

**Lake Anasagunticook
Watershed-Based Protection Plan
2020-2029**



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1. Background Information

A. Document Purpose and Scope

The purpose of this Watershed Based Plan, herein after referred to as the “plan”, is to lay out a strategy and schedule for Nonpoint Source Pollution (NPS) mitigation and water quality protection efforts for the Lake Anasagunticook Watershed over the next ten years (2020 to 2029). The Lake Anasagunticook Association, in partnership with Fiddlehead Environmental Consulting, prepared the plan with assistance and input from Maine Department of Environmental Protection (MDEP), and United States Environmental Protection Agency (EPA).

The plan was developed to satisfy national watershed planning guidelines provided by EPA. EPA requires *nine-element* plans for impaired watersheds, but allows *alternative* plans in several cases including for protection of high quality or unimpaired waters. MDEP accepts alternative plans for unimpaired lakes that have completed a recent watershed survey provided that the plans follow EPA and MDEP guidance and include minimum planning elements. Lake Anasagunticook meets these eligibility criteria, and the plan was written to include EPA and MDEP required planning elements (sections 2 through 6 in the plan cover EPA’s five elements for alternative watershed-based plans).

Note: Information collected during the 2019 Lake Anasagunticook watershed survey forms the basis for much of the plan. As such, the **Lake Anasagunticook Watershed Survey Report** is attached to the plan in Appendix A.

B. Watershed Background

Lake Anasagunticook is located in the towns of Hartford and Canton, Maine. The lake surface covers 593 acres and has a perimeter of 6.8 miles. The average depth is 28 ft. and the maximum depth is 54 ft. There is one dam at the Northern outlet of the lake. There is a popular town beach and boat ramp in Canton at the outlet end of the pond. The Town of Hartford also maintains a town beach near the mouth of Thompson Brook. Lake Anasagunticook is periodically stocked with brown trout.

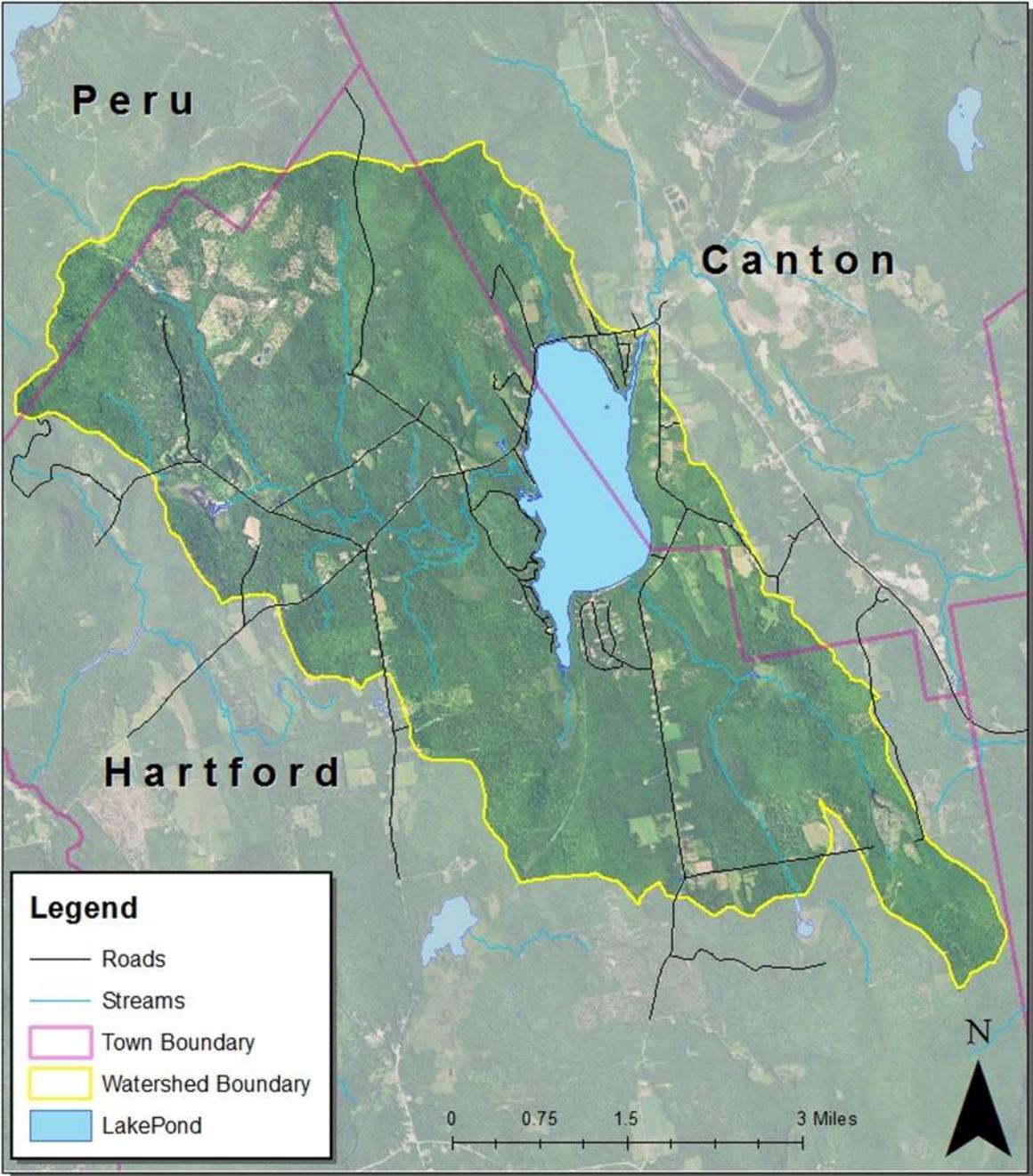
The direct watershed incorporates 13 square miles, the majority of which lies in Hartford with significant development in both Canton and Hartford. Sparrow Brook, Thompson Brook, and several unnamed tributaries drain into Lake Anasagunticook. The entire watershed empties into the Androscoggin River through Whitney Brook. (Figure 1).

Lake Anasagunticook provides the water supply to residents served by the Canton Water District.

C. Summary of Prior Watershed Work

The Lake Anasagunticook Association (LAA) provides several services to Lake Anasagunticook including water quality monitoring (since 1980) and LakeSmart assessments to help residents identify ways to minimize erosion and runoff problems on their properties. LAA’s membership base is active in water quality testing and reporting. Individual land owners are encouraged to manage their properties with water quality benefits in the forefront.

Figure 1 - Lake Anasagunticook Watershed



LAA and partners first conducted a watershed survey in 1998 with grant funding from USEPA under Clean Water Act (CWA) Section 319. The findings of this watershed survey led to the “Lake Anasagunticook Watershed BMP Demonstration Project” that was conducted from 2000-2003. This project was funded by the USEPA under CWA Section 319 and cost-shared the implementation of erosion control measures at a variety of sites throughout the watershed.

LAA, in conjunction with MDEP, Lake Stewards of Maine, Oxford County Soil and Water Conservation District, and Fiddlehead Environmental Consulting, completed an updated Watershed Survey in June 2019.

2. Identification of the Causes or Sources of the NPS Threat

A. Water Quality Summary

Water quality data has been collected on Lake Anasagunticook since 1980¹. Currently, there is one Lake Stewards of Maine (LSM)-certified lake monitor, Dr. Thomas Hamilton, with a back-up monitor in the works. Monitoring parameters include Secchi Disk Transparency (SDT), Chlorophyll-a (Chla), Total Phosphorus and Dissolved Oxygen (DO).

According to Scott Williams, Executive Director of Lake Stewards of Maine, overall water quality in Lake Anasagunticook is slightly below average for Maine lakes. The long-term average for SDT in Lake Anasagunticook is 4.7 meters, whereas the long-term average for all Maine lakes is in the mid-5 meter range. The long-term average for phosphorus concentration in Lake Anasagunticook is 9 parts per billion (ppb). Phosphorus in “clean” (unproductive) Maine lakes measures 2-4 ppb.² The average chlorophyll concentration in Lake Anasagunticook is 5 ppb, indicating moderate productivity.³

The water quality in Lake Anasagunticook is fairly good but the lake is vulnerable to declining water quality due to the incremental effects of nonpoint source pollution. There is substantial DO depletion at lower depths in late summer; in most years DO depletion affects the entire bottom half of the water column.^{4,5}

Anaerobic conditions at depth can cause the release of phosphorus from bottom sediments but fortunately Lake Anasagunticook has a favorable ratio of aluminum to phosphorus in the bottom sediments, which mitigates the release of sediment-bound (internal) phosphorus. This ratio could change if erosion from the surrounding watershed is allowed to introduce higher quantities of phosphorus into the lake. The best way to prevent this from happening is to prevent polluted runoff from entering the lake.

SDT readings indicate there was an algae bloom in 1980 that was probably of brief duration and not very extensive. SDT readings also reached a level in the late 1990s which indicate the lake was close to another algae bloom. However, Lake Stewards of Maine and MDEP currently rate the Lake’s risk factor for another algae bloom as low.⁶

B. Threatened Status

Lake Anasagunticook currently meets state water quality standards. However, it is listed on Maine’s NPS Priority Watersheds List (Threatened Lakes Priority List) because it is a public water supply. Lake Anasagunticook and the other unimpaired lakes were placed on this list because it was identified by

MDEP as being particularly sensitive to eutrophication based on current water quality, potential for internal recycling of phosphorus, potential as a cold water fishery, volume or flushing rate, or projected growth rate in the watershed.

C. Watershed NPS Threats

Like many other lakes in Maine, Lake Anasagunticook’s water quality is threatened by phosphorus enrichment. Phosphorus is the nutrient that controls the level of algae production in lakes. Small increases in phosphorus cause lake algae populations to increase and water clarity to decline. High levels can cause dense algae blooms, which can also create a biological and chemical reaction that depletes the oxygen from the bottom of the lake and results in the loss of cold water fisheries.

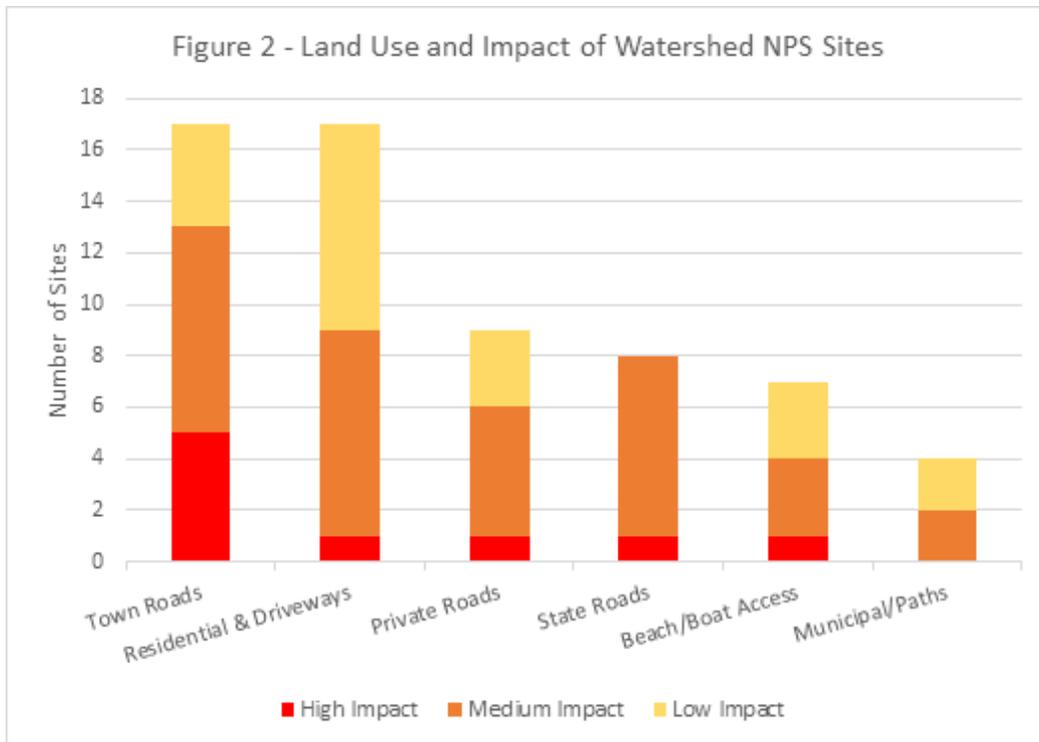
Phosphorus, which is typically attached to soil particles and organic matter, mostly reaches the lake in the form of storm water runoff from the lake’s watershed. Phosphorus-laden runoff volumes increase significantly in developed landscapes. Storm water flows across roads, driveways, residential properties and other developed areas and picks up phosphorus in soluble form or attached to eroded soil particles. MDEP monitoring in watersheds found that phosphorus export from the developed watershed was up to 10 times greater than the forested one (Dennis, 1985).

The Lake Anasagunticook Association raised funds for and conducted a watershed survey in 2019 to identify sources of phosphorus to Lake Anasagunticook. The survey followed MDEP guidance described in *Volunteer Lake Watershed Surveys: How to Conduct a Nonpoint Source Phosphorus Survey* (MDEP, 2011). In May 2019, the technical leaders and trained volunteers surveyed all developed portions of the watershed and documented soil erosion sites. Surveyors documented the location, nature and extent of each site’s erosion and runoff problems, recommended maintenance and pollution fixes and rated the impacts to the lake. Survey findings were summarized in the **Lake Anasagunticook Watershed Survey Report** (2019), which includes maps and a spreadsheet of NPS sites (Appendix A).

The watershed survey documented 62 problem sites. As previously stated, each site was rated high, medium or low impact based on the type of erosion, the size of the area eroded, and the type of buffering or filtering that the erosion underwent before entering a stream, ditch, or the lake. Of these, 20 sites were rated as low impact, 33 sites as medium impact and 9 as high impact (Table 1, Figure 2). Overall, 68% of the sites found were rated high or medium impact. Aside from soil erosion, no other significant sources of phosphorus were observed during the survey.

Table 1: Land Use by Impact Rating

	High	Medium	Low	Total	% of Total
Town Roads	5	8	4	17	27%
Residential	1	8	8	17	27%
Private Roads	1	5	3	9	15%
State Roads	1	7	0	8	13%
Beach/Boat Access	1	3	3	7	11%
Municipal/Paths	0	2	2	4	6%
Total	9	33	20	62	



3. Watershed Plan Goals and Objectives

Overall Goal: The overall plan goal is to maintain or improve Class GPA water quality standards in Lake Anasagunticook by reducing phosphorus and sediment loading to the lake. This will be achieved through the following actions over the coming ten year period (2020-2029):

- **Reduce current sources of phosphorus loading** by fixing 55 of the 62 sites identified in the watershed survey (34 road sites, 13 residential sites, 4 beach/boat access sites, and 4 municipal/path sites). This will be achieved by providing targeted outreach, technical assistance and cost-sharing assistance to install conservation practices at NPS sites identified in the watershed survey. **NOTE: It is anticipated that 4 residential/driveway sites and 3 beach/boat access sites will be fixed independently during the 10-year period.**
- **Prevent new sources of phosphorus loading** by facilitating improved land use practices and ongoing maintenance activities. This objective will be met by conducting outreach and providing technical assistance to watershed residents, farms, and municipal officials. The prevalence of coarse/sandy soil was observed throughout the watershed during the watershed survey. This warrants a special outreach effort by LAA to educate property owners about the proper care of septic systems.
- **Build local capacity** for watershed stewardship using social media and local talent to make projects and results visible and raising funds for mitigation work.
- **Conduct ongoing assessment of lake and watershed conditions** by monitoring lake water quality and setting up and maintaining an NPS Site Tracker. Site Tracker is an Excel spreadsheet that can be used to monitor sites identified in the watershed survey, to add new sites as they are discovered in the watershed, and to mark sites as completed when they are fixed.

4. Schedule and Milestones to Guide Plan Implementation

Table 2 – Implementation Schedule

2020 -2021	<ul style="list-style-type: none"> Publicize high priority projects to Hartford, Canton, Community Members Apply for EPA Section 319 Clean Water Act grant through MDEP (Phase II). * Notify landowners about NPS sites on their properties. Set up NPS Site Tracker
2021-2022	<ul style="list-style-type: none"> Conduct EPA 319 Phase II project (if funded) with targeted cost-sharing and matching grants for high priority sites. Lake Anasagunticook Association conducts annual meetings, outreach, maintains NPS Site Tracker and raises funds for ongoing stewardship. Landowners fix NPS sites independently.
2023	<ul style="list-style-type: none"> Apply for Phase III 319 project.*
2024-2025	<ul style="list-style-type: none"> Conduct Phase III 319 project (if funded).
2020-2029	<ul style="list-style-type: none"> LAA conducts LakeSmart evaluations, monitoring and municipal assistance for new development projects. LAA uses NPS Site Tracker to keep track of fixed sites, new sites, and to identify maintenance needs and prompt ongoing road maintenance. Continuous work to fund/execute site clean-ups in order of priority. Landowners fix sites independently.

* The 319 demonstration grant that was conducted from 2000-2003 is considered to be Phase I.

A. Action Plan and Schedule

Action items, an estimated schedule and milestones were developed to prevent new NPS problems and address existing NPS sites with the highest impact and phosphorus loading to Lake Anasagunticook. The number and types of sites targeted in the plan was based on local knowledge about potential funding sources, landowner cooperation and other considerations. Other actions in the plan were included because they have proven to be cost-effective and successful in the region.

The plan is designed to be implemented over a 10-year period, and an estimated schedule is provided for each action (Table 2). Potential funding sources and key partners were also identified for each action (Table 3).

The plan will be carried out, in large part, with local funding and resources. However, state and federal funding will also be sought to help implement some actions in the plan.

Table 3 – Action Items and Milestones	Schedule	Who (see key, pg. 8)	Potential Funding Sources
<i>Reduce current sources of P loading to the lake by addressing NPS sites identified in the watershed survey</i>			
Landowner self-funded BMP installations at NPS sites			
Residential sites – includes driveways (4 sites)	2020-2022	Landowners	Private
State Road sites (8 sites)	2020-2022	MDOT	MDOT, USEPA (319)
Provide opportunity for cost sharing assistance to install BMPs at NPS sites			
Private Roads (9 sites)	2021-2025	Private	USEPA (319), Private
Town Roads (17 sites)	2021-2025	Towns	USEPA (319), Towns
Residential sites – includes driveways (9 sites)	2021-2025	Volunteers	USEPA (319), Private
Municipal/paths (4 sites)	2021-2025	CWD, Towns	USEPA (319), CWD, Towns
Conduct LakeSmart, other outreach and tech assistance for lake residents	Ongoing	LAA, OCSWCD, ARWC	LAA, EPA (319)
Notify landowners with watershed survey sites	2020	LAA	LAA
<i>Prevent new sources of phosphorus loading to the lake</i>			
Reach out to agricultural operations to provide TA and cost-sharing for manure management.	Ongoing	OCSWCD, ARWC, LAA, Towns	LAA, USEPA (319), NRCS
Hold tours to highlight conservation practices	2021-2029	LAA, OCSWCD	USEPA (319)
Work with road associations and Towns to prompt ongoing road maintenance	Ongoing	LAA	Town, Private
Educate watershed community about proper septic system maintenance	Ongoing	LAA, Towns	LAA, Towns
<i>Build local capacity for watershed stewardship</i>			
Apply for 319 Watershed Implementation Grants (Phases II & III)	2020, 2022	LAA, OCSWCD, ARWC	Private
Apply for Source Water Protection Grants from Maine Drinking Water Program	Ongoing	CWD	Maine Drinking Water Program
Raise funds to support ongoing lake stewardship work	Ongoing	LAA	Private, Town
<i>Conduct ongoing lake and watershed assessment</i>			
Conduct lake water quality monitoring	Ongoing	LAA, MDEP, LSM	LAA
Set up NPS Site Tracker and train LAA to use	2020	LAA, MDEP	Private
NPS Site Tracker annual use and maintenance	Ongoing	LAA	Private

B. Plan Oversight and Partner Roles

The Lake Anasagunticook Association will assume responsibility for plan oversight and implementation. Partners include MDEP, the Towns of Canton and Hartford, Canton Water District, MDOT, land owners, OCSWCD and ARWC.

- **OCSWCD and ARWC** will support LAA with implementation of 319 grants; provide technical assistance; promote watershed stewardship through their websites and presentations; and work with the Towns to provide erosion control services for new development.
- **MDOT and landowners** will address NPS issues on their properties and conduct ongoing maintenance of BMPs.
- **LAA** will be a key partner in implementation grants, provide plan oversight, conduct water quality monitoring (in conjunction with LSM and MDEP), conduct outreach activities and raise funds for stewardship work. LAA will also set up and use the NPS Site Tracker to track improvements at existing sites, identify new NPS sites and prompt ongoing maintenance. LAA will continue to facilitate LakeSmart.
- The **Town of Canton** will provide funding support for the Plan and LAA's water quality monitoring and also work to address NPS problems and conduct regular maintenance on town road sites.
- The **Town of Hartford** will provide funding support for the Plan and LAA's water quality monitoring and also work to address NPS problems and conduct regular maintenance on town road sites.
- **Canton Water District** will provide technical assistance for 319 grant projects and apply for Surface Water Protection Grants.
- **MDEP** will provide technical assistance and the opportunity for financial assistance through the NPS Grants Program.
- **USEPA** may provide CWA Section 319 funds and guidance.

Organization Acronym Key:

OCSWCD = Oxford County Soil & Water Conservation District

MDOT = Maine Department of Transportation

ARWC = Androscoggin River Watershed Council

LAA = Lake Anasagunticook Association

LSM = Lake Stewards of Maine

USEPA = United States Environmental Protection Agency

CWD = Canton Water District

MDEP = Maine Department of Environmental Protection

NRCS = Natural Resources Conservation Service

C. Plan Outputs and Milestones

Organizational Outputs

- LAA, OCSWCD and ARWC apply for 319 grants for Phase II and III projects
- NPS Site Tracker created and local coordinator trained to use

- Contact made with all property owners (public and private) with sites identified in the 2019 watershed survey

NPS Mitigation Outputs

- Number of NPS sites fixed by voluntary landowner initiative
- Number of high and medium impact NPS sites fixed with cost sharing assistance
- Number of technical assistance visits
- Number of sites qualifying for LakeSmart
- Estimated pollutant load reductions achieved by installed BMPs

Water Quality Outcomes

- Meets lake GPA standards in MDEP’s biennial 303d reports
- Stable or improved trend for lake water clarity and dissolved oxygen

5. Proposed Management Measures

The *Lake Anasagunticook Watershed Survey Report* (Appendix A) lists specific management measures recommended for each of the NPS erosion problems identified during the survey. Typical problems and management measures for the most common land uses identified in the watershed survey are described in the sections below. Recommendations follow guidelines found in MDEP publications including the *Gravel Road Maintenance Manual*, *Conservation Practices for Homeowners* fact sheet series, and *Erosion and Sediment Control Manual*. The recommended BMPs accomplish the plan goal of reducing phosphorus and sediment loading to the lake by stabilizing bare soil and erosion and diverting, infiltrating or filtering polluted runoff before it reaches the lake.

In addition to structural BMPs recommended for each problem, public education and outreach efforts will also be needed to promote responsible stewardship and ongoing maintenance activities. The NPS Site Tracker will be created and used by the Lake Anasagunticook Association with support from MDEP on an ongoing basis to identify new problems and to prompt maintenance on sites fixed through the plan.

A. Residential Development

The watershed survey identified 17 residential erosion sites. This includes driveways. Of these, there was 1 high impact, 8 medium impact and 8 low impact. Common problems included lack of vegetated buffers, bare soil and erosion on footpaths, along roof driplines and adjacent to the lake. Based on the survey results, the most common BMPs will include:

- erosion control mulch to cover bare areas;
- runoff diverters on paths and driveways;
- stablized paths;
- infiltration steps;

- dripline trenches along roof driplines; and
- buffer plantings.

The plan aims to address 13 of the 17 residential /driveway erosion problems identified in the watershed survey. High and medium impact will be fixed by providing landowners with small matching grants for plants, erosion control mulch or other materials. Since the low impact sites are low cost and easy to fix, another 4 sites will be fixed independently by the landowners after the problem and recommended solutions are brought to their attention through targeted outreach and/or technical assistance visits.

B. Private Roads

The watershed survey identified 9 private road sites. There were 1 high impact, 5 medium impact and 3 low impact sites. Common problems included poor shaping, moderate to severe ditch or road surface erosion, and grader/plow berms trapping surface runoff on the road surface. The most common BMPs recommended in the survey included:

- reshaping (crowning) the road surface;
- removing berms that trap runoff on the road surface;
- installing waterbars to divert water off the road
- cleaning, enlarging and stabilizing ditches; and
- armoring culvert inlets and outlets.

The plan aims to address all 9 sites. They will be addressed by providing cost sharing funds to road associations and landowners. Similar to the low impact residential sites, targeted outreach and technical assistance will be provided to landowners and road associations associated with the remaining low impact sites.

Ongoing maintenance (e.g., grading, removing accumulated sediment from sediment basins and turnouts) is critical to long term performance of these BMPs and prevention of new NPS problems. As a result, the plan calls for periodic inspections of implemented BMPs through the NPS Site Tracker. Follow up contact will be made by the Lake Anasagunticook Association to road associations and landowners for any maintenance needs.

C. State and Town Roads

There were 17 town road sites and 8 state road sites identified in the watershed survey. Five town road sites were high impact, 8 medium and 4 low. One state road site was high impact and 7 were medium. All sites will be addressed in the plan.

Some of these sites may require engineering support and coordination with the adjacent private land owners. The plan aims to provide cost sharing assistance and engineering oversight to help the towns with site designs and construction costs.

Recommendations for the state road sites will be relayed to MDOT. The plan aims to notify Maine Department of Transportation (MDOT) about the problems and request that the recommendations be incorporated into their road maintenance schedule. The NPS Site Tracker can be used to prompt periodic inspections of the state road sites and communication with MDOT about future maintenance needs.

- replace, repair, armor and otherwise improve culverts;
- add plunge pools, sediment pools, and catch basins where appropriate;
- remove grader berms on the edges of roads;
- build up roads and add less erodible surface materials;
- armor ditches with stone;
- reshape roads and tilt away from waterbodies;
- remove sand or install diverters to prevent sand from entering water;
- stabilize road shoulders with compacted gravel or vegetate where possible; and
- remove clogs in culverts.

D. Municipal/paths

Four sites were found in the watershed survey; 2 were medium impact and 2 were low impact. The plan aims to fix all 4 sites working with the towns as needed. Recommendations may include:

- use mulch/Erosion Control Mix on slopes and surfaces;
- stabilize footpath;
- install runoff diverter (water bar); and
- install shoreline buffer.

E. Beach/boat access

Seven sites were found in the watershed survey; 1 was high impact, 3 were medium impact and 3 were low impact. The plan aims to fix the high and medium impact sites. It is anticipated that the 3 low impact sites will be fixed independently. Recommendations may include:

- add gravel, recycled asphalt or mulch;
- add rubber razor bars or other runoff diverters;
- armor culver inlets/outlets;
- pave surface;
- vegetate shoulder;
- establish a buffer; and
- improve infiltration.

6. Pollutant Load Reductions

Pollutant load reductions will be estimated for many NPS sites to help demonstrate the value of BMPs to reduce the amount of sediment and phosphorus entering the pond. Pollutant load reductions will be estimated and reported to MDEP for any work funded by 319 grants. Pollutant load reduction will be made using methods approved and recommended by the MDEP and EPA. An attempt was made to make preliminary estimates in December 2019 but weather conditions at the time precluded visiting most sites. An effort will be made to conduct additional soil loss measurements in the spring of 2020 when the snow melts. These estimates can be used to further prioritize projects in the watershed.

7. Water Quality Results Monitoring

Maine water quality criteria require that lakes and ponds have a stable or improving trophic state and be free of culturally induced algal blooms. LAA will continue to monitor Lake Anasagunticook twice a month from May through September for parameters including Secchi disk transparency, temperature, Chlorophyll-a, dissolved oxygen and total phosphorus. MDEP also conducts baseline monitoring on Lake Anasagunticook about every five years for these and other parameters.

MDEP conducts Secchi disk trend analysis every two years as part of their Integrated Water Quality Monitoring and Assessment report. Trend reporting (positive, negative or stable) will assist in determining whether the plan meets its goal of having stable or improving water quality over time.

References

¹ Jeff Stern telephone conversation January 9, 2020 with Scott Williams, Executive Director, Lake Stewards of Maine

² Ibid.

³ Amanda Pratt, Environmental Specialist III, MDEP, comments on draft WBPP, January 21, 2020.

⁴ Ibid.

⁵ https://www.lakesofmaine.org/data/2018_Lake_Reports/3604_1.html

⁶ <https://www.maine.gov/dep/water/lakes/bloomrisk.html>