

- Enforcement of Ordinances
 - Any of the above provisions could be codified in the watershed town’s Planning or Zoning regulations.

5. PLAN IMPLEMENTATION

5.1 PLAN OVERSIGHT

In order to effectively implement this watershed plan, an implementation committee should be formed. Many of the members of the plan development subcommittees could provide continuity and background to the implementation committee. This committee should include all relevant stakeholders across the watershed including local governments. State and federal agency personnel with funding, permitting or technical roles may be invited to participate but need not be committee members. This committee will be charged with ensuring that the plan is up-to-date, progress is being made, regulatory requirements are being met and opportunities for action are fully exploited. In general, the committee is responsible for the following broad objectives:

Develop a plan for sustainable funding. Lack of funding or insufficient funding can often slow or stop the implementation of a watershed plan. Funding should rely on multiple revenue streams to maintain momentum if one or more source of revenue declines or is eliminated.

Continue public outreach. Public outreach throughout implementation is critical to maintaining support for restoration efforts. Publicizing successes may lead directly to opportunities for expansion of existing efforts or new projects elsewhere in the watershed.

Develop a long-term monitoring program. Documenting improvements over time is essential to maintaining momentum in implementation. This may include direct measures, such as documenting water quality improvements through the existing monitoring program or indirect measures such as hectares of land conserved over time. The water quality and GIS data assembled to support this project should be viewed as base data to be continually updated as additional monitoring, assessment or geospatial data become available and projects are completed which result in changes in the watershed. This documentation forms the foundation of outreach efforts and directly impacts the ability to attract additional funding to support phosphorus reduction projects.

Establish measurable milestones. A schedule for implementation is critical to maintaining the forward momentum of the restoration project. A list of action items and target dates for completion is an essential part of the restoration plan. This schedule should include both short-term and long-term restoration schedules. Progress should be measured against milestone targets using metrics directly related to water quality such as in-lake phosphorus concentrations, frequency of cyanobacteria blooms or frequency of dissolved oxygen depletion occurrence.

The ultimate outcome of the watershed plan is to preserve water quality in Lake Sunapee for all human users and the biota that depend on the lake.

Projects implemented to preserve Lake Sunapee water quality would exhibit the characteristics listed in Table 14.

Table 14 - Existing and Desired Conditions Relevant to Preserving Lake Sunapee Water Quality		
Parameter	Existing Condition	Desired Future Condition
Water Quality	Phosphorus load supports oligotrophic conditions in the lake. Localized blooms of cyanobacteria do occur. Dissolved oxygen concentrations are depressed in the deeper water of Sunapee.	Lake Sunapee and all waterbodies within the watershed meet water quality standards and support designated uses which include drinking water, contact recreation and aquatic life. This will include phosphorus concentrations supporting an oligotrophic designation, minimal to no cyanobacteria blooms and sufficient dissolved oxygen in the deep water of Lake Sunapee to support aquatic life (>5 mg/l).
Infrastructure	Infrastructure is currently aging or failing in some locations in response to increases in development, intensity of storms and rainfall/runoff.	As infrastructure is replaced, use resilient designs that are stable and sufficient to handle larger volumes of water anticipated in the future.
Land Use Planning	A patchwork of ordinances and zoning among the watershed towns.	Consistent local regulation with preservation of water quality as a priority.
Preservation of Land	Large blocks of land within the watershed are currently protected from development.	Additional blocks of land in critical locations are added to the land currently under conservation.
Education and Outreach	5,634 children and adult attendance/participation at events, workshops and in classrooms for 2019.	Increase attendance/participation at events, workshops and in classrooms to 7,000.
Monitoring	Comprehensive monitoring program currently in place.	Continue existing program with a few changes to facilitate measurement of this plan's success.

5.2 ADAPTIVE MANAGEMENT APPROACH

An adaptive management approach is highly recommended for implementation of this plan. Adaptive management enables stakeholders to develop plans for restoration and protection, determine both what is working and what is not working. Based on a continual evaluation, the plan can be changed to improve the outcome. It also allows the plan to be changed to react to changes in funding availability, specific site conditions, watershed wide conditions, regulatory change and technological advances.

This plan should be considered a living document that will be continually updated as restoration activities are completed, or conditions change. The adaptive management approach recognizes that the entire watershed cannot be restored with a single restoration action or within a short time frame. Instead, adaptive management establishes an ongoing program that provides adequate funding, stakeholder guidance, and efficient coordination of restoration activities. Implementation of this approach ensures that appropriate restoration actions are taken, and that water quality and other environmental conditions are monitored to document restoration over an extended time period.

5.3 ACTION PLAN

The continued education of all stakeholders in the Lake Sunapee Watershed including residents, Town Officials, businesses, visitors and the general public is a critical component of this watershed management plan. LSPA has a long history of education and stewardship of Lake Sunapee and the surrounding watershed making it an important resource in the community. The Action Plan is divided into six categories including Education and Outreach, Research, Further Evaluation, Monitoring and Assessment, Land Conservation and Land Use Regulation, Zoning and Ordinances. Within each category, a brief description of the action item is included along with who will be leading the program, the location and the timeframe for when the action item will begin or be completed.

5.3.1 Education and Outreach

Over the next ten years, LSPA’s outreach efforts will focus on helping the public better understand the connection between water quality and using good practices to protect Lake Sunapee and the surrounding watershed. Educational programs will be hosted on-site at LSPA or at other locations where projects have been completed, signs will be installed where permitted to highlight these projects, articles will be included in various publications, and LSPA will pilot new programs that will encourage “lake-friendly” living. All findings from upcoming research projects will also be shared with the public.

Table 15 - Education and Outreach				
Action Item	Description	Performed/Led By	Where	Timeframe
Demonstration Sites	Educational tours of project/demonstration sites.	LSPA	Project sites with high educational value and visibility	During project work period and/or at the completion of project – time of greatest educational value
Signage	Educational signage at appropriate project sites where permitted.	LSPA	Projects sites with high public visibility, such as Sunapee Harbor	During project work period and at the completion of project
Progress Reports	Create written reports concerning progress of WMP in each town for annual town reports.	LSPA	Town Reports	Annually
Town Presentation	Make presentations for town administrators and select boards concerning the progress of WMP.	LSPA	In watershed towns	Annually
Publish Articles	Write articles for various local publication (newspapers, The Kearsarge Shopper) as well as LSPA publications with the objective of educating the public about major WMP objectives.	LSPA	Local publications	Three per year
Host Lecture Programs	Plan and carry out lecture/workshop format programs with the objective of educating the public. Possible topics may include runoff and septic issues.	LSPA Education Committee, professional presenters	At LSPA and other appropriate locations	Annually

Table 15 - Education and Outreach

Action Item	Description	Performed/Led By	Where	Timeframe
Host Professional Outreach Programs	Plan and carry out Professional Outreach programs such as UNH Cooperative Extension’s Landscaping on the Waters’ Edge, UNH T2 Center’s Green SnowPro training session and WIT Advisors Sustainable Winter Management Program (SWiM).	LSPA, professional presenters	At LSPA and other appropriate locations	Every 3rd year
Pilot Landscape Program	Pilot a program such as NH LAKES "Lake Smart" and/or develop a Lawn Smart program.	LSPA, homeowners	Homeowner and business venues	Start by 2021 and assess in 2024
Pilot Tour Program	Pilot “lake friendly” garden/lawn tours.	LSPA, identified homeowners	On site or “virtual”	Start by 2022 and assess in 2025
Septic System Reminders	Send septic care/maintenance reminders to residents.	LSPA	Through mail or email	Annually to coincide with EPA’s Septic Smart Week in September
Pilot Septic Program	Pilot “Septic Socials” (informal neighborhood gatherings/information sessions).	LSPA, host homeowners	At a host home or appropriate community site	Start by 2023 and assess in 2026
Media Presentations	Create media presentations to add to the LSPA website. Topics may include septic system maintenance, runoff management.	LSPA Education Committee, interns and/or paid professionals	At project sites, private homes, septic company etc.	Start in 2021 and revise as needed annually
Erect Low Road Salt Signs	Identify low salt road areas and look at feasibility of erecting signs to notify public. Review other town roads not listed that would be good candidates for designation.	LSPA Watershed Committee	Watershed	Start in 2022 and complete by 2027
Develop Edgy Outreach Campaign	Develop "edgy" outreach campaign to raise awareness about nonpoint source pollution issues and solutions (similar to EPA's "Watershed Outreach Campaign"). Delivery methods could include print ads, radio ads, LSPA website & newsletters, etc...	LSPA	LSPA	Annually

Table 15 - Education and Outreach

Action Item	Description	Performed/Led By	Where	Timeframe
Identify Private Unmaintained Stormwater Infrastructure	Work with Towns to determine private stormwater infrastructure not being maintained that is impacting waterways via sediment transport and erosion. Offer suggestions on how to clean and maintain structures such as routinely removing captured sediment from clogged culverts and drains. Assess possibility of drainage easements for sites where homeowners are not willing/able to maintain.	LSPA Watershed Committee	Watershed	Start in 2026 and complete by 2030

5.3.2 Research

Lake Sunapee supports a considerable amount of research in aquatic ecology and water quality. This is essential work that should continue however, there are several other areas of research interest that will greatly help convey a conservation message to the stakeholders and provide valuable insight into the efficacy of efforts to manage phosphorus loading to Lake Sunapee. These are detailed in Table 16 below.

Table 16 - Research

Action Item	Description	Performed/Led By	Where	Timeframe
Revisit 2012 NOAA Grant Project	Revisit 2012 NOAA Grant project to determine if Towns have "adapted" stormwater infrastructure in critical areas to be more resilient in response to climate change. Properly sized infrastructure will reduce scouring/erosion of soils and outright failure during storm events. Make recommendations to towns based on findings.	LSPA Watershed Committee	LSPA	Start in 2021 and complete by 2025

Table 16 - Research

Action Item	Description	Performed/Led By	Where	Timeframe
Review Economic Impact Literature	Review existing literature/research on the economic impact of water quality and watershed health to the local economy. Identify information that is applicable for use in the Sunapee Watershed.	LSPA Watershed Committee, student researcher(s)	LSPA	Start in 2020 and complete by 2022
Implement Economic Impact Study	Based on the findings above, research/implement economic impact study for the Sunapee Watershed.	LSPA Watershed Committee, LSPA, student researcher(s)	LSPA	Start in 2022 and complete by 2027
Expand Septic System Database	Expand the septic system status database to include property owners within 250 feet of wetlands and tributaries to determine phosphorous loading	LSPA	LSPA	Start in 2020 and complete in 2022. Revise database in 2030
Identify Septic Repair Funding Sources	Identify potential grant funding sources to fund repair work on failing septic systems.	LSPA	LSPA	Start in 2021 and complete by 2022
Phosphate Free Study	Pursue a study on phosphate-free cleaning products and fertilizers to determine if they are indeed phosphorus free. Preliminary findings from a Colby Sawyer student indicated that some of these products did have phosphorus in them. Depending on future findings LSPA can educate the public about this issue.	LSPA, student researcher(s)	TBD	Start in 2020 and complete by 2022
Airborne Dust Study	Pursue a study on impacts of airborne dust from leaf blowers. Does this activity contribute to phosphorus loading when dust settles onto water surfaces and/or when dust on landscape is washed into waterways from storm events? Depending on findings, LSPA can educate public about any potential harmful impacts aside from noise and air pollution these machines cause.	LSPA, student researcher(s)	TBD	Start in 2024 and complete by 2026.

Table 16 - Research

Action Item	Description	Performed/Led By	Where	Timeframe
Internal Phosphorus Loading Study	Collaborate with LSPA’s Scientific Advisory Committee, EPA and NHDES to better understand lake sediment chemistry and the possible release of phosphorus into the lake water column during anoxic conditions.	LSPA, Scientific Advisory Committee	LSPA	Start in 2020 and complete by 2021
Food Web Interactions Study	Collaborate with LSPA’s Scientific Advisory Committee on ongoing research on Lake Sunapee to better understand impacts of food web interactions on lake water quality.	LSPA, Scientific Advisory Committee	LSPA	Start in 2022 and complete by 2030
Phosphorus Transfer by Cyanobacteria Study	Collaborate with LSPA’s Scientific Advisory Committee on ongoing research on Lake Sunapee to better understand potential transfer of phosphorus from sediment into the lake water column by cyanobacteria. Incorporate relevant research findings into watershed plan.	LSPA, Scientific Advisory Committee	LSPA	Start in 2021 and complete by 2030

5.3.3 Further Evaluation

Due to the scale of the watershed and resource limitations, several areas of the watershed were only evaluated in a cursory fashion in this watershed plan. Additional detailed evaluation of several areas is warranted (Table 17). Data generated through these evaluations will help further the overall Sunapee Watershed goals.

Table 17 - Further Evaluation

Action Item	Description	Performed/Led By	Where	Timeframe
Track Future Use of EWP Renewable Power Plant	Plant located in Springfield is currently closed. Remain engaged in process of sale, reuse or recommissioning of the site to ensure phosphorus export is minimized.	LSPA Watershed Committee	Plant Site	As needed per future use

Table 17 - Further Evaluation

Action Item	Description	Performed/Led By	Where	Timeframe
Evaluate Durgin & Crowell Mill Site	Coordinate with mill owner(s) to evaluate ways to minimize phosphorus export from site.	LSPA, NHDES	Lumber Mill Site	Start in 2022 and complete by 2024
Blodgett's Landing Stormwater Study	Encourage Town of Newbury and Blodgett's Landing Cottage Association to create a plan addressing excessive stormwater runoff occurring in this development affecting the water quality of the lake. First step includes identifying and mapping above and below ground stormwater infrastructure such as conveyance pipes, dry wells, drop inlets and catch basins and how they connect. Second step includes the assessment and implementation of cost-effective solutions to address excessive runoff such as installing stormwater infiltration/treatment projects on both public and private properties. Grant funding with required match may be helpful to initiate this effort (see Sources of Funding in Section 5.6). Challenges include unknown locations of abandoned wastewater tanks potentially filled with waste, collapsed/plugged conveyance pipes, buried catch basin structures and the existence of asbestos lined pipes.	LSPA, Town of Newbury, Blodgett's Landing Landowners	LSPA, Blodgett's Landing, Town of Newbury	Ongoing effort

5.3.4 Monitoring and Assessment

The monitoring program currently in place at LSPA is very comprehensive in scope and longevity however, preparation of this watershed plan highlighted a number of areas where enhancements to the existing program would greatly increase understanding of the resource and ultimately management of the watershed. These are presented in Table 18 on the following page.

Table 18 - Monitoring and Assessment

Action Item	Description	Performed/Led By	Where	Timeframe
Tributary Flow Gaging	Determine and calculate more accurate flow volumes from tributaries for better idea of phosphorus loading and to record change over time.	LSPA	Tributaries flowing into Lake Sunapee	Start in 2020 and complete in 2021
Shoreline Survey	Perform survey (see example form in Appendix K) of shoreline properties used for long term comparison and identify hotspots. Educate landowners on lake friendly landscaping methods.	LSPA, interns	Lake Sunapee Shoreline	Complete in 2020 and repeat survey every 10 years
Expand Water Quality Program	Bolster data collection in upstream lakes and ponds to refine modeling and consider sub-basin plans for each of them in collaboration with local stakeholders.	Local lake and pond associations with assistance from LSPA	Upstream watershed lakes and ponds	Start in 2020 and continue annually

5.3.5 Land Conservation

Land conservation can play a critical role in the preservation of water quality in Lake Sunapee and the reduction of future phosphorus loads. Table 19 presents elements of a land conservation strategy for the watershed.

Table 19 - Land Conservation

Action Item	Description	Performed/Led By	Where	Timeframe
Identify Key Land Conservation Parcels	Identify undeveloped land parcels within subwatersheds suitable for land conservation based on size and location. Prioritize land parcels in subwatersheds with high TP loading estimates. Establish an in-house land protection committee and work with local land trusts to conserve properties.	LSPA, Local Land Trusts, Local Conservation Commissions	LSPA	Start in 2020 and continue preservation efforts annually

5.3.6 Land Use Regulation, Zoning and Ordinances

The six Lake Sunapee Watershed towns and the State have a patchwork of land use regulations at various levels of detail. As a result, water quality protection is not consistent among the towns and at the State level. Table 20 presents actions to bring the regulations closer together in the shared mission of water quality protection across the watershed.

Table 20 - Land Use Regulation, Zoning and Ordinances				
Action Item	Description	Performed/Led By	Where	Timeframe
Water Quality Buffers	Encourage towns to require water quality buffers during construction projects such as 25-foot setbacks from wetlands and streams not under the purview of the Shoreland Protection Act. Healthy riparian buffers reduce nutrient and pollutant loading to waterways and provide important wildlife habitat.	LSPA Watershed Committee, Towns	LSPA	Begin discussion by 2021 and continue as needed
Post Development Stormwater Ordinance	Encourage towns to enact or improve ordinance ensuring stormwater post-development runoff does not exceed pre-development runoff for construction projects. Include provision that requires any stormwater systems installed to comply with this ordinance be functional when a property is sold (model ordinances available). Collecting and infiltrating stormwater runoff onsite helps prevent downstream erosion and scouring of shoreline, streams and properties.	LSPA Watershed Committee, Towns	LSPA	Begin discussion by 2020 and continue as needed
Stormwater System Operation	Encourage advocacy organizations (such as NH LAKES) to introduce a bill requiring proper operation of stormwater systems such as dry wells and pervious driveways that were installed as required by Shoreland Protection Act permits when a property is sold.	LSPA Watershed Committee, NH LAKES	LSPA	Begin discussion in 2022 and continue as needed
Septic System Operation	Encourage advocacy organizations (such as NH LAKES) to introduce a bill requiring proper operation of septic systems including an inspection report from a licensed professional when a property is sold (modeled after other states).	LSPA Watershed Committee, NH LAKES	LSPA	Begin discussion in 2023 and continue as needed

5.3.7 Best Management Practices (BMPs)

Upon completion of the watershed survey, forty-two sites were identified as areas of concern where proposed Best Management Practices (BMPs) projects could be implemented with landowner participation. (See Appendix A, Proposed BMP Sites Map 14 and Appendix H, BMP Tables for site list). LSPA identified three of these projects to pursue in 2020 and applied for 319 Clean Water Act grant money in the fall of 2019 needed to fund engineering services, supplies and materials. These are identified as 1) the Davis Hill Brook Bank Stabilization project located at Davis Hill Road in New London, 2) the Beck Brook Bank Stabilization project located at Lot 1 at the Sunapee Mountain Resort and 3) the Garnet Hill Stormwater Improvement project located at Garnet Hill and Old Norcross Road intersection in Sunapee. These projects are listed as the 3rd, 10th and 20th priority on the BMP Prioritization Table located in Appendix H. LSPA pursued these specific projects due to several factors, including ease of implementation, synergy with upcoming town projects and willingness of landowners to pursue proposed projects.

These projects address erosion, sedimentation and nutrient loading within the Lake Sunapee Watershed. The proposed BMPs at two sites will also capture winter sanding material that is conveyed during spring melt not collected by street sweeping/cleaning machines. The result of having these proposed BMPs implemented will be the reduction of turbidity and available phosphorus and other nutrients within the two streams and lake by helping prevent a further decline in water quality. In addition, stabilizing stream banks at two sites (Beck and Davis Hill Brooks) will likely improve conditions necessary for the survival and reproduction of fish species and benthic macroinvertebrates.

5.3.8 Summary of Estimated Load Reduction Based on the Plan

This plan outlines a number of categories of actions that can reduce or offset phosphorus loads throughout the Lake Sunapee Watershed. Table 21 presents a summary of those actions and the estimated reductions and offsets to phosphorus loading to Lake Sunapee from each category.

Table 21 - Summary of Estimated Phosphorus Loading Reduction/Offsets			
Category	Estimated Annual P Load Reduction/Offset (kg)	Estimated 10 year P Reduction/Offset (kg)	Notes
Education and Outreach	1	10	Estimate includes voluntary action, septic upgrades and homeowner projects. Could be substantially higher.
Research	na	na	Critical to understanding watershed and lake processes.

Table 21 - Summary of Estimated Phosphorus Loading Reduction/Offsets				
Category		Estimated Annual P Load Reduction/Offset (kg)	Estimated 10 year P Reduction/Offset (kg)	Notes
Further Evaluation		na	na	Estimated reductions are presented in Best Management Practices Section (to be identified) below.
Monitoring		na	na	Data required to evaluate long term changes.
Land Conservation		2	20	Offset of P loading is 0.26 kg/yr (keeping land in forest rather than residential) for full buildout period. This equates to an offset of 0.08 kg/ha/yr for the next 10 years. Estimate based on 25 ha/yr protected or 250 ha over 10 years.
Land Use Regulation, Zoning and Ordinances		1	10	Estimate
Best Management Practices	Identified	4	40	See Appendix H - BMP Tables
	To be identified	2	20	Sites identified through further evaluation tasks.
Total Reductions/offsets:		10	100	

5.4 INDICATORS TO MEASURE PROGRESS

There are numerous ways to measure progress. The table below lists indicators and benchmarks that LSPA hopes to reach over the 10-year period.

Table 22 - Environmental Indicators			
Indicators	Benchmarks ¹		
	2020	2025	2030
Reduce the occurrence of cyanobacteria or algal blooms.	No major occurrences at bloom concentrations.	No occurrences at bloom concentrations.	No occurrences at bloom concentrations.
Maintain median summer epilimnetic in-lake total phosphorus of 5 ppb at the deep spot of Lake Sunapee.	Prevent or offset 10 kg/yr in phosphorus loading from new or existing development.	Prevent or offset 50 kg/yr in phosphorus loading from new or existing development.	Prevent or offset 100 kg/yr in phosphorus loading from new or existing development.

Table 22 - Environmental Indicators			
Indicators	Benchmarks ¹		
	2020	2025	2030
Improve dissolved oxygen conditions in bottom waters by reducing the extent and duration of depressed dissolved oxygen in Lake Sunapee.	No further decrease in oxygen to support cold water species throughout the hypolimnion (DO >5mg/l).	Sufficient oxygen to support cold water species throughout the hypolimnion (DO >5mg/l).	Sufficient oxygen to support cold water species throughout the hypolimnion (DO >5mg/l).
Prevent and/or control the introduction of invasive aquatic species to surface waters.	Absence of invasive aquatic species where they currently do not exist.	Absence of invasive aquatic species where they currently do not exist.	Absence of invasive aquatic species where they currently do not exist.
Notes: ¹ Benchmarks are cumulative starting at year 1.			

5.5 TARGET SCHEDULE

Program targets are indirect measures of watershed protection and restoration activities (Table 23). Rather than indicating that water quality reductions are being met, these programmatic measurements list actions intended to meet the water quality goal.

Table 23 - Program Targets				
Action Item	Indicator	BenchMarks ¹		
		2020	2025	2030
Education & Outreach	Number of Reports, Articles, Presentations and Programs Published/Hosted/Piloted/Completed	5	25	50
Education & Outreach	Number of Tours Given	1	4	8
Education & Outreach	Number of Signs Erected	1	3	6
Research	Number of Studies/Projects Started and/or Completed	1	5	10
Further Evaluation	Number of Additional Sites Evaluated	1	7	14
Land Conservation	Number of Parcels Identified and Landowners Approached	5	10	15
Model Ordinances	Number of Ordinance Campaigns Started/Enacted	1	2	4
Monitoring & Assessment	Number of Shoreline Surveys Completed	1	1	2
Monitoring & Assessment	Number of Tributaries Evaluated to Attain More Accurate Volume Measurements	1	4	8

Table 23 - Program Targets				
Action Item	Indicator	BenchMarks ¹		
		2020	2025	2030
Monitoring & Assessment	Number of Additional Monitoring Stations from Upstream Lakes/Ponds/Tributaries	2	4	6
BMP Projects	Number of Projects Completed	5	28	56
Notes: ¹ Benchmarks are cumulative starting at year 1.				

5.6 ESTIMATED COSTS AND TECHNICAL ASSISTANCE NEEDED

Conceptual level construction cost estimates for each BMP project are provided in the Proposed BMP Projects Table in Appendix H. These costs were developed based on EPA’s 2016 document “Methodology for developing cost estimates for Opti-Tool” (EPA 2016) for volume based BMPs and recent construction bid prices for erosion and stabilization related BMPs. Adjustments have been made such that costs are provided in 2019 dollars. Where needed, data from the New Hampshire Department of Transportation’s Weighted Average Unit Prices (NHDOT 2019) were also referenced to complete conceptual level construction cost estimates.

Additional cost estimating information is provided in Proposed BMP Projects Table in Appendix H. The *BMP Construction Cost Estimate* column provides conceptual level estimates for design and permitting costs set at 25% of the estimated construction cost. The *BMP Design/Permitting Costs* column includes a cost adjustment factor that can be applied to the total cost to reflect the relative ease or difficulty anticipated in designing, permitting and/or constructing each project. When assigning the adjustment factors, the general assumption made was that it would cost more to install a new BMP in a developed area (with more site constraints) than it would cost to install the same BMP in a previously undeveloped area. A cost adjustment factor of 1.0 was assigned to a new BMP in an undeveloped area; proposed BMPs on private property were given an adjustment factor of 1.5; and BMPs adjacent to or within the NHDOT right-of-way were given a cost adjustment factor of 2.0 to account for the complexity of the NHDOT project development processes.

Regarding technical assistance, it is most likely that LSPA will require technical assistance from several sources when attempting to implement the Plan. Initial discussions regarding potential projects may begin with LSPA staff soliciting input from their internal advisory committees regarding project feasibility, prioritization and funding sources. During the project development and scoping phase, it is likely that LSPA staff will need to coordinate with local town staff and/or private landowners depending on the location of the potential project. These discussions could involve project feasibility, landowner agreements and exploration of potential matching funds and/or assistance from the town. Additional

coordination may be required with other various stakeholders such as the Upper Valley Lake Sunapee Regional Planning Commission, local land trusts, other watershed groups, etc.

Close coordination and guidance from potential funders will also be required. When pursuing 319 Clean Water Act grant funding (i.e. Watershed Assistance Grants via NHDES), LSPA will require assistance from NHDES staff during both the grant application and implementation phases. And during design and implementation, LSPA will require technical assistance from engineering consultants and construction contractors. LSPA will most likely develop contracts with both and manage those contracts and payments.

The estimated costs presented in Table 24 are expected to be covered by a combination of LSPA in-kind contributions and dedicated program funding, grants, partner funding, private donations and watershed town in-kind and dedicated funding.

Table 24 - Estimated Annual and Total 10-Year Costs for Action Plan Implementation				
Category	Estimated Annual Cost	Estimated 10-Year Cost	Basis of Estimate	
Education & Outreach	\$8,000	\$80,000	LSPA Budget	
Research	\$15,000	\$150,000	Costs largely born by participating research institutions and grants.	
Further Evaluation	\$5,000	\$50,000	Cost may be offset, in part, by grant funding.	
Monitoring	\$5,000	\$50,000	LSPA Budget	
Land Conservation	\$65,000	\$650,000	Based on Jan 2020 listing price of parcels >20 ha (50 acres) in watershed towns (see Appendix L). Costs may be substantially less if easements are purchased or if land and/or easements are donated. Costs may include funding from towns and other grants.	
Land Use Regulation, Zoning & Ordinances	\$2,000	\$20,000	Estimate	
BMP Projects	Identified	\$75,000	\$750,000	Costs may be offset, in part, by grant funding. See Appendix H - BMP Tables
	To be identified	\$25,000	\$250,000	Costs may be offset, in part, by grant funding. Sites identified through further evaluation tasks.
Total Cost:		\$2,000,000		

Diverse funding sources and strategies will be needed to implement these recommendations. Below are some possible funding sources. In addition, there are numerous private donors and charitable foundations that may support conservation causes.

Sources of Funding

- **USEPA/NHDES 319 Grants (Watershed Assistance Grants)** – This NPS grant is designed to support local initiatives to restore impaired waters (priorities identified in the NPS Management Program Plan, updated 2014) and protect high-quality waters. 319 grants are available for the implementation of watershed-based management plans and typically fund \$50,000 to \$150,000 projects over the course of two years.
<https://www.des.nh.gov/organization/divisions/water/wmb/was/categories/grants.htm>
- **Water Quality Planning (604B)** - Grants are available to Regional Planning Commissions and/or the Connecticut River Joint Commissions for water quality planning purposes. Funding priority is given to projects developing watershed-based plans.
- **Local Source Water Protection Program** - This grant is available for the protection of public drinking water sources.
<https://www.des.nh.gov/organization/divisions/water/wmb/was/categories/grants.htm#wqp>
- **Water Supply Land Conservation Grant Program** – Cost sharing grants available to assist in the protection of community and non-transient non-community drinking water supplies by providing grant funds for the acquisition of land or conservation easements.
https://www.des.nh.gov/organization/divisions/water/dwgb/dwspp/land_acqui/categories/overview.htm
- **NH State Conservation Committee (SCC) Grant Program (Moose Plate Grants)** – County Conservation Districts, municipalities (including commissions engaged in conservation programs), and qualified nonprofit organizations are eligible to apply for the SCC grant program. Projects must qualify in one of the following categories: Water Quality and Quantity; Wildlife Habitat; Soil Conservation and Flooding; Best Management Practices; Conservation Planning; and Land Conservation. The total SCC grant request per application cannot exceed \$24,000. <https://www.mooseplate.com/grants/>
- **Land and Community Heritage Investment Program (LCHIP)** – This grant provides matching funds to help municipalities and nonprofits protect the state’s natural, historical, and cultural resources. <https://www.lchip.org>
- **Aquatic Resource Mitigation Fund (ARM)** – This grant provides funds for projects that protect, restore, or enhance wetlands and streams to compensate for impacted aquatic resources and loss of associated functions and values in a watershed. <https://www4.des.state.nh.us/arm-fund/>
- **New England Forest and River Grant** – This grant awards \$50,000 to \$200,000 to projects that restore and sustain healthy forests and rivers through habitat restoration, fish barrier removal, and stream connectivity such as culvert upgrades.
<https://www.nfwf.org/programs/new-england-forests-and-rivers-fund>

- **Milfoil and Other Exotic Plant Prevention Grants (NHDES)** – Funds are available each year for projects that prevent new infestations of exotic plants, including outreach, education, Lake Host Programs, and other activities.
<https://www.des.nh.gov/organization/divisions/water/wmb/exoticspecies/categories/grants.htm>
- **Clean Water State Revolving Loan Fund (NHDES)** – This fund provides low-interest loans to communities, nonprofits, and other local government entities to improve and replace wastewater collection systems with the goal of protecting public health and improving water quality. A portion of the CWSRF program is used to fund nonpoint source, watershed protection and restoration, and estuary management projects that help improve and protect water quality in New Hampshire.
<https://www.des.nh.gov/organization/divisions/water/wweb/grants.htm>
- **Agricultural Nutrient Management Grant Program:** The NH Department of Agriculture, Markets, and Food provides small grants to assist agricultural land and livestock owners with efforts to minimize adverse effects to waters of the state by better management of agricultural nutrients. Applications are accepted annually. More information can be found at:
<https://www.des.nh.gov/organization/divisions/water/wmb/was/categories/grants.htm>

5.7 WATER QUALITY MONITORING PLAN

LSPA has participated in the Volunteer Lake Assessment Program (VLAP) administered by NHDES since 1986. LSPA also participates in the Lake Host program to educate boaters and examine boats and trailers for aquatic invasive plants and animal species entering or leaving lakes.

Sampling is conducted at four deep stations, eight nearshore stations and at most of the major tributaries to Lake Sunapee (Table 25 on following page). In addition, samples are collected from some of the lakes and ponds in the watershed and some tributary streams to those lakes and ponds (Appendix A, VLAP Monitoring Stations Map 7).

Field and Laboratory Protocols for LSPA Water Quality Collection and Analysis 2020

The LSPA follows the NHDES VLAP field sampling protocols, found in the “VLAP Field Manual” on the website: <https://www.des.nh.gov/organization/divisions/water/wmb/vlap/categories/publications.htm>

The laboratory protocols are found in the Colby-Sawyer/LSPA Satellite Laboratory QA Manual, which is updated yearly and filed with NHDES and EPA and can be obtained by contacting the LSPA Water Quality Lab Manager or NHDES VLAP Coordinator.

Table 25 - VLAP Water Quality Parameters Measured at LSPA Sites			
Water Quality Parameter	Tributary Site (25 locations)	Cove Site (8 locations)	Deep Site (4 locations)
	Data Collected: (each station sampled once per month)		
	May-October	June-September	May-lake turnover (normally October)
Transparency (Secchi Disk)		X	X
Dissolved Oxygen			X
Temperature			X
pH	X	X	E, M, H
Acid Neutralizing Capacity			E
Conductivity	X	X	E, M, H
Turbidity	X	X	E, M, H
Chloride	X	X	E, M, H
Apparent Color	X	X	E
Total Phosphorus	X	X	E, M, H and 1 m off bottom at end of season
Chlorophyll- <i>a</i>		Integrated tube one meter from bottom to surface	Integrated tube from metalimnion to surface
Plankton			Haul from metalimnion
Notes: E= epilimnion (surface), M=metalimnion (transition layer), H=hypolimnion (lower layer)			

In general, the existing monitoring program is sufficient to monitor water quality in Lake Sunapee however additional monitoring would assist in quantifying loads from tributaries and understanding the dynamics of watershed lakes and ponds. The following modifications to the existing monitoring program conducted by LSPA are suggested:

- 1) Tributary stream samples should be collected during both wet and dry periods and multiple samples should be collected during long storm events. Flow measurements associated with the sample collection would allow direct calculation of loads rather than estimation through modeling. This can be accomplished by installing staff gages in each tributary and developing stage/discharge relationships for each gage to relate specific gage readings with specific flows. Furthermore, flow measurements should initially be recorded systematically over a season and after storm events at or near where samples are

taken and preferably where stream profiles can easily be obtained such as at bridge and culvert crossings. If specific locations show consistently high concentrations or loads, visual investigation and/or additional monitoring points upstream should be considered to isolate the cause. Reaches with the highest TP load would be the target of initial efforts to reduce TP.

2) It is recommended that VLAP sampling be continued to document the in-lake response, trends, and compliance with water quality criteria following implementation of TP reduction measures outlined in the plan. Data collected by LSPA which includes TP, DO, conductivity, transparency, planktonic chlorophyll-*a* and the reporting of cyanobacteria scums should continue. LSPA may wish to consider reducing the sampling frequency or eliminating one or more of the four deep stations as analysis of results from 2009-2018 suggest that for TP, chlorophyll-*a* and transparency, there is no difference (statistically) in these parameters among the stations (Section 3.2.1). Resources associated with this monitoring can be directed elsewhere.

3) There exist few data on several of the upstream ponds and lakes in the watershed. Annual deep site profiling and a minimum of monthly sampling on each of the major pond/lake outlets in the watershed would help further inform the modeling and source identification. Recorded data could also form the basis for sub-watershed plans in the future.

4) Visual BMP effectiveness monitoring should commence as soon as practicable from pre-construction through post-construction to document that estimated removal efficiencies are obtained by the “as-built” design. At a minimum, projected TP removal calculations should be compared to calculations for the “as-built” condition. The addition of other parameters such as total suspended solids and flow should be considered in calculation of effectiveness from the “as-built” condition. Geo-referenced photographic evidence should accompany each visual inspection along with field notes. Until the site is stabilized, it should be inspected after every rainfall over 1 inch. Once stabilized, the sites should be visited in the spring and fall of every year. This will allow quick recognition of the need for maintenance or a retrofit to every constructed BMP.

The evaluation of individual BMP’s as well as routine data collection will allow progress towards the goal for the Sunapee Watershed to be quantified.

5) In order to evaluate the effectiveness of the public outreach and education efforts to be conducted as a part of this plan, a survey that evaluates the current state of knowledge about fertilizer, shoreland protection, septic system maintenance and stormwater management should be conducted. Use the results of the survey to target specific topics and individuals for educational efforts. After implementation of the public education components of the watershed plan, conduct a follow up survey to test the effectiveness of the program by repeating the initial survey. The increase in awareness will be used as a metric to measure the effectiveness of the program. If deficiencies are still noted in the knowledge of watershed residents, the public outreach and education program can be modified to provide the appropriate information.

5.8 CONCLUSION

Lake Sunapee is an exceptional resource that is well worth preserving. Watershed residents, towns, landowners, business owners, and recreationalists must all be invested in this plan for it to be successful. Every stakeholder has a part to play. The goal of this plan is to improve water quality by reducing phosphorus loading to Lake Sunapee by 100 kg over the next 10 years. This goal can be reached if the actions discussed in this plan are implemented.

Implementation of this plan over the next 10 years is expected to cost \$2,000,000 and will require the dedication and hard work of municipalities, conservation groups, and volunteers to ensure that the actions identified in this plan are carried out. As important as adherence to the plan as it is now written is to success, the plan will need to be updated as the plan is implemented, new knowledge is gained and circumstances unknown at this time are realized. As a result, this plan should be viewed as a living document as described in the adaptive management approach section.

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