatory and non-regulatory options such as zoning, conservation/drinking water protection overlays or land easements to increase the Town’s jurisdiction over land use practices directly surrounding drinking water wells and to protect the land from future development.
4. Identify additional grant funding from local, state, and federal sources for acquiring ownership of land surrounding wells, drinking water protection and system improvements.
5. Improve cooperation and communication between the Town and local property owners to protect the community’s drinking water and create forums for public engagement.

With these goals in mind the stakeholder group established a vision statement: *Through the development of this program. The Town of Machias will preserve and protect its source of drinking water from potential contaminants, land use development, and other influences that may compromise the community’s clean, safe, and reliable drinking water.*

2.0 DRINKING WATER SOURCE ASSESSMENT

2.1. Water System Overview

This section of the Plan provides an overview of The Town’s Water System and the hydrogeologic setting, refer to Appendix A.4 for the completed Water System Overview

Worksheet. The assessment also includes delineation of the drinking water source protection areas and inventories potential contaminants of concern.

The Machias Town Water District serves 725 customers through 250 service connections. The sources of the water for this system are two groundwater wells. A water quantity worksheet was completed by the stakeholder group to provide a summary of the wells, see Table 2-1 and Table 2-2 below.

Table 2- 1: Town of Machias Groundwater Wells Summary

Well	Location	Depth (feet)	Pumping Rate (gpm)
Well #1	Pines Health Care	58	425
Well #3	Pines Health Care	68	370

Table 2- 2: Water Quantity Summary

Current Water Withdrawal Permit Expiration Date(s)	No expiration date
Total Permitted Water Withdrawal Capacity	100,000 GPD per well
Average Daily Water Demand (= Yearly Usage / 365)	100,000 GPD per well
Maximum Daily Water Demand (Unofficial 3-day average in peak month - e.g. July)	1 MGD
Annual Water Losses (can be obtained from Water Conservation Program form)	Estimated 50%

The source water is drawn from the wells and is disinfected by the addition of sodium hypochlorite prior to being pumped into the distribution system. No other disinfection occurs.

There are no known maximum contaminant level (MCL) violations in the last seven years for the system, and no water quality violations were reported in the 2022 Annual Water Quality Report. Previous nitrate MCL violations occurred in the past, and previous simple modeling has shown that the nearby fields could be contributing agricultural sources of nitrate to the wells.

2.2. Drinking Water Source Protection Areas

2.2.1. Hydrogeological Setting

The Machias Town Water District wells are drilled into a post-glacial, alluvial sand and gravel unconsolidated aquifer. The aquifer is rated as highly productive with estimated yields of greater than 100 GPM. The aquifer is oriented north to south along Route 16 in Machias, and groundwater flow direction within the town is to the east, towards Lime Lake.

The aquifer is composed of sand and gravel. The municipal wells are installed in sand and gravel. The depths of the wells range from 58 to 68 feet. The unconfined nature of the system makes it susceptible to contamination from runoff, spills, and nearby land use.

2.2.2. Drinking Water Source Protection Areas

Drinking water protection areas are established to protect against different classes or types of contaminants. For wells serving public water systems, there are various protection areas that can be identified. These include: (1) the ownership and control area; (2) the critical area; and (3) the source water area. Well #1 and Well #4 are located on land that is owned by the county and therefore the Town does not own or control land activities around the wells. For this Plan Machias' source water protection areas include a critical contributing area, which was delineated from groundwater modeling (Section 2.1.4 and Appendix B), and a source water area, which was delineated using StreamStats (Appendix B). The critical contributing area encompasses one-, two-, and five-year time of travel contributing areas. As requested by the stakeholders, the source water area represents the contributing aquifer and surface water to the wells. These protection areas were delineated to identify locations in the watershed that could potentially impact the source water.

2.2.3. Drinking Water Source Protection Mapping

ESRI ArcGIS ArcMap Desktop v.10.8.2 was used to generate the drinking water source protection maps. Figure 1, the System Overview and Project Location Map, displays the location of the Town of Machias within NYS and an overview of the drinking water system, including locations of the two wells. Figure 2 displays the locations and delineates the extent of two of the three protection areas described above: the critical contributing area and the source water area.

Figures 3-9 provide an overview of conditions within the critical and the source water area. They are:

- Figure 3 – Groundwater Model Flow Paths
- Figure 4 – Aquifer Overview
- Figure 5 – Surficial Geology
- Figure 6 – Bedrock Geology
- Figure 7 – Land Cover
- Figure 8 – Land Use
- Figure 9 – Potential Contaminant Sources

2.2.4. Delineate and Map Critical Source Areas Data and Analysis

The contribution areas for Wells #1 and #3 were delineated using Environmental Simulations Incorporated Groundwater Vistas modeling software, a pre- and post-processor for MODFLOW models. The model for the wells has three layers. Layer 1 (the top layer) represents overburden (sand/mud), Layer 2 represents a sand and gravel aquifer (where the wells pump from), and Layer 3 represents clay. The top elevations of Layer 1 were assigned using a USGS 1/3 Arc Second GeoTIFF dataset. Layer thicknesses were determined using well logs from the 1978 Edwards and Moncreiff, P.C. Engineers and Surveyors aquifer test report.

The estimated hydraulic properties of these lithologic units were initially set to standard values and best fit using the PEST parameter estimation software extension paired with manual calibration techniques. The hydraulic properties and recharge values can be found in the table below. Refer to Appendix B for additional information.

Table 2- 3: Hydraulic Properties and Recharge Values

	Horizontal K (m/day)	Vertical K (m/day)
Layer 1 (Overburden)	23	2.3
Layer 2 (Sand/gravel)	60	6.0
Layer 3 (Clay)	0.005	0.0005

2.3. Potential Contaminant Source Inventory

The potential contaminant source inventory was assembled for the Town of Machias and includes a list of potential contaminant sources (PCSs) that may impact the quality of drinking water sources, if improperly managed. The inventory of PCSs was created based on data available to the NYSDOH in both public and internal datasets. Appendix A.6 shows the PCS inventory, and Figure 9 shows the locations of all PCSs mapped within the critical and source water areas.

The data provided lists the facility, address, and database source in addition to other important attributes associated with the proximity to the drinking water source and source water protection areas. The data is categorized by an overall potential source category and further into the potential source consistent with the Framework. The PCSs are then assigned a contaminant category of concern (physical, chemical, or biological) if known to further assist with priority identification. Potential future sources of contamination were also identified in the PCS Inventory and were referred to as such, as they currently do not exist in the critical or source water areas. These future sources could potentially be present in the near or far future. The PCS categories assessed and identified within the critical and source water areas are listed in Table 2-4 on the next page.

Table 2- 4: Potential Contaminant Source Categories and Sources

Potential Contaminant Source Category	Source	Identified
Bulk Storage	Chemical Bulk Storage	No
	Major Oil Storage Facilities	No
	Petroleum Bulk Storage Facilities	Yes
Waste Management and Disposal	Active Landfills	Yes
	Inactive Landfills (Title 12)	No
	Hazardous Waste Management Facilities	No
	Land Application Sites	No
	Vehicle Dismantling Facilities	No
Contamination Sites or Incidents	Remediation Sites	Yes
	Spill Incidents	No
Mineral Extraction Sites	Oil and Gas Wells	No
	Orphan Oil and Gas Wells	No
	Mines	Yes
	Historical Abandoned Mines	No
Discharge to Water	State Pollutant Discharge Elimination System permitted (SPDES) Facilities	No
	Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs)	No
Transportation	Airports	No

	Transportation Corridors	No
	Road and Maintenance Facilities	No
	Salt and Deicers Storage	No
Agriculture	Agricultural Activities	Yes
Residential Sources	On-Site Septic Systems	No
	Lawn and Garden Chemicals	No
	Waterfront Property Management	No
Conveyances and Pipelines	Oil and Gas Pipelines	No
Other	Golf Courses	No
	Marinas and Boat Launches	Yes
	Stormwater	No
	Toxic Release Inventory Facilities	No
	Fire Training and Dedicated Fire Training Facilities	No
	Nutrient Loading (Lakes Only)	No
	Saltwater Intrusion	No
	Road Salt Application	No
	Other (Auto Maintenance Facilities)	Yes

3.0 PROTECTION AND MANAGEMENT STRATEGIES

3.1. Protection and Management Methods

Since the Town of Machias is fully dependent on groundwater for their drinking water source, it is critical to implement effective strategies for current and future source water protection. Implementation of these strategies will allow the vision and goals of the stakeholder group to be met, which include to *preserve and protect its source of drinking water from potential contaminants, land use development, and other influences that may compromise the community's clean, safe, and reliable drinking water.*

3.1.1. Land Use Tools and Methods

Under the broad scope of land use tools and methods, many methods of drinking water source protection are available. Land use tools and methods include zoning ordinances, special use permits, site plan reviews, subdivision controls, critical environmental area, watershed rules and regulations, intermunicipal agreements, land purchase or voluntary conservation easements, and encouraging or incentivizing the use of best management practices.

3.1.2. Monitoring and Reporting

Additional monitoring throughout the source water area may help locate specific areas where contamination and sources affecting the drinking water wells. A detailed review of current monitoring plans and existing data can identify gaps and highlight potential areas of vulnerability. Additionally, expanded monitoring could potentially uncover previously unknown contaminants and provide early warning of emerging contaminants.

3.1.3. Public Education and Outreach

Informing the public and providing educational tools to teach them about source water area protection methods can reduce the risk of contamination from residential sources including septic systems, household products, and fertilizers. Public involvement in monitoring programs (citizen science) can be a highly effective means of building understanding of source water area issues and a commitment to stewardship.

The following questions should be considered when identifying potential outreach approaches:

1. Who are your target audience(s) and what do you want them to do in response to your project (e.g., what behaviors you seek to change, or actions you want them to take as a result of the information provided)?
2. What are your key messages and where do you want to direct people to get more information on the topic?
3. Are messages short, long, require graphics, etc.?
4. How do you plan to get the information out? (in person, email, digitally, direct mail)?
5. Who are partners who can help you get the information out?
6. What is your budget? Example strategies for education and outreach include digital/social media, paid advertising, press release, newsletters, factsheets and flyers, email blasts, signage, tabling/presenting, community events, and training.

Each priority issue includes an identified potential contaminant source, goal(s), and various protection and management methods to reduce the risk or mitigate the threat. Refer to Appendix C for a list of project profiles developed by the stakeholder group for implementation of the protection and management methods. Refer to Appendix D for a cost estimate for each project profile.

The long-term protection of the Town's water supply will require leadership and oversight to manage implementation of the recommended actions. Designating a Watershed Coordinator to lead this effort is highly recommended. This position could be newly created, or tasks can be assigned to existing staff. Opportunities to partner with regional or state resources for technical support and funding should be explored.

3.2. **Priority Issues**

A discussion was held with the stakeholder group to understand the municipality's priority issues. With each priority issue, a targeted PCS was identified, along with prevention or mitigation goals. Refer to Appendix B for the comprehensive project profiles and implementation, protection, and management methods. Appendix C provides cost estimates for each project. Potential costs are classified into low, medium, and high. Low-cost projects are those that would ideally be able to be completed with the existing municipality's budget or with a budget amendment. Medium-cost projects may require the use of capital funding and may require external or new personnel. High-cost projects would require capital funding and would require additional staff or contracted personnel. Using the updated source water maps,

stakeholders identified potential sources of contamination as concerns. Of highest concern, agricultural activities, petroleum bulk storage, mines, and nutrient loading are the most likely to affect the water system due to proximity to the wells and past water quality records. Lawn and garden chemicals were of a medium concern to the water system, with impacts from SPDES discharges, septic systems, stormwater runoff, and in-water herbicides prioritized as low. Other PCS categories were deemed as not an immediate concern, due to the lack of nearby facilities that can affect the source water area.

1. New Development in the Source Water Area

Future development in the source water area has the possibility of introducing chemical, biological, and physical contaminants into the drinking water supply. To prevent this, The Town plans to enact methods of watershed protection to prevent future potential harmful development in the source water area. These methods include developing zoning and land use protections within the municipal boundary of the Town. Encouraging best land use management practices for residents and businesses can also prevent contaminants from entering the source water area. The Town of Machias may consider purchasing land for conservations easements as well.

2. Designate a Critical Environmental Area (CEA).

By designating a CEA, the Town can ensure that the potential harmful impacts of future development and contamination within this area are carefully reviewed prior to construction. CEA designation can encourage more proactive planning and design to conserve critical resources, avoid hazards, and keep track of “big picture” issues like habitat connectivity and watershed protection.

3. Well Land Ownership and Control

Currently, the Town does not have ownership or control of land activities around Well #1 and Well #3. Without this control, unregulated activities surrounding the wellheads may cause direct contamination of the groundwater below. One method to reduce this risk is to acquire a minimum of 100’ radius of land around each wellhead. To begin the land acquisition process, reviewing historical records of land ownership in this area would be helpful for the Town.

4. Management of Regulated Potential Contaminant Sources

Targeted potential contaminant sources for Machias include mineral extraction sites and bulk storage facilities. Leaks, spills, and materials released by run-off may allow contaminants to enter the groundwater directly, resulting in increased treatment costs or water use restrictions. To mitigate these concerns, communication with local facilities and regulatory staff will be important to enact. The goal of this priority issue is to gain a greater understanding of impacts these facilities may have on the source water, and how to best prepared for associated risks with response efforts.

5. Agriculture Activities

Agricultural related chemicals and nutrients that enter the source water through overland flow and groundwater seepage can impact the water’s quality and increase treatment costs. Methods to reduce the application of chemicals in the source water protection areas are, to

establish partnership with Cattaraugus Soil & Water Conservation District to work with farmers to implement BMPs in priority areas in source water protection areas and create education and outreach materials on how to reduce chemical usage on agricultural lands to farms in the source water protection areas through best communication strategies.

Long term protection of the Town's water supply is vital for public health. Opportunities to support the priority issues above should be explored such as partnering with regional or state resources for technical support and funding. Other priority protection methods for the Town include creating and coordinating with intermunicipal organizations to better protect water quality, and reviewing existing water quality data to document and anticipate water quality trends that can affect the source water.

3.3. Implementation Timeline

For each protection and management method identified, the stakeholder group has established a step-by-step process for implementation. Refer to Appendix C for the project profiles, which identify the project leader and partnerships needed, and step-by-step processes. Refer to Appendix A.7 for a table summary of the implementation and a summary of the implementation timeline for each protection and management method. Note that potential funding sources are not guarantees. It is the responsibility of the Town to determine eligibility and apply for any potential funding source listed in this report.

4.0 PLAN PROGRESSION AND MAINTENANCE

This Plan has been created to provide the Town of Machias with the tools and information, including the potential contaminant source list and implementation timeline, the Town needs to protect their drinking source water.

4.1. Plan Management

A Plan Management Team (PMT) has been created and tasked with overseeing the implementation of the plan. The PMT is also responsible for generating and sharing progress reports. The point of contact for this Plan is Town Board Member, Bob Shenk (Rshenk0212@gmail.com, (716) 307-0708). The Town of Machias will continue to serve as a secondary point of contact ((716) 353-8207). If additional information is needed, contact Cattaraugus County Department of Health. Table 4-1 provides a list of Machias' PMT members and Appendix A.8 includes their full contact information.

These members were selected based on their knowledge of the water system, position, and potential to lead recommended actions. It is highly recommended to invite additional members to the PMT to provide relevant expertise based on implementation actions. New members could serve on an advisory basis if needed. The team will meet on a regular basis to review the Plan and will coordinate with their respective organizations to share the ideas and methods contained within the Plan for succession planning. Annual progress reports will be produced and shared with NYSDEC and NYSDOH along with the Machias community. The PMT is expected to update their DWSP2 every five years to reflect progress and emerging concerns.

Table 4- 1: Plan Management Team

Name	Relevant Affiliation(s)	Contact information
Joshua Dusterhus	Town Supervisor	
Timothy Zerfas	Cattaraugus County Department of Health	
Caleb Henning	MDA Engineers	
Derek Rule	MDA Engineers	
Bob Shenk ³	Town Board Member	
3 Point of Contact		

5.0 IMPLEMENTATION

This Plan serves to guide the Town’s PMT with implementing methods designed to protect the Town’s drinking water sources. The maps included in this Plan outline the source water protection areas that are of priority for protection. The potential contaminant source inventory within these priority areas identifies both point and non-point sources of contamination that can negatively impact the water source. The project profiles included in Appendix C of this Plan outline specific goals, partnerships, funding opportunities, and implementation steps to complete a variety of projects that align with the Town’s goals and vision. The PMT will use this Plan to progress forward with their drinking water source protection.

5.1 Implement the Plan

The PMT is tasked with overseeing the implementation of the DWSP2 Plan. Steps to implementing the plan below will aid in ensuring its usefulness for the Town of Machias.

Steps to implementing the plan.

1. Start with priority action from the implementation timeline table.
2. Review project profile for the action including steps.
3. Assign how work will be divided for the project.
 - a. For example, if one of the earlier steps is to contact a local partner, who will conduct that outreach? Once that individual/group is on board, designate individuals for the remaining tasks.
4. Identify lead for the project.
5. Implement project. Note that certain projects may be recurring, therefore certain steps for the project will become routine overtime and allow for projects to be implemented simultaneously. If this is not the case, review the project with the team before considering it completed/closed out and moving on to the next action.

6. The team may decide to complete a retrospective review of how the implementation action went to enhance the process moving forward.

Items for the Plan Management Team to consider:

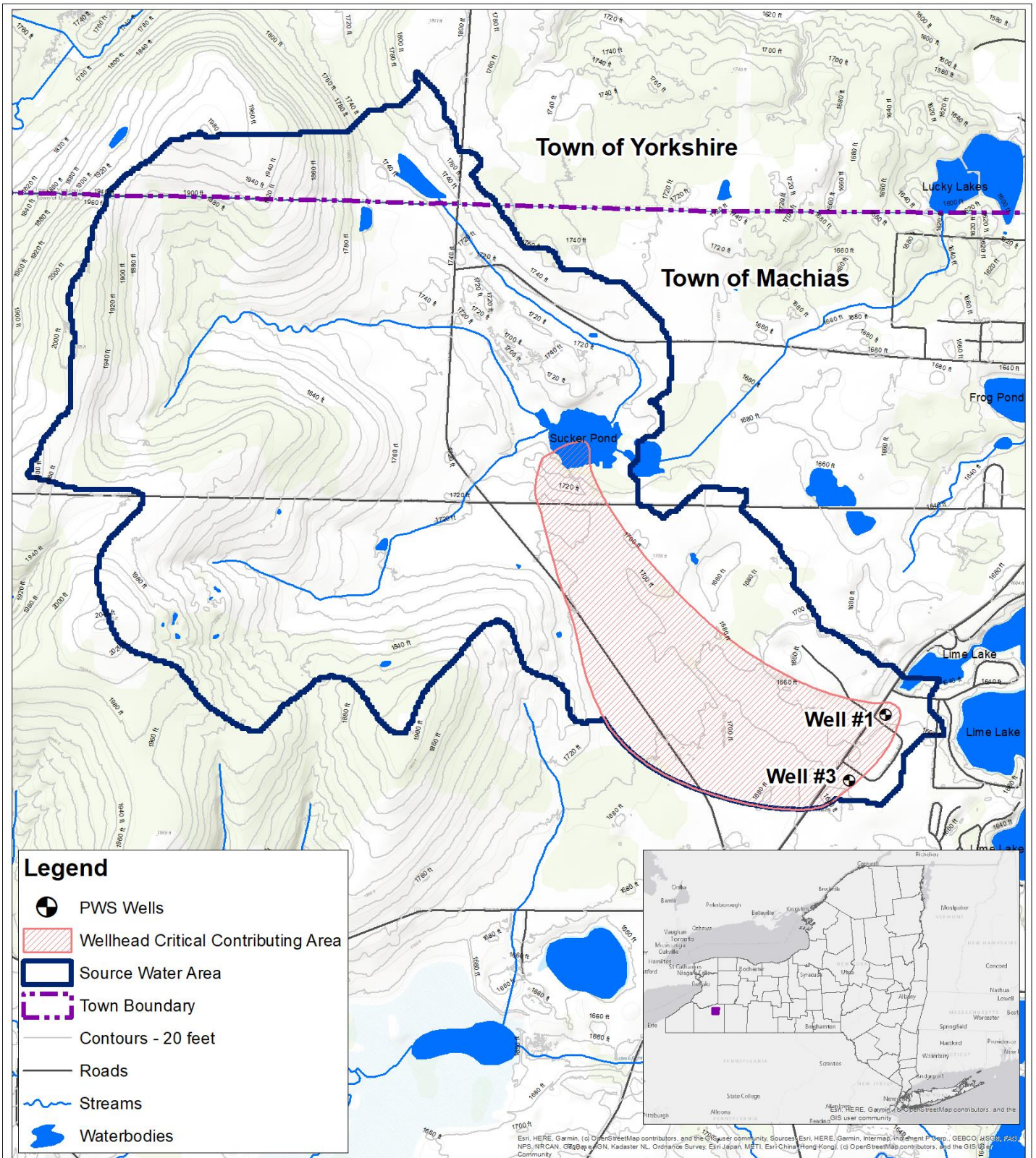
- The PMT may decide to implement one action at a time or have certain actions concurrently.
- The PMT should frequent the state DWSP2 webpage for any new templates or resources that will aid with plan implementation.

5.2. Progress Reports

An additional responsibility that the PMT is tasked with is to generate and share progress reports with the community to build support for implementation strategies. The PMT decided to generate reports every five years along with updating the plan.

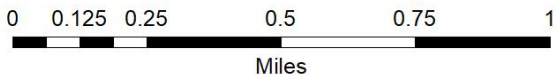
Figures

Figure 1
Project Location and System Overview



Legend

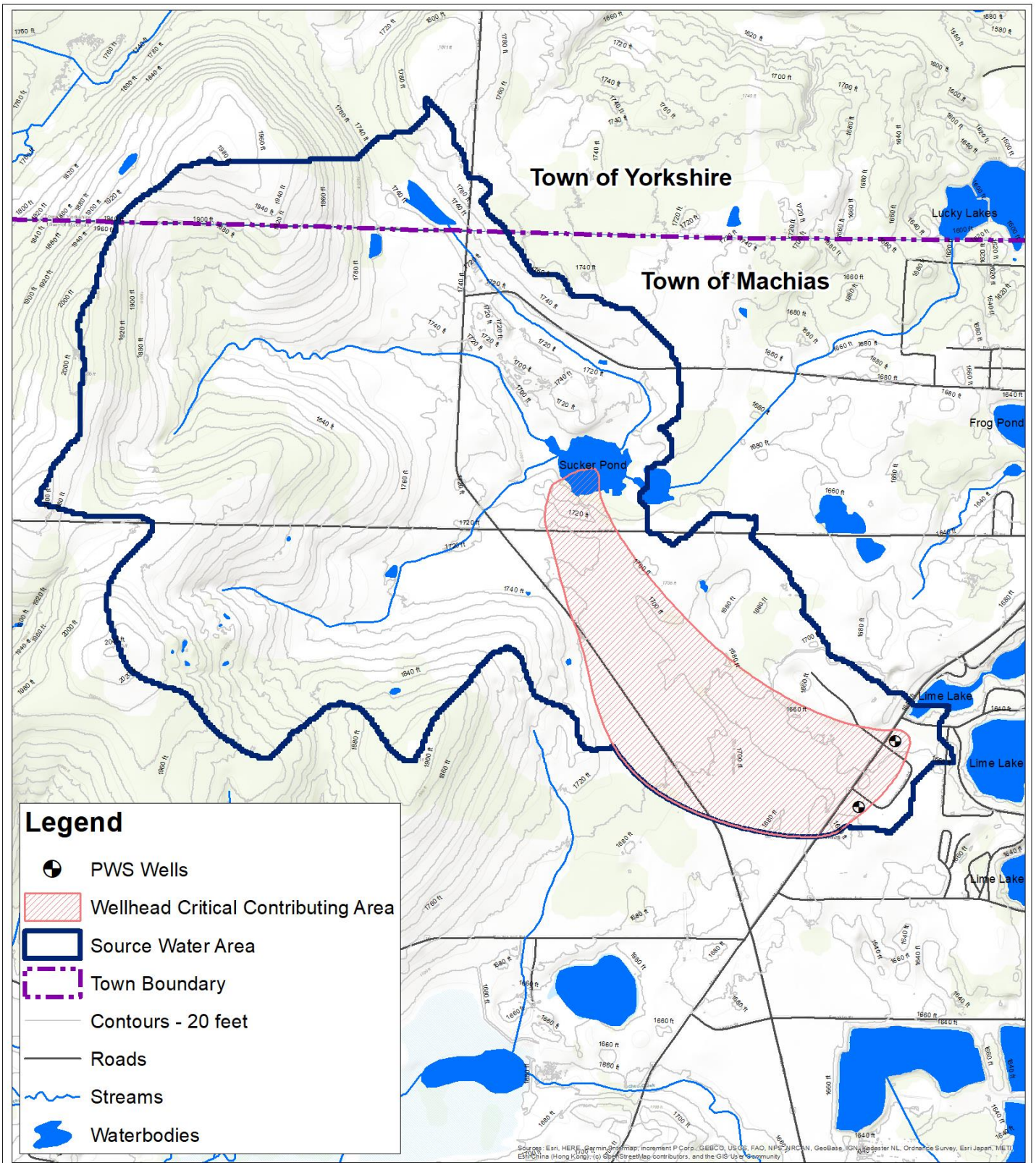
- PWS Wells
- Wellhead Critical Contributing Area
- Source Water Area
- Town Boundary
- Contours - 20 feet
- Roads
- Streams
- Waterbodies











Town of Machias
Drinking Water Source Protection Program Plan
Project Location Overview

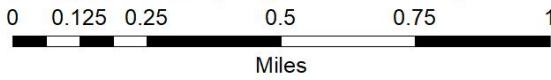


Figure 2
Critical and Source Water Areas



Legend

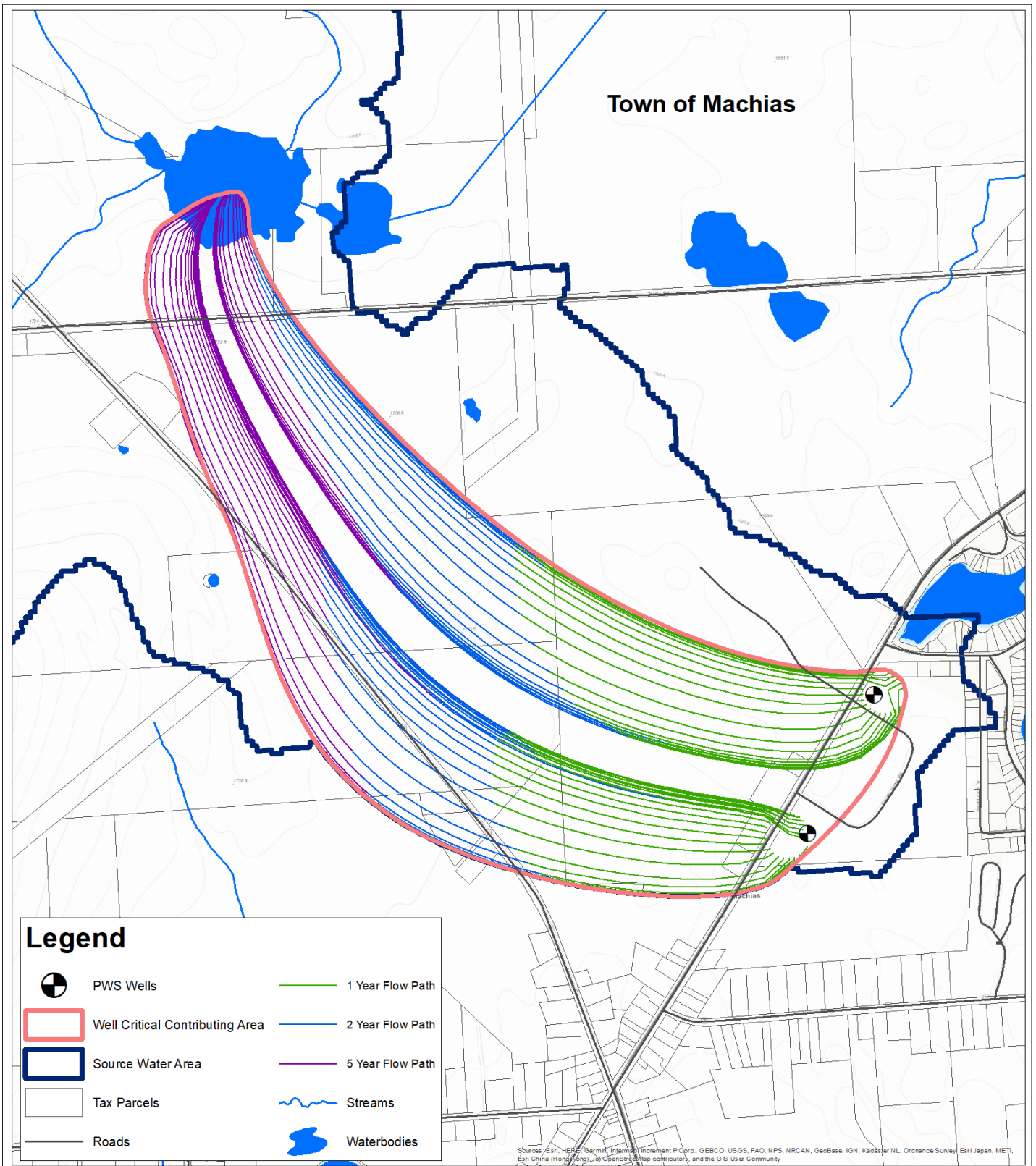
-  PWS Wells
-  Wellhead Critical Contributing Area
-  Source Water Area
-  Town Boundary
-  Contours - 20 feet
-  Roads
-  Streams
-  Waterbodies













Town of Machias
 Drinking Water Source Protection Program Plan
**Critical and
 Source Water Areas**

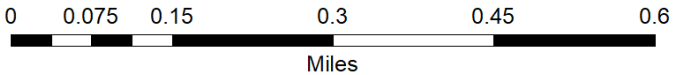


Figure 3
Groundwater Model Flow Paths



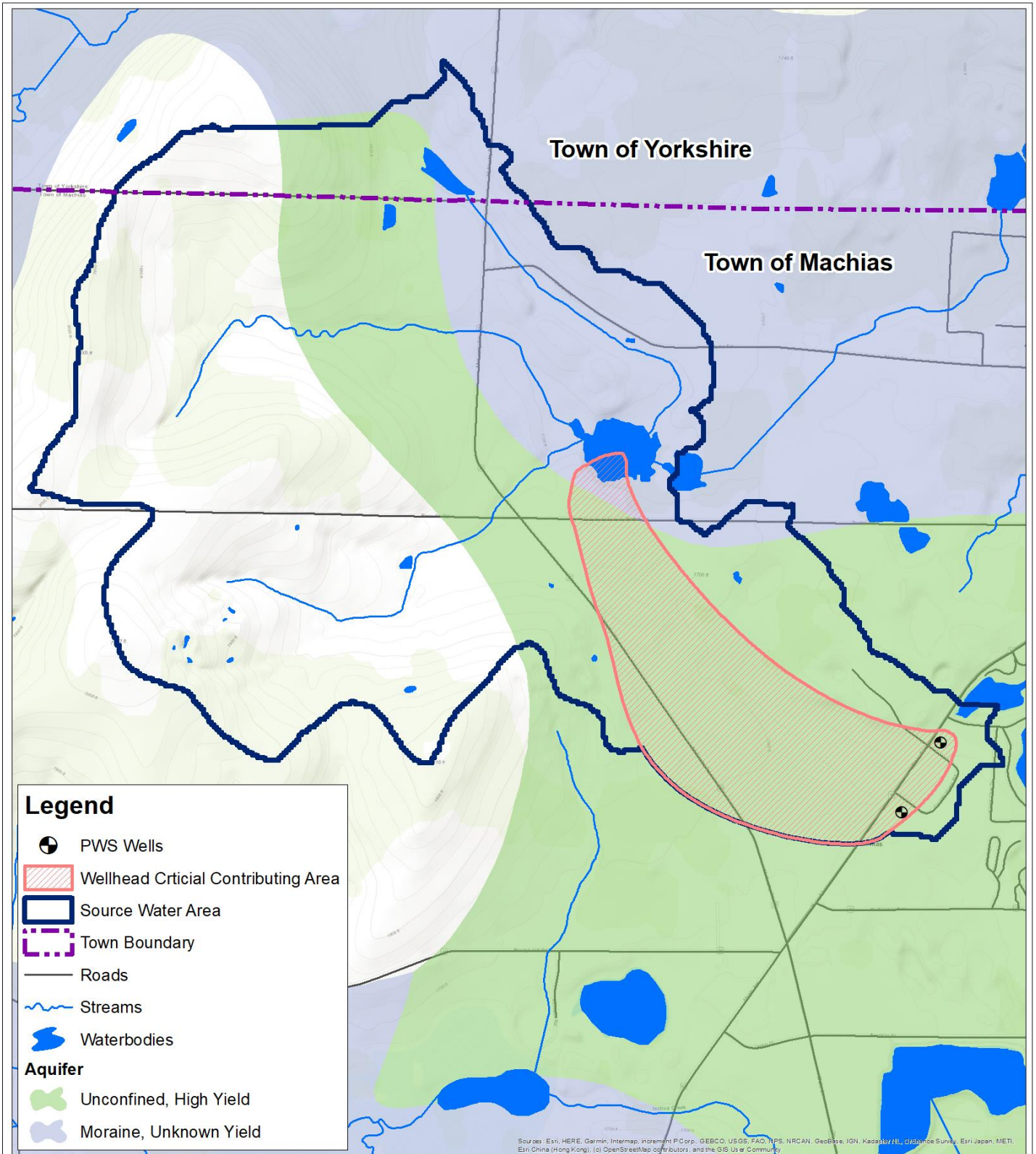
Legend

-  PWS Wells
-  Well Critical Contributing Area
-  Source Water Area
-  Tax Parcels
-  Roads
-  1 Year Flow Path
-  2 Year Flow Path
-  5 Year Flow Path
-  Streams
-  Waterbodies



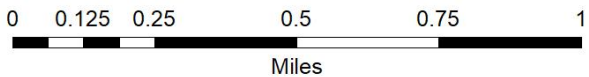
Town of Machias
 Drinking Water Source Protection Program Plan
**Groundwater Model
 Flow Paths**

Figure 4
Aquifer Overview



Legend

- PWS Wells
- Wellhead Critical Contributing Area
- Source Water Area
- Town Boundary
- Roads
- Streams
- Waterbodies
- Aquifer**
- Unconfined, High Yield
- Moraine, Unknown Yield

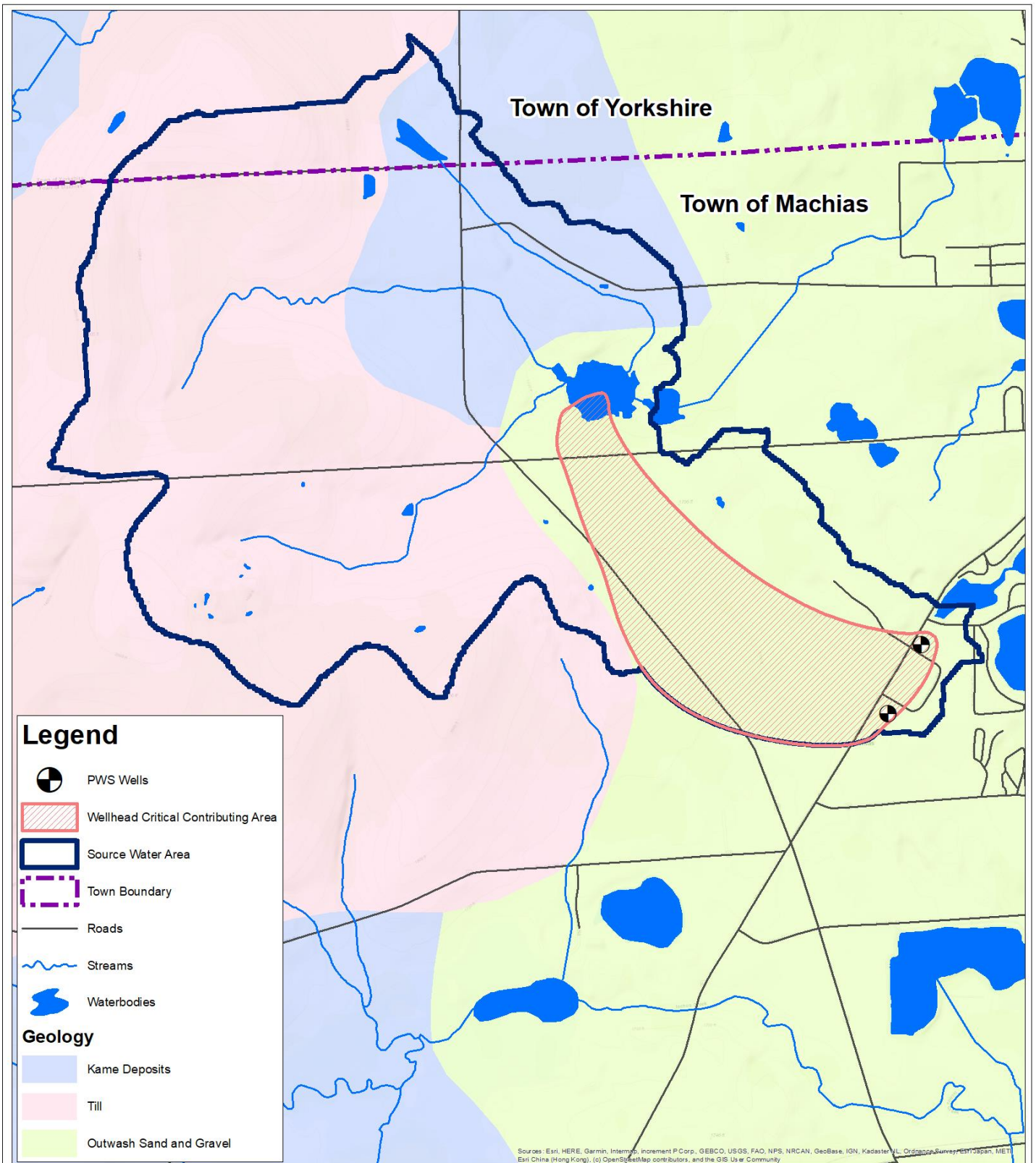


Town of Machias
Drinking Water Source Protection Program Plan

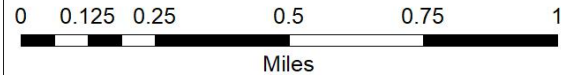
Aquifer Overview



Figure 5
Surficial Geology



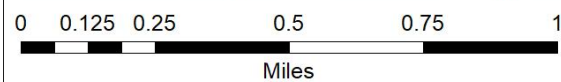
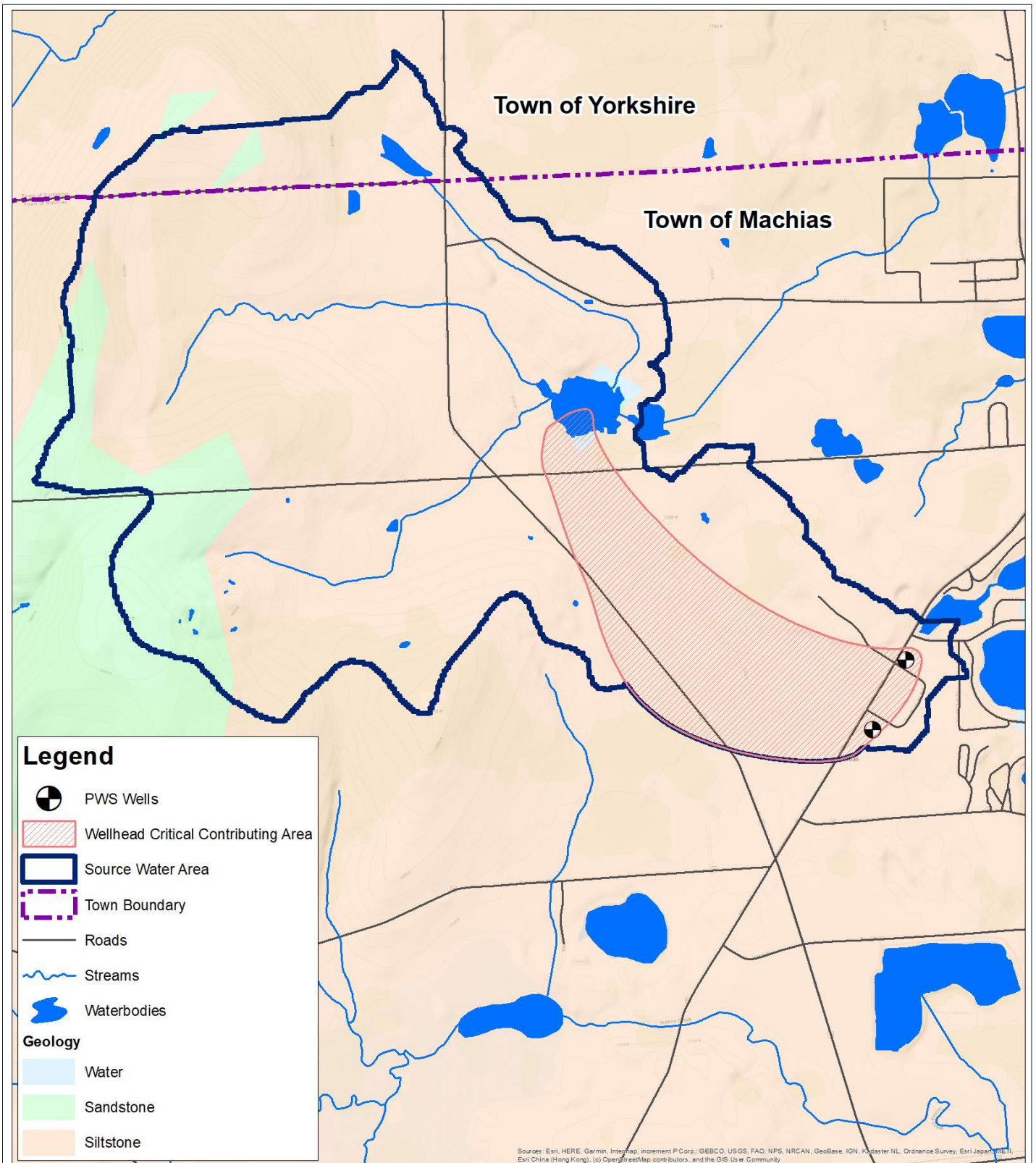
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Town of Machias
 Drinking Water Source Protection Program Plan
Surficial Geology



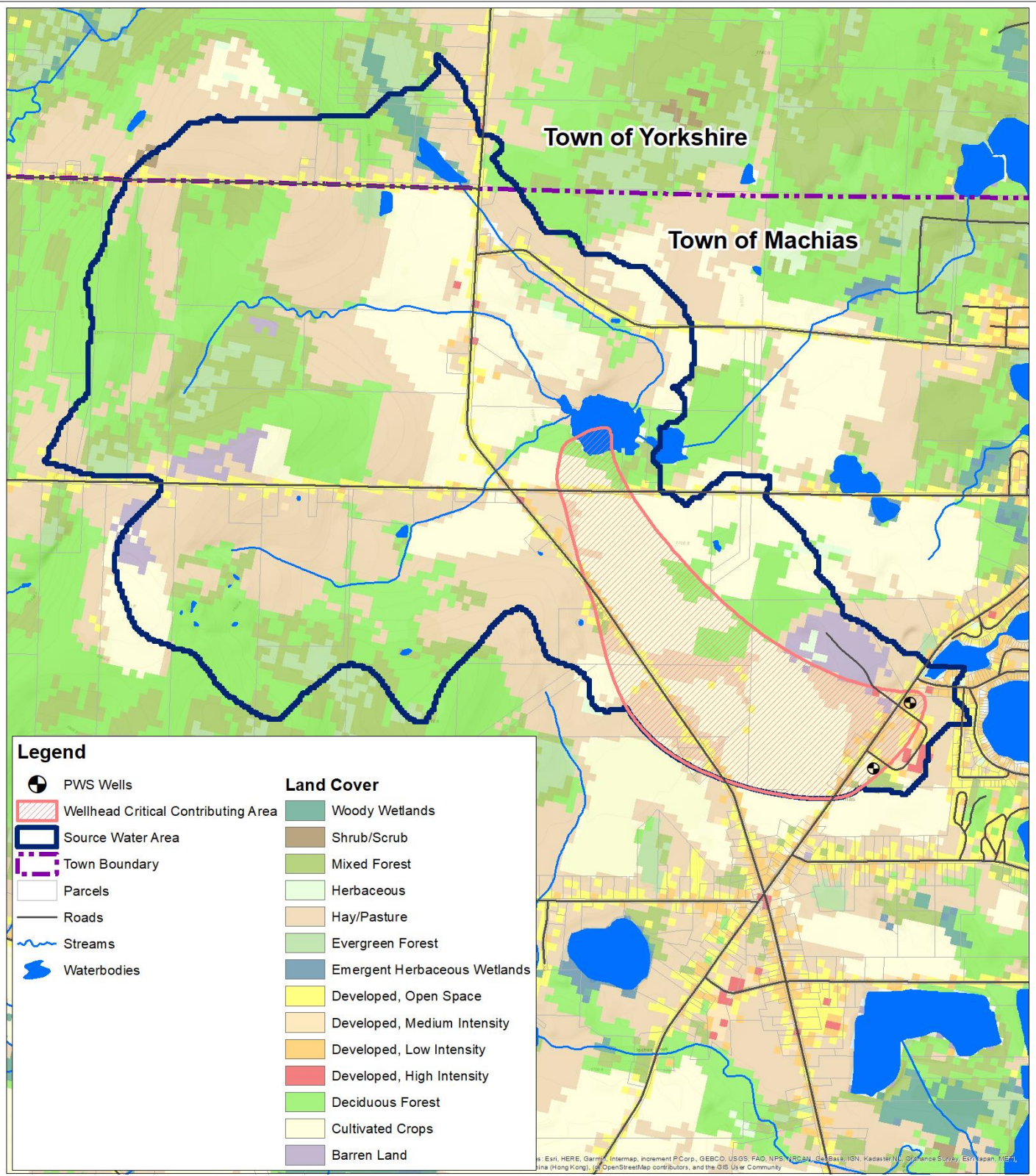
Figure 6
Bedrock Geology



Town of Machias
 Drinking Water Source Protection Program Plan
Bedrock Geology

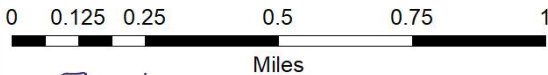
Center for Environmental Health, Bureau of Water Supply Protection GIS Date: 2/16/2024
 Disclosure: Geographic data represented on this map are based on entries to the Safe Drinking Water Information System (SDWIS), Department of Health, and/or other government agency. As such, the map may contain errors or inaccuracies, and represents a generalized description of the area. Basemap provided by the Environmental Systems Research Institute (ESRI).

Figure 7
Land Cover



Legend

- | | |
|-------------------------------------|------------------------------|
| PWS Wells | Land Cover |
| Wellhead Critical Contributing Area | Woody Wetlands |
| Source Water Area | Shrub/Scrub |
| Town Boundary | Mixed Forest |
| Parcels | Herbaceous |
| Roads | Hay/Pasture |
| Streams | Evergreen Forest |
| Waterbodies | Emergent Herbaceous Wetlands |
| | Developed, Open Space |
| | Developed, Medium Intensity |
| | Developed, Low Intensity |
| | Developed, High Intensity |
| | Deciduous Forest |
| | Cultivated Crops |
| | Barren Land |

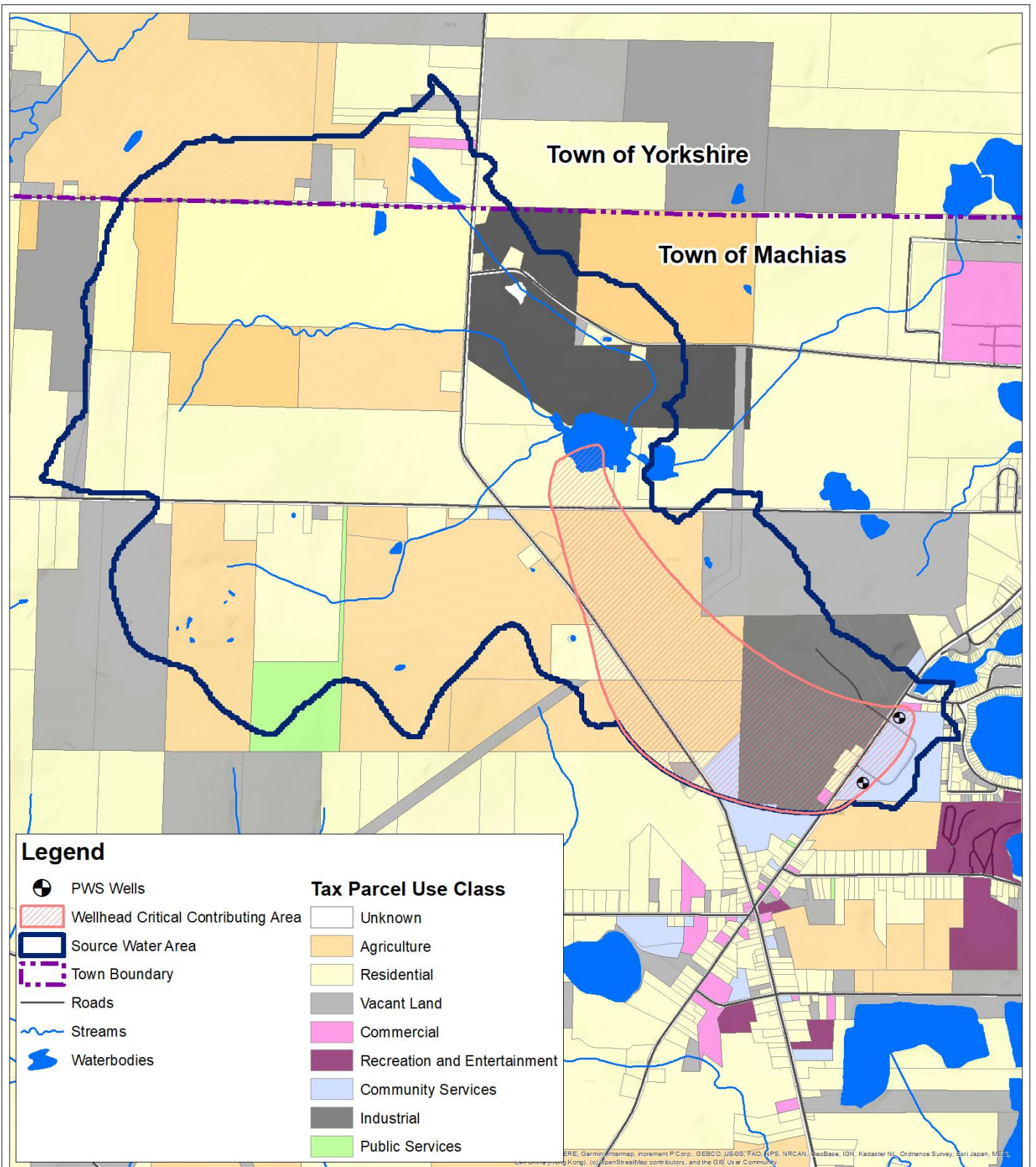


Town of Machias
Drinking Water Source Protection Program Plan

Land Cover

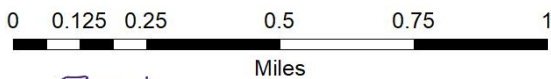


Figure 8
Land Use



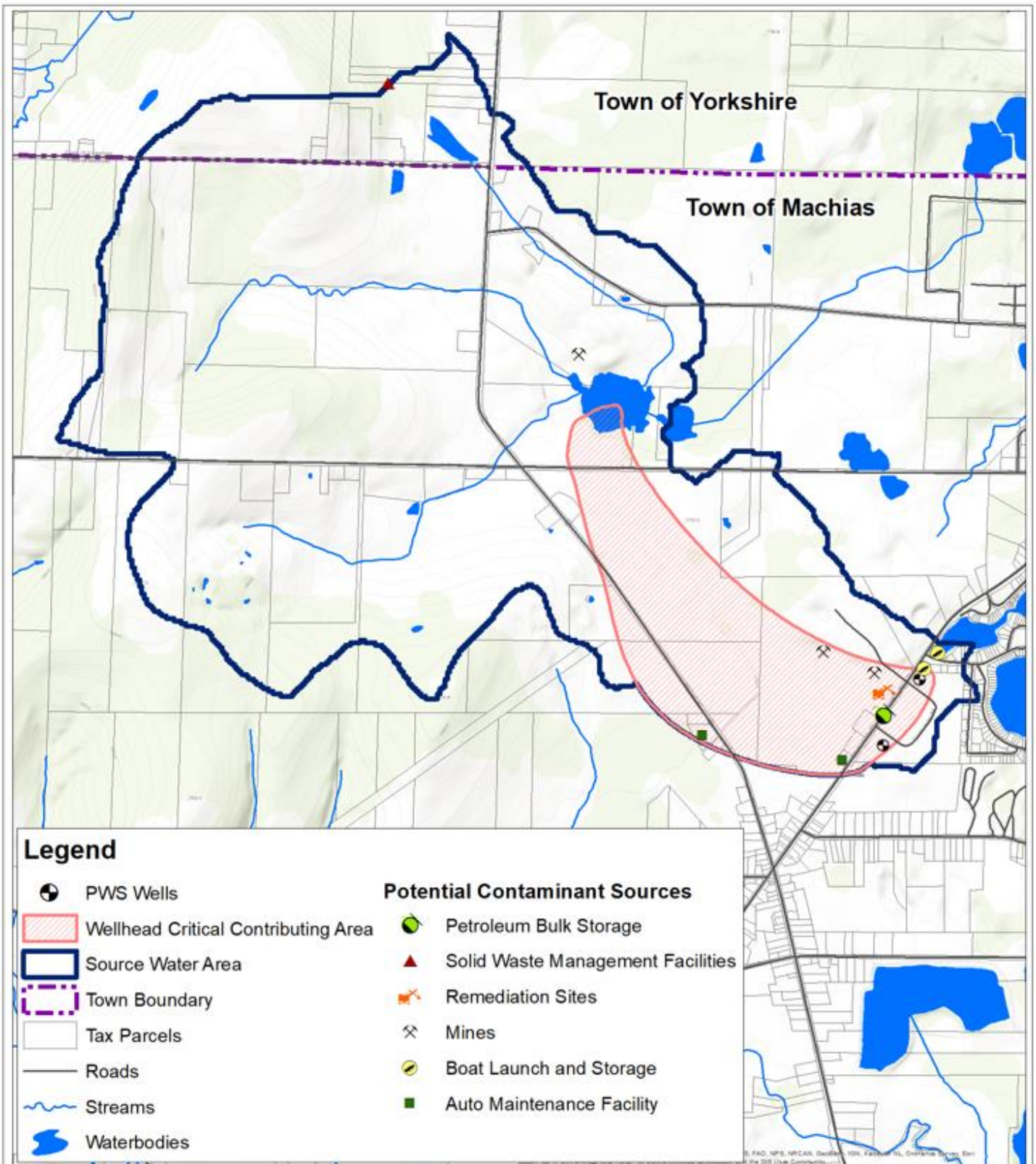
Legend

- | | |
|-------------------------------------|------------------------------|
| PWS Wells | Tax Parcel Use Class |
| Wellhead Critical Contributing Area | Unknown |
| Source Water Area | Agriculture |
| Town Boundary | Residential |
| Roads | Vacant Land |
| Streams | Commercial |
| Waterbodies | Recreation and Entertainment |
| | Community Services |
| | Industrial |
| | Public Services |



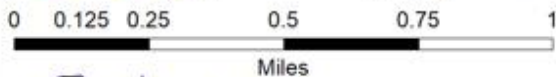
Town of Machias
Drinking Water Source Protection Program Plan
Land Use

Figure 9
Potential Contaminant Sources



Legend

- | | |
|-------------------------------------|-----------------------------------|
| PWS Wells | Petroleum Bulk Storage |
| Wellhead Critical Contributing Area | Solid Waste Management Facilities |
| Source Water Area | Remediation Sites |
| Town Boundary | Mines |
| Tax Parcels | Boat Launch and Storage |
| Roads | Auto Maintenance Facility |
| Streams | |
| Waterbodies | |



Town of Machias
Drinking Water Source Protection Program Plan

Potential Contaminant Sources



Appendices

Appendix A
DWSP2 Data Summary

Appendix A.1
DWSP2 Plan Checklist

Drinking Water Source Protection Program (DWSP2) Plan Data Summary

Description

This DWSP2 Plan Data Summary is a tool to summarize data gathered throughout the protection planning process using the DWSP2 Framework. The sections in this Data Summary align with the components of the DWSP2 Framework. Communities may seek to include information beyond what is outlined in this document and should make additions based on local needs. The tables and information in this document will be valuable to include within a community's DWSP2 Plan. For guidance on writing a DWSP2 Plan, refer to the DWSP2 Plan Template. The DWSP2 Plan Template specifies where the tables from the data summary can be included in a DWSP2 Plan.

DWSP2 Plan Checklist

This checklist can be used throughout the protection planning process to keep track of components that are in-process or complete. Select "in-process" or "complete" under the status dropdown menu for each component.

Component	Status
Phase 1. Stakeholder Group	Complete
1.1 Form a Stakeholder Group	Complete
1.2 Establish Goals and Formulate a Vision	Complete
Phase 2. Drinking Water Source Assessment	Complete
2.1 Develop an Overview of the Water System	Complete
2.2 Prepare a Drinking Water Source Protection Map	Complete
2.3 Create a Potential Contaminant Source Inventory	Complete
Phase 3. Protection and Implementation Strategies	Complete
3.1 Identify Protection and Management Methods	Complete
3.2 Develop an Implementation Timeline	Complete
Phase 4. Progression and Maintenance	Complete
4.1 Designate a Plan Management Team	Complete
Phase 5. Implementation	
5.1 Implement the Plan	
5.2 Progress Reports	

Appendix A.2
Stakeholder Group

1.1 Form a Stakeholder Group

Member Name	Phone Number	Email	Relevant Affiliation(s)
Steve Cornwall			Former Machias Town Supervisor
Tim Zerfas			Water Resource Specialist, CDOH
Caleb Henning			Consultant Engineer, MDA Engineers
Derek Rule			Consultant Engineer, MDA Engineers

Stakeholder Group Meetings

Date	Topics Covered
7/28/2021	Kickoff meeting, summarize roles and responsibilities. Describe the DWSP2 Framework and next steps for the Stakeholder Group.
9/22/2021	Develop Goals and Vision Statement, Begin Water System Overview Form
11/9/2021	Complete Water System Overview, begin PCS mapping and itemization.
3/8/2022	Review Source Water Protection Maps.
5/10/2022	Groundwater model discussion, protection and delineation.
8/2/2022	Review Groundwater model and map with DOH Hydrogeologists.
11/29/2022	Protection and Management Methods discussed.
9/29/2023	First plan review meeting. The maps, implementation table, PCS inventory, and cost analysis table were discussed.
10/27/2023	Second plan review meeting. The updates made by the TA provider provided from the stakeholder group from the previous meeting were discussed, as well as potential funding opportunities, and next steps for the plan.

Appendix A.3
Goals and Vision Statement

1.2 Establish Goals and Formulate a Vision

Vision Statement

Through the development of this program. The Town of Machias will preserve and protect its source of drinking water from potential contaminants, land use development, and other influences that may compromise the community's clean, safe, and reliable drinking water.

Goals

Goal #1	Preserve and protect the Town of Machias' drinking water sources in order to supply the community with safe and reliable drinking water in perpetuity.
Goal #2	Continue long-term efforts to identify potential contaminant sources surrounding drinking water wells.
Goal #3	Implement regulatory and non-regulatory options such as zoning, conservation/drinking water protection overlays or land easements to increase the Town's jurisdiction over land use practices directly surrounding drinking water wells and to protect the land from future development.
Goal #4	Identify additional grant funding from local, state, and federal sources for acquiring ownership of land surrounding wells, drinking water protection and system improvements.
Goal #5	Improve cooperation and communication between the Town and local property owners to protect the community's drinking water and create forums for public engagement.

Appendix A.4
Overview of Water System

Public Water Supply (PWS) Information	
PWS Name:	Machias Water District
PWS ID:	NY0400344
Type of sources identified in the plan:	Groundwater
Name(s) of sources being protected:	Drinking Water Wells (Well #1 and Well #3)

2.1 Develop an Overview of the Water System		
Water system name:	Machias Town Water District	
NYS PWS ID:	NY0400344	
Type of water system (e.g. community, non-community, transient, non-transient):	Community	
Name of community, or communities, served by system:	Town of Machias	
Population served by the system:	750	
# of service connections:	275	
Summary of wells, intakes, infiltration galleries, and/or springs including name, depth, screen length, and pumping rates where applicable:	Well #1 58 feet deep, drilled in 1978 Well #3 68 feet deep, drilled in 2004	
General treatment information:	Disinfection using sodium hypochlorite.	
Summary of hydrogeographic setting of drinking water sources including watershed information and/or type of aquifer and aquifer materials (this information may be gathered after completing Section 2.2):	The wells are drilled into a post-glacial, alluvial sand and gravel aquifer and produce sufficient water to readily meet the needs of the town. Both wells are situated in the grounds of the Pines health care facility but are within 200 ft of agricultural fields which make up most of the land use in the area.	
Water quality summary including any known raw or ambient water quality information, finished water detections, and/or history of maximum contaminant level (MCL) violations*:	Historical Nitrate MCL violations, trend upwards in warmer months, possible link to manure storage and spreading in agricultural land to the NW of the wells. It has been noted previously (correspondence in Cattaugus County archives) that liquid manure is spread periodically onto these fields, most recently taking place in October 2016. The well water has exceeded nitrate Maximum Contaminant Limits (MCL) in the past, and previous simple modeling has shown that the fields could be contributing agricultural sources of nitrate to the wells.	
Water quantity summary:	Current Water Withdrawal Permit Expiration Date(s)	No expiration date
	Total Permitted Water Withdrawal Capacity	100,000 GPD per well
	Average Daily Water Demand (= Yearly Usage / 365)	100,000 GPD per well
	Maximum Daily Water Demand (Unofficial 3-day average in peak month – e.g. July)	1 MGD
	Annual Water Losses (can be obtained from Water Conservation Program form)	Estimated 50%

Appendix A.5
DWSP2 Map Creation

2.2 Prepare a Drinking Water Source Protection Map

Provide a description of established drinking water source protection areas below, including distances and/or time of travel information. In addition, make note of any applicable studies (e.g. Wellhead Protection Plan) or technical assistance that were used to determine each protection area and/or delineation method

Protection Areas	Description	Delineation Method
Critical Contributing Area	Critical Contributing Area derived from a NYSDOH-produced groundwater model (MODFLOW)	MODFLOW
Source Water Area	Source Water Area delineated from StreamStats	Other

URL	Publicly Available Data
https://data.ny.gov/	<ul style="list-style-type: none"> Bulk Storage Facilities Solid Waste Management Facilities Environmental Remediation Sites Superfund Sites Spill Incidents Oil, Gas and Other Regulated Wells SPDES Multi-Sector General Permit Combined Sewer Overflows (CSOs) Water Withdrawals by Facility Boat Launch Sites Inventory & Priority Waterbodies
https://gis.ny.gov/	<ul style="list-style-type: none"> State Pollutant Discharge Elimination System NYS DOT Facilities NYS Tax Parcels USGS Digital Raster Graphic Quadrangle NYS Tax Parcels
https://mrlc.gov/	<ul style="list-style-type: none"> NLCD Land Cover
http://opdgig.dos.ny.gov/index.html#/home	<ul style="list-style-type: none"> Unconsolidated Aquifers
https://datagateway.nrcs.usda.gov/GDGOrder.aspx	<ul style="list-style-type: none"> NRCS Conservation Easement Areas by State
https://www.conservationaleasement.us/	<ul style="list-style-type: none"> Conservation Easement Areas US
https://datagateway.nrcs.usda.gov/GDGOrder.aspx#	<ul style="list-style-type: none"> National Hydrography Dataset 1:24,000
http://www.dec.ny.gov/lands/5374.html	<ul style="list-style-type: none"> Mines
https://www.eia.gov/	<ul style="list-style-type: none"> Pipelines
https://www.epa.gov/	<ul style="list-style-type: none"> TRI Basic Data Files

Layer	Date created or acquired	Description
Well Locations	8/17/2022	Created a map layer based on NYS active drinking water wells
Critical Contributing Area	8/16/2022	Critical Contributing Area derived from a NYSDOH-produced groundwater model (MODFLOW)
Source Water Area	11/15/2022	Source Water Area delineated from StreamStats
National Hydrography Dataset (streams and waterbodies)	3/8/2022	USDA NRCS Dataset (https://datagateway.nrcs.usda.gov/GDGOrder.aspx)
Municipal Boundaries	3/8/2022	Municipal Civil Boundaries from ESRI (https://gisservices.its.ny.gov/arcgis/rest/services/NYS_Civil_Boundaries/FeatureServer)
Cattaraugus County Parcels	4/5/2023	Cattaraugus County Real Property and GIS Services (https://www.cattco.org/real-property-and-gis)
Potential Contaminant Sources Data Summary	11/9/2021	Combined layers from NYS GIS Clearinghouse, NYS DEC, and NY data websites (http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1010) (https://www.dec.ny.gov) (https://data.ny.gov/Energy-Environment)
National Land Cover Data	4/3/2022	2019 National Land Cover Database raster file downloaded from the MultiResolution Land Consortium Data Viewer (https://www.mrlc.gov/viewer/)
Land Use	4/11/2023	Created from Cattaraugus County parcel property class attributes
Unconsolidated Aquifers	4/11/2023	Includes confined and unconfined aquifers (https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1141)
Groundwater Flow Paths	8/16/2022	Flow Paths derived from NYSDOH-produced groundwater model (MODFLOW)
USGS Mapping	NA	ESRI Basemap
Bedrock Geology	4/11/2023	NYS Museum GIS NYS Geology Data (Geographic Information System (GIS) The New York State Museum (nysed.gov))
Surficial Geology	4/11/2023	NYS Museum GIS NYS Geology Data (Geographic Information System (GIS) The New York State Museum (nysed.gov))

Appendix A.6
Potential Contaminant Source Inventory

Potential Source Category	Potential Source	Facility	Contaminant of Concern	Protected Area(s) Impacted	Status	Relevant Information	Latitude	Longitude	Street	City	ZIP
Bulk Storage	Petroleum Bulk Storage Facilities	Boehmer Gravel Products Inc.	Chemical (diesel fuel)	Critical Contributing Area	Active	Storage above ground on saddles, legs, stilts, rack, or cradle	42.427128	-78.492498	9829 NYS Rt. 16	Machias	14101
Mineral Extraction Sites	Mines	Boehmer Gravel Products Inc.	Physical and Chemical (diesel fuel and mineral extraction fluids)	Critical Contributing Area	Active	Mine name: Machias Gravel Pit	42.42756	-78.49244	West side of Route 16	Machias	14101
Mineral Extraction Sites	Mines	Cattaraugus County DPW	Physical and Chemical (diesel fuel and mineral extraction fluids)	Critical Contributing Area	Active	Mine name: Machias Deposit	42.42686	-78.48984	West side of Route 16	Machias	14101
Mineral Extraction Sites	Mines	D&H Materials, Inc.	Physical and Chemical (diesel fuel and mineral extraction fluids)	Source Water Area	Active	NA	42.43919	-79.50520	Contact location: 11930 NY-98	Arcade	14009
Waste Management and Disposal	Solid Waste Management	Hard Rock C&D	Chemical and Biological (concrete)	Source Water Area	Active	NA	42.44752	-78.52168	Town Line Road	Machias	14101
Contamination Sites	Remediation Sites	Boehmer Property	Chemical	Critical Contributing Area	Unknown	State Superfund Program	42.42618	-78.4892694	Route 16	Machias	14101
Other	Auto Maintenance Facility	Joe's Repair Shop	Chemical (chlorinated solvents and petroleum hydrocarbons)	Critical Contributing Area	Active	NA	42.42402	-78.49084	9785 NYS Rt. 16	Machias	14101
Other	Auto Maintenance Facility	Unknown	Chemical	Critical Contributing Area	Active	RV Maintenance and Storage Facility	42.42434	-78.49864	9803 McKinstry Road	Machias	14101
Other	Boat Launch	Lime Lake Boat Launch	Chemical (phosphorous)	Source Water Area	Active	NA	42.42764	-78.48669	Launch on Broad Bay Circle	Machias	14101
Other	Boat Maintenance Facility	Unknown	Chemical (phosphates, chlorine, ammonia)	Critical Contributing Area	Active	NA	42.42720	-78.48704	288 Broad Bay Circle	Machias	14101

Appendix A.7
Implementation Timeline

3.1 Identify Protection and Management Methods & 3.2 Develop an Implementation Timeline

Priority Issue	Targeted Potential Contaminant Source(s)	Goal	Protection Method and/or Management Method	Potential Cost	Potential Funding Sources	Project Leader and Partnerships Needed	Implementation Timing
New Development in the Source Water Area	Future potential sources of chemical, physical or biological contamination	Enact land use protection methods to reduce and manage harmful new development in the source water area to protect the drinking water source.	Develop land use protections (e.g. zoning), monitor development, and consider conservation and wellhead protection areas within the Municipal Boundary of the Town of Machias.	Low-Medium	NYSDEC Climate Smart Communities Grant Program Green Innovation Grant Program NYSDOS Smart Growth Comprehensive Grant Program	Town Board Planning Professionals	Year 1 to 2 (including public outreach and comment period. Start date: Winter 2025)
Designating a Critical Environmental Area	Future sources of chemical, physical or biological contamination	Ensuring that potential harmful impacts to the source water area are reviewed and close evaluation of proposed projects that are in the source water area from future developments that might affect it.	Designate and implement a Critical Environmental Area.	Low-Medium	Not applicable	Town of Machias Plan Management Team Town Board	Year 1 to 2 (including application process) Start date: Winter 2025
Well Land Ownership and Control	Direct contamination to the wellhead	Protect the wells from direct contamination, and control land use activities.	Land acquisition for a minimum of 100' radius around the wellhead.	High	NYSDEC WQIP Land Acquisition Funding	Town of Machias Plan Management Team	Year 2-4 including application process Start date: Fall 2025
Management of Regulated Potential Contaminant Sources	Mineral Extraction Sites	To enhance communication with specific facilities or DEC staff that work these regulated facilities to understand the potential impact to the source water and report any risks.	Review permit information and potential contaminant concerns	Low-Medium	Not applicable	Town of Machias Plan Management Team	Year 1 (once initiated, ongoing) Start date: Fall 2025
	Bulk Storage		Establish and maintain communication with the facility, additionally the Town of Machias and NYS DEC Bulk Storage Program. Monitor for potential leaks.			Town of Machias Plan Management Team Local Bulk Storage Facilities	
Agricultural Activities	Agriculture related chemicals and nutrients	Reduce the application of nutrients and chemicals to the land in the source water protection areas.	Establish a partnership with Cattaraugus Soil & Water Conservation District to work with farmers to implement BMPs in priority areas in source water protection areas.	Medium	NYSAGM Agriculture Nonpoint Source Abatement and Control Grant Program USEPA Environmental Education Grants	Town of Machias Plan Management Team Cornell Cooperative Extension Cattaraugus Soil & Water Conservation District	Year 1-3 (once initiated, ongoing) Start date: Spring 2025 – Fall 2025
		Increase communication with local farms and discuss land use techniques.	Establish communication and provide education and outreach materials on how to reduce chemical usage on agricultural lands to farms in the source water protection areas.				

Appendix A.8
Plan Management Team

4.1 Designate a Plan Management Team		
Name	Contact Information	
	Phone Number	Email
Joshua Dusterhus		
Timothy Zerfas		
Caleb Henning		
Bob Shenk*		
*Point of Contact		

Use the table below to document the Plan Management strategy for keeping your DWSP2 Plan up to date:

Plan Management Summary	
Item	Status
Designate a Plan Management Team	Complete
Determine progress report frequency	Complete
Share progress reports	
Review and share the plan	
Verification from NYS DOH and DEC for completeness	
Create a revision schedule	

Use the table below to track updates and revisions to the DWSP2 Plan. Use the notes section to detail changes made in each update and/or revision:

Update/Revision Tracker		
Report	Date	Notes
First Report	9/29/2023	Delineate a source water area that encompasses the unconfined aquifer and surface waters that have an influence on the wells. Update the price for PP #3 to reflect the increased price per acre of land.
Update/Revision 1	10/27/2023	Second plan review meeting. The updates made by the TA provider provided from the stakeholder group from the previous meeting were discussed, as well as potential funding opportunities, and next steps for the plan.
Update/Revision 2		

Appendix B
Model and Delineation Methodology

Model Methodology used to Delineate and Map Wellhead Capture Zones and Critical Contributing Area

The groundwater modeling effort completed by NYSDOH/NEIWPC staff serves as a supplement to DWSP2 plans created for community drinking water systems throughout NY State. Using advanced modeling software, staff will design, implement, and interpret conceptual and numerical groundwater models for systems on a case-by-case basis. These models may be changed based on the needs of the community, but they should include a simulation of the current groundwater regime and pumping schedules validated by the most up to date data available to the modeling staff. End products will include shapefiles for a GIS created perimeter of the Model produced particle trace simulations to identify contribution areas to the well in order to delineate the source water protection areas for that community.

This document serves as a temporary, stand in draft release of the DWSP2 Groundwater Model Data for the Town of Machias. The groundwater model data attached to this report is also considered draft at this time and are subject to change with new or additional information. The Town of Machias will receive a complete QAPP for the groundwater modeling work when it has been completed. The community or DWSP2 Technical Assistance Provider may reach out at any time for additional information.

Attached to this draft DWSP2 groundwater model data you will find one shapefile for the following items:

1. One-, two-, and five-year time of travel contributing areas for Machias Well #1 and Well #3.

Purpose and Background

The purpose of the groundwater modeling effort was to provide simulated contribution areas to community well(s) for the purpose of creating a DWSP2 plan. The Town of Machias is currently undergoing the DWSP2 process, and a groundwater model for the Town of Machias was created for potential use in this plan. The Town of Machias is in Western New York. The main drinking water source for the Village are groundwater from 2 operational wells: Well #1 and Well #3.

Model Details

The contribution areas for wells #1 and #3 were delineated using Environmental Simulations Incorporated Groundwater Vistas modeling software, a pre- and post-processor for MODFLOW (-2005) models. The model for the wells has three layers. Layer 1 (the top layer) represents overburden (sand/mud), Layer 2 represents a sand and gravel aquifer (where the wells pump from), and Layer 3 represents clay. The top elevations of Layer 1 were assigned using a USGS 1/3 Arc Second GeoTIFF dataset. Layer thicknesses were determined using well logs from the 1978 Edwards and Moncreiff, P.C. Engineers and Surveyors aquifer test report.

The estimated hydraulic properties of these lithologic units were initially set to standard values and best fit using the PEST parameter estimation software extension paired with manual calibration techniques. The hydraulic properties can be found in the table below. As these values are best estimates, they are subject to change with new or additional information. Any changes to these values will require a modification to the current delineations for them to remain valid.

	Horizontal K (m/day)	Vertical K (m/day)
Layer 1 (Overburden)	23	2.3
Layer 2 (Sand/gravel)	60	6.0
Layer 3 (Clay)	0.005	0.0005

Methodology used to Delineate Well #1 and #3 Source Water Area

The source water area (contributing aquifer and surface water drainage basin for the wells) was delineated using StreamStats. StreamStats is a Web-based Geographic Information Systems (GIS) application that provides users with access to an assortment of analytical tools that are useful for a variety of water-resources planning and management purposes, and for engineering and design purposes. A key feature of StreamStats is the “Delineate Basin” tool. StreamStats determines drainage-basin boundaries by use of digital elevation data obtained from the USGS 3D Elevation Program (3DEP). The StreamStats “Delineate Basin” tool was used to generate the Source Water area for Mayville’s Well #4. The location of the groundwater well was mapped in ArcGIS and the corresponding location was located on the StreamStats mapper (<https://streamstats.usgs.gov/ss/>). The “Delineate” tool was used at the well location and StreamStats automatically generated a watershed basin from the selected point. The generated basin is then downloaded as a shapefile and reviewed for accuracy using topographic mapping and National Hydrography Dataset streamlines. The resulting shapefile represents the entire watershed, or source water area, for the groundwater well. The watershed shapefile that is generated follows the guidance outlined in the DWSP2 Framework. Refer to the Framework, section title “Using StreamStats” for a step-by-step guide on using StreamStats to delineate source water areas.

Appendix C
Project Profiles

Project Profile Summary and Notes

The project profiles outlined in this document are meant to be a suggested guide for the protection and management methods and implementation timeline and steps. Each project profile also outlines a priority issue, targeted potential contaminant source and threat, goals and priorities for the project, potential costs, funding sources, potential partnerships for project success, and implementation steps.

Potential costs are classified into low, medium, and high. Low-cost projects are those that would ideally be able to be completed with the existing Town budget or with a budget amendment. Medium-cost projects may require the use of capital funding and may require external or new personnel. High-cost projects would require capital funding and would require additional staff or contracted personnel. Detailed cost estimates are included in Appendix D. Project schedules have been classified into short (1-2 years), medium (3-5 years), and long (5+ years). Many project profiles include education and outreach as a protection and management method. For simplicity, the broad implementation steps have been condensed into a protection and management highlight, included at the beginning of this document.

Although all projects are important to the Town of Machias they are shown in this appendix according to their priority, which was set by the Town based on their immediate needs and priorities.

Project Profile 1: New Development in the Source Water Area

Targeted Potential Contaminant Source: Future potential sources of chemical, physical, or biological contamination.

Goals and Priorities:

- Enact protection methods to reduce and manage the amount of potential harmful development in the source water area to protect the drinking water source.

Summary of Protection and Management Methods:

Methods to reduce the risk and mitigate the threat include:

- Develop land use protections (e.g. zoning) within the municipal boundary of the Town of Machias.
- Monitor development in the Town and source water protection areas.
- Focus on lands that are of high priority and will contribute the most to the source water in Future Land Plans.
- Establishing conservation subdivisions and/or wellhead protection areas.

Potential Costs:

Potential costs include effort hours to apply for funding, effort hours to meet with potential partnerships and subsequent progress meetings, effort hours to research potential future issues, potential land acquisition costs, and effort costs developing zoning.

Classification: Low/Medium

Potential Funding Sources

- NYSDEC Climate Smart Communities Grant Program
- Green Innovation Grant Program
- NYSDOS Smart Growth Comprehensive Grant Program

Potential Partnerships – People and Agencies Involved:

- Machias Town Board
- Plan Management Team
- Municipal Planner and/or Cattaraugus County Planning Division

Suggested Timeline

Length: Short (1-2 years) initial implementation, including public outreach and comment period, and ongoing monitoring.

Considerations for the Plan Management Team:

- Balancing land protection and economic development.
- Funding opportunities.

Implementation Steps:

1. Create a monitoring plan for new development.
 - a. Research previous land use purchases and changes.
 - b. Follow up with new land purchases within the critical and source water area.
 - c. Record future changes to land after purchases and impacts on the source water.
2. Educate new landowners in the source water protections areas on best practices to maintain lawns, gardens, and general properties.
 - a. Research and review previous efforts and materials created for landowner education. Determine if the information can be repeated for actions included in this plan.

- b. Building off any resources collected, create a renter's guide for pollution prevention to include in any rental properties.
 - c. Determine best communication strategies to reach landowners (e.g. including flyers in water bills).
 - d. Distribute educational materials to landowners in the source water protections areas.
3. Document high priority land purchases for land use protection methods (e.g. conservation easements, subdivisions, or zoning (see steps below to establish a Municipality's first zoning regulations))
4. Determine which grant and/or funding opportunities from the list above best fits the needs for the specific action(s) the Town and PMT would like to pursue.
 - a. Look into existing resources to assist with funding.
 - i. New York State's [Guide to Planning and Zoning Laws of New York State](#)
 - ii. NYS's [Adopting Zoning for the First Time](#) document and steps below
5. Apply for identified grant funding.

Adoption Procedure for Establishing a Municipality's First Zoning Regulations

1. Creation of zoning commission
2. Performance of the zoning commission; public participation and final report
3. Compliance with the comprehensive plan and environmental assessment
4. Performance of the local governing board; notice and public hearing
5. Referral by the local governing board to the county planning agency or regional planning council
6. Enactment procedures; voting and entry into the minutes
7. Publication, posting, filing and effective date

Build-Out Analysis (See [Build-Out Analysis: Conservation Tools](#) for more information)

1. Choose a scale for conducting the build-out analysis. Simple or comprehensive. A comprehensive investigation will require more resources.
2. Start with all parcels within the Town Boundary.
3. Using GIS, create a layer with parcels and land areas that cannot be developed. These areas may be wetlands, conservation easements, unbuildable lot (i.e. slopes >20%).
4. Evaluate current local laws pertaining to land use regulations. Integrate maximum lot coverage and building height per district, current or pending development application, identification of existing vacant, developable lots or lots targeted for redevelopment.
5. The result would be maximum development potential in square feet, assessment of build-out potential and related traffic impacts, and the ability to make recommendations related to land use and transportation improvements.

Project Profile 2: Designating a Critical Environmental Area

Targeted Potential Contaminant Source: Future sources of chemical, physical or biological contamination and changes to the source water area.

Goals and Priorities:

- Close evaluation of proposed projects that are in the source water area.
- Ensuring that potential harmful impacts to the source water area are reviewed.

Summary of Protection and Management Methods:

Methods to reduce the risk and mitigate the threat include:

- Designate high priority area(s) in the source water protection areas as a Critical Environmental Area (CEA) to protect the area from future developments that might affect it.

Potential Costs:

Potential costs include effort hours for designation research and the process, effort hours to hold informational meetings with the public.

Classification: Low/Medium

Potential Funding Sources:

Not applicable.

Potential Partnerships – People and Agencies Involved:

- Town of Machias
- Plan Management Team
- Town Board
- Municipal Planner and/or Cattaraugus County Planning Division

Suggested Timeline

Length: Short (1-2 years)

Considerations for the Plan Management Team:

- Closely reviewing the framework of designating a CEA.
- Reviewing the benefits and limitations of a CEA designation.
- Balancing land development and economic growth.

Implementation Steps:

1. Prepare a map that is to appropriate scale to readily locate the CEA boundaries and create a written justification supporting the designation.
2. Communicate with NYS DEC Region 9 and Division of Environmental Permits throughout the application process as they may serve as a resource.
3. If applicable, hold an informal meeting with impacted landowners, the public and interested agencies to discuss the proposal.
4. Provide a written public notice and hold a public hearing prior to the designation.
 - a. The act of designating a CEA is a discretionary decision by the designating agency and is, therefore, subject to SEQR.
4. After the agency approves the designation, the map, written justification, and proof of public hearing must be filed with the DEC Commissioner and others.
5. Designation takes effect 30 days after these filings.

Project Profile 3: Well Land Ownership and Control

Targeted Potential Contaminant Source: Unreviewed or unregulated activities surrounding the wellheads may cause direct contamination of groundwater, which threatens the municipalities' ability to provide potable water to its customers.

Goals and Priorities:

- Protect the wells from direct contamination and control land use activities.

Summary of Protection and Management Methods:

Methods to reduce the risk and mitigate the threat include:

- Land acquisition for at minimum a 100' radius around each wellhead

Potential Costs:

Potential costs include planning costs, potential land purchases, and effort hours applying for WQIP land acquisition and funding.

Classification: Low

Potential Funding Sources:

- NYSDEC WQIP Land Acquisition Funding

Potential Partnerships – People and Agencies Involved:

- Town of Machias
- Landowner of the wellhead areas
- Plan Management Team

Suggested Timeline

Length: Medium (2-4 years)

Considerations for the Plan Management Team:

- Locating the original deed of the property if it exists.
- Determine what land (if any) that the Town already owns around both wellheads.
- Storing existing and new documents related to ownership around the wellheads moving forward.

Implementation Steps:

1. Locate land ownership paperwork from the County Clerk's office (if possible).
2. If the town is not the listed property owner, move forward with property acquisition.
3. Work with the identified landowner and discuss the wellhead areas.
4. Identify and apply to grant funding that best fits the Town's needs.
 - a. NYSDEC WQIP [webpage](#), [toolkit](#), [fact sheet](#), and steps are below.
5. Obtain proper documentation of ownership with the assistance of attorneys.
6. Record and save paperwork and the deed acquired from this process.

Steps to WQIP Land Acquisition Project for Source Water Protection

1. Learn more about the grant program.
 - a. Visit [DEC's WQIP webpage](#) to learn more about the grant program and when funding is available.
 - b. Visit [WQIP Land Acquisition Projects For Source Water Protection Toolkit - NYSDEC webpage](#) to learn more about land acquisition and available resources for an awardee to complete such a project
2. Gather information.

- a. Review your Drinking Water Source Protection Plan (DWSP2) to understand the area that drains to your surface water intake.
3. Prioritize parcels.
 - a. Use the information gathered in Step 2 to prioritize parcels or an area for outright purchase or conservation easement that will protect the public drinking water source.
 - b. If you need assistance with identifying parcels, consider working with land acquisition and source water protection experts in your area that could aid with the Town's land acquisition for source water protection goals. For example, a consulting firm or land trust may be a great partner and aid with the transaction side (e.g., appraisals, survey, environmental assessments, title, etc.) of the land acquisition program.
4. Apply for funding.
 - a. Utilize the information gathered in Steps 2 and 3 to fill out a NYSDEC WQIP Land Acquisition application when available through the [NYS Consolidated Funding Application](#).
5. Acquire parcel(s).
 - a. If you receive a NYSDEC WQIP Land Acquisition grant, acquire parcels for source water protection.
 - b. Review [WQIP Land Acquisition Projects For Source Water Protection Toolkit - NYSDEC webpage](#) for program and document resources that will aid with the land acquisition process.
6. Steward land.
 - a. Steward the land and make sure it is only used for activities that will not harm the public drinking water source.

Project Profile 4: Management of Regulated Potential Contaminant Sources

Targeted Potential Contaminant Source: Excess contaminants into the source water from mineral extraction sites and bulk storage facilities in the source water protection areas.

Goals and Priorities:

- To enhance communication with specific facilities or DEC staff that work with these regulated facilities.
- Gain a greater understanding of the potential impact these facilities have to the source water and report any risks.

Summary of Protection and Management Methods:

Methods to reduce the risk and mitigate the threat include:

- Establish and maintain communication with each facility, and by extension the Town of Machias and NYS DEC Bulk Storage Program.
- Monitor for potential leaks.
- Review permit information and potential contaminant sources.

Potential Costs:

Potential costs include: for establishing communication with facilities in the source water protection areas, effort hours for reviewing permits and taking action if contamination concerns arise.

Classification: Low/Medium

Potential Funding Sources:

Not applicable.

Potential Partnerships – People and Agencies Involved:

- Town of Machias
- Plan Management Team
- Cattaraugus County Department of Health
- NYSDEC
- Local Bulk Storage Facilities

Suggested Timeline

Length: Short (1 year)

Considerations for the Plan Management Team:

- Closely reviewing facilities and their permits located within the source water protection areas.
- Establishing communication with potential contaminant source facilities and find the best form(s) of communication.
- Reviewing past spill incidents and create a report system for the future.

Implementation Steps:

1. Reach out to targeted facilities to establish communication and a relationship to move forward.
2. Gather past and current information about status on high importance sites, including type and quantity of waste or contaminants located on site.
 - a. [NYS DECinfo Locator](#) is a public site that can be used to collect information and records.
 - b. Conduct a site visit for potential issues (if applicable).
3. Identify any potential contaminant concerns that may have occurred or could occur in the future.
4. Work with the facilities to establish best communication moving forward.

5. Create a monitoring, reports, or spill incident system with the facility to continue source water protection efforts.
6. Note, these protection and management methods do not have funding sources, but agencies listed below could aid as a helpful resource.
 - b. NYS DEC Region 9
 - c. Division of Environmental Permits

Project Profile 5: Agricultural Activities

Targeted Potential Contaminant Source: Agricultural related chemical and nutrients that can enter the source water area and groundwater.

Goals and Priorities:

- Reduce the application of nutrients and chemicals to the land in the source water protection areas.
- Increase communication with local farms and discuss land use techniques.

Summary of Protection and Management Methods:

Methods to reduce the risk and mitigate the threat include:

- Establish a partnership with Cattaraugus Soil & Water Conservation District to work with farmers to implement BMPs in priority areas in source water protection areas.
- Establish communication and provide education and outreach materials on how to reduce chemical usage on agricultural lands to farms in the source water protection areas.

Potential Costs:

Potential costs include effort hours for communicating and creating a partnership with involved parties, effort hours for creating education and outreach materials, and effort hours for distributing those materials.

Classification: Medium

Potential Funding Sources:

- NYSAGM Agriculture Nonpoint Source Abatement and Control Grant Program
- USEPA Environmental Education Grants

Potential Partnerships – People and Agencies Involved:

- Town of Machias
- Plan Management Team
- Cornell Cooperative Extension
- Cattaraugus Soil & Water Conservation District

Suggested Timeline

Length: Medium (1-3 years)

Considerations for the Plan Management Team:

- Building relationships with farmers and agricultural landowners in the source water area.
- Research best communication techniques and methods to distribute educational materials.
- Funding opportunities that best fit the Town's needs and goals.

Implementation Steps:

1. Partner with Cattaraugus County Soil and Water Conservation District to discuss overlapping goals and potential gaps in current efforts to protect the source water and its quality.
 - a. If current programs exist, discuss opportunities to support those.
2. Create a plan for outreach and education to farmers and agricultural landowners in the source water area.
 - a. Discuss priority information to be included in the materials and how to best distribute such materials.
3. Determine which funding opportunities to pursue to support this action's efforts.
4. Apply for funding.
5. Continue to monitor water quality to identify if changes occur post implementation efforts.

Appendix D
Cost Estimates

Preliminary Cost Estimate

Note: These estimates are based on an opinion of time requirement and transactional costs. Dependent on emerging needs or altered priorities, these could change. It is recommended that dedicated staff are designated to assist with these efforts, and it is not assumed that consultants will be hired to lead these efforts. The wage rate is based on one staff person with a salary of \$77,000, including a 75% increase for staff benefits, overhead costs, etc. This cost estimate is based off of occupational wage rates estimated by NYS Department of Labor in Q1 2021 dollars for an average environmental scientist. All transactional costs are preliminary and subject to change greatly; THIS IS NOT INTENDED TO BE A FINAL EXACT ESTIMATE. Please note that many efforts across various projects can be combined to save costs. For the purposes of this estimate, each project is estimated individually. It is likely that actual costs will be lower given that efforts for steps like education and outreach are combined.

Project Profile	Priority Issue	Goal	Protection Method and/or Management Method	Timeline	Time Requirements	Weekly Hourly Requirements	Hours Required	Labor Cost per Hour (NYS DOL Wages)	Approximate Transactional Costs (Materials, Construction)	Total Cost
1	New Development in the Source Water Area	Enact protection methods to reduce and manage the amount of development in the source water to protect the drinking water source	Develop land use protections (e.g. zoning), monitor development, and consider conservation and wellhead protection areas within the Municipal Boundary of the Town of Machias.	1-2 years	Meetings, site visits, project implementation and planning	5	260	\$64.78	\$1,000.00	\$17,843.75
2	Designating a Critical Environmental Area	Closely review proposed projects and future developments that may harmfully impact the source water.	Designate and implement a Critical Environmental Area.	1-2 years	Site visits, meetings, designation process	3	156	\$64.78	\$2,000.00	\$12,105.68
3	Well Land Ownership and Control	Reduce the possibility of direction contamination to the wellheads and control land use activities	Land acquisition for a 100' radius around the wellheads	2-4 years	Meetings, site visits, drafting, submit application for WQIP land acquisition, purchasing land	3	312	\$64.78	\$15,000.00	\$35,212.50
4	Management of Regulated Potential Contaminant Sources	To enhance communication with specific facilities or DEC staff that work	Review permit information and potential contaminant concerns. Establish and maintain	1 year	Meetings, permit reviewing, coordinating partnerships,	3	156	\$64.78	\$0.00	\$10,105.68

	Management of Regulated Potential Contaminant Sources (continued)	these regulated facilities to understand the potential impact to the source water and report any risks.	communication with the facility, Town officials and NYS DEC Bulk Storage Program. Monitor for potential leaks.		monitoring, and recording spills and water quality (if applicable)					
5	Agricultural Activities	Reduce the amount of nutrients and chemicals that have been applied to the land in the source water protection areas. Increase communication with local farms and discuss land use techniques	Establish a partnership with Cattaraugus Soil & Water Conservation District to work with farmers to implement BMPs in priority areas in source water protection areas. Establish communication and provide education and outreach materials on how to reduce chemical usage on agricultural lands to farms in the source water protection areas.	1-3 years	Meetings, coordinating partnerships, creating and distributing education and outreach materials.	5	520	\$64.78	\$1,000.00	\$35,685.60
										Total \$110,953.21



**Department
of Health**

