

# WHITTEN BROOK

SKOWHEGAN, MAINE

## WATERSHED-BASED MANAGEMENT PLAN (2026-2035)



JANUARY 2026

# WHITTEN BROOK WATERSHED-BASED MANAGEMENT PLAN



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*Cover Photo Credit: Ecological Instincts*

# Acknowledgments

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The Whitten Brook WBMP is an updated version of the 2011 Whitten Brook Watershed Restoration Plan developed by FB Environmental Associates. Some portions of the 2011 plan, including maps, tables, photos, and some text were retained as part of this update.

# Commonly Used Acronyms

The following are used throughout this document:

<b>BMP</b>	Best Management Practice
<b>DO</b>	Dissolved Oxygen
<b>IC</b>	Impervious Cover
<b>Maine DEP</b>	Maine Department of Environmental Protection
<b>Maine DOT</b>	Maine Department of Transportation
<b>NPS</b>	Nonpoint Source (Pollution)
<b>SCC</b>	Skowhegan Conservation Commission
<b>SPC</b>	Specific Conductivity
<b>TMDL</b>	Total Maximum Daily Load
<b>TP</b>	Total Phosphorus
<b>US EPA</b>	United States Environmental Protection Agency
<b>VRMP</b>	Volunteer River Monitoring Program
<b>WBMP</b>	Watershed-Based Management Plan

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# Executive Summary

## PURPOSE

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The Whitten Watershed-Based Management Plan (WBMP) provides details about current water quality conditions, watershed characteristics, and steps that can be taken to improve water quality in Whitten Brook over the next 10 years as part of a long-term restoration strategy. This plan was created to update the goals and strategies outlined in the 2011 WBMP (FBE, 2011). Implementation is estimated to cost \$2 million through state, federal and local resources over the 10-year time frame. The plan outlines management strategies and an activity schedule (2026 – 2035), establishes water quality goals and objectives, and describes actions needed to achieve these goals. This includes strategies to:



*Whitten Brook. Photo Credit: Field Geology Services*

- A. Reduce impacts from the watershed and stormwater inputs** by implementing practices to reduce actual and effective impervious cover (IC) at identified stormwater retrofit sites, and by addressing runoff from IC on residential properties;
- B. Implement In-Stream Restoration Strategies** through additions of large wood, improving culverts, and improving riparian buffers;
- C. Prevent new sources of pollution** from impacting Whitten Brook by improving municipal maintenance strategies and increasing stream protection through land use planning and land protection;
- D. Raise public awareness** about stream protection strategies by increasing local education, outreach, and communication efforts through updates in newsletters, press releases, targeted outreach, and education programs to increase participation among watershed residents;
- E. Build local capacity** through partnership building across multiple community groups, engaging steering committee members, and developing a robust fundraising strategy;
- F. Conduct long-term monitoring and assessment** of Whitten Brook to monitor changes in water quality and assess the success of WBMP implementation efforts.

## THE GOAL

A team of scientists and local stakeholders worked collaboratively over two years with input from the public to develop an updated WBMP for Whitten Brook. The goal of the WBMP is to improve water quality and in-stream conditions so that the stream attains Class B water quality standards and supports a healthy native brook trout fishery. The following objectives were identified as integral to this goal:

Goals	Watershed Restoration Objectives
<b>Improve Water Quality</b>	<b>Urban Pollutants:</b> manage sources and transport of urban stormwater pollutants and nutrients to restore and protect watershed health and achieve applicable water quality standards (including supporting diverse and healthy aquatic communities).
	<b>Bacteria:</b> track sources of elevated bacteria levels and upgrade wastewater systems as needed to reduce bacteria levels.
<b>Improve Physical Habitat</b>	<b>Aquatic Habitat:</b> improve aquatic habitat quality and diversity to support healthy aquatic communities.
	<b>Terrestrial Habitat:</b> improve riparian habitat extent and quality to support healthy riparian and terrestrial communities and to protect stream health.
<b>Improve Hydrology</b>	<b>Stream Flow:</b> reduce IC and increase runoff infiltration and detention areas to normalize stream hydrographs and reduce stormwater flow to the stream.
	<b>Channel and Floodplain Conditions:</b> reduce constraints to stream flow and include additions of large wood in the stream to improve habitat quality and diversity and to improve stream stability and natural hydrologic functions.

### What actions are needed to meet the goal?

The Whitten Brook WBMP outlines 56 individual action items within six core planning categories to achieve the 10-year water quality goal. Planning recommendations, developed with input from the project's steering committee, are outlined in the plan. The action plan provides current, science-based solutions for restoring the water quality in Whitten Brook while simultaneously promoting communication between watershed residents, business owners, and the SCC and the Town of Skowhegan. The action plan outlines pollution reduction targets, responsible parties, potential funding sources, approximate costs, and an implementation schedule for each task within each of the six categories.

### How will the plan be funded?

The Whitten Brook WBMP is expected to cost approximately **\$2M over a 10-year period**. Therefore, a sustainable funding strategy is needed within the first year that includes diverse funding sources. The funding strategy will be led by the Skowhegan Conservation Commission in coordination with the Town of

Skowhegan and other watershed partners. The combined resources of the SCC, Town of Skowhegan, and private landowners expect to be leveraged to support watershed implementation projects in addition to state, federal, and local grants. The funding strategy will be revisited on at least an annual basis by an engaged steering committee. The action plan (Sections 6 & 7) is divided into the following six major planning objectives along with estimated costs to complete the work:

Action Plan Category	Description of Work	10-Year Cost
<b>A. Watershed Restoration &amp; Stormwater Management</b>	Detention basin, other stormwater outfalls, high & medium impact commercial sites, state road sites, residential cost-share	\$723,000
<b>B. In-Stream Restoration</b>	Targeted wood additions, culvert upgrades, riparian buffers	\$990,000
<b>C. Prevention - Reduce New Sources of Pollution</b>	O&M plan for Madison Avenue, catch basin maintenance & monitoring, street sweeping, salt reduction, land conservation, ordinance improvements	\$145,500
<b>D. Education, Outreach &amp; Communications</b>	Newsletters, Adopt-a-Stream, winter maintenance	\$33,500
<b>E. Build Local Capacity</b>	Funding plan, Steering Committee, grants	\$23,000
<b>F. Science - Conduct Long-Term Monitoring &amp; Assessment</b>	Volunteer monitoring, bacteria source tracking, pre- & post-BMP monitoring, continuous monitoring	\$80,700
		<b>\$1,995,700</b>

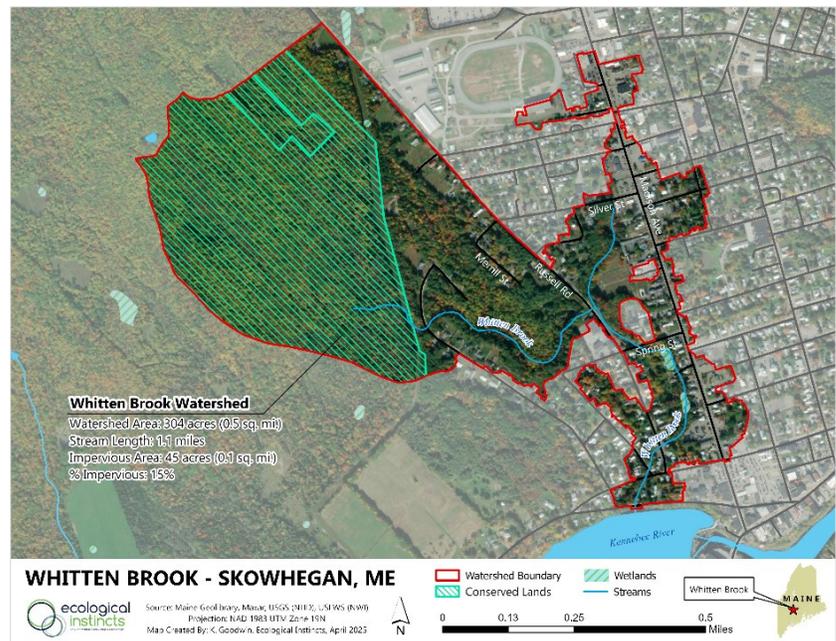
### How will success be measured?

Environmental, social, and programmatic milestones were developed to reflect how well implementation activities are working and provide a means by which to track progress toward the established goals (Section 8). The steering committee will review the milestones on an annual basis, at a minimum, to determine if progress is being made, and will then determine if the watershed plan needs to be revised if the targets are not being met.

## THE STREAM & WATERSHED

Whitten Brook is a 1.1-mile, Class B, first-order stream located in the Town of Skowhegan in Somerset County, Maine. The main stem and the northern branch of the stream flow alongside a highly developed area of Madison Avenue (Rt 201) near downtown Skowhegan and receives stormwater from four major outfalls draining the road and adjacent commercial and residential development. Whitten Brook has a 304-acre watershed, approximately 45 acres of which is made up of impervious surfaces including roads, driveways, and buildings.

The watershed includes three major sub-basins, a northern branch located between Russel Road and Madison Avenue, a western branch originating in an area of undeveloped forestland at the northwest of the watershed, and the main stem, closing south from the confluence of the northern and western branches toward the Kennebec River. Much of the undeveloped land around the west branch is conserved by the Somerset Woods Trustees. The watersheds of the northern branch and the main stem are highly developed: the north branch watershed is 52% impervious and the watershed of the main stem is 40% impervious.



## THE PROBLEM

Whitten Brook is listed as an impaired Class B stream on Maine's 303 (d) listing of impaired waters based on monitoring results of the macroinvertebrate community, physical habitat parameters and water chemistry from 2002-2007. The stream is listed for both non-attainment of aquatic life criteria, and for non-attainment of bacteria standards.

The stream has a highly developed urban watershed, causing impacts both from watershed runoff from developed areas, and from direct inputs including leaking sewage pipes and a gasoline contamination site identified during the 2010 stream corridor survey, which Maine DEP has been actively remediating for over a decade. Stream hydrology has been significantly impacted by development and concentrated flows from impervious surfaces, especially where runoff is concentrated and routed directly to the stream through outfall pipes.

Some of these problems have been addressed in recent years. For example, since 2011, improvements have been made to separate the town's combined sewer system, helping reduce the risk of wastewater inputs to the stream. Additionally, in 2015, an air sparge system was installed by Maine DEP to help remediate a petroleum contamination site near the stream<sup>1</sup>. However, little has been done to effectively reduce impacts from impervious areas in the watershed. Biological monitoring has not been successfully completed since 2007 due to unstable substrates and concentrated flows during storm events. Hydrologic impacts from runoff from impervious surfaces will need to be reduced in order for further biological monitoring to be possible, as well as to allow for in-stream improvements to be completed.

<sup>1</sup> Dan Courtemanch, Maine Department of Environmental Protection, personal communication, November 4, 2025.

Water quality data have been collected in Whitten Brook since 2002 at 11 different sites with varying levels of frequency. Six of these sites are located on the main stem, three are on the north branch, and two on the west branch. Water quality data was collected by Maine DEP in five years (2002, 2006, 2007, 2014, and 2022), and by Volunteer River Monitoring Program (VRMP) volunteers in 6 years between (2014-2017, 2021, and 2022). Available data from these sources indicate:

- Whitten Brook does not meet Maine DEP Class B standards for aquatic life.** Results of macroinvertebrate monitoring conducted by DEP in 2002 and 2007 indicated that Whitten Brook did not meet standards for either Class C or Class B streams. Subsequent sampling efforts in 2012 and 2022 were unsuccessful due to increased abundance of unstable sandy substrates on the stream bottom.
- Dissolved oxygen (DO) concentrations fall within acceptable standards for Class B streams.** All DO measurements exceed the minimum criterion of 7 mg/l.
- E. coli* bacteria** in Whitten Brook still occasionally exceed criteria in the north branch. Elevated bacteria was first noted near Whitten Brook's outlet in 2006, and additional sampling is needed to determine what impact the sewage system improvements have had on *E. coli* levels at that location.
- Chloride concentrations are somewhat elevated in the northern branch of Whitten Brook,** but generally remain below levels that would be considered harmful to aquatic life. Data loggers deployed in the north branch in 2014 recorded just one instance of chloride exceeding the acute exposure maximum for an hour or more. The chronic chloride maximum was regularly exceeded for short periods, but never for four days. Chloride levels in the main stem are generally lower, potentially due to dilution by water coming from the west branch.

### **What are the primary causes of impairment?**

The primary causes of impairment in Whitten Brook include the extent of urban development and IC in the watershed, degraded stream habitat resulting from historical channelization, and inadequate stream crossings. Runoff from impervious surfaces has caused increased flow of stormwater into the stream, and high-intensity flows are concentrated at stormwater outfalls, causing channel erosion, sedimentation, and habitat instability. Stormwater inputs also carry pollutants to Whitten Brook, causing elevated chloride and nutrient levels. A secondary cause of impairment is elevated *E. coli* bacteria levels in the stream, likely originating from leaky sewage pipes.

### **Why do we need to reduce the elevated discharge of stormwater and associated pollutants from the watershed's impervious cover?**

Impervious surfaces generate substantially more stormwater runoff than pervious areas, and the runoff they produce—especially from roads and parking lots—often contains elevated levels of pollutants. Increased runoff volumes accelerate streambank erosion and sediment deposition downstream, degrading in-stream habitat. In addition, the associated pollutant loads include nutrients and toxic compounds that can lead to reduced levels of dissolved oxygen in the stream and elimination of pollution-sensitive aquatic species.

Addressing stormwater runoff is a key step in a multi-year effort to restore Whitten Brook. Meaningful progress will require reducing IC throughout the watershed—by removing unnecessary pavement and restoring vegetation—as well as treating runoff to limit the amount of impervious area that directly delivers pollutants to the stream.

An updated Stormwater Retrofit Reconnaissance Inventory in 2022 identified 33 sites where Best Management Practices (BMPs) could be installed to treat stormwater runoff, thereby reducing the impacts to the stream (reducing effective IC). The action plan includes strategies for addressing 20 RRI sites, along with addressing stormwater runoff at 50% of residential properties in the watershed and upgrading an existing detention basin to treat water at the northern Madison Avenue stormwater outfall. Reducing IC will require ongoing work annually over a 10-year period and beyond. Success of this work will depend on cooperation from landowners, the town, and businesses.



*A large, paved parking lot at a business along Madison Avenue.*

### **Why do we need to complete in-stream restoration projects?**

Reducing impacts from stormwater runoff will allow the stream to return to a stable geomorphic state over time. However, some stormwater inputs will continue to impact the stream, impeding this progress. Habitat diversity has also been reduced in Whitten Brook, both by stormwater inputs and other alterations to stream conditions including artificial channel straightening and constriction of certain reaches. In-stream restoration projects will help stabilize the stream and reduce excess bank erosion, along with introducing much needed habitat diversity. A 2013 fluvial geomorphic assessment of Whitten Brook provided recommendations for in-stream restoration activities and prioritized sections of the stream for restoration. The action plan recommends adding large wood additions to high priority stream reaches, as well as upgrading undersized culverts.

### **What about future development?**

While population growth in Skowhegan is currently slow, and much of the undeveloped land in the western watershed is conserved, there is still potential for further development in the watershed, both in the remaining undeveloped and unconserved areas of the western watershed and infill and redevelopment along Madison Avenue. Since the development of the 2011 Whitten Brook Watershed Restoration Plan, additional pavement has been added in a few areas around Madison Avenue, and Coburn Avenue has been extended further into the undeveloped western watershed.

Along with protecting vulnerable areas of the stream through improved shoreland zoning ordinances, measures to reduce IC in the watershed must be factored into development standards in order to improve stream health. The Town should continue to re-visit existing ordinances to ensure that stream protection

is prioritized in future planning efforts. Ordinances that could be considered to help protect Whitten Brook and other small streams include ensuring that impaired headwater streams are included in shoreland zoning rules, and the site review ordinance is expanded to ensure adequate stormwater treatment for all new development and redevelopment.

## ADMINISTERING THE PLAN

The Whitten Brook WBMP provides a framework for restoring water quality in Whitten Brook so that it meets state water quality standards. The plan will be led by the Skowhegan Conservation Commission (SCC) with guidance and support from other watershed steering committee members comprised of the Town of Skowhegan, Maine DEP, Somerset County Soil & Water Conservation District, Somerset Woods Trustees, local businesses, and landowners. The formation of subcommittees that focus on the six main watershed action categories will result in more efficient implementation of the plan.

## INCORPORATING US EPA'S 9 ELEMENTS

The US EPA has identified nine key elements that are critical for achieving improvements in water quality. An approved nine-element plan is a prerequisite for future Clean Water Act section 319 funded work in impaired watersheds. The nine elements are designed to provide a robust framework by which to restore waters impaired by NPS pollution through characterization of the watershed, partnership building, development of an implementation plan (actions, schedule, costs), goal setting, and monitoring. The nine elements can be found in the following locations within the Whitten Brook WBMP.

Planning Element	WBMP Section	Description
<b>a) Identify Causes &amp; Sources</b>	Section 1	Highlights programs and research that have helped frame the water quality problem.
	Section 2	Describes the characteristics of the brook and watershed that have contributed to the changes in water quality.
	Section 3	Provides an analysis of water quality data to describe changes in water quality.
	Section 4	Provides an overview of in-stream and watershed assessments that have been conducted in Whitten Brook to identify causes of impairment and solutions
	Section 6 & Appendix B	Summarizes current stormwater retrofit sites in the Whitten Brook watershed.
<b>b) An estimate of the load reductions expected from</b>	Sections 5 & 6	

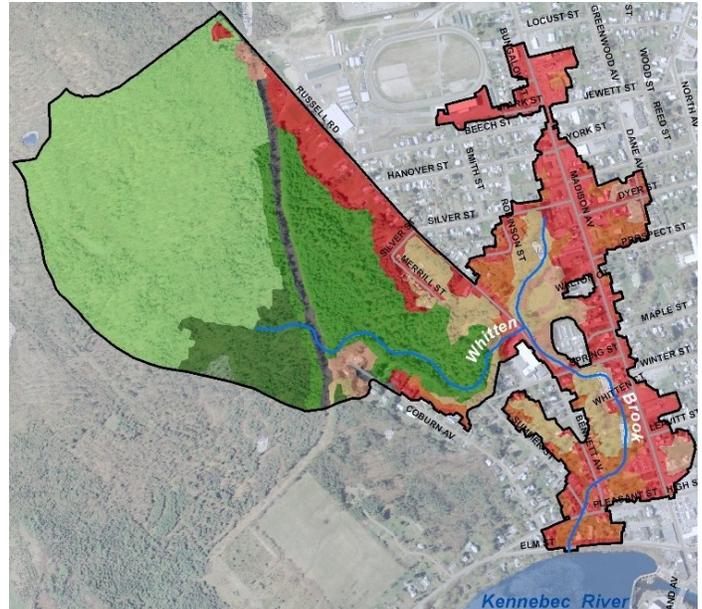
Planning Element	WBMP Section	Description
<b>management measures</b>		Provides an overview of IC reduction targets and pollutant load reduction estimates from installing BMPs at stormwater retrofit sites.
<b>c) Description of Management Measures &amp; critical areas in which measures will be implemented</b>	Sections 5, 6 and 7	Identifies ways to achieve the estimated IC reduction and reach water quality targets described in (g) below. The action plan covers six major topic areas that focus on reducing impacts from development, including: stormwater management, in-stream restoration, preventing new sources of NPS pollution, education and outreach, building local capacity, and conducting long-term monitoring and assessment.
<b>d) Estimate of Technical &amp; Financial Assistance &amp; Relevant Authorities Implementing the Plan</b>	Sections 6 - 9	Provides a description of the associated costs, sources of funding, and organizations responsible for plan implementation. The estimated cost to implement the plan is estimated at \$2M over the next ten years.
<b>e) Information &amp; Education &amp; Outreach</b>	Section 6	Describes how the education and outreach component of the plan should be implemented to enhance public understanding of the project. This includes leadership from watershed partners to promote stream/watershed stewardship including both general outreach, and targeted outreach to students, business owners, and residential landowners.
<b>f) Schedule for Addressing the NPS Management Measures</b>	Section 6	Provides a list of strategies and a set schedule that defines the timeline for each action. The schedule should be reviewed and adjusted by the steering committee on at least an annual basis.
<b>g) Description of Interim Measurable Milestones</b>	Section 8 (Tables 9 – 11)	Lists milestones that measure implementation success that will be tracked annually, makes the plan relevant, and helps promote implementation of action items. The milestones are broken down into three categories: programmatic, social, and environmental.
<b>h) Set of Criteria</b>	Section 8 (Table 11)	Provides a list of criteria and benchmarks for determining whether IC reduction goals are being achieved over time, and if substantial progress is being made towards water quality objectives. Environmental milestones are a direct measure of environmental conditions, or in some case a series of steps needed to achieve environmental objectives.
<b>i) Monitoring Component</b>	Section 6 (Action Plan p. 49-52) & Section 7	Provides a description of planned monitoring activities for Whitten Brook to evaluate the effectiveness of implementation efforts over time as measured against the criteria in (h) above.

# 1. Background

Whitten Brook is 1.1-mile-long stream located in the Town of Skowhegan, Maine. Small (first-order or headwater) streams such as Whitten Brook help sustain the biological productivity of downstream rivers, lakes and estuaries. These small streams also provide natural flood control, recharge the groundwater, and maintain water quality by trapping sediments and pollution from fertilizers and other pollutants. Small streams recycle nutrients, create habitat, and maintain biological diversity for plants and animals including fish species such as salmon and trout (Meyer et al., 2007). Small streams also provide intrinsic benefits to our communities by providing a sense of place for the people that live near them, a place for children to grow and explore the natural world around them.

Human activities such as land clearing and development and associated increases in urban runoff can have dire effects on the health of small streams and the plants and animals that live there. Poorly planned development can result in changes to riparian vegetation and watershed hydrology, water pollution, and the introduction of invasive species. Conservation efforts, including protecting the riparian zone around small streams, preserving the natural undeveloped forest buffers along these streams, and the use of low-impact development techniques will ultimately protect these small streams in the long run.

Evidence suggests that the high percentage of developed land (commercial, industrial and residential land uses) in the Whitten Brook watershed have altered the natural hydrologic cycle of this small first and second-order headwater stream, resulting in increased surface water flow during storm conditions which carry large volumes of water and attached pollutants directly into Whitten Brook. The stream is listed as an impaired Class B stream on Maine's 303(d) listing of impaired waters based on monitoring results of the macroinvertebrate community, physical habitat parameters and water chemistry from 2002-2007.



*The red/orange tones in this aerial photo of the Whitten Brook watershed highlight developed land, while undeveloped land is represented by different shades of green (Appendix A).*

**Maine DEP's Nonpoint Source Priority Watersheds List** includes 92 "Impaired" streams, including Whitten Brook. These streams are included on the State's 303(d) list of impaired waters because they do not meet state water quality standards. An additional 76 streams are considered "Threatened."

Whitten Brook is listed for both non-attainment of aquatic life criteria and habitat and for non-attainment of bacteria standards. The bacteria impairment is included in the Statewide Bacteria Total Maximum Daily Load (TMDL) (Maine DEP, 2009).

The aquatic life impairment prompted the development of a draft Total Maximum Daily Load (TMDL) report for Whitten Brook, which was incorporated into the Statewide Impervious Cover (IC) TMDL using an IC target (Maine DEP, 2012). The TMDL set a target goal of 9% effective IC, which will help reduce the current pollutant load from the watershed, mimic natural watershed conditions, and help restore Whitten Brook, so that it can meet Class B water quality standards.

- ❖ **Impervious Cover (IC)** refers to landscaped surfaces that no longer absorb rain and may direct large volumes of stormwater runoff into the stream (i.e., paved roads, driveways, buildings, parking lots and roofs).
- ❖ **Total Impervious Cover** refers to the total area of IC in the watershed.
- ❖ **Effective Impervious Cover** refers to the portion of the total IC that drains directly to storm drains, ditches or streams and is effectively impacting hydrology and water quality in Whitten Brook.

## PURPOSE

The Whitten Brook Watershed-Based Management Plan (WBMP) provides details about current water quality conditions, watershed characteristics, and steps that can be taken to improve water quality in the stream over the next 10 years as part of a long-term strategy to restore water quality and in-stream habitat in Whitten Brook. Implementing the 10-year plan is estimated to cost approximately \$2 million through a combination of state, federal and local contributions over this time period. The plan outlines management strategies and an activity schedule (2026 – 2035), establishes water quality goals and objectives, and describes actions needed to achieve these goals. This includes strategies to:

1. **Reduce impacts from the watershed and stormwater inputs** by implementing practices to reduce effective IC at identified stormwater retrofit sites, and by addressing runoff from IC on residential properties;
2. **Implement in-stream restoration strategies** through additions of large wood, improving culverts, and improving riparian buffers;
3. **Prevent new sources of pollution** from impacting Whitten Brook by improving municipal maintenance strategies and increasing stream protection through land use planning and land protection;
4. **Raise public awareness** about stream restoration strategies by increasing local education, outreach, and

### WATERSHED PLANNING GOALS

(2026-2035)

1. **REDUCE IMPACTS FROM IMPERVIOUS COVER IN THE WATERSHED**
2. **IMPROVE IN-STREAM HABITAT**
3. **MEET CLASS B AQUATIC LIFE STANDARDS FOR STREAMS**
4. **RESTORE WATER QUALITY & HABITAT TO SUPPORT A HEALTHY NATIVE BROOK TROUT FISHERY**

communication efforts through updates in newsletters, press releases, targeted outreach, and education programs to increase participation among watershed residents;

5. **Build local capacity** through partnership building across multiple community groups, engaging steering committee members, and developing a robust fundraising strategy;
6. **Conduct long-term monitoring and assessment** of Whitten Brook to monitor changes in water quality and assess the success of WBMP implementation efforts.

## STATEMENT OF GOAL

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The goal of this plan is to restore water quality and in-stream habitat in Whitten Brook over the next 10 years so that it supports a healthy and robust native brook trout fishery and attains Maine’s Class B water quality standards. This includes reducing the volume of stormwater draining from watershed impervious surfaces and the concentration of pollutants in that stormwater.

## PLAN DEVELOPMENT & COMMUNITY PARTICIPATION

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The 2025 Whitten Brook WBMP was developed with input from a group of local stakeholders and scientists over a two-year period (2024-2025). Updated plan recommendations are the result of multiple steering committee meetings and subcommittee meetings (detention basin, education & outreach). The plan update was led by Ecological Instincts in partnership with the Town of Skowhegan (grantee), Skowhegan Conservation Commission, Maine Department of Transportation (MDOT), and Maine DEP. Additional stakeholders included Somerset Woods Trustees and Somerset County Soil & Water Conservation District (SCSWCD). Information from the 2011 Watershed Restoration Plan was incorporated into the current WBMP and updated with more recent information.



*A public meeting was held at the Heritage House Restaurant in April 2025 to present information about the updated WBMP.*

Successful development of a WBMP depends primarily on the commitment and involvement of community members. Bringing together people, policies, priorities, and resources through a watershed approach blends science and regulatory responsibilities with social and economic considerations (US EPA, 2008). Community participation in development of the updated plan included a public workshop for residents and commercial business owners on April 9, 2025 at the Heritage House Restaurant. The meeting drew 15 attendees and provided information about the current state of the stream, and proposed management measures to restore the stream, including a presentation of the proposed detention basin design plan. Two rain barrels were raffled off to attendees. Notification of the public meeting was mailed to all stream abutters and business owners on Madison Avenue. Additional outreach included development of a new

web page for Whitten Brook on the town's website, development of Conservation "newsflashes," and direct outreach to abutters of the detention basin.

The Town of Skowhegan is committed to improving conditions in Whitten Brook. Local stakeholders and partners, particularly the Skowhegan Conservation Commission (SCC), have recognized the benefits of working with each other and with watershed stakeholders to address a common problem. Through funding and oversight from the US EPA and Maine DEP, and technical consulting by Ecological Instincts, the town actively participated in this watershed planning process. The community-based approach will continue through the implementation of the updated WBMP. In order for the goals of the WBMP to be reached, the community should consider this plan to be a "living document" that is revisited and revised on an annual basis.

## **WATERSHED PROJECTS, PROGRAMS & RESEARCH**

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The SCC has an ongoing interest in restoring Whitten Brook and has been actively involved in the project since the development of the TMDL beginning in 2007. Both the US Environmental Protection Agency (US EPA) and Maine DEP believes that restoration is attainable and have provided funding and staff support for the restoration efforts. A list of recent and/or relevant watershed projects is presented below.

### **TMDL STUDIES**

**(2009) Whitten Brook Bacteria TMDL-** Waterborne pathogens (bacteria) enter streams from a variety of sources including human sewage and the feces of other warm-blooded animals. Direct ingestion of water containing pathogens can cause gastrointestinal illness in humans. High numbers of indicator bacteria in water samples collected from Whitten Brook prompted the stream's status for non-attainment of Class B bacteria standards (Category 5A). This impairment was described by Maine's Statewide Bacteria Total Maximum Daily Load (TMDL) report (Maine DEP, 2009). The Whitten Brook Watershed Protection Plan should not lose sight of the need to identify and address sources of bacteria in the stream. Actions to reduce the negative effects of IC in the watershed will likely address sources of bacteria in the watershed since stormwater can potentially carry bacteria from urban areas.

**(2012) Impervious Cover TMDL-** To address the aquatic-life impairment, a draft Impervious Cover Total Maximum Daily Load (IC TMDL) report was developed for Whitten Brook by Maine DEP, which was incorporated into the 2012 statewide IC TMDL using an IC target (Maine DEP, 2012). The TMDL identified the high percentage of developed land (commercial, industrial and residential land uses) in the Whitten Brook watershed as the primary culprit to the current aquatic life impairment.

Since portions of the Whitten Brook watershed are highly developed (total impervious surface area of approximately 14%), IC was used as a surrogate measure of the range of pollutants in stormwater for the TMDL. The TMDL set a target goal of 9% effective IC, which will help reduce current pollutant loads from the watershed, mimic natural watershed conditions, and help Whitten Brook achieve Class B water quality standards. The TMDL aimed to reduce IC by 40% (18 acres treated). Aquatic life assessments (biomonitoring

of the benthic macroinvertebrate community) provide an appropriate endpoint to measure the progress of TMDL implementation.

## OTHER PLANNING/RESEARCH

**(2002-2022) DEP Biological Monitoring & Water Quality Monitoring** - Sampling data were collected by Maine DEP between 2002 and 2007 which included monitoring of the macroinvertebrate community, physical habitat parameters and water chemistry. Sampling results were compared to Maine's statutory Class B water quality standards and the stream was listed as impaired due to non-attainment of aquatic life criteria and for non-attainment of bacteria standards. Sampling efforts in 2007 and 2022 failed due to unstable substrate, indicating a continued or worsening lack of adequate habitat for aquatic organisms. In 2014, DEP installed data loggers at two sites on Whitten Brook to measure specific conductivity and temperature. Data from these loggers adds to our understanding of water quality impairment in the stream and the potential impacts of chloride from road salts.

**(2010) Whitten Brook Watershed and Impervious Cover Delineation**- An on-site detailed watershed delineation and IC analysis was conducted by Maine DEP during the summer of 2010 to include the watershed's stormwater conveyance system. This survey documented the high % of IC in the watershed, particularly along the northern branch and main stem of Whitten Brook. The revised watershed boundary places IC in the Whitten Brook watershed at approximately 14%. This study also delineated four major watershed subcatchments that carry stormwater directly from areas of high impervious area directly to the stream. IC levels in these subcatchments range from 43-74%. This survey supports the idea that the high percentage of IC, especially in the subcatchments, has led to dramatic impacts to the stream as a result of increased stormwater runoff and its associated pollutants.



*SCC volunteers helped collect stream flow and temperature data for the 2010 watershed study.*

**(2010) Whitten Brook Watershed Study**- Several members of the SCC volunteered their time to assist FB Environmental and Maine DEP with a Watershed Study in 2010. The study involved conducting a Level 1 Stream Corridor Survey, including a Rapid Habitat Assessment and Rapid Geomorphic Assessment of Whitten Brook. In addition, SCC volunteers participated in a Watershed Retrofit Reconnaissance Inventory (RRI) of the watershed in late August 2010. The RRI survey included a rapid field assessment of potential stormwater storage and on-site stormwater retrofit sites throughout the watershed. Typical sites that were investigated for possible retrofitting included culverts, storm drain outfalls, highway rights-of-way, open spaces, and parking lots. Results of these surveys are described in the Whitten Brook Watershed Study (FBE, 2010) as well as in the 2011 Whitten Brook Restoration Plan (FBE, 2011).

**(2011) Whitten Brook Watershed Restoration Plan** - This plan combined results from the 2010 Watershed and IC Delineation and Watershed Study to provide recommendations to improve water quality,

physical habitat, and hydrology in Whitten Brook. This included structural recommendations such as redirecting the northern Madison Avenue outfall to an extended detention basin, installing BMPs at high-impact sites identified in the RRI study, along with education and outreach to watershed residents and landowners and improving municipal stormwater maintenance practices (FBE, 2011).

**(2013) Fluvial Geomorphic Assessment of Whitten Brook-** Following development of the 2011 Whitten Brook WBMP, an in-depth fluvial geomorphic assessment was completed for Whitten Brook by Field Geology Services (FGS, 2013). Results of the assessment were used to develop recommendations for in-stream restoration strategies for specific areas of the stream. The assessment also determined that better stormwater management is essential before completing in-stream restoration in order to ensure the success of in-stream practices.

**(2021-2022) MDOT Detention Basin Planning & Camera Inspections-** Maine Department of Transportation (MDOT) and Maine DEP have been working cooperatively to identify potential measures to reduce the impacts of stormwater from State Route 201 (aka Madison Avenue) since 2012, beginning with planning efforts funded by US EPA Clean Water Act Section 319 grants through the Phase I Whitten Brook Watershed Restoration Project. In 2021-2022, the SCC organized a working group of watershed partners including MDOT, DEP, the Town, and an environmental consultant to revitalize efforts to address stormwater runoff from upper Madison Avenue by retrofitting the existing stormwater detention basin located on private property (highest priority in the 2011 Restoration Plan). The group met on-site in 2021 with four follow-up meetings via Zoom in 2022. The work resulted in an evaluation of the 2014 MDOT conceptual design for the detention basin (MDOT, 2021), and a MDOT camera inspection examined the integrity of the storm drain system from Madison Avenue to Whitten Brook in 2022.

**(2022) Updated Watershed Survey-** Ecological Instincts conducted a survey of the Whitten Brook watershed to update site conditions and recommendations made in the 2010 RRI (Ecological Instincts, 2023). This included revisiting stormwater retrofit sites along Madison Avenue, documenting new NPS sites, conducting a desktop analysis of potential residential retrofits in the watershed, and conducting site visits to stormwater outfalls and major stream crossings. The survey resulted in updated cost estimates and pollutant reduction estimates as well as re-prioritization of NPS sites in the watershed. The updated list includes 38 sites including 2 highest priority sites (detention basin and Whitten Ct.), 5 high priority sites (Boynton's, Cumberland Farms, Walgreens, High Tide Seafood, residential properties), 15 medium, and 17 low priority sites (primarily commercial development on Madison Avenue). Two sites on the 2010 list were addressed and one site was deemed not feasible due to site constraints.

## **WATERSHED/WATER QUALITY IMPROVEMENT ACTIONS**

**Whitten Brook Stream Clean-Ups-** In the fall of 2010, the SCC organized a stream clean-up for Whitten Brook utilizing volunteers from the Town of Skowhegan, the SCC and the Charleston Youth Center. Approximately 20 yards of debris was removed from the stream between the unnamed tributary to Whitten Brook and Bennett Avenue. The SCC has organized similar clean-ups for Whitten Brook in the past and plans to continue these efforts in the future.

### Conservation Efforts in the Whitten Brook Watershed-

Acquisition of land for conservation in the watershed has resulted in the long-term preservation of undeveloped forestland in the upper watershed. The Town of Skowhegan owns a small parcel near Russell Rd. also known as "The Whitten Brook Conservation Area." In addition, the Somerset Woods Trustees (SWT) owns approximately 300 acres of land called "Coburn Woods". Some of this land was purchased recently to prevent potential heavy cutting and development in the sensitive, undeveloped headwater of Whitten Brook. Because Whitten Brook lacks adequate protection from development (no zoning for portions of the stream), ongoing efforts to protect the riparian habitat and large undeveloped blocks of land will be important for maintaining the existing water quality. Poorly planned development in the upper watershed will only cause further degradation despite efforts to reduce the impact from developed areas in the watershed.



*Youth volunteers helped remove 20 yards of trash from the stream in 2010.*

**(2012-2014) Whitten Brook 319 Phase I-** In 2012-2014, the Town of Skowhegan acquired a CWA s.319 implementation grant to help implement BMPs at high-priority sites in the Whitten Brook Watershed. The project resulted in the installation of numerous BMPs at the Whitten Brook Conservation Area on Russell Road, including adding check dams to the road ditch and installing a hybrid bioretention cell. The project also resulted in a conceptual design for upgrading the detention basin to treat more water from upper Madison Avenue. Public engagement was fostered through a ribbon cutting ceremony and volunteer events at the Conservation Area site, as well as through installation of an educational poster at the kiosk.



*Volunteers installing native vegetation in the bioretention cell at the Whitten Brook Conservation Area on Russell Road in 2014.*

**(2015-Present) Contaminated Soil Remediation-** In 2010, SCC volunteers working with consultants to complete a stream corridor survey documented an oil sheen and petroleum odor in the upper reaches of Whitten Brook below the detention basin. In 2011, Maine DEP collected a pore water sample in the seep discharge identified during the field survey which tested positive for petroleum hydrocarbons with moderately high concentrations of volatile petroleum hydrocarbons and total extractable hydrocarbons which confirmed a plume of petroleum contaminated groundwater, resembling gasoline discharging from an unknown source into the upper reach of Whitten Brook (C.A. White & Associates, 2012). In 2012, a hydrogeologic assessment was completed for a 4.5 acre area between Madison Avenue and Whitten Brook determined that the most likely sources of contamination are the former tanks and pump island on the

Kyes property and the retail petroleum operations on the Damon property (C.A. White & Associates, 2012). Since 2015, Maine DEP has been actively remediating the site with a focus on addressing the contamination using an in-situ approach including an air-sparge system. A newer and larger system was installed in 2024 using a grid of 10 wells to aerate the groundwater and promote breakdown of the contaminants. To date, Maine DEP has spent an estimated \$200,000 on the remediation efforts. Remediation is expected to continue for several more years with annual monitoring to determine the success of the remediation effort.

## 2. Stream & Watershed Characteristics

A watershed is the geographic area of land in which all surface water runoff drains to a common outlet, such as a stream, river, lake, wetland, or coastal water. Large watersheds, like the Kennebec River watershed are made up of many smaller watersheds (also called subwatersheds). Whitten Brook is a subwatershed of the Kennebec River because all the water that flows overland to Whitten Brook flows into the Kennebec River via Whitten Brook. The Whitten Brook watershed is considered a small watershed, being comprised of just 304 acres (0.48 sq. mi.) of land near part of downtown Skowhegan, Maine (Figure 1).

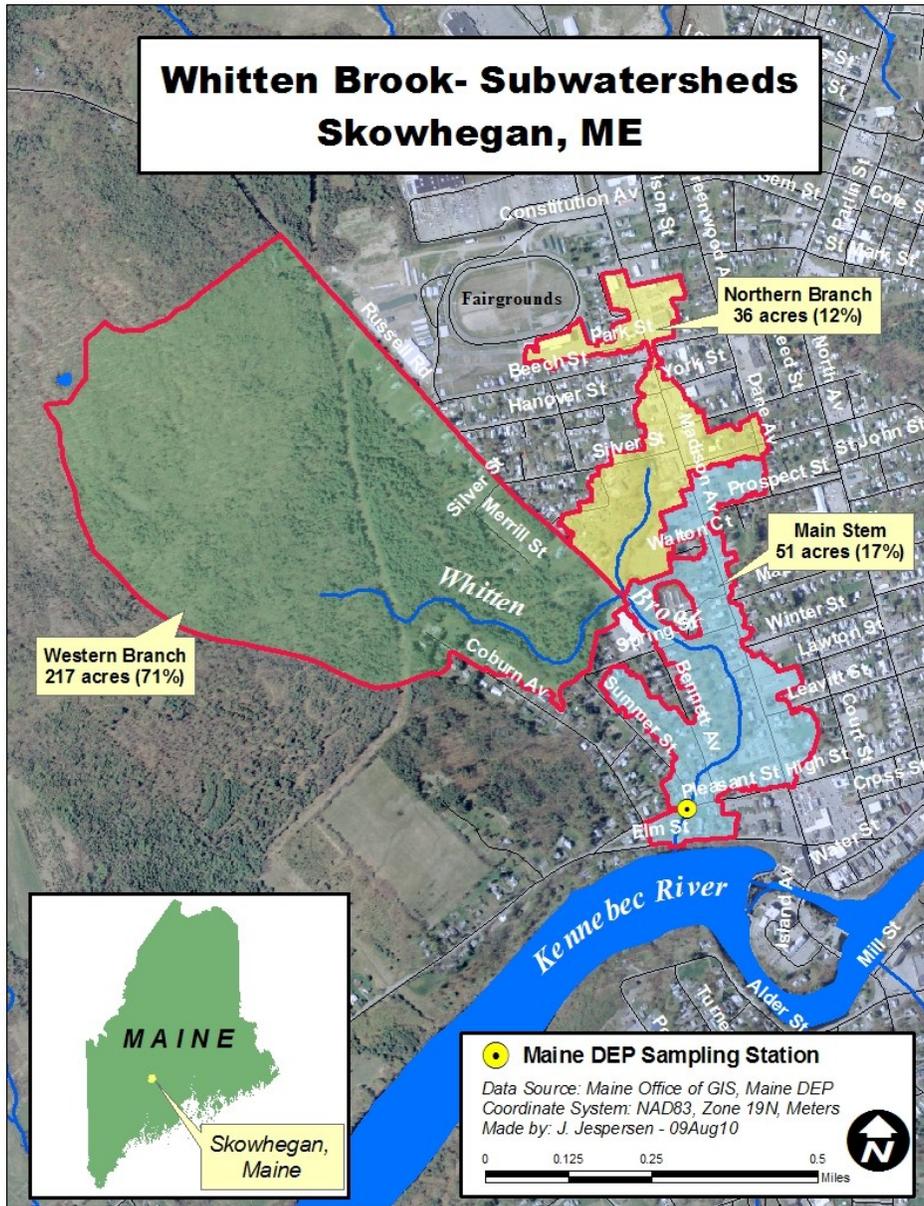
The 1.1-mile-long stream flows primarily through residential neighborhoods and includes six road crossings. Whitten Brook originates as a first order stream in a forested area northwest of Russell Road, and flows for approximately 0.6 miles before crossing under Russell Road in a culvert where it meets with an unnamed first order stream. At this point it becomes a channelized second order stream running adjacent to Russell Road. After approximately half a mile, the stream flows under Spring Street and Whitten Court, southwest under Bennett Avenue and Summer Street, through a concrete channel under Pleasant Street, and finally under Elm Street to the Kennebec River. The upper portion of Whitten Brook above Coburn Avenue is known by local fisherman for its native brook trout fishery. Much of the forested area surrounding the western branch of the stream is conserved land, owned by Somerset Woods Trustees and the Town of Skowhegan.

The topography of the Whitten Brook watershed ranges from approximately 455 feet above sea level in the upper watershed to 170 feet above sea level where it flows into the Kennebec River (see topography map in Appendix A). The stream itself is fairly low-gradient with few areas of fast moving water. Steep embankments are common along a majority of the stream reaches, with slopes greater than 30% common on at least one bank.

### **SUB-WATERSHEDS & STORMWATER OUTFALLS**

The Maine DEP 2010 watershed delineation and IC analysis resulted in a revised accurate watershed boundary for Whitten Brook that incorporated the Town of Skowhegan's stormwater system. This system captures water in catch basins placed within the dense commercial and residential development and

roadways in town. Water that does not flow into a stormwater catch basin either infiltrates into the ground, or flows as overland flow directly to the stream.

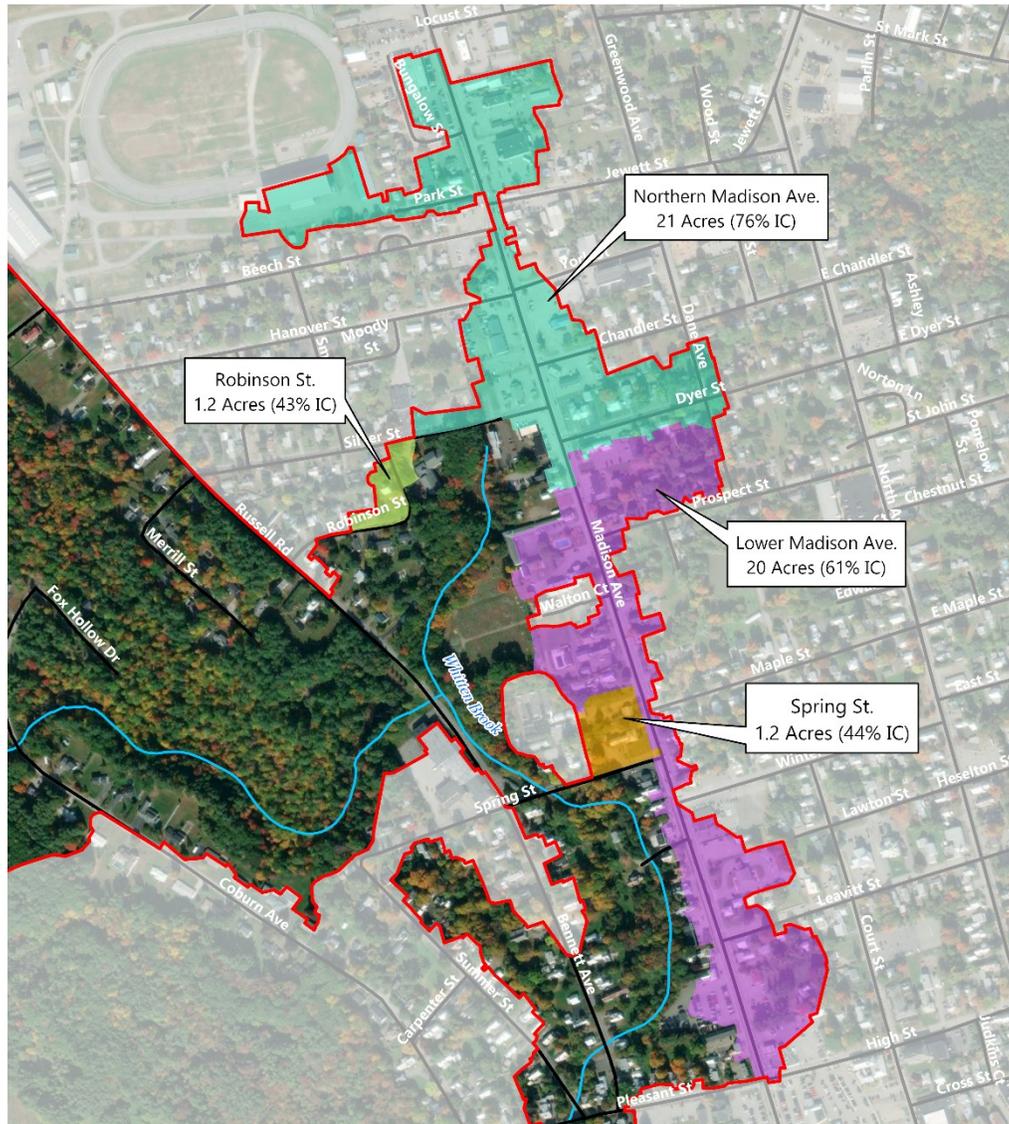


**Figure 1.** Subwatersheds of the larger Whitten Brook Watershed in Skowhegan, Maine.

The Whitten Brook watershed consists of three major subwatersheds (Figure 1):

- ▶ The **western branch** (217 acres), including the large area of undeveloped forestland west of Coburn Avenue and the CMP Right-of-Way;
- ▶ The **northern branch** (36 acres), which consists of the watershed area that flows to the unnamed tributary west of Madison Avenue;
- ▶ The **main stem** (51 acres) including the land area that flows to the area of Whitten Brook between the confluence of the two first order streams to the Kennebec River.

The Whitten Brook watershed also includes four subcatchments (Figure 2). These subcatchments are areas of land (like a subwatershed) but are driven by the location of the town’s stormwater system. This system effectively collects stormwater and directs it to a known location or “outfall.” The four subcatchments drain to four outfalls in Whitten Brook. This means that all the water and associated stormwater pollutants from parking areas, and roads flows directly to the stream without being treated first. This water can be highly toxic and flows in large volumes with high velocity during storm events.



**WHITTEN BROOK - OUTFALL CATCHMENTS**

Whitten Brook Watershed Boundary

Streams

Roads



Source: Maine Geolibary, FBE, USFWS (NWI), Vantor  
 Projection: NAD 1983 UTM Zone 19N  
 Map Created By: K. Goodwin, Ecological Instincts,  
 December 2025



Figure 2. Subcatchments based on the town’s storm drain system that drain to Whitten Brook.

The four outfall catchments for Whitten Brook include:

- ▶ **Northern Madison Avenue** exhibits the highest percentage of IC (76%) of all the subcatchments. The outfall is located on the east side of the unnamed tributary that flows to Whitten Brook between Madison Avenue and Robinson Street.
- ▶ **Madison Avenue** collects stormwater from all of lower Madison Avenue to Pleasant Street.
- ▶ **Robinson Street** includes a small (1.2 acre) subcatchment with a high level of IC (43%). The outfall is located on the west-side of the stream adjacent to the Northern Madison Avenue outfall.
- ▶ **Spring Street** is similar in size and comparable in IC to the Robinson Street subcatchment. The outfall is located on the east-side of Whitten Brook downstream of Spring Street.

The high percentage of IC (43-76%) in these subcatchments, has led to dramatic negative impacts to the stream as a result of increased stormwater runoff. Inadequate riparian buffers along some sections of the stream as well as the lack of stormwater treatment (including vegetated buffers) in developed areas of the watershed exacerbate the problems.

## POPULATION, GROWTH, & MUNICIPAL ORDINANCES

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### POPULATION AND FUTURE DEVELOPMENT

While population growth is currently slow in Skowhegan, there is potential for further development in the watershed, particularly the headwater areas of Whitten Brook which currently provides valuable natural habitat and ideal conditions for good water quality. Skowhegan has a shoreland zoning ordinance that was developed in 1991 and last amended on June 5, 2021. This ordinance protects only the portion of Whitten Brook below the confluence with the north branch and the western branch of the stream. The watershed action plan offers suggested measures to provide further protection of the stream and the watershed.



*An empty lot on Madison Avenue next to KFC ready for development.*

### MUNICIPAL ORDINANCES

Protecting natural resources starts with good municipal ordinances that meet or exceed the minimum state requirements. Ordinances that are up to date, provide clear consistent criteria and guidelines for development, and are adequately enforced provide the means by which to protect Whitten Brook water quality through responsible development.

Probably the most important ordinance for stream protection is administration and enforcement of local shoreland zoning regulations, required through the Mandatory Shoreland Zoning Act (MSZA). The State

created Chapter 1000 Guidelines for Municipal Shoreland Zoning Ordinances<sup>2</sup> to provide guidance that towns can choose to use for their own ordinances, or as guidance for adopting more stringent ordinances- as long as they are equally or more effective in achieving the purposes of the MSZA.

As part of developing this plan, an ordinance review was conducted by the Town of Skowhegan to assess the effectiveness of current ordinances and to develop recommendations for future improvements to these ordinances (Town of Skowhegan, 2025). The review found that the current ordinances provide at least the minimum protections required by the MSZA, and that the town's site review ordinance provides additional protections and provides an opportunity for the planning board to impose additional conditions to safeguard impaired resources.

***The shoreland zone** is defined as all land areas within 250 feet, horizontal distance, of the normal high-water line of any great pond or river, upland edge of a coastal wetland, including all areas affected by tidal action, upland edge of defined freshwater wetlands, and all land areas within 75 feet, horizontal distance, of the normal high-water line of certain streams.*

Although the town's SLZ protections follow the state requirements, they fail to protect first order streams including the western and northern reach of Whitten Brook. The watershed of the western branch is currently largely undeveloped and provides habitat for Whitten Brook's notable native brook trout population. While much of this undeveloped area is conserved land, a portion of the west branch watershed is not conserved and remains available for development. Given these areas of buildable land surrounding the western branch and the potential increase in IC from new development, there is a need to address guidelines for the future protection of Whitten Brook as land use changes.

Along with shoreland zoning ordinances, development around Whitten Brook is regulated by the town's Site Plan Review Ordinance, most recently updated in 2022. This ordinance regulates non-residential development and allows the town to review a site plan prior to construction to ensure that the development will not have adverse impacts on traffic patterns, stormwater flows, or other considerations, depending on the project. However, this ordinance does not require stormwater management plans for all development projects, but only for "major developments." It also includes minimum parking requirements for businesses, resulting in an additional barrier to the goal of reducing IC in the watershed.

In 2025, the Town prepared an updated Comprehensive Plan that outlines goals and priorities for future planning efforts (KVCOG, 2025). The plan highlights the value of Whitten Brook as a natural resource and its importance as a native brook trout fishery, and also details the history of restoration efforts in the stream including the 2011 WBMP and subsequent watershed improvements. The plan mentions the possibility of improving ordinances to reduce the impact of IC on Whitten Brook and other water resources and suggests reconsidering standards for parking requirements or requiring studies on stormwater impacts for all new developments.

<sup>2</sup> CMR 06-096, Department Rules Chapter 1000. A model regulation adopted in January 1988 and amended through January 2015.

Along with protecting vulnerable areas of the stream through improved shoreland zoning ordinances, measures to reduce IC in the watershed must be factored into development standards in order to improve stream health. The Town should continue to re-visit existing ordinances to ensure that stream protection is prioritized in future planning efforts. Ordinances that could be considered to help protect Whitten Brook and other small streams include ensuring that impaired headwater streams are included in shoreland zoning rules, and the site review ordinance is expanded to ensure adequate stormwater treatment for all new development and redevelopment.

## LAND COVER

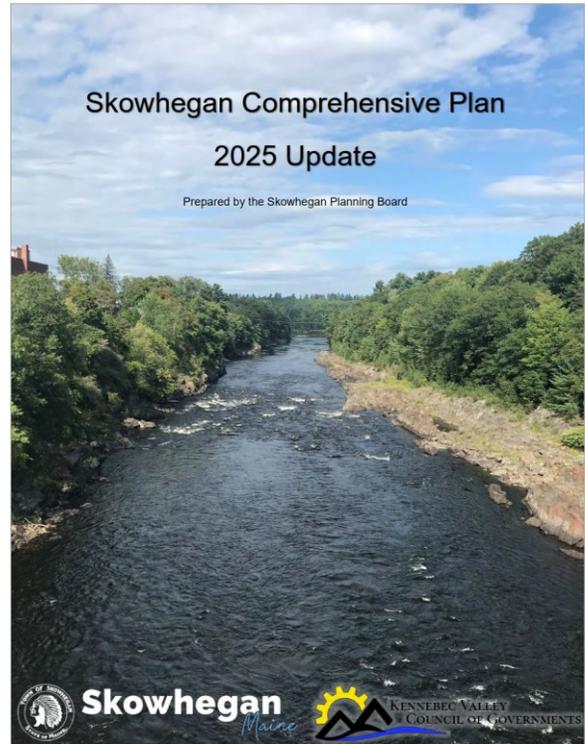
Land cover is the essential element in determining the extent of nutrients and sediments entering a waterbody from its watershed. For example, more intensive development such as commercial development, industrial development, and agriculture can contribute more runoff than a low-density residential property with natural landscaping. In addition, changes in land cover occur over time in a watershed as undeveloped forested areas are cleared for development.

A land use analysis was conducted as part of the 2011 Watershed Restoration Plan. The analysis showed that developed land in the watershed encompasses 44% of the total watershed area (Table 1). High intensity development dominates the developed land in the watershed (commercial and residential uses with impervious surfaces ranging from 50-100%).

**Table 1.** Land cover in the Whitten Brook watershed based on the 2011 analysis (Source: FBE 2011).

Land Cover Type	Area (ac)	% of Watershed
High Intensity Development	67.5	22%
Medium Intensity Development	20.4	7%
Low Intensity Development	12.2	4%
Developed Open Space	23.2	8%
Forest	170.7	65%
Other	10.2	3%
<b>Total</b>	<b>304</b>	<b>100%</b>

Based on recent aerial imagery, land use has remained relatively stable since 2011, with the exception of Coburn Avenue, which was lengthened recently for access to new residential development. Coburn Avenue now crosses Whitten Brook just downstream of the powerline easement (see 2025 updated IC analysis in



*Additional protections for Whitten Brook were described in Skowhegan's 2025 Comprehensive Plan update.*

Section 6). Although this change represents a small increase in the overall land use percentages in the watershed, a larger portion of the western branch watershed is more developed than in 2011, with nearly all of the non-conserved area fully developed. Forestland, dominated by deciduous forest, makes up 65% of the land area in the watershed (see land use map in Appendix A). The large area of undeveloped forestland in the western branch (or headwaters) of the stream is an important and beneficial feature of the Whitten Brook watershed. The Somerset Woods Trustees is a major landowner in the western branch and has made significant efforts to conserve this area in perpetuity (see conserved lands map in Appendix A). Unfortunately, the high percentage of developed land and IC in the remainder of the watershed has resulted in increased runoff and changes to the hydrologic characteristics of the stream.

## SOILS & GEOLOGY

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Soils in the watershed consist primarily of Adams loamy sand and Bangor very stony silt loam (see soils map, Appendix A). Approximately 73% of the soils in the watershed have high infiltration rates, while the remaining 27% have slow infiltration rates. Soils with slow infiltration rates are located primarily in the forested area within the western branch of Whitten Brook's watershed, and along the stream corridor. A combination of steep slopes, poor infiltration, and poorly planned development can lead to soil erosion, a major cause of stream degradation. The largest areas of highly erodible and potentially highly erodible land in the Whitten Brook watershed are located in the western branch, and in several areas along the stream corridor.

The surficial geology in the watershed is composed of three different types of glacial deposits (see surficial geology map, Appendix A). Fine grained deposits cover 44 acres (14%) of the watershed, coarse or medium grained deposits cover 115 acres (38%) of the watershed, and till covers 145 acres (48%) of the total watershed area. Glacial till includes a mixture of sand, silt, clay and stones and may include boulders. Till conforms to underlying bedrock and can also form drumlins and other glacial hills. Glacial till is most abundant in the upper (western branch) watershed in areas of steeper terrain. Coarse-grained glaciomarine deposits of sand, gravel, and minor amounts of silt are located in flat to moderately sloping areas of the watershed along the Madison Avenue corridor and along the main stem of Whiten Brook. Fine-grained glaciomarine deposits include sand, clay and minor amounts of gravel. This material is commonly referred to as clayey-silt (the Presumpscot Formation). Sand is dominant in some places but may be underlain by finer grained sediment.

## WATER RESOURCES AND WILDLIFE HABITAT

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Whitten Brook and its watershed provide valuable wildlife habitat, as well as having a direct impact on the health of the Kennebec River downstream. Riparian areas around the stream especially provide habitat benefits, especially when these riparian areas are forested or minimally disturbed. Healthy riparian zones are not only important for water quality but are essential for more than 60 species of Maine wildlife. More animals live in riparian zones than in any other habitat type in

**Riparian habitat** is the transitional area between aquatic habitats and dry, upland areas.

Maine, with hundreds of species depending on riparian zones for survival (ME Audubon, 2006). Sections of the riparian habitat in the watershed have been impacted by development and roads, especially in the main stem near Madison Avenue. Continued development could continue to diminish this valuable habitat - underlining the need for strong protection of the riparian zone and conservation of undeveloped land within the watershed.

There is only one large undeveloped forest block in the Whitten Brook watershed, located around the west branch of the stream. Much of this land is conserved as part of Coburn Woods, owned by SWT. This conserved land provides protection for the undeveloped forest surrounding the west branch watershed, in turn protecting both in-stream water quality and the quality of the riparian areas surrounding the stream. The town also owns a smaller parcel of land in the undeveloped area of the west branch watershed off of Russel Road, known as the Whitten Brook Conservation Area.

A significant sand and gravel aquifer (Type 1, 10-50 gallons/minute) underlies a portion of Northern Madison Avenue as well as portion of the western branch. The aquifer extends north and east of the fairgrounds outside of the watershed (see water resources map, Appendix A).

## **FISHERIES**

Whitten Brook is known to support a wild native brook trout fishery despite the urban setting and impacts of development in the watershed. This brook trout population is a valuable resource to local fisherman. However, limited data is available on the extent of the native brook trout population in Whitten Brook. According to Maine Department of Inland Fisheries & Wildlife, a small section of Whitten Brook was surveyed in 2009 and brook trout were documented. Follow-up studies on the size and extent of the wild native brook trout population in the stream (as well as other fish species) would provide valuable insight into the ability of the stream to support this fishery, and as a baseline for future restoration work in the stream and watershed.

## **FISH CONSUMPTION ADVISORIES**

The Maine Center for Disease Control and Prevention (CDC) has posted a fish consumption advisory for all freshwater fish in inland waters in Maine due to mercury contamination. The advisory warns pregnant and nursing women, women who may get pregnant and children under age eight not to eat any freshwater fish from Maine's inland water except brook trout and landlocked salmon (one meal/month is safe). All other adults and children older than eight years old can eat two freshwater fish meals/month and for brook trout and landlocked salmon the limit is one meal/week.

# 3. Water Quality Assessment

Water quality in Whitten Brook must meet Class B standards as defined under Maine’s Water Classification Program as designated by the Maine Legislature (*Title 38 MRSA § 464-468*). The Maine Legislature also defined designated uses for all classified waters, which state that “Class B waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life.” Table 2 (below) summarizes the narrative and numeric water quality standards applicable to Whitten Brook.

**Table 2.** Maine water quality criteria for Class B waters (38 MRSA § 465).

Parameter	Criteria for Compliance
<b>Designated Uses</b>	Water must be suitable for: drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; an unimpaired habitat for fish and other aquatic life.
<b>Dissolved Oxygen (year-round)</b>	May not be less than 7 ppm or 75% of saturation, whichever is higher
<b>Dissolved Oxygen (October 1-May 15<sup>th</sup>)</b>	In order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 ppm and the 1-day minimum dissolved oxygen concentration may not be less than 8 ppm in identified fish spawning areas.
<b><i>E. coli</i> Bacteria</b>	Between April 15 <sup>th</sup> and October 31 <sup>st</sup> , the number of <i>Escherichia coli</i> bacteria in these waters may not exceed a geometric mean of 64 CFU or MN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval.
<b>Discharges</b>	May not cause adverse impact to aquatic life, and the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the residential biological community.

Numerous assessments have been conducted in Whitten Brook to either directly or indirectly monitor water quality in the stream and to determine whether it meets these water quality criteria. These include biological monitoring, grab sampling by Maine DEP and volunteers, and continuous monitoring sensors installed in the stream by Maine DEP. Data for this analysis was available for the period of 2002-2022, collected at 12 different stations over this time period (Figure 3).

Biomonitoring data collected by Maine DEP between 2002-2006 indicated poor water quality based on macroinvertebrates in Whitten Brook when compared to Maine’s statutory Class B water quality standards, leading to the addition of Whitten Brook to the State of Maine’s Nonpoint Source Priority Watersheds List of threatened streams. Further biomonitoring efforts have been unsuccessful due to altered stream habitat (sandy substrates) and high-velocity storm flows. Ongoing inputs of polluted stormwater runoff from the urbanized portion of the watershed continue to need to be addressed.

Monitoring results (described below) provide additional information about stream health and will serve as a baseline as improvements are made to address water quality impairment. Changes in the biological community, levels of dissolved oxygen, temperature, and bacteria, as well as changes in levels of metals, chloride and other pollutants will provide information about the long-term health of the stream. The available data was assessed to provide a complete picture of water quality concerns in Whitten Brook (Ecological Instincts, 2025a).

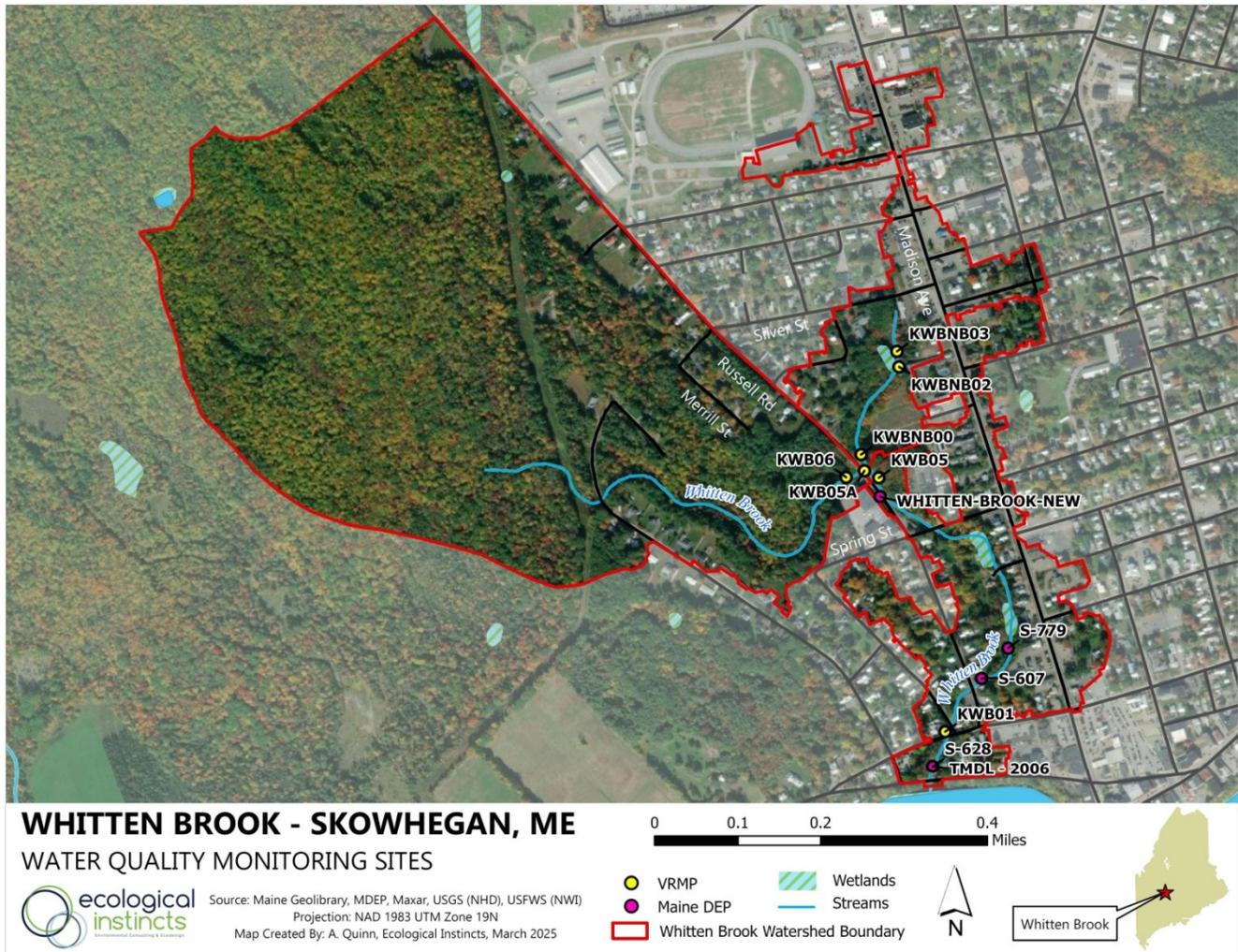


Figure 3. Whitten Brook water quality monitoring sites.

## BIOLOGICAL ASSESSMENT

### MACROINVERTEBRATES

Macroinvertebrates are useful as indicators because they capture the biological responses to pollution over their lifecycles, which can be multiple years. Chemical water samples only offer a snapshot of conditions at the time of sample collection. Macroinvertebrates live on the bottom of rivers, streams and wetlands, including in places where fish might be obstructed from accessing. They are also less able to avoid polluted

areas than fish. Macroinvertebrates have a wide range of pollutant tolerances and can be found in all but the most severely polluted or disturbed habitats. They are also relatively easy to sample using well-established sampling and analysis procedures. The abundance and generic richness of the macroinvertebrate community in the stream is determined by counting the number of species or genera in a rock bag, which is placed on the stream bottom for approximately four weeks. This allows time for the macroinvertebrates to colonize the cobble habitat within the rock bag. Biologists collect and preserve all accumulated material from the rock bag and collect physical data such as water velocity, dissolved oxygen, temperature, conductivity, substrate composition (sand, gravel, stones, etc.), and a physical description of the site and surrounding area (amount of tree cover, land use, etc.). In the laboratory, macroinvertebrates are separated from sediment and debris and identified to the lowest possible taxonomic level (usually genus or species).

***Aquatic Benthic Macroinvertebrates***  
*are aquatic animals without backbones that can be seen by the unaided eye and typically on the bottom substrate of a waterbody (e.g., rocks, logs, sediment, plants). Examples include: insects (e.g., mayfly, dragonfly and caddis fly larvae); aquatic worms; amphipods (scuds); leeches; clams and snails.*

Rock bags were deployed in Whitten Brook approximately 23 m upstream of the Elm Street crossing in 2002 and 2007. Monitoring results for 2002 and 2007 were similar. In both cases, the stream did not attain aquatic life standards for Class B or Class C streams. The number of sensitive organisms was found to be very low for a small coldwater stream like Whitten Brook.

Biomonitoring is generally conducted by Maine DEP on a five-year rotation, but in Whitten Brook, biomonitoring data was last collected in 2007. Biomonitoring efforts were planned for 2012, but due to increased amounts of unstable sandy substrate in the stream caused by erosion and stormwater runoff, this attempt was unsuccessful. Another unsuccessful attempt was made to conduct biological monitoring in 2022 at an upstream location below the confluence of the west branch and the north branch, during which the rock bag was buried in sediment and could not be retrieved.

## **ALGAE**

Biomonitoring of the algal community in Whitten Brook was completed by the DEP Biomonitoring Unit in 2002 at two stations on the main stem of Whitten Brook. Final determinations were not made on these samples. However, the report indicates a high abundance of salt-tolerant diatoms and nutrient tolerant diatoms compared to the reference range at SA-607 as well as a high abundance of nutrient-tolerant diatoms at SA-779.

## **DISSOLVED OXYGEN & TEMPERATURE**

### **DISSOLVED OXYGEN**

Dissolved oxygen (DO) is a measure of the amount of oxygen in the water that is available to plants and animals. DO concentrations below 5 ppm (mg/L) can stress fish populations and DO concentrations below 3 mg/L are too low to support fish (US EPA, 2025). DO is closely connected to water temperature because

cold water has the ability to retain more dissolved oxygen, helping to reduce physiological stress on aquatic organisms (Allan and Castillo, 2007).

DO measurements were collected in Whitten Brook in 2002, 2006, and 2007 as well as 2014 – 2017 and 2021 – 2022. In 2002 and 2007, DO data was collected as part of the DEP biomonitoring sampling events in July and August. In 2006, DO was collected as part of a baseline sample between August and September, as well as storm samples collected in November and December. DO was collected in 2014 – 2017 and 2021 - 2022 by VRMP volunteers every two weeks from mid-May to the end of September. All DO measurements were above the minimum criterion for Class B streams of 7 mg/L. The lowest measured DO concentration was 7.4 mg/L on July 1, 2002, on the main stem of Whitten Brook (S-628). Average DO was 9.2 mg/L in 2022, the last year data was collected. DO readings from all years ranged from 7.4 – 13.0 mg/L. The lowest readings were associated with summer sampling, while the highest readings correspond with winter storm samples in December.

## **STREAM TEMPERATURE**

Water temperature has an important influence on the health of aquatic life in the stream, especially for brook trout and other coldwater fish. These fish prefer waters colder than 18°C, and experience negative growth rates in waters warmer than 24°C. Other aquatic organisms can also be negatively impacted by high temperatures, and temperature changes can also affect other water quality parameters. Warm water holds less oxygen than cold water, and the rate of chemical reactions generally increases as water temperature increases (USGS, 2018).

Impervious surfaces absorb and emit heat, increasing the temperature of runoff that flows over them. Thus, heated stormwater runoff flows into and mixes with the stream, increasing the base temperature of the water and threatening the survivability of juvenile brook trout (references). Increases in stream temperature can also be caused by degraded canopy cover around the stream, which allows sunlight to fall directly on the stream and cause warming.

Temperature measurements were taken from in-stream loggers placed at two locations in Whitten Brook in 2014. Temperature ranged from 0.2°C to 24.7°C at the upstream site (KWBNB02) on the northern branch and 0.6°C to 19.8°C at the downstream site (KWB05) below the confluence with the western branch. Both sites recorded their highest value on August 8th. The loggers were deployed from late March to early October, with gaps in the measurements in early June to mid-June and early July to early August for the upstream data, and from early July to early August for the downstream data. Due to the presence of data gaps in the summer, some of the highest temperatures of the year may not have been captured by the data loggers. The hourly measurements of temperature only exceeded 24°C once in 2014, which was recorded at the upstream site (KWBNB02) in August.

Discrete sampling efforts between 2002 and 2022 captured a high of 18°C on August 11, 2021, measured at the outlet of the impounded western branch of the stream at Russell Road (KWB06). Temperature at this site is likely warmer than upstream where there are no impoundments and water is flowing freely. Excluding this site, the highest discrete temperature reading was 17.3°C, recorded in the main stem in 2006 and 2016 (TMDL-2006 & KWB01) and on the western branch below Russell Road in 2022 (KWB05A).

## BACTERIA

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Whitten Brook is classified as a category 4-A impaired stream because it does not meet Maine's Class B water quality criteria for *Escherichia coli* (*E. coli*) bacteria. For Class B streams, *E. coli* may not exceed a geometric mean of 64 CFU per 100 mL over a 90-day interval or 236 CFU per 100 mL in more than 10% of the samples in any 90-day interval between April 15th and October 31st. Three *E. coli* samples were collected by Maine DEP on August 30, September 28, and October 30, 2006, at the TMDL-2006 sampling site on the main stem of Whitten Brook, just north of Elm Street and the stream's outlet into the Kennebec. Of these, the two samples collected during baseflow conditions (August and September) ranged from 139 counts/100 mL to 261 counts/100 mL. The October sample was collected during storm flow conditions and had the highest *E. coli* levels at 579 counts/100 mL. Sampling notes from the 2006 monitoring season documented a sewage smell at the sampling site on two instances, as well as brown and white foam in the water on a third sampling date. High bacteria counts during base flow sampling conditions imply that there is/was a local source of contamination (i.e., leaky sewer pipes) rather than from stormwater. Since these initial samples were collected, improvements to the town sewer system have been made including replacing an aging pump station, replacing potentially leaky or obstructed pipes, and separating the combined sewer system.

In 2021 and 2022, trained volunteers with the Skowhegan Conservation Commission (SCC) collected *E. coli* samples in Whitten Brook at four stations. The range of instantaneous counts throughout the two years was 9 to 1120 counts/100 mL, indicating that the stream continues to occasionally exceed the instantaneous limit for bacteria impairment. There were just four instantaneous exceedances in 2021 and 2022, all of which were collected from site KWBNB03, the northernmost sampling site located near the Robinson Street outfall and just upstream of the Northern Madison Avenue outfall. The geometric mean of all seven sampling dates at this site is 128 counts/100 mL. Samples collected in June at this site did not exceed instantaneous criteria but did for every sample in July and August. Three out of four sites had the highest concentrations of *E. coli* in August samples. The site was with the lowest overall geometric mean was the upstream site on the west branch (KWB06). Future field reconnaissance (bracket sampling) is needed to determine the source of the elevated bacteria counts at the Robinson Street outfall, and more current monitoring is needed on the lower main stem to determine if improvements made to the town's stormwater system after 2006 resulted in lower *E. coli* concentrations at the downstream site near the confluence with the Kennebec River (TMDL-2006/S-628).

## NUTRIENTS

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Algal growth in streams depends on essential nutrients, phosphorus and nitrogen. Nutrient lab samples at Whitten Brook include total phosphorus, Total Kjeldahl Nitrogen, nitrite and nitrate, and ammonia. Total Kjeldahl Nitrogen is a test to measure all organic and reduced nitrogen. Nitrate (NO<sub>3</sub><sup>-</sup>), nitrite (NO<sub>2</sub><sup>-</sup>), and ammonia (NH<sub>4</sub><sup>+</sup>) are all accessible forms of nitrogen for algae. Total phosphorus (TP) measures all phosphorus, including dissolved phosphorus and phosphorus that may be in or adhered to particulates in

the water. Phosphorus and nitrogen levels in streams are impacted by fertilizers, manure from livestock, septic systems and erosion in runoff from the surrounding watershed.

Compared to recommended standards identified by the US EPA for rivers and streams in the ecoregion VIII (US EPA 2001), and Maine DEP's nutrient criteria for Maine streams, Whitten Brook frequently experiences elevated nitrogen levels and at least occasionally experiences elevated phosphorus levels, though phosphorus levels are generally below the DEP recommended standards. Nutrient samples were last collected in 2022 by Maine DEP, in 2006 as part of the TMDL, and in 2002 through the Maine DEP biomonitoring program. Nitrogen and phosphorus concentrations have only been measured on the main stem of Whitten Brook, which limits what conclusions can be drawn about where these nutrients originate in the watershed and how nutrient levels vary across the watershed.

## **NITROGEN**

Based on limited data collected at four stations between 2002 and 2022, nitrate and nitrite concentrations frequently exceeded the ecoregion VIII total nitrogen (TN) standard of 0.39 mg/L. Whitten Brook combined nitrate and nitrite concentrations ranged from 0.38 – 0.58 mg/L, with only one value below 0.39 mg/L (S-628 in August 2002). TKN concentrations were all below the standard of 0.27 mg/L; the highest of which was 0.2 mg/L at sites S-607 and S-628 on the main stem in July and August 2022, respectively.

## **PHOSPHORUS**

TP concentrations in Whitten Brook have ranged from 11 to 82 µg/L at four stations on the main stem between 2002 and 2022. Five of the eight TP samples were collected in 2006 at Station TMDL-2006, with one sample collected at the other three stations. With the exception of one sample collected just above the confluence with the Kennebec River (TMDL-2006) in December 2006 where TP measured 82 µg/L, all other samples were below the DEP maximum criteria of 30 µg/L TP for class B streams. The lack of consistent TP measurements in Whitten Brook limits conclusions that can be drawn about the data. More frequent and widespread collection of TP data in Whitten Brook should be a priority for future monitoring in order to create a baseline and to track changes over time and within different areas of the stream.

# **METALS, CHLORIDE, & OTHER POLLUTANTS**

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## **METALS**

Metals and other toxic pollutants (such as arsenic or DDT) are commonly found in high quantities in urban watersheds. These pollutants can be toxic in certain amounts or concentrations and are tested to protect aquatic life and human health. Aquatic life criteria are used to assure that toxic pollutants are not present in quantities or concentrations that would acutely or chronically harm organisms living within or relying on the stream. Human health criteria are used to assure that toxic pollutants are not present in quantities or concentrations that would harm humans who eat organisms or drink water taken from the stream.

Water samples collected in Whitten Brook between August 30 - December 6, 2006 (Station TMDL-2006) included 26 metals and metalloids such as arsenic, cadmium, chromium, copper, zinc and lead. Results of

this testing were compared to the US EPA aquatic life criteria where applicable. Concentrations of iron (Fe) exceeded the Criterion Continuous Concentration (CCC) in 50% of samples collected (2 out of 4), and lead (Pb) concentrations exceeded the CCC in 1 of 4 samples. Where these samples were collected almost 20 years ago, routine testing for metals should be established in Whitten Brook to provide more current information about the concentration of toxic metals in the stream (every 5 to 10 years and at more than one location).

## **CHLORIDE**

Maine DEP's criteria for chloride concentrations recommend that chloride concentrations not exceed an average of 860 mg/L for acute (one hour) exposures, and an average of 230 mg/L for chronic (4-day) exposures (DEP 06-096 Chapter 584). However, aquatic communities can be impacted by increases in chloride even when concentrations are below these levels, and chloride contamination should be minimized in streams as much as possible. In 2014, hourly specific conductivity (SPC) was measured in Whitten Brook using data loggers deployed by DEP at two locations (KWBNB02 on the north branch and KWB05 on the main stem). Inferred chloride concentrations were calculated based on SPC measurements collected by the loggers. The downstream inferred chloride did not exceed 230 mg/L at any point while the logger was deployed (3/27/2014 – 7/1/2014 and 8/4/2014 – 10/3/2014) and the highest inferred chloride was 181 mg/L at the end of March 2014. The inferred chloride calculated from the upstream logger data exceeded 860 mg/L for five readings with only two of these being consecutive readings where inferred chloride exceeded 860 mg/L for an hour. All of these exceedances occurred in late March or early April during periods when snow melt was likely causing excess chloride inputs from road salts, with the consecutive readings of over 860 mg/L occurring on April 16. At no point did inferred chloride exceed 230 mg/L for four days, although 230 mg/L was regularly exceeded for short periods in late March and early April at the upstream site.

SPC data was also collected between 2014 and 2022 by VRMP volunteers. This data was used to infer chloride levels in the stream by applying the same formula used by DEP for the logger data. Based on this formula, SPC levels of 895  $\mu\text{S}/\text{cm}$  would indicate a chloride level of 230 mg/L (limit for chronic exposure). Sampling by VRMP began no earlier than May in all the six years where SPC was measured. Therefore, significant chloride inputs that occurred in early spring could have been missed. Results of VRMP chloride sampling indicate that the north branch of Whitten Brook is most threatened by chloride stemming from the use of road salt along the Madison Avenue corridor. SPC was generally higher at sites in the north branch but remained below 895  $\mu\text{S}/\text{cm}$ , with values ranging from 164-865  $\mu\text{S}/\text{cm}$ . The maximum SPC in the main stem from discrete sampling was 460  $\mu\text{S}/\text{cm}$  at site KWB05-VRMP in July 2014, and the maximum recorded in the western branch was 355  $\mu\text{S}/\text{cm}$  at site KWB06-VRMP in August 2021. These numbers indicate that chloride levels in Whitten Brook are elevated due to impacts from road salt, and the effects are concentrated in certain locations in the stream (i.e., downstream of stormwater outfalls). Dilution from the largely undeveloped watershed around the western branch is likely to be mitigating the effects of road salt on downstream areas of the Whitten Brook.

## **OTHER POLLUTANTS**

Information gathered in 2010 revealed that legacy pollutants may be a concern for Whitten Brook. Legacy pollutants are pollutants such as PCB's, dioxins, DDT, or other substances that have already been banned from production or use that contaminated the soil near the stream or sediments within the stream at some time in the past. While there is no known additional load occurring, concentrations of these pollutants accumulate in aquatic insects, or make it difficult for animals to survive and thrive. These contaminants are difficult and expensive to control. The Whitten Tannery was at one time operating along the main stem of Whitten Brook. Local residents remember a dam on the stream at this location which created a pond for ice skating in the winter. It's possible that industrial wastewater was discharged to the stream/pond at this location contaminating sediments.

A gas station (later located at the site of the Whitten Tannery) reportedly dumped barrels of oil (on many occasions) into the pond at night, leaving an oily sheen in the water during the day. In 2010, local volunteers from the SCC noticed an oily sheen in the water at the Northern Madison Avenue outfall. Concern for the source of this oily sheen prompted an investigation by Maine DEP to conduct a hydrogeologic investigation to determine the source of the petroleum contamination. This 2012 study confirmed widespread soil contamination along the water table and contamination in groundwater samples from monitoring wells. The distribution of the petroleum concentration suggest several possible sources related to a former pump island on the Keyes property, on the southeastern portion of the property and behind the building. Clean-up of the contaminated soil at this site is ongoing using an air sparge system first installed in 2015, and updated with a bigger, more robust air sparge system in 2024. The new system is expected to run for several years.

Since 2010, Conservation Commission volunteers and DEP staff have documented an unknown source of fine, silty clay discharging from the two Madison Avenue outfalls. Clay particles suspended in the stream can degrade habitat by reducing the success of filter feeding insects and clogging fish gills, and may be evidence that clay is infiltrating in from the underlying soil through the pipe system. In September 2022, the Maine Department of Transportation (MDOT) conducted a CCTV survey for 88 feet of the stormwater drainage system connecting Madison Avenue to the outfall at Whitten Brook. The camera inspection indicated that the pipes were not compromised, but the bottom of the culvert at the outfall is rusted out, and according to Jason Finley, Road Commissioner for the Town, there is similar damage to the bottom of pipes within the storm drain system on Madison Avenue. MDOT has indicated they will be willing to replace this section of pipe in the future.

# 4. Stream and Watershed Assessments

In-stream conditions, riparian habitat conditions, and watershed characteristics were assessed as part of development of the 2011 Whitten Brook Watershed Restoration Plan. This included an analysis of the area of IC in the watershed, a Stream Corridor Survey consisting of a rapid habitat assessment and a rapid geomorphic assessment, and a stormwater Retrofit Reconnaissance Inventory (RRI). Since the 2011 plan, all of these surveys have been updated or improved upon. First, the stream corridor survey and rapid geomorphic assessment were followed by a more in-depth Fluvial Geomorphic Assessment conducted by Field Geology Services in 2013. This 2013 survey resulted in specific recommendations for accelerating the process of channel evolution and increasing geomorphic stability in Whitten Brook, along with a prioritized list of sites for remediation. In 2022, an updated RRI survey was conducted by Ecological Instincts to provide updated priorities, recommendations, pollutant reductions, and cost estimates for sites identified in the original survey, as well as to identify new RRI sites in the watershed. Finally, an IC analysis was updated in 2025 to account for recent changes and new development in the watershed.

## **STREAM CORRIDOR SURVEY**

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In August 2010, staff from FB Environmental, Maine DEP, and volunteers from the SCC conducted a Level 1 Stream Corridor Survey for Whitten Brook consisting of a rapid habitat assessment and a rapid geomorphic assessment. This survey was meant to identify high-quality coldwater habitat as well as severe habitat or water quality problems. This survey provided a general understanding of geomorphic and habitat conditions in the stream on a screening level.

### **RAPID HABITAT ASSESSMENT**

The rapid habitat assessment divided the stream into three major areas and nine stream reaches based on physical characteristics of the stream as well as man-made structures such as road crossings. Parameters observed/measured include habitat types (pool, riffle, run), stream substrate embeddedness, frequency of coarse woody debris (aka large wood), water appearance and odor, riparian vegetation, water temperature, and streambank and channel characteristics.

Most reaches were categorized as having poor habitat conditions in the main stem of Whitten Brook, while only three reaches were rated "fair": the southernmost reach on the mainstem near the outlet into the Kennebec River, the north branch, and the west branch (Figure 4). A majority of the stream has at least one bank with steep, eroding slopes above the stream, and vertical undercut banks at the stream. Degradation

of natural streamside plant cover and collapsed banks were both common. Discharging pipes (including storm drain outfalls) and/or ditches are present in all but one of the nine stream reaches, carrying storm water and attached sediment and pollutants, and causing erosion where the water meets the stream. Macroinvertebrates were found occasionally, but not in abundance, with the exception being the last reach before Whitten Brook flows into the Kennebec River where macroinvertebrates were abundant in riffles in the lower portion of the reach.

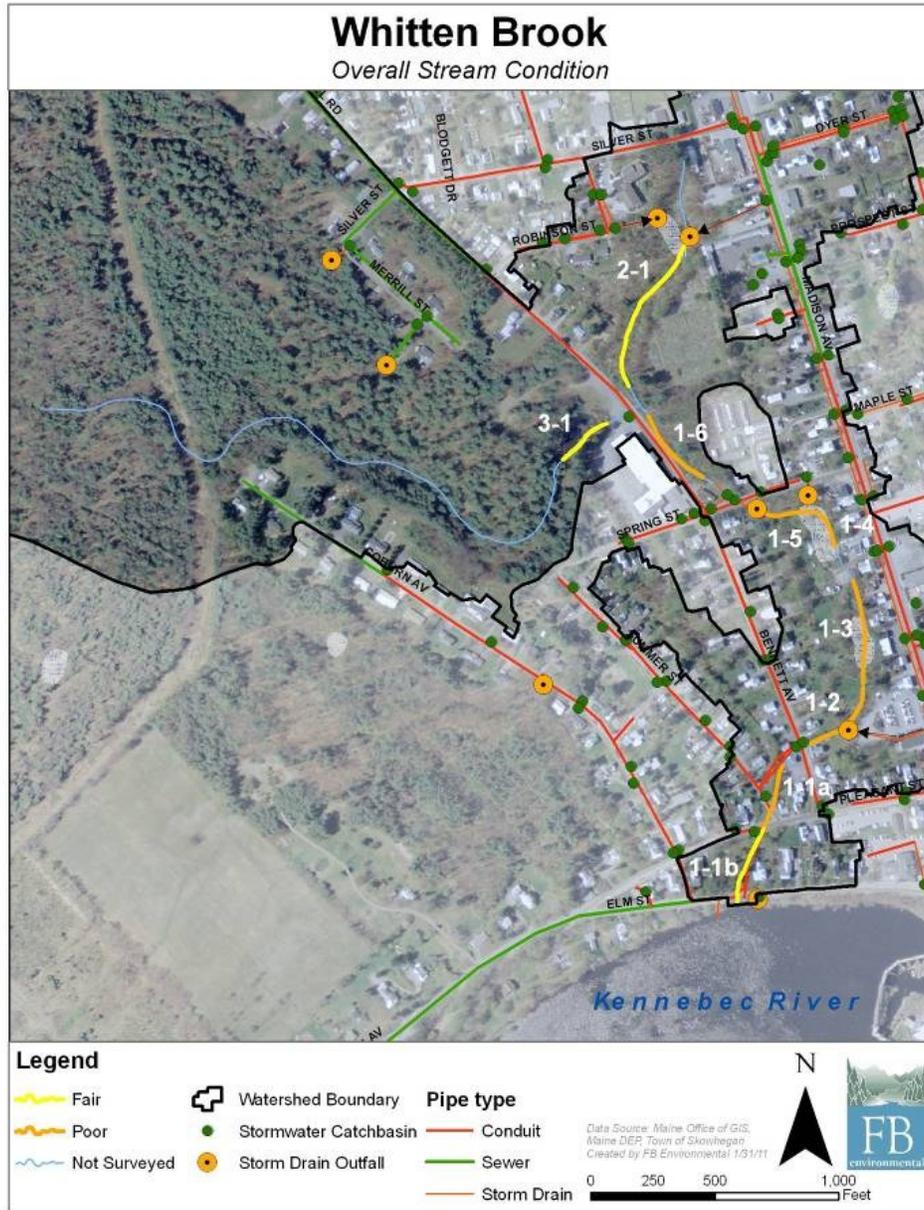


Figure 4. Overall stream condition for Whitten Brook from the 2010 Watershed Study.

### RAPID GEOMORPHIC ASSESSMENT

A Rapid Geomorphic Assessment (RGA) provides screening-level information about the fluvial geomorphological characteristics of the stream (shape and stability of the stream) including the physical

processes related to water and sediment transport through the stream system. Results from the 2010 RGA (FBE, 2010) were grouped into three major geomorphic conditions in order of condition from best to most affected, where: 1) In Regime; 2) In Transition or Stressed; 3) In Adjustment. Whitten Brook is currently “In Transition or Stressed” based on the RGA. Five of the nine survey reaches meet this condition, while three reaches were noted to be “In Adjustment.” The three reaches that were “In Adjustment” are all reaches that receive high volumes of stormwater from impervious surfaces in developed areas of the watershed.

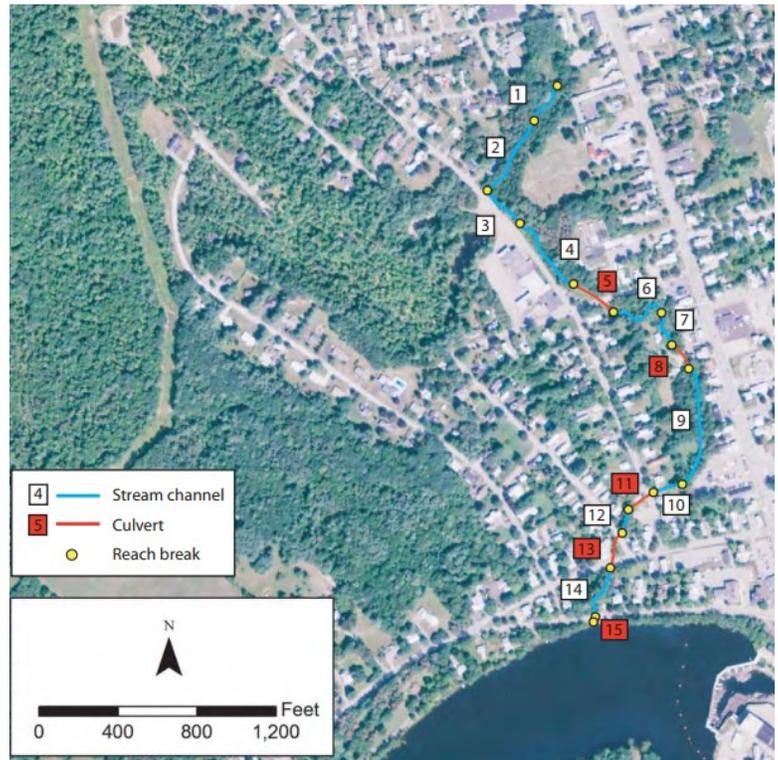
**Geomorphic Condition of Whitten Brook:**  
*“In Transition or Stressed”*

## FLUVIAL GEOMORPHIC ASSESSMENT

The fluvial geomorphic assessment completed by Field Geology Services (FGS, 2013) provides a more in-depth look at the geomorphic condition of Whitten Brook, along with recommendations for improving habitat and geomorphic stability in the stream. The assessment included an analysis of historical conditions and alterations to the stream, delineation of reaches, mapping stream channel conditions in each reach, topographic surveys, and development of restoration options.

While most industry in Skowhegan has historically been focused on the Kennebec River, Whitten Brook has also been impounded for industry and irrigation. An impoundment was present just upstream of Whitten Court throughout most of the 1900s, originally used by a tannery and then by a greenhouse until the 1970s. With the removal of this dam, the stream channel has incised through the sediments that had built up behind the impoundment, causing the sediment to be transported downstream. Given that the dam was used by a tannery, further investigation of these sediments may be necessary to determine if any pollutants related to tannery wastes may be present and impacting water quality in the stream. Along with this impoundment, portions of the stream have been artificially straightened in the past, causing changes in stream velocity and reduced habitat diversity.

For the purposes of this survey, Whitten Brook was divided into 15 reaches in which in-stream conditions are relatively homogeneous throughout the length of the reach. Four of these reaches are long culverts where the stream flows through a culvert for 150 ft or more (Figure 5). Locations of channel features



**Figure 5.** Whitten Brook stream reaches (Source: FGS, 2013).

including bank erosion, armoring, mass failures, stormwater inputs, deep pools, large wood, and culverts and stream crossings were mapped to provide information about the relationship between these features. One major cause of channel instability identified by this assessment is undersized culverts causing deposition upstream and erosion downstream of the culverts. Channels that have been artificially straightened in the past has also caused bank incision, leading to increased bank height in the straightened reaches and deposition of sediment downstream, causing decreased bank height and channel widening downstream. The survey also revealed that large wood is unevenly distributed along the channel, with long stretches (up to 200 ft) of the stream having no large wood in the channel.

Results of the fluvial geomorphic assessment were used to develop recommendations for restoring in-stream habitat and channel stability. The goal of in-stream restoration options is to accelerate the natural process of channel evolution, by which incised and otherwise de-stabilized channels return to a more stable geomorphic position over time. Currently in Whitten Brook, factors such as IC and inadequate infrastructure (undersized culverts) are preventing or slowing the natural process of channel evolution by causing repeated channel erosion. Improving stormwater management, upgrading infrastructure, and reducing IC and its impacts are essential before conducting in-stream restoration work in order to ensure that channel evolution can proceed uninhibited once in-stream management practices are installed.

The major recommendations for in-stream restoration in Whitten Brook are to improve and enlarge culverts that are constraining the stream, and to add large wood (aka woody debris) to key reaches of the stream. Additions of large wood are an effective method for accelerating channel evolution and stability, as well as for increasing flow complexity and habitat diversity within the stream. The stream reaches were prioritized for wood additions based on current stream conditions and the potential benefits that wood additions could provide (Table 3).

**Table 3.** Wood addition priorities for Whitten Brook reaches (Source: FGS, 2013).

Priority	Reach	Design goals	Notes
1	1	Increase roughness to buffer high flows	Promote sediment deposition to reduce channel degradation and stabilize banks
2	7	Sediment deposition	Slow rate of incision into legacy sediments
3	9	Bank stabilization	Very unstable banks downstream of Whitten Ct culvert
4	10	Bank stabilization	No riparian buffer, anchor wood to prevent mobilization
5	12	Provide structure for improved habitat	Anchor wood to prevent mobilization
6	14	Provide structure for improved habitat	Anchor wood to prevent mobilization
7	2	Increase roughness to buffer high flows	Additional wood to further buffer high flows
8	6	Bank stabilization	Use wood to stabilize banks in lower portion of the reach
9	3	Bank stabilization	Deploy wood along Russell Road to lower risk to infrastructure
10	4	Additional structure	Habitat good, but could be improved

# STORMWATER RETROFIT RECONNAISSANCE INVENTORY (RRI)

Stormwater retrofits are structural stormwater management practices that can be used to address existing stormwater issues. In order to assess the potential for on-site stormwater retrofit opportunities in the Whitten Brook watershed, a Stormwater Retrofit Reconnaissance Inventory (RRI) was conducted in August 2010. The survey focused on areas with the highest percentage of IC (four major stormwater outfall catchments). An updated RRI was conducted in 2022 by Ecological Instincts to provide updated cost estimates, pollutant load reductions, and recommendations (Ecological Instincts, 2023). The 2022 survey also included a desktop analysis of less highly developed residential areas to estimate potential stormwater reductions from those areas.

Thirty-three sites were identified as potential stormwater retrofit opportunities in the 2010 RRI. With a few exceptions, retrofit opportunities were located in privately owned commercial parking lots, or within the state right-of-way along Rt. 201 (Madison Avenue). Two of the originally identified sites were addressed by the landowners prior to the 2022 survey, and one site was deemed not feasible and was therefore not visited in 2022. Twenty-seven of the original sites were re-visited during the 2022 survey, including all of the high and medium-priority sites and a majority of the low impact sites. The updated survey results included a total of 38 sites that contribute polluted runoff to Whitten Brook. Two of the sites were deemed highest priority, based both on field observations and the priorities identified by past studies, including the 2013 fluvial geomorphic assessment.

Results of the updated RRI were used to determine potential pollutant load reductions that could be achieved by implementing BMPs at the identified retrofit sites (Table 6). Percent reductions in effective IC that could be achieved through addressing these sites were also calculated. Addressing all RRI sites would reduce effective pervious cover by an estimated 37%, along with reducing the load of total suspended solids (TSS) by 13,433 lb/yr, reducing total phosphorus inputs by 13 lb/yr, and reducing zinc inputs by 27 lb/yr (see Section 7 for more information about pollutant load reductions).

## ADDRESSED AND IN-PROGRESS SITES

### Madison Avenue Detention Basin

Maine DEP and MDOT have been working in partnership with local stakeholders since 2010 to determine the best possible treatment of stormwater runoff from the northern Madison Avenue drainage. In 2014, the MDOT developed a conceptual design for upgrading the detention basin. This conceptual design was



*Project consultants investigating a storm drain during the 2022 Stormwater RRI update.*

evaluated by project partners in 2022, along with a camera inspection of the storm drain system surrounding the detention basin. Improvements will aim to reduce stormwater volume and remove pollutants in this upper portion of the stream, thereby helping to alleviate stressors in the lower portion of the stream. As part of the development of this WBMP, a detailed engineered design was developed for the project.

### Addressed RRI Sites

During the first phase of US EPA Clean Water Act Section 319 funded implementation projects (completed in 2012-2014), one site identified during the 2010 RRI was addressed. This site is located at the Whitten Brook Conservation Area. Improvements included removing pavement and compacted gravel, installing an impervious parking area, installing a hybrid bioretention cell, and adding check dams to the adjacent road ditch. An educational sign was also installed near the parking area, describing the water quality problems that Whitten Brook is facing and outlining all the BMPs installed at the site. Re-visiting this site in 2022 confirmed that the detention cell is still functioning properly and that vegetation within the basin is well-established.



*BMPs installed at the Whitten Brook Conservation Area are functioning properly and vegetation is well-established.*

One additional site was discovered to have been completed independently by the landowner during the 2022 updated RRI. Improvements included removing some existing pavement in unused parking areas and re-grading the parking lot to flow toward vegetated areas instead of into the road. The landowner also installed a catch basin going directly into the ground near the back of the property to drain part of the driveway.

## IMPERVIOUS COVER ANALYSIS

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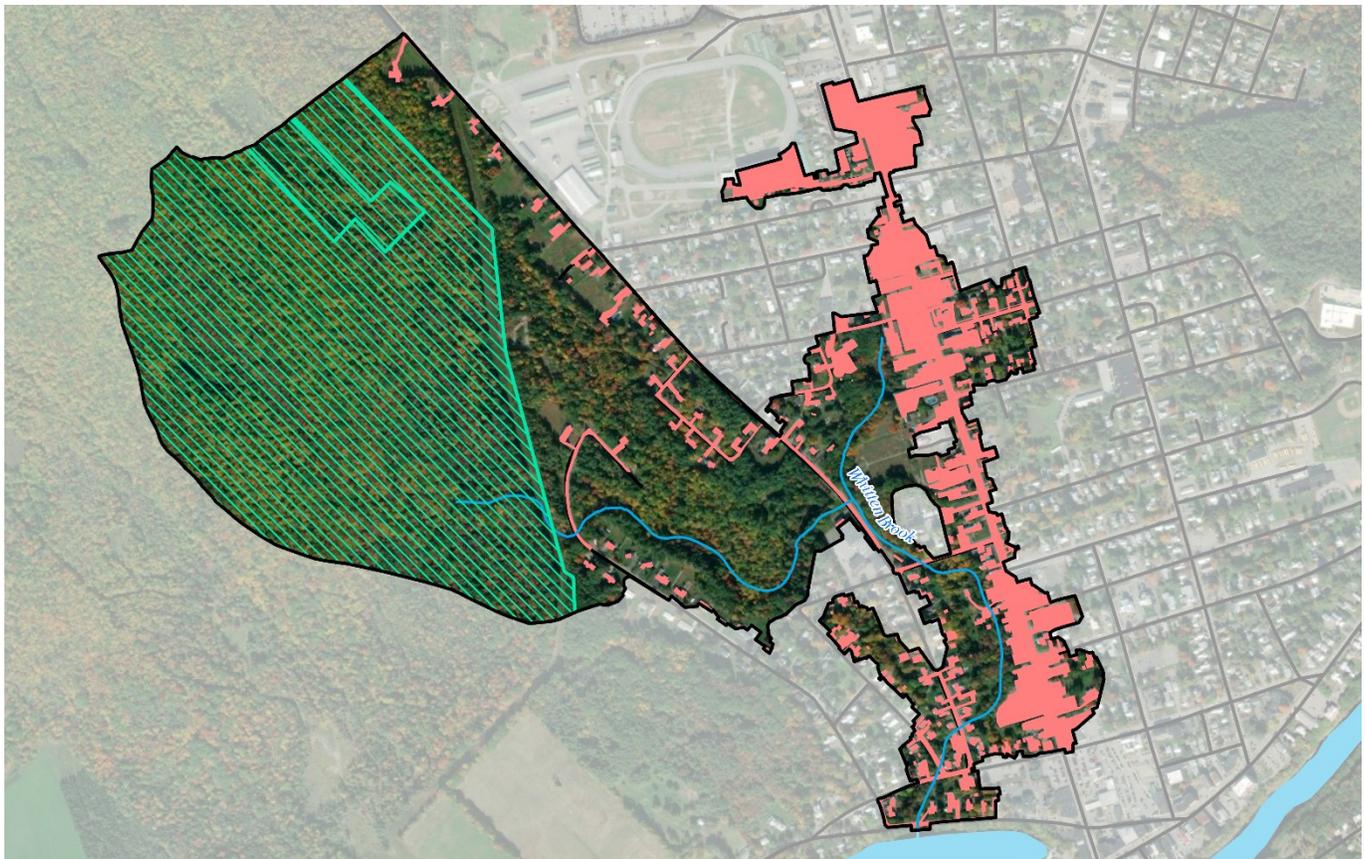
Increases in IC pose significant risks to streams. Watersheds exceeding 12% IC often fail to meet aquatic life criteria and narrative water quality standards (Stanfield and Kilgore, 2006). Other research has shown that sensitive species of fish may decline in watersheds with 4-6% IC or less, and declines in sensitive macroinvertebrate species can occur at very low levels of urbanization (Wenger et al, 2008).

Whitten Brook's watershed is highly developed, especially in the sub-watersheds of the north branch and the main stem, which consist of areas of intense commercial and residential development surrounding Madison Avenue. The 2011 Whitten Brook WBMP estimated the total area of IC in the watershed to be approximately 43 acres, or 14% of the total watershed area. Since this analysis, development has continued in the watershed. To measure these changes, the 2011 IC layer was compared to the NOAA's 2023 nationwide IC layer. Both layers contain some inaccuracies, so for the sake of consistency, the 2011 IC layer

was used as a baseline and updated to include areas where new IC had clearly been added based on aerial images dating back to 2007. This resulted in an addition of 2.16 acres of IC, for a total of approximately 45 acres of IC in the watershed (Figure 6). This IC is made up primarily of parking lots, with another large portion made up of buildings and roads (Table 4).

**Table 4.** Types of IC in the Whitten Brook watershed.

Type of IC	Total Area (Ac)	% of Watershed Area	% of Total Watershed IC
Building	12.3	4%	27%
Driveway	3.7	1%	8%
Parking Lot	16.9	6%	38%
Road	11.9	4%	27%
Sidewalk	0.1	0%	0%
<b>Total</b>	<b>44.8</b>	<b>15%</b>	<b>100%</b>



**WHITTEN BROOK WATERSHED - IMPERVIOUS COVER**



**Figure 6.** 2025 updated impervious cover in the Whitten Brook watershed.

# 5. Establishment of Water Quality Goals

The purpose of the Whitten Brook WBMP is to improve water quality and in-stream conditions in Whitten Brook so that the stream: 1) attains water quality classification standards; and 2) supports a healthy native brook trout fishery. This can only be achieved with the commitment of a coordinated group of local community leaders, conservation groups, state and federal partners, and citizens of the watershed working together to accomplish common goals and objectives (Table 5).

*Table 5. Whitten Brook watershed restoration objectives..*

Goals	Watershed Restoration Objectives
<b>Improve Water Quality</b>	<b>Urban Pollutants:</b> manage sources and transport of urban stormwater pollutants and nutrients to restore and protect watershed health and achieve applicable water quality standards (including supporting diverse and healthy aquatic communities).
	<b>Bacteria:</b> track sources of elevated bacteria levels and upgrade wastewater systems as needed to reduce bacteria levels.
	<b>Chloride:</b> reduce salt use throughout the watershed where feasible to prevent groundwater contamination and protect aquatic life.
<b>Improve Physical Habitat</b>	<b>Aquatic Habitat:</b> improve aquatic habitat quality and diversity to support healthy aquatic communities.
	<b>Terrestrial Habitat:</b> improve riparian habitat extent and quality to support healthy riparian and terrestrial communities and to protect stream health.
<b>Improve Hydrology</b>	<b>Stream Flow:</b> reduce IC and increase runoff infiltration and detention areas to normalize stream hydrographs and reduce stormwater flow to the stream.
	<b>Channel and Floodplain Conditions:</b> reduce constraints to stream flow and include additions of large wood in the stream to improve habitat quality and diversity and to improve stream stability and natural hydrologic functions.

Findings from evaluations of water quality and in-stream habitat indicate that reducing the impacts of IC in the watershed is an important component of the long-term strategy to restore water quality in Whitten Brook along with addressing in-stream habitat and inadequate stream crossings in the north branch and main stem.

The watershed action plan (Section 6) outlines the actions needed to achieve the water quality goals. Increased and concentrated stormwater runoff from IC is one of the leading causes of habitat degradation in Whitten Brook, leading to aquatic life impairment. Stormwater inputs also contribute pollutants to the stream, causing elevated chloride and nutrient levels that may be contributing to impairment. In addition to aquatic life impairment, Whitten Brook is also not meeting water quality standards for bacteria levels in some parts of the stream. Locating the source of bacteria inputs and addressing them is an important component of restoring Whitten Brook.

Reducing the impacts of stormwater runoff and taking steps to improve water quality and habitat in Whitten Brook can be achieved in part by installing BMPs at 20 RRI sites throughout the watershed, upgrading the detention basin to treat stormwater at the northern Madison Avenue stormwater outfall, and addressing runoff at 50% of residential properties (Section 6).

In addition to the actions above, two primary strategies to improve in-stream habitat include adding large wood at four priority stream reaches and improving and replacing three priority culverts that constrain the stream, and improving riparian buffers.

### **IC REDUCTION TARGETS**

**Timeframe:** 2026- 2035

**Detention Basin:**  
9 acres treated

**Urban Stormwater Retrofits:**  
2 acres treated

**Residential Areas:**  
50 properties addressed

**Total Effective IC Reduction:**  
13 acres treated

# 6. Watershed Action Plan & Management Measures

Many of the recommendations to restore Whitten Brook are referred to as Best Management Practices (BMPs). BMPs are conservation practices that are designed to minimize the discharge of stormwater and associated pollutants to the stream from impervious surfaces in the watershed. Examples of recommended BMPs include revegetating previously paved areas, installing bioretention areas and rain gardens, using rain barrels to capture roof runoff, and cleaning out catch basins.

## **WATERSHED RESTORATION & STORMWATER BMPS**

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Whitten Brook contains approximately 45 acres of IC, with the largest and most connected IC in the Madison Ave/Rt. 201 corridor. The RRI survey conducted in 2010 found that the majority of impervious surfaces in the watershed have no existing stormwater treatment in place, and that large quantities of stormwater are discharged directly to Whitten Brook via four major outfalls. The updated RRI survey in 2022 confirmed that little has changed, and much of the stormwater collected from impervious services along Madison Avenue still flows directly into Whitten Brook through a few major outfalls with little treatment. Sites identified in the 2010 RRI survey were prioritized for remediation based on the level of impact that the site is having on the stream, along with the ease of implementation for each site. These priorities were modified based on the 2022 RRI survey as needed.

An overall goal and focus of watershed restoration and stormwater retrofits is for the Whitten Brook watershed to eventually exhibit the characteristics of a watershed with 9% IC (currently at 14%). Focus areas for implementation of structural BMPs should utilize the list of 33 prioritized retrofit sites in the watershed, with immediate efforts focused on the highest priority sites. Prioritizing retrofit sites will help direct restoration efforts.

### **DETENTION BASIN RETROFIT**

The highest priority site identified in the 2010 RRI survey and again during the 2022 RRI Update is the Northern Madison Avenue outfall. An existing detention basin near the outfall provides some filtration for runoff from surrounding areas, but does not receive water from the stormwater outfall which drains most of the watershed of the north branch of Whitten Brook. A Basis of Design Report and 90% Plan Set was developed by Sevee & Maher Engineers in 2025 for retrofitting the existing detention basin (Appendix D). This included preparing a hydrologic model for the watershed and stormwater system to determine peak flow rates for the outfall, providing three options for basin retrofit strategies, modeling the impacts of these three options on overall flows and pollutant loads, and providing cost estimates for the three options. These options were presented to the WBMP Steering Committee and a final design option was selected based on costs and water quality benefits.

Implementation of the design would reroute stormwater from the Madison Ave outfall to the retrofitted detention basin, effectively slowing down the flow of stormwater entering the stream during storm events and raise the height of the existing berm at the outlet of the detention basin, thereby increasing the holding capacity of the basin and releasing water more slowly into the stream, and reducing the velocity of storm flows. Water will need to be routed to the detention basin by the Town by using a gate valve during the spring, summer, and fall, and readjusted to bypass the detention basin in the winter months in order to flush chloride from winter road salts down the stream and reduce infiltration of chloride into the groundwater. Implementing this design plan is expected to reduce channel erosion in the northern branch of Whitten Brook, and result in positive impacts to downstream stream segments by reducing velocity in the stream overall during storm events and reducing erosion and sedimentation throughout the stream.

A major barrier to installing the detention basin design is acquiring access to the land where the detention basin is located. The Town is in communication with the landowner to negotiate access. Access to the site will also need to be negotiated with other abutting landowners. Once permission has been granted from the landowner, a final design will be needed along with bids from contractors, and funding for construction. An operations and maintenance plan will be needed to ensure that required maintenance will be completed in a timely manner so that the detention basin continues to function as intended. A detailed planning schedule, potential funding sources, and estimated costs for each of the six detention basin retrofit actions is provided in Table 8A.

**IMPROVEMENTS AT OTHER STORMWATER RETROFIT SITES**

While the detention basin retrofit is expected to improve conditions throughout Whitten Brook, additional stormwater retrofits are needed to slow and infiltrate runoff from other areas of the watershed, especially from the southern portion of Madison Avenue. The 2022 updated RRI survey identified two sites as highest priority (one being the upper Madison Avenue detention basin), five sites as high priority, and 15 sites as medium priority for stormwater retrofits. Recommendations for improvements at these sites include reducing pavement and re-vegetating previously paved areas, installing bioretention areas and rain gardens, using rain barrels to capture roof runoff, and cleaning out catch basins. A list of RRI sites, cost estimates, proposed BMPs, and load reduction estimates for each site is provided in Appendix B.

An analysis of potential pollutant load reductions for RRI sites was completed by FBE in 2010 and was recalculated as part of the 2022 RRI update by Ecological Instincts. The analysis estimates the amount of total suspended sediments (TSS), total phosphorus (TP), and zinc (Zn) delivered to the stream in the absence of stormwater controls (BMPs), with stormwater controls, and the estimated percent reduction for each parameter (Table 6). In addition to the significant reductions that can be expected

**Table 6.** Estimated loading and load reductions for stormwater retrofit sites in the Whitten Brook watershed.

	<b>TSS (lb/yr)</b>	<b>TP (lb/yr)</b>	<b>Zn (lb/yr)</b>
<b>Load without BMPs</b>	21,505	108	43
<b>Load with BMPs</b>	8,072	94	16
<b>% Reduction</b>	<b>62%</b>	<b>12%</b>	<b>62%</b>

for TSS, TP and Zn, proposed retrofits are estimated to treat 53% of the IC at these sites, and reduce effective IC by 37% across the watershed (16 of 45 total acres of IC in the watershed) (Table 7).

**Table 7.** Total IC treated and estimated reductions for retrofit sites in the Whitten Brook watershed.

Estimated IC for RRI Sites (acres)	Estimated IC Treated (acres)	Estimated % Reduction in Watershed Effective IC
37	20	37%

This plan recommends reducing erosion issues at the Spring Street stormwater outfall and addressing all seven of the highest and high priority sites identified in the RRI survey, including the detention basin and three high priority state road sites located on Madison Avenue. Additional actions recommended in the plan aim to address high and medium priority sites by preparing concept designs, conducting outreach, and providing incentives to landowners for installing BMPs. A detailed planning schedule, potential funding sources, and estimated costs for each of the six stormwater retrofit and outfall improvement actions is provided in Table 8A.

## OTHER STORMWATER REDUCTION STRATEGIES

As part of the 2022 RRI update, a desktop analysis was conducted to estimate the number of residential properties in the watershed. The analysis found that there are approximately 101 residential properties in the watershed, each including areas of IC (rooftops, driveways, etc.) that have the potential to contribute excess stormwater runoff to Whitten Brook. Impacts from residential areas could be reduced by installing rain barrels, gutters and drywells, or vegetated buffers to slow runoff and disconnect it from the stormwater system. This plan recommends providing free technical assistance and discounted materials to landowners to implement these strategies. Along with targeting residential properties, the plan recommends implementing strategies to reduce parking and impervious surfaces throughout the watershed through education, ordinance improvements, and acquiring funding for pavement removal projects.

## IN-STREAM RESTORATION

Along with addressing impacts from stormwater runoff from the watershed, in-stream restoration is essential to ensure the long-term health of Whitten Brook. The 2013 Fluvial Geomorphic Assessment identified a number of problems that are impacting habitat diversity and quality in Whitten Brook. These include artificial channel straightening, long sections of the stream passing through culverts, and channel incision and bank erosion from stormwater runoff. Repeated high-velocity stormwater inputs to the stream have prevented natural processes of channel evolution from occurring in Whitten Brook. Addition of a detention basin at the northern Madison Avenue outfall, along with installation of other BMPs in the watershed will reduce the frequency and intensity of high-velocity stormwater flows, allowing in-stream restoration strategies to be successfully implemented downstream.

Two primary strategies to improve in-stream habitat include: 1) additions of large wood at key points in the stream, and 2) improving and replacing culverts that constrain the stream. The assessment also provides a list of priority areas for implementing each of these strategies (Table 3, Section 4). Next steps to complete

improvements at these sites include preparing conceptual designs for wood additions, developing plans for culvert improvements, and acquiring funding to support these projects. A detailed planning schedule, potential funding sources, and estimated costs for each of the four in-stream restoration actions is provided in Table 8B.

## PREVENTING NEW SOURCES OF POLLUTION

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Preventing new sources of NPS pollution from getting into Whitten Brook is imperative to the success of the management strategies described above. Without adequate development standards, continued development in the watershed will continue to worsen the impacts of stormwater runoff on Whitten Brook. Municipal ordinances should be strengthened to ensure proper treatment of stormwater from new and existing development. Proper maintenance of stormwater systems and improved road salting, street sweeping, and catch basin cleaning are also important to reducing pollutant levels in stormwater that flows to the stream, and ensuring that stormwater systems are functioning properly. Continued land conservation efforts in strategic areas of the watershed will help to reduce negative impacts from future development. A detailed planning schedule, potential funding sources, and estimated costs for each of the ten actions to prevent new sources of pollution is provided in Table 8C.

Adequate street sweeping, including commercial parking areas can significantly reduce sediment loads and play a major role in source reduction. However, reductions can vary depending on the type of equipment used (vacuum vs. mechanical street sweeper), and the frequency of maintenance (monthly vs. bi-annually). on the order of 10-20%

*Implementation of non-structural BMPs will result in an estimated 10% reduction in pollutants to Whitten Brook.*

Depending on cleanout frequencies of catch basins, it is expected that the range in annual pollutant removal efficiencies of 18-35% for total solids (TS) (which includes sediment and organic matter) and less than 1-2% for TP. The expected range in pollutant removal rates from street sweeping is 9-31% for TS, and 3-8% for TP. The lower end represents monthly street sweeping by a mechanical street sweeper, while the upper end characterizes the pollutant removal efficiencies using regenerative air/vacuum street sweeper at weekly frequencies (Law et al., 2008). A conservative estimate for Whitten Brook would therefore be a 10% reduction in pollutants watershed-wide as a result of planned non-structural management measures.

The Town of Skowhegan has an existing street sweeping/catch basin cleaning/storm drain maintenance program that involves systematically sweeping every street in town to clear them of winter sand at the end of March each year. Once completed, the town systematically sweeps a different region of town every Friday through spring and summer to keep roads clear of dirt, sand and debris. Every catch basin in town is cleaned of sand and debris once a year after the street sweeping is complete, and before the beginning of May. However, better records are needed to document the condition of catch basins during inspections/cleaning, the amount and type of material used in order to help track which catch basins need repairs and which are collecting the most sediment/debris on an annual basis. Actions to reduce impacts

from road maintenance are outlined in Table 8C and includes working collaboratively with MDOT to develop an O&M schedule for catch basin inspections, cleaning, and maintenance on Madison Ave. and the stormwater outfall to Whitten Brook.

## **EDUCATION, OUTREACH & COMMUNICATIONS**

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Public education and outreach is an important and necessary component of meeting the water quality goals for the Whitten Brook WBMP. Implementation of education and outreach activities in the action plan will be led by a steering committee consisting of watershed partners that are actively conducting outreach. The goal of education & outreach actions is to streamline outreach messaging, increase participation in watershed planning activities and support the adoption of long-term operation and maintenance of BMPs. Efforts will focus on engaging community groups, business, town maintenance crews, individuals and school groups.

The Skowhegan Conservation Commission will work in partnership with the Town of Skowhegan and other local groups to conduct public outreach about Whitten Brook and water quality issues to watershed residents and business owners. Actions to increase awareness of and participation in watershed projects include:

- Forming an outreach committee to oversee education and outreach activities
- Providing project updates in annual newsletters
- Submitting press releases about major project activities
- Developing an “adopt a stream segment” program
- Conducting targeted outreach to residential and commercial landowners about winter maintenance and pesticide and fertilizer use.
- Providing watershed education in schools and organizing watershed cleanups with students.

A full list of the ten education and outreach actions, along with a detailed planning schedule, potential funding sources, and estimated costs for each action is provided in Table 8D.

## **BUILDING LOCAL CAPACITY**

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Implementation of restoration activities in the watershed are estimated to cost approximately two million dollars over the course of the next 10 years. Therefore, a long-term sustainable funding plan, and a dedicated administrative organization are needed to implement the plan and ensure its success. This plan recommends six actions to help build the capacity needed to achieve the goals of the plan, both through raising the required funds and by strengthening relationships and communication between stakeholders. A detailed planning schedule, potential funding sources, and estimated costs for each of these six actions is provided in Table 8E.

**Table 8.** Whitten Brook Watershed Action Plan, 2026-2035.

<b>Whitten Brook Watershed Action Plan (2026-2035)</b>									
<b>Action</b>	<b>How</b>	<b>Who</b>	<b>Sub-watershed(s)</b>	<b>Stressors Addressed</b>	<b>Schedule</b>	<b>Priority</b>	<b>Potential Funding Sources</b>	<b>Estimated Total Cost (10 years)</b>	
<b>A. Watershed Restoration &amp; Stormwater Management</b>									
<b>Northern Madison Avenue Outfall - Detention Basin Retrofit</b>									
A1	Acquire permission from landowner to move forward with project	Work with the landowner and Somerset Woods Trustees to acquire an easement or purchase the land outright. Negotiate access with adjacent landowners	Town, Somerset Woods Trustees	North Branch	Habitat, velocity	Year 1	High	Town, Grants	\$50,000
A2	Complete final construction design	Acquire bids for an engineer to complete the 90% design set for the detention basin	Town	North Branch	Habitat, velocity	Year 2	High	Town, DOT	\$10,000
A3	Acquire bids from contractors	Acquire bids based on 90% concept plan provided by engineer	Town	North Branch	Habitat, velocity	Year 2	High	Town	\$1,500
A4	Acquire funding for construction	Apply for grants, work with MDOT, local fundraising	Town, SCC	North Branch	Habitat, velocity	Years 1-2	High	Town, SCC	\$2,500
A5	Retrofit the existing detention basin near the northern Madison Ave. outfall	Hire a contractor to implement the engineered design, retrofit the detention basin	Town, Consultants	North Branch	Habitat, velocity	Year 3	High	Town, Grants	\$220,000
A6	Prepare and implement an O&M plan for the detention basin	Work with contractor and engineer to develop plan; oversee operation and maintenance.	Town, contractor, engineer	North Branch	Habitat, velocity	Years 3-4	High	Town, MDOT, Grants	\$5,000
<b>Improvements at Other Stormwater Outfalls in the Watershed</b>									

## Whitten Brook Watershed Action Plan (2026-2035)

	Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
A7	Address erosion issues at the Spring Street outfall (RRI Site # 2BW-5a)	Assess options for replacing/improving the outfall pipe. Armor the outlet and stabilize the steep slope.	Town	Main Stem	Habitat	Years 2-6	High	Town, Grants	\$5,000
<b>Install BMPs at High &amp; Medium Priority Commercial &amp; Road Sites on Madison Ave.</b>									
A8	Develop a plan for addressing highest and high priority sites (Goal: 7 sites)	Review recommendations and cost estimates for retrofit sites. Develop a list of feasible sites and a timeline for BMP installation.	Steering Committee, Town, SCC, Consultant	All	Habitat, toxins	Year 1	High	SCC	\$1,500
A9	Meet with high and medium priority commercial property owners to gauge interest in future cost-sharing projects (Goal: 20 meetings)	Schedule meetings to discuss potential retrofit and cost-share opportunities	Town, SCC, Consultant, Landowners	All	Habitat, toxins	Year 1	High	Town, SCC, Grant	\$2,500
A10	Prepare BMP concept designs for high & medium priority sites (Goal: 12 sites)	Hire an engineer to design BMP retrofits for high priority sites with interested landowners	Town, SCC, Consultant	All	Habitat, toxins	Years 2-3	High	SCC, Grants	\$25,000
A11	Provide incentives to commercial property owners for installing BMPs	Develop and implement a cost-share program for commercial property owners installing BMPs on their properties	Town, SCC	All	Habitat, toxins	Year 3 and ongoing	High	SCC, Town, Grants	\$240,000

### Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
A12	Implement BMPs at high priority state road sites on Madison Avenue (Goal: 3 sites)	Work with MDOT to include stormwater improvements in their road maintenance schedule following review of the outcomes of the detention basin retrofit, enhanced catch basin cleaning/street sweeping regime, and stream monitoring	Town, MDOT	All	Habitat, toxins	TBD	Low	MDOT, Grants	TBD
<b>Other Stormwater Reduction Strategies</b>									
A13	Provide free materials to residential property owners for reducing stormwater runoff (Goal: 50% participation/50 property owners)	Provide free rain barrels, gutters, and buffer plants to residential or small commercial property owners in the watershed. Advertise the availability of these materials in press releases and newsletters.	Town, SCC	All	Habitat, velocity, nutrients, toxins	Years 2-5	Medium	SCC, Town, Grants	\$150,000
A14	Promote BMPs that replace traditional parking lots	Seek funding and rewrite ordinances that support projects that replace parking lots with pervious pavement or vegetated surfaces (no road salts needed)	Town, SCC	All	Habitat, velocity, toxins	Year 1 and ongoing	Medium	SCC, Town, Grants	\$10,000
<b>Watershed Restoration &amp; Stormwater Total</b>									<b>\$723,000</b>

## Whitten Brook Watershed Action Plan (2026-2035)

Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)	
<b>B. In-Stream Restoration</b>									
B1	Prioritize wood additions in targeted stream reaches	Prepare conceptual designs for wood additions in high priority reaches	SCC, Consultants	TBD	Habitat	Years 1-2	High	Town, Grants	\$20,000
B2	Improve in-stream habitat by adding wood in targeted stream reaches (Goal: 4 high priority reaches)	Seek funding through local, state, and federal grants to fund in-stream wood additions. Hire an experienced contractor to implement conceptual designs.	Town, SCC, Consultants	TBD	Habitat	Years 2-5	High	Town, SCC, Grants	\$160,000
B3	Improve and stabilize existing culverts (Goal: 3 highest priority culverts)	Develop and implement plans for improving and/or replacing the highest priority culverts identified in the 2013 Fluvial Geomorphic Assessment (Whitten Court and Spring Street) and 2022 field survey	SCC, Town, Consultants	All	Habitat, velocity	Years 5-10	High	SCC, Town, Grants	\$800,000
B4	Improve riparian buffers	Host invasive plant removal volunteer days to remove invasive terrestrial plants around the stream; offer cost-sharing for riparian buffer enhancements on residential properties.	SCSWCD, SCC, SWT, Town	All	Habitat, altered food source	Years 1-10	Medium	SCC, SCSWCD, Grants	\$10,000
<b>In-Stream Restoration Total</b>								<b>\$990,000</b>	

## Whitten Brook Watershed Action Plan (2026-2035)

Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)	
<b>C. Prevention - Reduce New Sources of Pollution</b>									
<b>Municipal Maintenance</b>									
C1	Develop an updated O&M plan for Madison Ave in partnership with MDOT	Work collaboratively to develop a O&M schedule and MDOT expectations for catch basin inspections, cleaning, and maintenance on Madison Ave. and the stormwater outfall to Whitten Brook.	Town, MDOT	North Branch, Main Stem	Toxins, habitat	Year 1	High	SCC, Town	\$1,000
C2	Evaluate the current town road maintenance schedule and make recommendations to improve water quality	Create a schedule to ensure that catch basins, culverts and ditches are cleaned and maintained regularly.	Town	All	Toxins, habitat	Year 1	High	SCC, Town	\$1,500
C3	Implement an effective catch basin monitoring program	Develop a catch basin monitoring program that includes documentation of catch basin conditions including information about the state of the infrastructure, amount of accumulated debris removed at each site, and date of cleaning	Town	North Branch, Main Stem	Toxins, habitat	Years 1-10	High	Town	\$10,000

### Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
C4	Assess current use of salt on commercial properties on Madison Ave	Conduct a salt-use study to assess the type and amount of deicers used on private properties along Madison Ave.	Town, SCC, Consultant, Landowners	North Branch, Main Stem	Toxins, habitat	Years 1-2	Medium	Town, SCC, Grants	\$2,500
C5	Improve street sweeping practices	Assess the current street sweeping schedule and make improvements (e.g., monthly schedule)	Town	All	Toxins, habitat	Years 1-10 (annually)	Low	SCC, Town	\$500
C6	Reduce impact from road salt	Implement a reduced salt use plan to reduce the potential for chloride infiltration at the Northern Madison Avenue detention basin	Town	All	Toxins	Years 5-10	Low	SCC, Town	\$22,000
<b>Land Use Planning</b>									
C7	Increase the amount of land in permanent conservation (Goal: 5 acres)	Work with stakeholders to expand the amount of land currently held by Somerset Woods Trustees in conservation land with a focus on first order streams and riparian areas	SWT, SCC, Town	All	Habitat, altered food source, toxins, velocity	Years 1-10	Medium	Somerset Woods Trustees, SCC	\$100,000
C8	Expand town stormwater rules to reduce impacts from new development	Work with Planning Board and Ordinance Committee to develop rules to protect water quality for all new development	Town, SCC, Consultants	All	Habitat, altered food source, toxins, velocity	Years 1-10	Medium	Town	\$5,000

### Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
C9	Include impaired headwater streams in town shoreland zoning rules	Continue working with the planning board and selectboard in support of zoning to limit development, or upgrade development standards that protect first order reaches of the stream	SCC, Town	All	Habitat, altered food source, toxins, velocity	Year 1 and ongoing	Medium	Town	\$2,500
C10	Minimize impacts from ATV's	Conduct a presentation at local ATV/snowmobile clubs	SCC, SWT, Maine Trails, Town	West Branch	Habitat	Year 2	Low	Town	\$500
<b>Prevent New Sources of NPS Pollution Total</b>									<b>\$145,500</b>

#### D. Education, Outreach & Communications

##### General Outreach

D1	Develop an outreach strategy/ communications committee	Meet annually to discuss plan objectives and develop strategies for community outreach	SCC, Town, Consultants	All	All	Year 1 and ongoing	High	SCC	\$3,000
D2	Provide project updates in annual newsletters	Distribute an annual newsletter to inform the public about SCC projects with a dedicated section for the Whitten Brook restoration project	SCC, Town	All	All	Years 1-10	High	SCC	\$5,000
D3	Submit press releases about major project activities	Submit press releases about important activities or successes during the project to update the public about restoration efforts	Town, SCC	All	All	Years 1-10	Medium	SCC, volunteers	\$1,000

## Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
D4	Complete storm drain stenciling	Create a stencil with a message calling attention to the fact that storm drains flow to Whitten Brook. Place on all relevant storm drains, re-stenciling annually or as needed	Volunteers, SCC, Town	All	Toxins	Years 1-10	Low	SCC, Town	\$1,500
D5	Create an "Adopt a Stream Segment" program (Goal: 10 participants)	Encourage landowners (residential or business owners) to "adopt" a stream segment, and provide signage advertising their contribution	SCC, Town, volunteers	All	All	Years 1-10	Low	SCC, volunteers	\$5,000
<b>Targeted Outreach</b>									
D6	Provide recognition for business owners participating in restoration efforts (Goal: 10 certifications)	Develop a "Green Business" program educating business owners on stormwater management, and recognize businesses that make changes	SCC, Town, Steering Committee, Main St. Skowhegan, SCSWCD	All	All	Years 1-10	Medium	SCC, Grants	\$7,500
D7	Conduct outreach to commercial property owners about winter maintenance practices	Develop and distribute educational materials that focus on winter maintenance practices that promote responsible salt usage and possible re-purposing of unused parking, and MDEP chloride point system (Chapter 500 revisions)	Town, SCC, SCSWCD, Main St. Skowhegan	All	Toxins (chloride)	Years 1-3	Medium	Town, Grants	\$2,500

Whitten Brook Watershed Action Plan (2026-2035)									
Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
D8	Raise awareness about the impacts of fertilizer and pesticide use on stream health	Conduct outreach to residential and commercial property owners to encourage property owners to limit fertilizer and pesticide use	SCC, Town, SCSWCD	All	Toxins	Years 2-4	Low	SCC	\$2,500
D9	Provide watershed education in local schools	Coordinate a general watershed education program for students at Skowhegan schools, using the Whitten Brook watershed as a case study	SCC, SCSWCD, Town	All	All	Year 3	Low	SCC, Town	\$3,000
D10	Organize stream cleanups with students	Organize stream clean-up events as a community service opportunity for students	SCC, Town	All	In-stream habitat	Years 2, 4, 6, 8 and 10	Low	SCC, Town	\$2,500
<b>Education, Outreach &amp; Communications Total</b>									<b>\$33,500</b>

## Whitten Brook Watershed Action Plan (2026-2035)

Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)	
<b>E. Build Local Capacity</b>									
<b>Fundraising</b>									
E1	Establish a funding plan and establish a funding committee	Recruit volunteers to serve on a fundraising committee to find and apply for local, state, and federal grants to help implement water quality initiatives. Identify opportunities for improving fundraising through SCC and allocating funds towards water quality initiatives. Create a sustainable funding plan to pay for the cost of implementing the plan.	Town, SCC, Steering Committee	All	All	Year 1 and ongoing	High	SCC	\$2,500
E2	Apply for US EPA Clean Water Act Section 319 watershed implementation grants to address NPS sites <b>Goal: 3 phases of 319 implementation projects</b>	An application should be prepared and submitted in year 1 of the plan (2026) for the first two-year round of funding (2027-2028). Additional applications should be submitted in 2029 and 2032.	Town, SCC, Consultants	All	All	Years 1, 4, 7	High	SCC	\$9,000

## Whitten Brook Watershed Action Plan (2026-2035)

Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)	
E3	Apply for other state, federal or private foundation grants that support planning recommendations	Apply for additional grants as identified by the fundraising committee	Fundraising committee	All	All	Years 2-10	High	SCC, volunteers	\$2,500
<b>Steering Committee &amp; Partnerships</b>									
E4	Develop a WBMP Steering Committee and meet annually	Develop a steering committee made up of multiple stakeholders that meets annually to review action items and milestones	Town, SCC, watershed partners	All	All	Year 1 and ongoing	High	SCC, volunteers	\$3,500
E5	Strengthen stakeholder relationships and bolster community support for restoration efforts	Attend regular selectboard meetings to update the Town about watershed activities and needs. Attend Main Street Skowhegan meetings to ensure that Whitten Brook restoration is considered in their planning strategies.	SCC, MDOT, Town	All	All	Years 1-10	Medium	Town, SCC	\$5,000
E6	Build relationships with local contractors to increase capacity to complete stormwater retrofit projects in the watershed	Meet with area construction/landscaping companies to discuss the goals of the project and gauge their interest and capacity to do complete stormwater retrofits	SCC, SCSWCD	All	All	Years 2	Medium	SCC	\$500

<b>Build Local Capacity Total</b>	<b>\$23,000</b>
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## Whitten Brook Watershed Action Plan (2026-2035)

Action	How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)	
<b>F. Science - Conduct Long-Term Monitoring &amp; Assessment</b>									
<b>Water Quality Monitoring</b>									
F1	Increase capacity for volunteer monitoring	Recruit and train volunteers to collect baseline monitoring data through the DEP VRMP program	SCC, DEP	All	All	Years 1-2	High	SCC	n/a
F2	Establish a baseline water quality monitoring program	Establish a water quality monitoring program to collect baseline data (DO, temp, SPC, E. coli) to inform long-term management actions (July- September). Site KWBNB02 should be prioritized prior to and following detention basin upgrades to monitor the effects of the project.	SCC, Volunteers, Consultants	All	All	Ongoing (Years 1-10)	High	SCC, volunteers	\$20,000
F3	Identify sources of E.coli in the stream	Conduct bacteria source tracking to locate sources of bacteria in the stream, especially in Northern Branch near Site KWBNB03 near Robinson Street	Volunteers, Town, Consultants	All (Focus on North Branch)	Bacteria	Years 2-3	High	SCC, volunteers	\$5,000
F4	Expand monitoring to include monthly nutrient sampling to establish a baseline	Collect P & N grab samples monthly to create a baseline. Measure flow rates whenever possible.	Town, Volunteers, Consultants	All	Nutrient enrichment, DO	Ongoing (Years 1-10)	High	SCC, volunteers	\$8,200

### Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
F5	Complete biological monitoring in Whitten Brook	Biological monitoring should be attempted downstream of the extended detention basin after it is installed. If successful, continue biomonitoring as dictated by DEP's monitoring schedule.	Maine DEP	North Branch, Main Stem	All	Year 3 and ongoing	High	Maine DEP	\$3,500
F6	Utilize VRMP, local volunteers, and/or school groups to collect biomonitoring data through the Stream Explorers Program	Recruit and train volunteers to collect biomonitoring data through the Maine Audubon's Stream Explorer's program	SCC, Maine Audubon, Volunteers	All	All	Year 3 and ongoing	Medium		\$1,500
F7	Conduct site-specific monitoring before and after installation of BMPs	Monitoring should be conducted repeatedly before BMP installation to develop a baseline, as well as after to test the efficacy of the installed BMPs. Sampling plans should be developed for each site depending on the intended impact of the BMP, and may include volumetric discharge rate, installation of data loggers (DO, temperature, SPC), grab samples for suspended solids, metals, etc.	SCC, volunteers, Maine DEP	All	All	Years 1-10	Medium	SCC, Town, Grants	\$10,000

### Whitten Brook Watershed Action Plan (2026-2035)

Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
F8	Develop a stage-discharge rating to characterize volumetric discharge in the stream	Deploy a continuous stage (water-level) recorder and collect manual velocity-area measurements to develop a stage-discharge rating across a range of flows during storm events (rising/falling)	Consultants, VRMP, Maine DEP	All	Habitat, velocity	Year 3	Medium	Town, Grants	\$5,000
F9	Test the stream for metals and other toxins associated with road runoff	Update the 2006 TMDL testing for metals and other toxins that affect aquatic life	Maine DEP, VRMP, Consultants, Town	All	Toxins	Year 2 and ongoing	Medium	SCC, Grants	\$2,500
F10	Measure continuous SPC at select locations in Whitten Brook	Install data loggers to measure SPC downstream of major stormwater outfalls (northern Madison Avenue below detention basin, lower Madison avenue behind Hight Chevrolet)	Maine DEP, Consultants	North Branch, Main Stem	Chloride	Years 3-4	Low	Maine DEP, Town, Grants	\$5,000
<b>Fisheries</b>									
F11	Monitor changes in stream temperature	Install temperature loggers at various locations throughout the stream to track changes in temperature and impacts to the coldwater fishery	SCC, Volunteers, Consultants	All	Temperature	Years 2-4	Low	Grants	\$5,000

Whitten Brook Watershed Action Plan (2026-2035)									
Action		How	Who	Sub-watershed(s)	Stressors Addressed	Schedule	Priority	Potential Funding Sources	Estimated Total Cost (10 years)
F12	Conduct a fish survey to document presence of coldwater fish	Conduct a coldwater fishery survey to document species richness, abundance and distribution of the coldwater fishery; conduct eDNA sampling & DNA sampling to characterize the wild native brook trout population	MDIFW, SCC, Consultants, Trout Unlimited	All	Habitat, temperature	Years 2-4	Low	Grants	\$15,000
<b>Conduct Long-Term Monitoring &amp; Assessment Total</b>									<b>\$80,700</b>
<b>Whitten Brook WBMP Project 10-Year Grand Total</b>									<b>\$1,995,700</b>

# 7. Monitoring Activity, Frequency and Parameters

Whitten Brook is currently not meeting water quality standards for Class B streams. Consistently measuring water quality and assessing the biological community in the stream is a necessary component of successful watershed planning because results can be used to evaluate the effectiveness of watershed management measures. If improvements in aquatic life, bacteria levels, or other parameters are evident, then planning objectives are being met. If no change is observed or if water quality gets worse, then additional management strategies may be needed.



*Collecting macroinvertebrates from a "rock bag" deployed in the stream.  
(Photo credit: Maine DEP)*

## **WATER QUALITY MONITORING**

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An assessment of existing water quality monitoring data in Whitten Brook was completed as part of the water quality analysis (2002-2022). This assessment found that water quality data is extremely limited for most parameters, and that more robust monitoring efforts will be needed to track progress and monitor for potential future threats to the health of the stream. Future monitoring should include, at a minimum, the four high priority actions described in Table 8F. Medium and low priority monitoring actions should be added as deemed necessary to determine the effectiveness of plan implementation.

## **FISHERIES**

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Whitten Brook is known to support a population of native brook trout, and maintaining and improving this fishery is a major goal of restoration efforts. Monitoring fish populations and temperature will allow project partners to assess the progress that is made through these restoration efforts to support coldwater fish populations. Two actions are included in Table 8F to improve our knowledge of the coldwater fishery in Whitten Brook over the next 10 years.

# 8. Measurable Milestones, Indicators & Benchmarks

The following section provides a list of interim, measurable milestones to document progress in implementing management strategies outlined in the action plan (Section 7). These milestones are designed to help keep project partners on schedule. Additional criteria are outlined to measure the effectiveness of the plan by documenting changes in water quality over time thus providing the means by which the steering committee can reflect on how well implementation efforts are working to reach established goals.



*Photo Credit: Maine DEP*

Environmental, social, and programmatic indicators and proposed benchmarks represent short-term (1-2 years), mid-term (3-5 years), and long-term (6-10 years) targets for restoring the water quality in Whitten Brook. The steering committee will review the criteria for each milestone annually to determine if progress is being made, and then determine if the watershed plan needs to be revised if targets are not being met. This may include updating proposed management and/or reassessing the time it takes for water quality and in-stream habitat conditions respond to watershed and in-stream management strategies.

The high percentage of IC in the Whitten Brook watershed makes it imperative to both reduce actual IC where possible, and to mitigate the impacts of these impervious areas on the stream. Addressing impacts of stormwater runoff from impervious areas will also help to ensure the success of in-stream restoration efforts. Addressing the impacts of IC in the watershed and making improvements to in-stream conditions are both essential to the restoration of Whitten Brook. Actions outlined in the 10-year action plan to reduce the amount of effective IC in Whitten Brook support long-term water quality and habitat quality improvements in Whitten Brook in the face of threats from current development, future development, and changing weather patterns.

**Environmental Milestones** are a direct measure of environmental conditions. They are measurable quantities used to evaluate the relationship between pollutant sources and environmental conditions. Table 9 outlines the water quality benchmarks, and interim targets for improving the water quality in Whitten Brook over the next 10 years.

**Social Milestones** measure changes in social or cultural practices and behavior that lead to implementation of management measures and water quality improvements. Table 10 outlines the social indicators, benchmarks, and interim targets for the Whitten Brook WBMP.

**Programmatic Milestones** are indirect measures of watershed protection and improvement activities. Rather than indicating that water quality reductions are being met, these programmatic measurements list actions intended to meet the water quality goal. Table 11 outlines the programmatic indicators, benchmarks, and interim targets for the Whitten Brook WBMP.

**Table 9.** Water quality benchmarks and interim targets for Whitten Brook.

Environmental Milestones			
Water Quality Benchmarks	Interim Targets*		
	Years 1-2	Years 3-5	Years 6-10
1) Stream meets Class B aquatic life standards	None	Successful biological monitoring attempt	Stream meets Class B biological monitoring aquatic life criteria
2) Decrease E. Coli levels to meet water quality standards	None	<64 CFU geometric mean for E. coli at 50% of sites	<64 CFU geometric mean for E. coli at all sites

\* Benchmarks are cumulative unless otherwise noted. Years 1-2 (2026-2027); Years 3-5 (2028-2030); Years 6-10 (2031-2035). (▲ ▼) arrows indicate a change in water quality up or down over the planning period.

**Table 10.** Social indicators, benchmarks, and interim targets for Whitten Brook.

Social Milestones			
Indicators	Benchmarks & Interim Targets*		
	Years 1-2	Years 3-5	Years 6-10
1) Number of homeowners installing BMPs (rain barrels, gutters) to reduce stormwater runoff	10	25	50
2) Number of educational programs conducted in schools.	-	1	1
3) Number of stream cleanups organized <b>Goal: 5</b>	1	3	5
4) Number of landowners participating in "Green Business" program <b>Goal: 3 workshops, 10 certifications</b>	1 workshop, 2 certifications	2 workshops, 5 certifications	3 workshops, 10 certifications
5) Number of landowners participating in "Adopt a Stream Segment" program <b>Goal: 10 participants</b>	2 participants	5 participants	10 participants
6) Number of landowners planting riparian buffers	-	5	10
7) Number of targeted brochures sent to property owners (pesticides and winter maintenance) <b>Goal: 6 brochures</b>	2	2	2
8) Number of storm drains stenciled	60	Re-stenciled annually	Re-stenciled annually
9) Number of press releases and newsletter articles distributed <b>Goal: 2/year</b>	4	10	20

Social Milestones			
Indicators	Benchmarks & Interim Targets*		
	Years 1-2	Years 3-5	Years 6-10
10) Number of new Steering Committee members participating in WBMP Implementation	1	2	3
11) Number of trained volunteer water quality monitors	3	4	5

\* Benchmarks are cumulative unless otherwise noted. Years 1-2 (2026-2027); Years 3-5 (2028-2030); Years 6-10 (2031-2035).

**Table 11.** Programmatic indicators, benchmarks, and interim targets for Whitten Brook.

Programmatic Milestones			
Indicators	Benchmarks & Interim Targets*		
	(Years 1-2)	(Years 3-5)	(Years 6-10)
3) Reduce effective impervious cover in the watershed <b>Current:</b> 43.9 acres <b>Goal:</b> 31 acres (reduce effective IC by 13 acres)	1 acre	11 acres	13 acres
1) Number of culverts upgraded <b>Goal:</b> 3 culverts	-	1	3
2) Number of reaches improved with additions of large wood <b>Goal:</b> 4 reaches	-	2	4
3) Number of RRI sites addressed <b>Goal:</b> 20 sites	4 sites	10 sites	20 sites
4) Number of steering committee meetings <b>Goal:</b> 1 meeting/year	2 meetings (2 total)	3 meetings (5 total)	5 meetings (10 total)
5) Amount of money spent on plan implementation. <b>Goal:</b> \$2M	\$200k	\$1M	\$2M
6) Number of CWA Section 319 grants awarded <b>Goal:</b> Three 319 grants	1 grant	2 grants	3 grants
7) Number of new or revised ordinances passed that help protect water quality <b>Goal:</b> 3 ordinance updates	1 ordinance	2 ordinances	3 ordinances
8) Amount of new land in permanent conservation <b>Goal:</b> 5 acres	1 acre	3 acres	5 acres

\* Benchmarks are cumulative unless otherwise noted. Years 1-2 (2026-2027); Years 3-5 (2028-2030); Years 6-10 (2031-2035).

# 9. Plan Oversight, Partner Roles, and Funding

## PLAN OVERSIGHT

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Implementation of a 10-year WBMP cannot be accomplished without the help of a central organization to oversee the plan, and a diverse and dedicated group of project partners and the public to support the various aspects of the plan. The following organizations will be critical to the plan's success and are excellent candidates for the watershed plan steering committee. The committee will need to meet at least annually to update the action plan, to evaluate the plan's success, and to determine if the water quality goal is being met.

## PARTNER ROLES

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**Skowhegan Conservation Commission (SCC)** will oversee plan implementation and plan updates in coordination with project partners. SCC will serve on the watershed steering committee, and may provide cash and in-kind support for water quality monitoring, watershed improvement projects, and 319 grant projects. SCC will also provide ongoing education and outreach throughout the watershed, and support initiatives to reduce IC. They will serve as a liaison between watershed residents, the town, and technical advisors.

**Town of Skowhegan** will serve on the steering committee, assist with fundraising efforts, review and upgrade town maintenance practices, and consider improvements to ordinances to be more protective of stream water quality in Whitten Brook and other streams.

**Somerset County Soil & Water Conservation District (SCSWCD)** will serve on the steering committee, and support education and outreach efforts to landowners in partnership with other watershed partners.

**Somerset Woods Trustees (SWT)** will work with the town and landowners to protect high priority conservation land in the watershed.

**Watershed Residents & Business Owners** will address documented NPS sites on their properties and provide a private source of matching funds by contributing to fundraising efforts and participating in watershed projects and in-stream restoration activities.

**Maine Department of Environmental Protection** will provide watershed partners with ongoing guidance, technical assistance and resources, and the opportunity for financial assistance through grants including the US EPA's 319 grant program. Maine DEP will also serve on the steering committee.

**US Environmental Protection Agency** will provide guidance on grant programs particularly Clean Water Act Section 319, work plan guidance, and selected project funding, pending acceptability of grant proposals, final workplans and availability of federal funds.

## ACTION PLAN IMPLEMENTATION & FUNDING

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The Watershed Plan Steering Committee, led by SCC, will develop and coordinate a sustainable fundraising plan and will coordinate and implement the proposed action plan. Expected partners are the Town of Skowhegan, SCSWCD, SWT, Maine DEP, landowners, businesses, and private donors. Many of these partners have worked together in the past improve water quality in Whitten Brook.

There are a number of opportunities for acquiring funding to support implementation of the watershed restoration plan. The list below contains a few of the better-known state and federal funding options. Additional support from private foundation grants, local fundraising efforts, monetary contributions by participating landowners, and financial support from SCC and the Town of Skowhegan will be needed to adequately fund this plan.

- **Land for Maine’s Future Program** – Funding for land conservation that provides multiple public and natural resource benefits: <https://www.maine.gov/dacf/lmf/>
- **Maine DEP Invasive Aquatic Plant Removal Grants** – Administered by Maine DEP to assist communities planning and managing removal of invasive aquatic plant infestations: <https://www.maine.gov/dep/water/grants/invasive/index.html>
- **Maine DEP Small Community Grant Program (SCG)** – Administered by Maine DEP, this program provides grants to Municipalities to help replace malfunctioning septic systems that are polluting a waterbody or causing a public nuisance: <https://www.maine.gov/dep/water/grants/scgp.html>
- **Maine DOT Municipal Stream Crossing Program** – A competitive grant program for one-time funding to upgrade of municipal culverts at stream crossings to be resilient to future climate conditions and that provide community, economic, and environmental benefits: <https://www.maine.gov/dot/about/funding/grants/stream>
- **Maine DOT’s Municipal Partnership Initiative (MPI)** – This program funds projects of municipal interest on state infrastructure working with Maine DOT as a partner to develop, fund, and build the project: <https://www.maine.gov/dot/sites/maine.gov.dot/files/inline-files/MPI-Municipal-Guide-2025.pdf>
- **Maine Governor’s Office of Policy Innovation and the Future (GOPIF)** – Two types of grants are offered including Community Action Grants to support projects that reduce energy use and costs and/or make their community more resilient to climate change effects, such as flooding, extreme weather, drought, and public health impacts: <https://www.maine.gov/future/climate/community-resilience-partnership/grants>
- **Maine Natural Resource Conservation Program (MNRCP)** – A cooperative program between Maine DEP and US Army Corps of Engineers, administered by The Nature Conservancy, funding the restoration, enhancement, preservation, and creation of wetland habitat: [https://www.maine.gov/dep/land/nrpa/ILF and NRCPP/index.html](https://www.maine.gov/dep/land/nrpa/ILF%20and%20NRCPP/index.html)

- **National Fish Passage Program** – The National Fish Passage Program provides financial and technical assistance for projects that improve the ability of fish or other aquatic species to migrate by reconnecting habitat that has been fragmented by a barrier such as a dam or culvert. <https://www.fws.gov/program/national-fish-passage>
- **NFWF America’s Ecosystem Restoration Initiative** – The America’s Ecosystem Restoration Initiative (AERI) supports locally led projects that invest in fish and wildlife habitat restoration, ecosystem and community resilience, access to nature, conservation workforce development, habitat corridors and connectivity, and collaborative, partnership-driven conservation. <https://www.nfwf.org/programs/americas-ecosystem-restoration-initiative?activeTab=tab-3>
- **Trout Unlimited Embrace-A-Stream Program** – The EAS grant program supports the conservation projects of TU chapters and councils, and as such, a TU chapter or council must be the applicant. We strongly encourage chapters and councils to partner with government agencies, nonprofits (especially within TU), and other groups to strengthen their EAS proposal. Project proposals with strong chapter capacity and/or community building components are highly encouraged. EAS will not make grants to individuals or non-TU projects. <https://www.tu.org/get-involved/volunteer-tacklebox/fundraising-resources/grants-corporate-fundraising/embrace-a-stream/>
- **US EPA Clean Water Act (Section 319) Watershed Nonpoint Source (NPS) Grant Program** – Administered by Maine DEP, federal CWA 319 grants from EPA assist communities implementing a Watershed-Based Plan for waters named on Maine DEP’s NPS Priority Watershed List: <https://www.maine.gov/dep/water/grants/319.html>
- **US EPA/Maine Clean Water State Revolving Fund (CWSRF)** – Provides financial assistance for a wide range of water infrastructure projects including control of nonpoint sources of pollution, and other water quality projects: <https://www.epa.gov/cwsrf/learn-about-clean-water-state-revolving-fund-cwsrf>
- **USDA/NRCS Financial Assistance** – NRCS offers voluntary programs to eligible landowners and agricultural producers to provide financial and technical assistance to help manage natural resources including financial assistance to help plan and implement conservation practices that address natural resource concerns or opportunities to help save energy, improve soil, water, plant, air, animal and related resources on agricultural lands and non-industrial private forest land: <https://www.nrcs.usda.gov/getting-assistance>

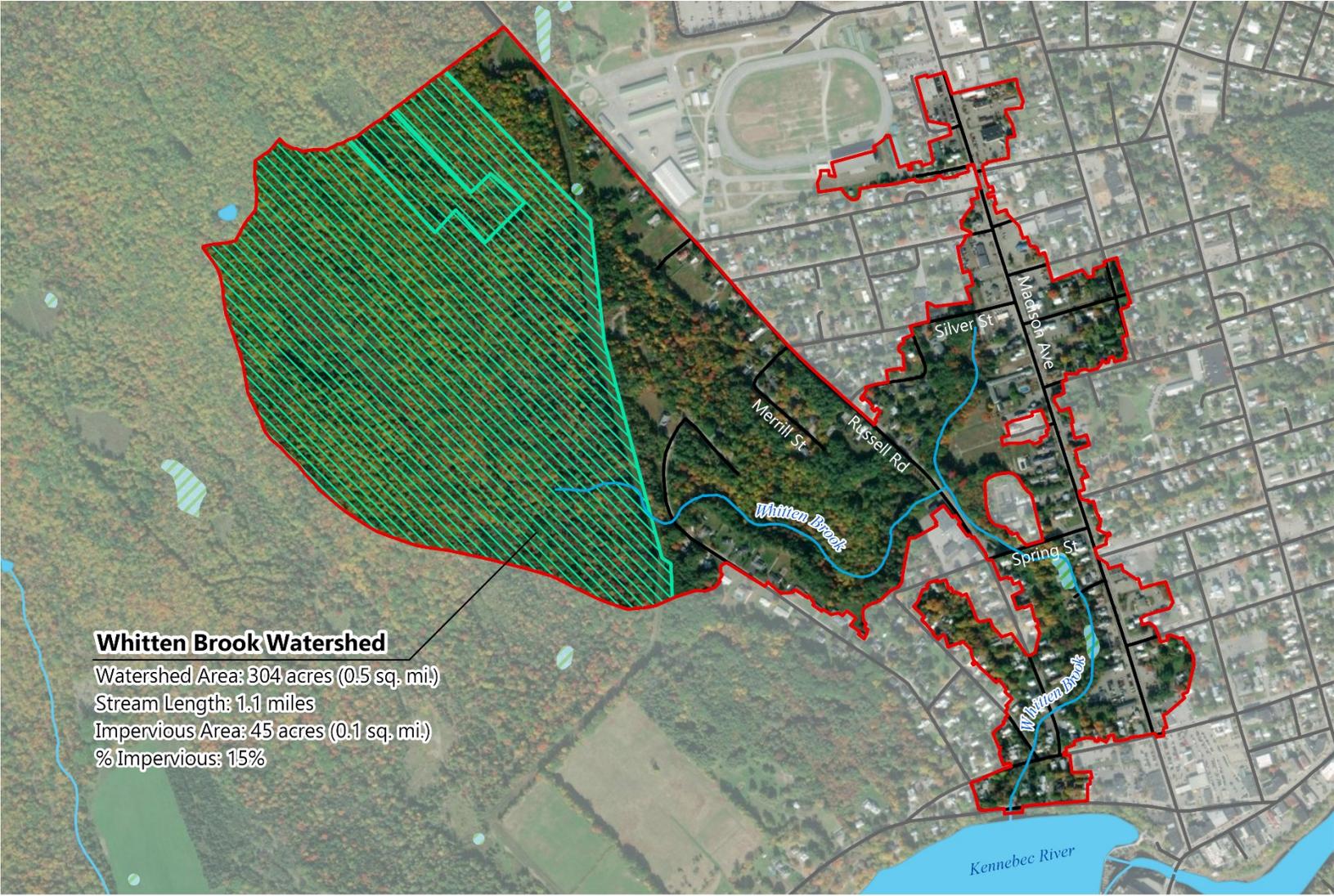
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## **APPENDIX A. WATERSHED MAPS**

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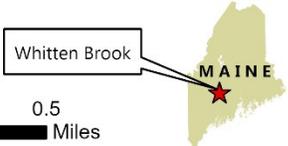
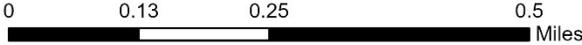
**WHITTEN BROOK - SKOWHEGAN, ME**

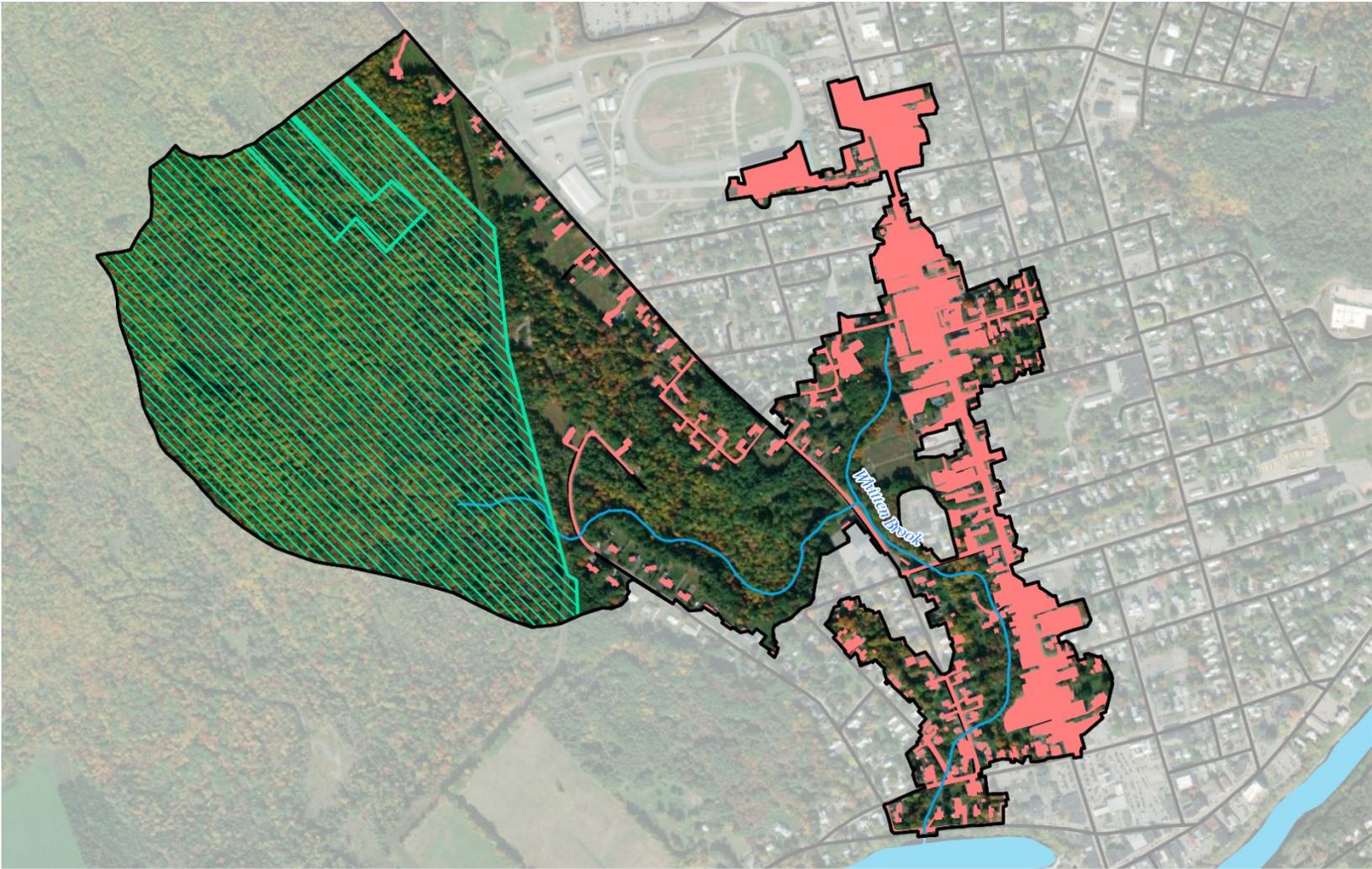


Source: Maine Geolibary, Maxar, USGS (NHD), USFWS (NWI)  
 Projection: NAD 1983 UTM Zone 19N  
 Map Created By: K. Goodwin, Ecological Instincts, April 2025



- Watershed Boundary
- Conserved Lands
- Wetlands
- Streams



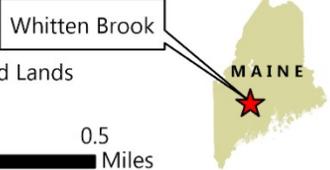


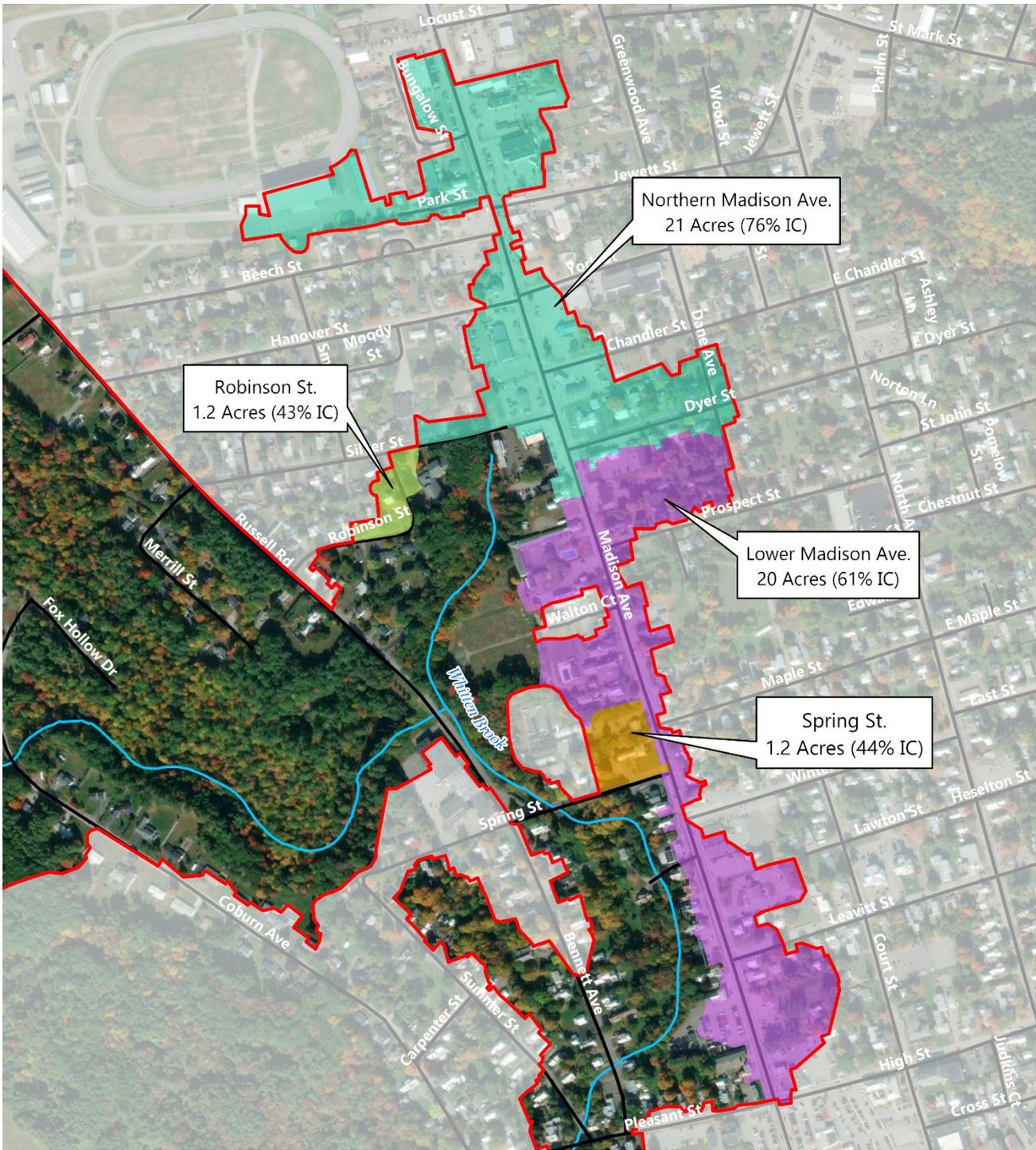
### WHITTEN BROOK WATERSHED - IMPERVIOUS COVER

- Whitten Brook Watershed Boundary
- Streams/Rivers
- 2025 Updated IC
- Conserved Lands



Source: Maine Geolibary, FBE, USFWS (NWI), Vantor  
Projection: NAD 1983 UTM Zone 19N  
Map Created By: K. Goodwin, Ecological Instincts, December 2025





**WHITTEN BROOK - OUTFALL CATCHMENTS**

Whitten Brook Watershed Boundary

Streams

Roads



Source: Maine Geolibrary, FBE, USFWS (NWI), Vantor  
Projection: NAD 1983 UTM Zone 19N  
Map Created By: K. Goodwin, Ecological Instincts,  
December 2025





**WHITTEN BROOK - SKOWHEGAN, ME**  
WATER QUALITY MONITORING SITES

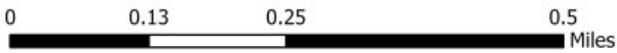


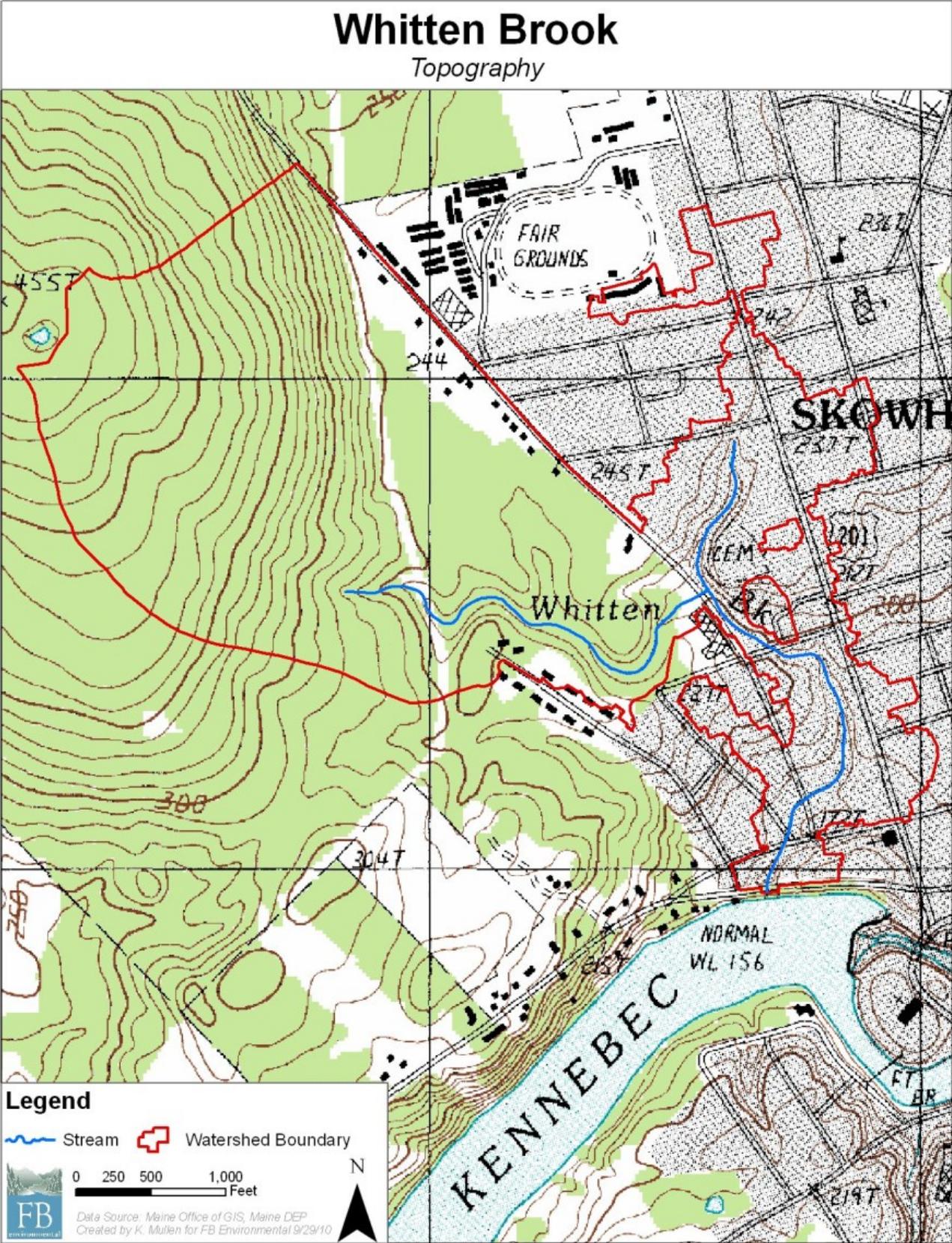
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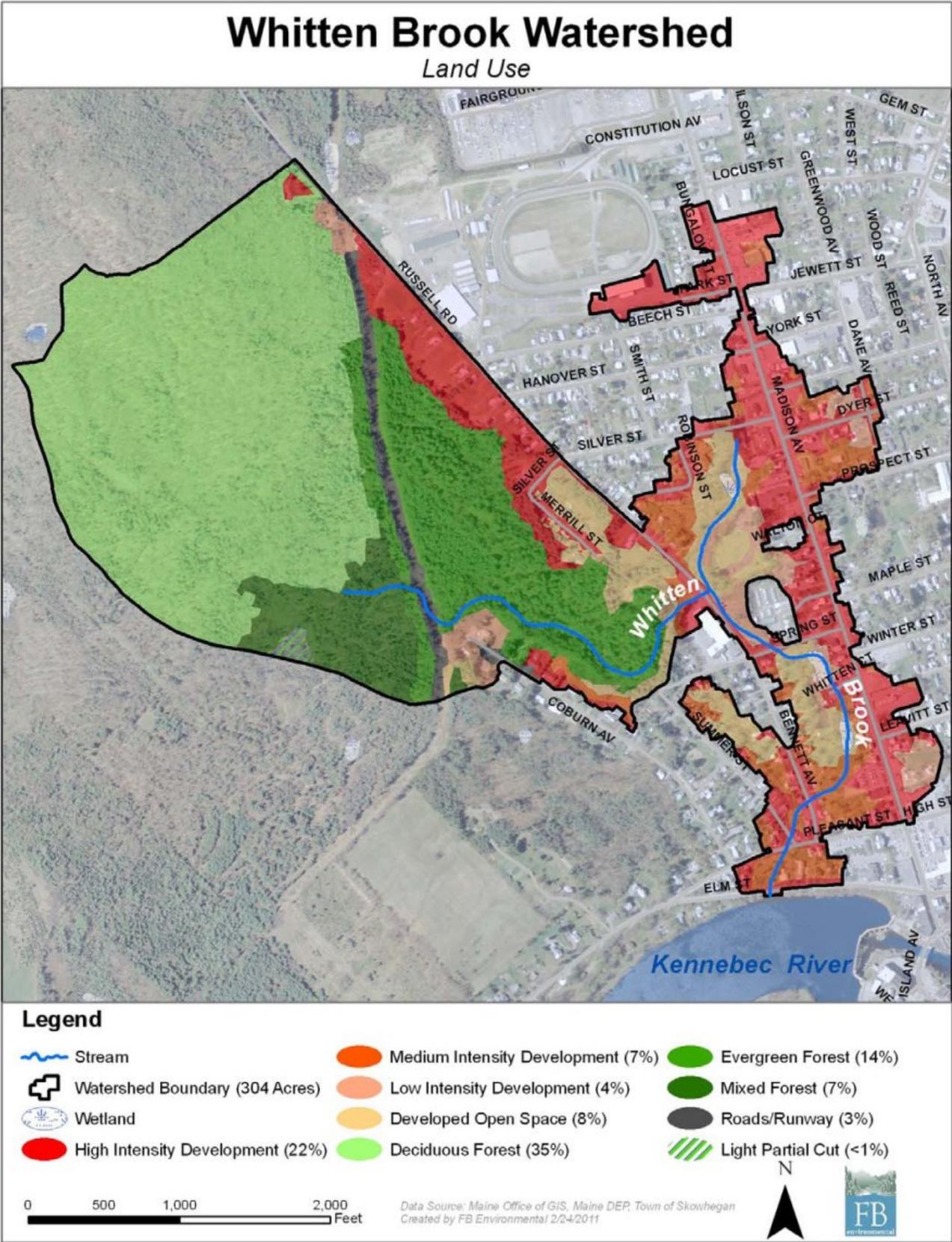


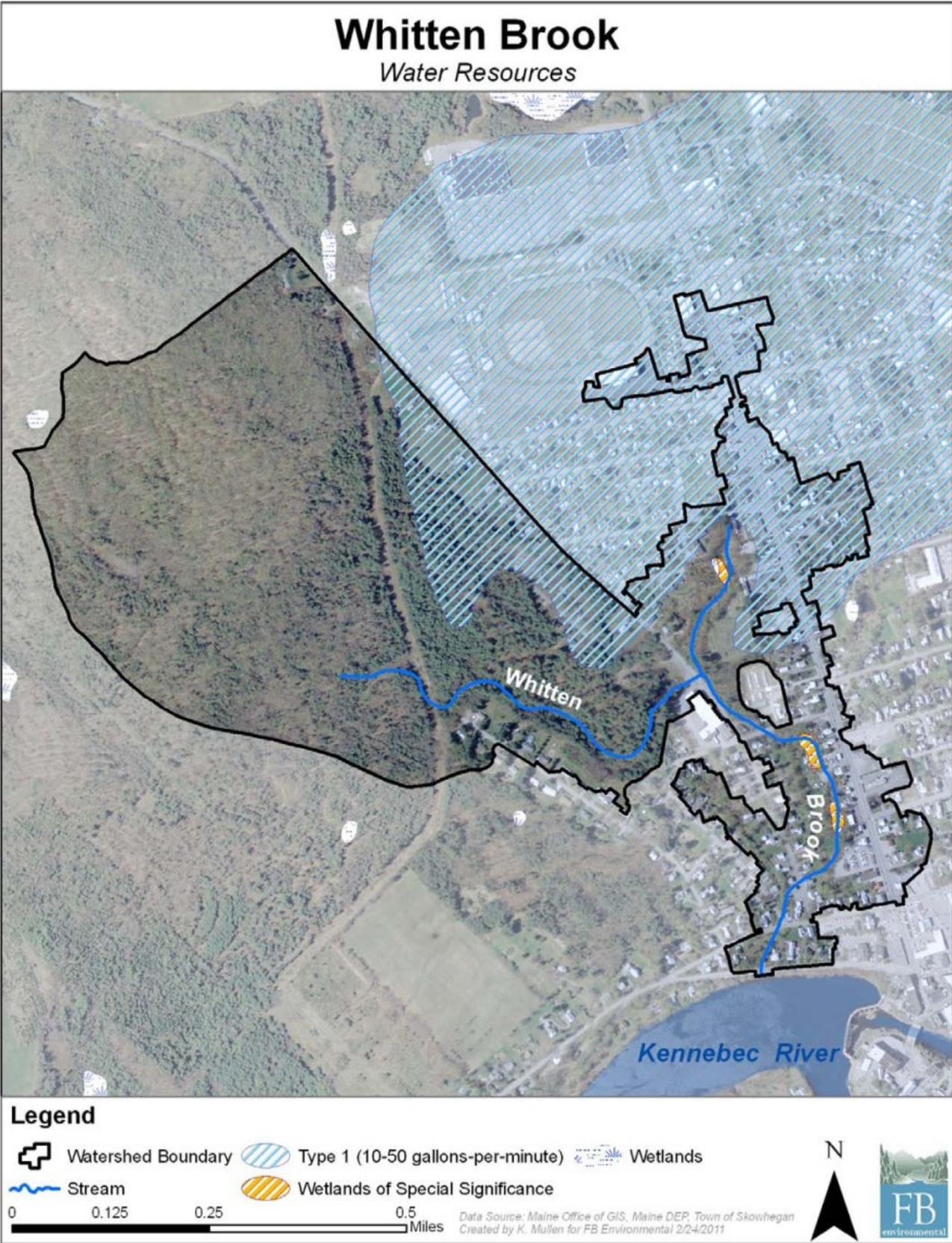
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- Maine DEP
- Watershed Boundary

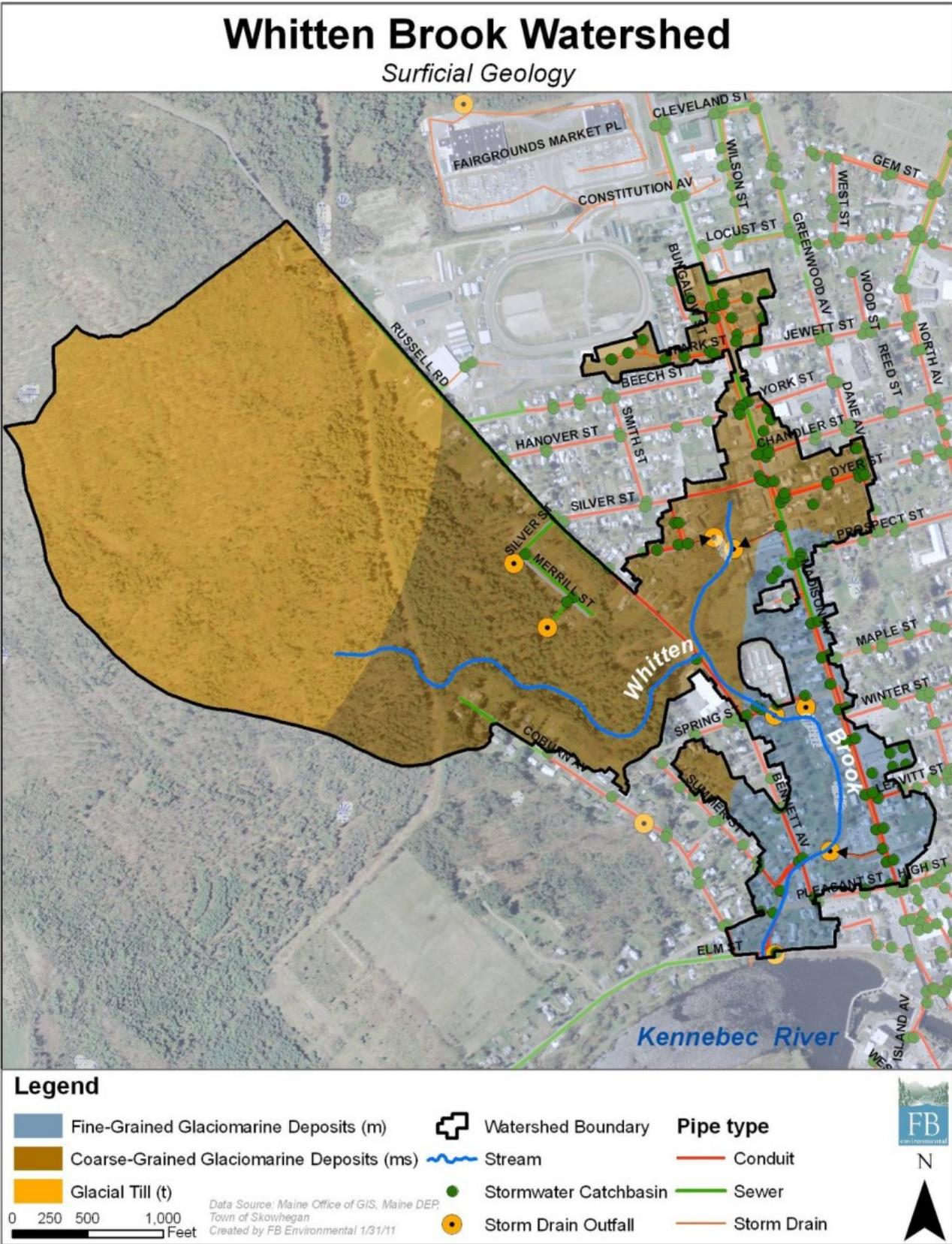
- Wetlands
- Streams

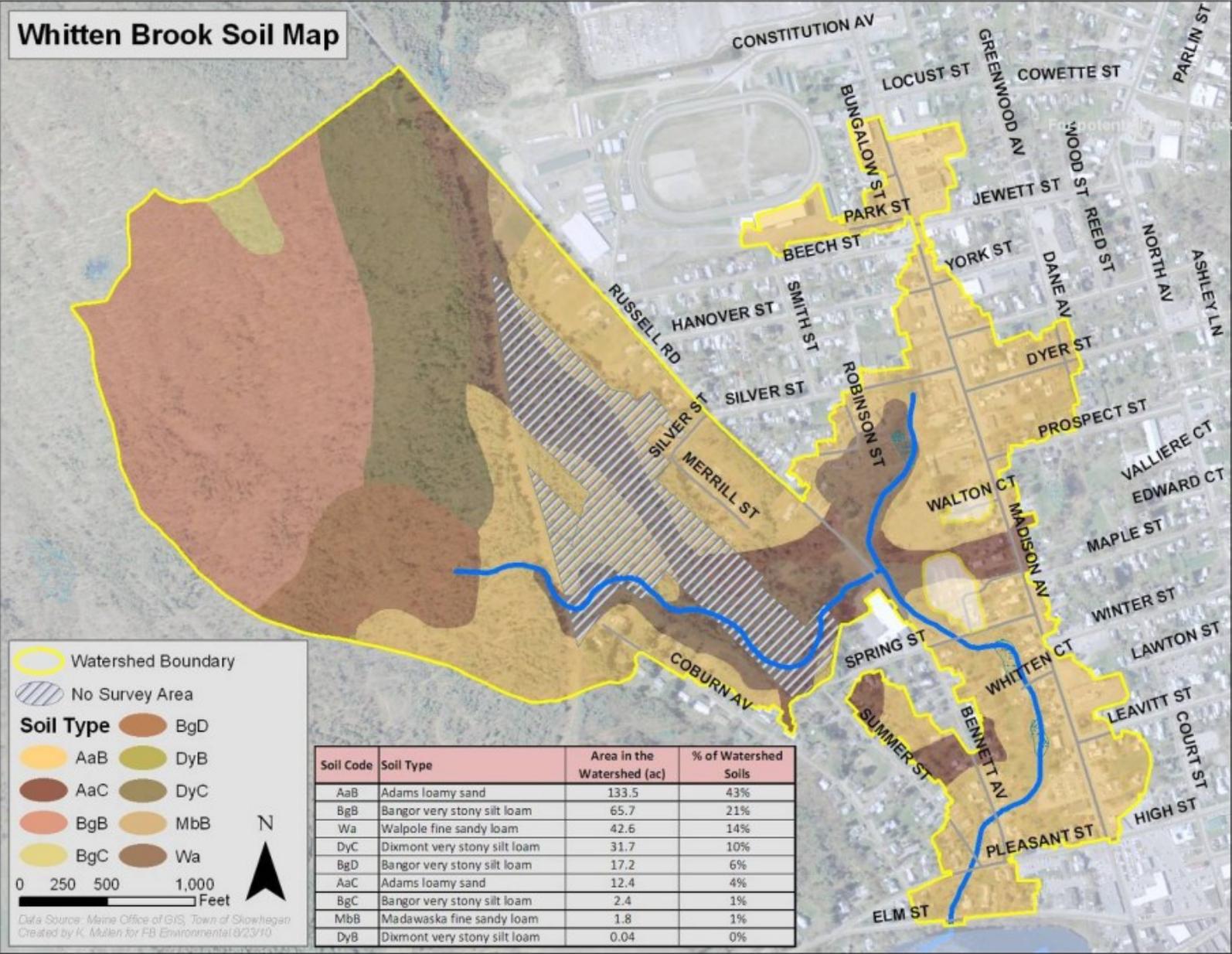












## APPENDIX B. WHITTEN BROOK RRI SITES

Site Characteristics- 2022 Whitten Brook RRI Sites										
Site ID	Description	Estimated Low Cost	Estimated High Cost	Updated Proposed BMPs	Value to Stream 1 High, 5 Low	Ease of Implementation A high, E Low	2022 Updated Priority	Pollutant Load Reductions		
								TSS lb/yr	TP lb/yr	Zn lb/yr
Basin1	Detention Basin	\$200,000	\$220,000	Increase berm height, install reducer orifice on detention basin, install gate valve at MH to divert water to Detention basin	1	C	HH	2871.12	2.81	4.82
2BW-5	Whitten Ct. Residential and Laney's Gas Station	\$45,329	\$53,515	For Whitten Ct: Move parking area toward house and include rain garden/bio retention in front of cars where current parking is. For Laney's: install filter in the catch basin to remove sediment and pollutants	2	C	HH	327.17	0.42	0.76
2BW-7	201/Boynton's	\$28,650	\$40,520	Install rain garden/focal point stormwater treatment systems (or similar) using native plants and underdrain pipe connected to nearest storm drain. Consider Rain Guardian to provide pre-treatment and prevent sand and trash from clogging Focal Point system	1	C	H	228.63	0.26	0.47
2CE-1	Lot Behind Cumberland Farms	\$2,046	\$3,411	Include bio-retention areas where possible in unused paved areas of the parking lot, vegetate paved swale between back of gas station and row of parking	4	B	H	226.22	0.09	0.56
1AE-3	Walgreens	\$28,612	\$33,977	Reduce size of parking lot, add rain garden/bioretenion in no parking area	3	C	H	538.25	0.21	1.33

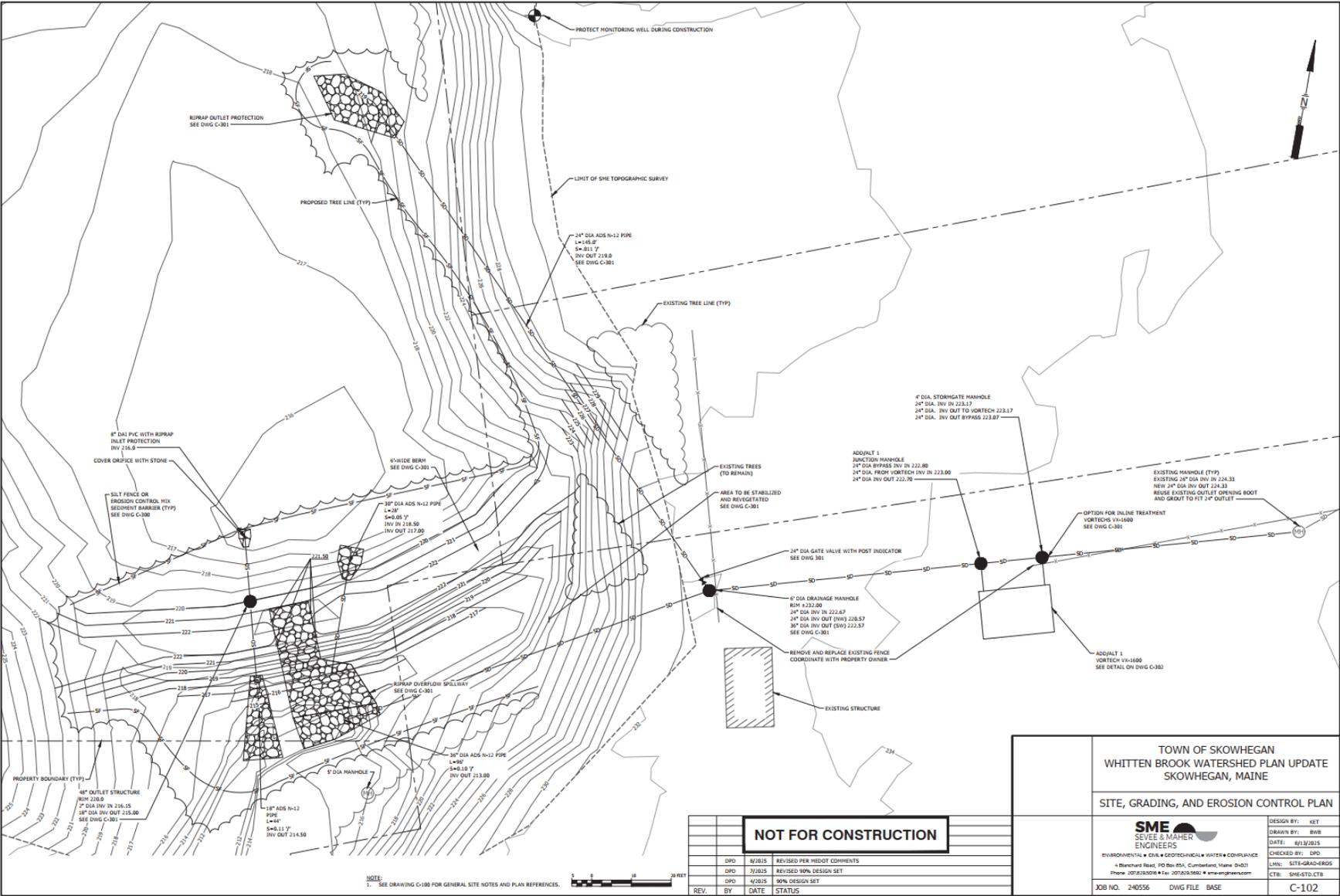
Site Characteristics- 2022 Whitten Brook RRI Sites										
Site ID	Description	Estimated Low Cost	Estimated High Cost	Updated Proposed BMPs	Value to Stream 1 High, 5 Low	Ease of Implementation A high, E Low	2022 Updated Priority	Pollutant Load Reductions		
								TSS lb/yr	TP lb/yr	Zn lb/yr
Residential*	Estimated total residential lots in watershed (101 lots)	\$25,000	\$75,000	Install rain barrels or rain gardens at 25% of lots to disconnect roof runoff from the stormwater system	2	D	H	252.89	1.01	n/a
1AW-2	High Tide Low Tide Seafood Market	\$13,317	\$22,048	Install rain garden around tree, grade parking area to drain there, permeable pavement where possible (in the parking area to the side of the building)	4	B	H	24.13	0.03	0.05
2BW-8	201/152 Madison Ave	\$16,372	\$32,743	Possibly include breaks in sidewalk draining to tree boxes or infiltration gardens in the grassy area between the sidewalk and retaining wall (DOT)	1	TBD	M	n/a	n/a	n/a
22-02*	Driveway next to 2B-10	\$16,752	\$48,840	Re-pave driveway adjacent to former mill building, consider raising the catch basin rim and directing water from the driveway to the existing stormwater drainage basin to avoid runoff from the driveway and road going into the stream untreated	2	C	M	149.27	0.07	0.28
2AW-2	Randy's Auto Repair	\$10,000	\$61,394	Re-plant or install bio-retention in paved curb area at the front of the parking lot	2	B	M	381.06	0.43	0.78
22-06*	Between Hight Ford and Pak Lee	\$6,000	\$59,096	Deepen existing sandy/grassy area to create swale, possibly connect to storm drains	5	B	M	214.76	0.09	0.27
1AE-7	Allied Realty	N/A	N/A	Install a rain garden/ deepen swale in grassy area between Damon's and Allied Realty	3	C	M	50.81	0.06	0.10
2AE-1	Prospect St. corner	\$2,046	\$3,411	Clean out catch basins	3	C	M	16.42	0.01	0.04

Site Characteristics- 2022 Whitten Brook RRI Sites										
Site ID	Description	Estimated Low Cost	Estimated High Cost	Updated Proposed BMPs	Value to Stream 1 High, 5 Low	Ease of Implementation A high, E Low	2022 Updated Priority	Pollutant Load Reductions		
								TSS lb/yr	TP lb/yr	Zn lb/yr
1AW-1	Height Ford Motors	\$77,799	\$95,153	Underground storage with use of isolator row, in-line filters	4	C	M	391.70	0.49	0.77
1AE-4	Motor Supply Co.	\$2,183	\$2,592	Potential to add planters on the south side of the parking lot to define distinct entrance and exit to the parking lot. Remove pavement and re-vegetate unused parking lot areas (near road)	4	C	M	81.29	0.03	0.20
1AE-5	Chandler St. Corner - gravel area behind motor supply garage	\$2,046	\$3,411	Define parking/driving areas, revegetate where possible, re-grade lot into bio filtration at the front corner or re-vegetate entire lot	4	C	M	61.59	0.02	0.15
2BW-5a	Empty lot adjacent to Spring St	\$4,366	\$4,366	Repair eroding culvert/protect outlet & stream	4	C	M	n/a	n/a	n/a
22-04*	Storage Unit behind KFC and adjacent empty lot	\$21,829	\$76,401	Potential site for a pavement buyback program, re-vegetate empty lot	4	C	M	275.65	0.19	0.31
1C-3A	Williamson pools	\$10,914	\$12,961	Remove pavement and re-vegetate where possible, around corner of Silver St and Madison Ave	3	D	M	821.13	0.32	2.03
2BE-1	Tax Pro	\$4,952	\$5,669	Install a gutter draining to rain barrel or garden in the grassy area next to the building, or remove pavement if possible	3	D	M	137.18	0.18	0.29
22-01*	Spring Street Culvert - north end	\$250,000	\$400,000	Stabilize eroding slope, replace culvert	2	D	M	n/a	n/a	n/a

Site Characteristics- 2022 Whitten Brook RRI Sites										
Site ID	Description	Estimated Low Cost	Estimated High Cost	Updated Proposed BMPs	Value to Stream 1 High, 5 Low	Ease of Implementation A high, E Low	2022 Updated Priority	Pollutant Load Reductions		
								TSS lb/yr	TP lb/yr	Zn lb/yr
1AE-6	Damon's Quick Stop	\$10,000	\$53,044	Install a rain garden/ deepen swale in grassy area between Damon's and Allied Realty	1	E	M	548.72	0.63	1.12
1BW-2A	Skow-Mad Lodge 2531	\$3,274	\$3,888	Remove pavement and re-vegetate where possible	3	A	M	205.28	0.08	0.51
22-03*	Bennet Ave mowed lawn, downstream of Madison S outfall	\$0	\$2,000	stop mowing, re-vegetate with native plants	4	B	L	n/a	n/a	n/a
22-05*	Blue Sky Counseling	\$4,000	\$5,000	Re-pave eroding area, add a gutter and rain barrel or remove pavement and add a dripline trench	5	C	L	154.34	0.08	0.02
1A-2	Kentucky Fried Chicken	\$11,667	\$13,857	Reduce pavement where possible	3	D	L	219.40	0.09	0.54
Tree Boxes/ 2012	23 tree boxes on 201 not accounted for in RRI survey	\$188,273	\$376,547	Install tree boxes to capture runoff from 201 and adjacent res/com homes & driveways	1	?	L	n/a	n/a	n/a
2CW-1	For Lease/right GMC	\$16,372	\$32,743	Not Visited 2022	1	?	L	72.52	0.09	0.15
2CE-3	Alice & Company	\$819	\$1,126	Add a gutter to direct roof runoff to a rain garden in the unpaved area, reduce pavement and extend garden if possible	3	A	L	20.53	0.01	0.05
2D-1	25 Pleasant Street	\$13,097	\$14,325	Not Visited 2022	3	B	L	82.11	0.03	0.20
2BW-6	Corner of Spring St and Madison Ave	\$8,186	\$16,372	Bio-filtration above storm drain	3	C	L	109.06	0.14	0.22
2CW-2	Height/Car Quest	\$8,186	\$16,372	Install Tree Box filter above storm drain, reduce pavement if possible	4	C	L	259.12	0.34	0.52
2CW-3	Skowhegan Insurance	\$25,922	\$38,473	Rain garden in the area around the sign	2	C	L	228.63	0.26	0.47

Site Characteristics- 2022 Whitten Brook RRI Sites										
Site ID	Description	Estimated Low Cost	Estimated High Cost	Updated Proposed BMPs	Value to Stream 1 High, 5 Low	Ease of Implementation A high, E Low	2022 Updated Priority	Pollutant Load Reductions		
								TSS lb/yr	TP lb/yr	Zn lb/yr
2CE-4	High-Powered Health Food (Formerly Skowvegas Tattoo)	\$24,557	\$29,469	Remove pavement and re-vegetate where possible	2	D	L	304.85	0.35	0.62
1B-1A	Enterprise	\$59,406	\$111,989	Minimize pavement, define entrance edges with rain gardens/bio-infiltration/tree boxes	4	D	L	635.10	0.72	1.30
1AE-8	Smart & Edwards Funeral Home	\$22,511	\$34,790	N/A	4	D	L	277.13	0.11	0.69
1AW-3	Skowhegan Fairgrounds	\$152,802	\$231,931	Use bioretention around storm drains - infiltrating bioretention cell w/underdrain	5	D	L	3175.48	3.62	6.49
2AW-1	American Glass	\$8,186	\$16,372	Remove Pavement where possible	5	D	L	248.65	0.09	0.50
1A-1	Rinaldi's Automotive	\$3,916	\$3,916	Minimize pavement where possible	5	E	L	105.31	0.04	0.26

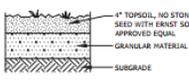
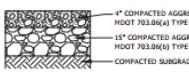
# APPENDIX C. DETENTION BASIN DESIGN (SME, 2025)



<b>NOT FOR CONSTRUCTION</b>		
SPD	8/2015	REVISED PER MEDOT COMMENTS
SPD	3/2015	REVISED 90% DESIGN SET
SPD	4/2015	90% DESIGN SET
REV.	BY	DATE STATUS

TOWN OF SKOWHEGAN WHITTEN BROOK WATERSHED PLAN UPDATE SKOWHEGAN, MAINE	
SITE, GRADING, AND EROSION CONTROL PLAN	
<b>SME</b> SEVEE & MAHER ENGINEERS <small>ENVIRONMENTAL • CIVIL &amp; GEOTECHNICAL • WATER • COMPLIANCE</small> <small>1 Blanchard Road, PO Box 85A, Cumberland, Maine 04012</small> <small>Phone: 207.833.0016 • Fax: 207.833.0880 • <a href="http://www-engineers.com">www-engineers.com</a></small>	DESIGN BY: KEF DRAWN BY: BHB DATE: 8/13/2015 CHECKED BY: SPD LHM: SITE-GRAD-EROS CTB: SHE-STG-CTR
JOB NO. 240556	DWG FILE BASE
C-102	

# Whitten Brook WBMP (2026-2035) Appendix C. Detention Basin Design

CONSTRUCTION	USE
	<b>GRASS</b> ALL DISTURBED AREAS
	<b>GRAVEL</b> PARKING

**NOTES:**

1. COMPACT SUBGRADE AND EACH LAYER OF BORROW, SUBBASE MATERIAL, AND BASE MATERIAL TO MINIMUM 95% OF MATERIAL MAXIMUM DRY DENSITY PER ASTM D1557.

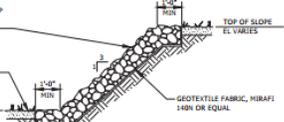
**SCHEDULE OF SURFACE FINISHES**

NTS

CONSTRUCT BERM WITH COMPACTED CLAY IN AREAS OF FILL SOIL SHOULD HAVE 100% PASSING THE # 20 SIEVE AND 30% PASSING THE 100 SIEVE

**BERM CONSTRUCTION**

NTS



**RIPRAP SLOPE SECTION**

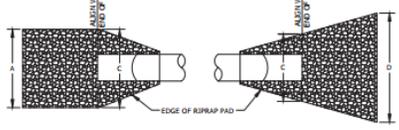
NTS

RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CURB.

PIPE DIA.	A	B	C	D	E	PAD DEPTH	Sp
12" OR LESS	3 FT.	2 FT.	3 FT.	4 FT.	6 FT.	10"	5"
15"	3.75 FT.	2.5 FT.	3.75 FT.	5 FT.	8 FT.	10"	8"
18"	4.5 FT.	3 FT.	4.5 FT.	7 FT.	10 FT.	18"	8"
24"	6 FT.	4 FT.	6 FT.	10 FT.	12 FT.	20"	10"
30"	10 FT.	6.67 FT.	10 FT.	20 FT.	24 FT.	28"	14"



CROSS SECTION

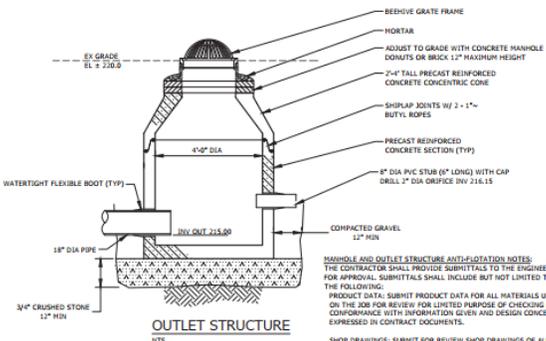


**RIPRAP INLET/OUTLET PROTECTION**

NTS

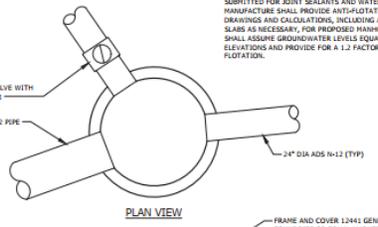
**TYPICAL GATE VALVE WITH POST INDICATOR**

NTS

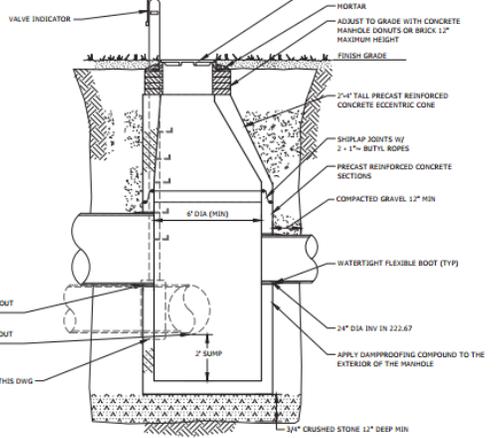


**OUTLET STRUCTURE**

NTS



**PLAN VIEW**

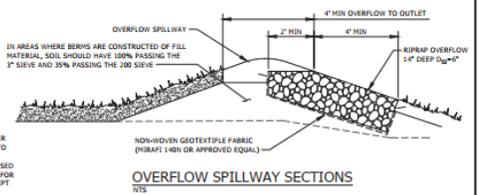


**DRAINAGE MANHOLE SECTION**

NTS

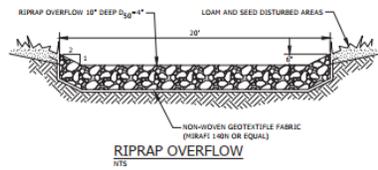
NOT FOR CONSTRUCTION

REV.	BY	DATE	STATUS
DPD	8/2025		REVISED PER MHDOT COMMENTS
DPD	7/2025		REVISED 90% DESIGN SET
DPD	4/2025		90% DESIGN SET
REV.	BY	DATE	STATUS



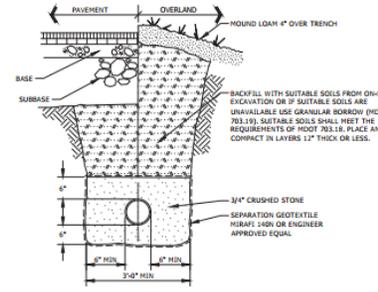
**OVERFLOW SPILLWAY SECTIONS**

NTS



**RIPRAP OVERFLOW**

NTS



**TYPICAL TRENCH SECTION**

NTS

TOWN OF SKOWHEGAN  
WHITTEN BROOK WATERSHED PLAN UPDATE  
SKOWHEGAN, MAINE

SECTIONS AND DETAILS

 <p style="font-size: small;">ENVIRO/ARCH/PLN &amp; CIVIL • GEOTECHNICAL • WATER &amp; CONFLUENCE 4 Standard Street, PO Box 854, Cumberland, Maine 04021 Phone 207.878.3200 • Fax 207.878.3882 • sme-engineers.com</p>	<p style="font-size: x-small;">DESIGN BY: KET DRAWN BY: BMB DATE: 8/2025 CHECKED BY: DPD LWL: NONE CTB: SH6-610.CTB</p> <p style="font-size: x-small;">JOB NO. 240556 DWG FILE DETAILS C-301</p>
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