3.6.3 Data Processing and Prioritizations

A table describing proposed BMP projects is provided in Appendix H. The table includes a Project ID, project location, site name, drainage characteristics, an estimate of phosphorus generated from the drainage, estimated phosphorus load reductions based on the proposed BMP, and an estimate of design, permitting and construction cost for each project.

The Simple Method (Schueler 1987) was used to estimate annual pollutant loads based on sub-basin area, annual rainfall and pollutant concentration. Pollutant load reductions were calculated based on documented removal efficiencies for specific types of BMPs. Conceptual costs were developed as summarized in Section 5.6. The estimated cost of each project was then divided by the respective P load reduction estimate, to produce a cost per pound of phosphorus removed. A common metric for evaluating the cost effectiveness of a project, the cost per pound of phosphorus removed was used as one of the criteria to prioritize the list of BMP projects, discussed briefly below.

The BMP prioritization was performed by assigning numerical scores to each project relative to six criteria. These criteria were developed by the project team and are specific to the project and characteristics of the lake and watershed. The total scores were used to sort the projects by priority, with the highest score receiving top priority for implementation, and the lowest score having the lowest priority for implementation. The prioritization methodology is discussed in more detail in Appendix H along with a prioritized list of projects.

4. MANAGEMENT STRATEGIES

4.1 GOALS FOR LONG-TERM PROTECTION

Numerical water quality criteria for total phosphorus (TP) in oligotrophic lakes have been established by the State of New Hampshire (Section 3.1). For Lake Sunapee, an oligotrophic lake, the criterion is set at < 8 µg/L. This criterion is 60% higher than the current summer epilimnetic concentration of TP (5.0 µg/L- measured) and 35% higher than the current annual average TP concentration (5.9 µg/L- estimated with LLRM). By this criterion, Lake Sunapee is currently oligotrophic.

Best professional judgment of the project technical team, NHDES, and the steering committee were employed to give a range of options for a goal. The steering committee then selected a quantitative target TP loading that will protect water quality into the future.

Review of existing data and modeling of current conditions suggested that the current phosphorus concentrations in the lake would result in acceptable water quality going forward. This point is bolstered by the fact that water quality as measured by chlorophyll-*a* and TP has not changed appreciably in recent years. At present, the modeling projects a zero percent probability of a lake-wide algal bloom based on current nutrient levels. However, periodic water quality problems like the localized cyanobacteria blooms observed in recent years, evidence that nearshore water quality may be declining and the deficit of dissolved oxygen in the deep sections of the lake is worrying. It is acknowledged that continued development and loading as well as episodic large loading events have the potential to cause an increase in future TP concentrations. It was further recognized there would be future development in the watershed and a goal reducing current loading may allow some of that development impact on nutrient loading to be offset before it occurs. A reduction is related to current loading while an offset is related to future loading that is anticipated but is currently not present. As a result, the Committee selected a 10-year goal of reducing/offsetting phosphorus loading by 100 kg/yr. This represents a 7.5% reduction from current phosphorus loading and would result in a phosphorus load to Lake Sunapee of 1215 kg/yr and an annual average in-lake phosphorus concentration of 5.4 ug/l.

4.2 ADDRESSING NONPOINT SOURCE POLLUTION (NPS)

4.2.1 Structural NPS Restoration

While a variety of stormwater Best Management Practices (BMPs) exist, they can be categorized into four broad categories based on their primary functions and purpose:

1. Volume BMPs –Provide storage of runoff to control flow downstream. They are typically used to reduce peak flows and usually provide a means for settling out suspended sediment from the water column. Examples are wet ponds, dry ponds, and gravel wetlands.

2. Infiltration BMPs – Encourage water to infiltrate into the ground resulting in an overall reduction of runoff volume. Examples include bioretention (i.e. rain gardens), infiltration chambers or trenches, porous pavement, and drywells.

3. Filtering BMPs – Provide a means for filtering or removing suspended sediment and other pollutants out of the water column. BMPs that employ filtering via biological or chemical processes are also included in this category. Examples are grass swales, buffer plantings, sand filter, deep sump catch basins, and manufactured stormwater treatment devices (i.e. 'swirlers').

4. Stabilization BMPs – Includes measures to stabilize or prevent erosion of soils by stormwater runoff or geological instabilities. Examples include stream bank stabilization, replacement of undersized culverts, and stabilization of rills or gullies. Stabilization techniques could include erosion control matting or fabrics, planting of grass, shrubs or trees, bioengineering techniques such as fascines or brush mattresses, or placement of rock.

Roads and Stormwater Management

There are approximately 257 miles of road within the Lake Sunapee Watershed. Of these, 61 miles (24%) are gravel roads and 196 miles (76%) are paved.

Roads, especially gravel roads, are a large source of phosphorus and solids in the watershed, which can be managed with appropriate BMPs. The BMP Prioritization Table located in Appendix H identifies specific road drainage areas in the watershed where runoff from roads is directly conveyed into tributaries and BMPs are recommended. A combination of general road maintenance BMPs and the installation of structural means that promote the infiltration of stormwater from roads can be found in Appendix I.

4.2.2 Non-Structural NPS Restoration

Development regulations pertaining to the Lake Sunapee Watershed are under the jurisdiction of the federal government, the State of New Hampshire and the Towns of Sunapee, Newbury, New London, Springfield, Sutton and Goshen. While this is not intended to be an exhaustive review of those regulations, it highlights important provisions of each of the jurisdictions regulations that have relevance to water quality in the Lake Sunapee Watershed. Any specific development project should do a complete review of requirements prior to any action.

Federal Requirements

- Dredge and fill permit. – Under section 404 of the Clean Water Act dredging and filling of waters of the United States is regulated. A permit is required for dredging or filling water. This included many activities on the waterfront, along streams or in wetlands including construction of beaches, break walls and boat houses.

- Stormwater Permit – A federal stormwater permit (NPDES – Phase II Construction Permit) is required for any land disturbance of greater than 1 acre.

State Requirements

- Site Specific Permit – A Site Specific Permit is required when disturbing more than 100,000 square feet of land or more than 50,000 square feet of land in the Shoreland zone (within 250 feet of a lake or tributary).
- State Septic Permit – A permit for on-site wastewater disposal is required for new construction or expansion of current use of a structure to include additional bedrooms.
- Shoreland Water Quality Protection Act – Requires a permit for many activities in the 250-foot zone from the shoreline of a lake or tributary.

Municipal Requirements

All towns within the watershed maintain varying degrees of stormwater and erosion control requirements, within each respective Zoning Ordinance. A summary of zoning districts per town, and relevant ordinances for each respective district is provided in Appendix J. This table provides information such as minimum lot size, setbacks, maximum lot density for developments, and additional information. A summary of ordinances with respect to stormwater and erosion and sediment control is also provided.

Towns in New Hampshire have the authority to develop and enforce ordinances to protect designated resources of the town such as Lake Sunapee. The statute authority is granted under RSA 674:35 and 674:43 to regulate subdivisions, and nonresidential and multi-family residential site development, respectively. The requirements associated with the development of a town master plan are stated in

RSA 674:1-4. Authority for developing and enforcing zoning ordinances are specified in 674:17-20, and the application of innovative land use controls are described in RSA 674:21.

Considerations for Management of Land Development

Water quality impacts associated with development activities can be mitigated through zoning and planning ordinances and measures including:

- Removing the potential for development: If a landowner is willing, a private owner, conservation organization or the town can either remove the development rights from a property through a conservation easement, or through deeded ownership of the land. Landowners may donate conservation easements in exchange for tax reductions, or easement compensation. Approximately 34% of the land in the Lake Sunapee Watershed is currently under conservation protection. Additional land conservation has the potential to considerably reduce future increases in TP export to Lake Sunapee from the watershed. As presented in the discussion of buildout (Section 3.5), development of all land that could currently be developed in the Lake Sunapee Watershed would result in an increase in phosphorus loading to Lake Sunapee of 50% from the watershed. Additional protection of lands from development would result in a direct decrease in the maximum potential increase in TP loading related to future development.
- General Ordinances
  - Local or regional bans on phosphorus in lawn fertilizer
- New Development / Construction Ordinances
  - Incorporate low impact development (LID) requirements
    - Dry wells
    - Infiltration trenches
    - Bioretention Systems ("rain gardens")
    - Rain Barrels
  - Minimize disturbed areas
  - Maintain natural buffers
  - Maximize setbacks from lakes and tributaries
  - Minimize impervious cover
  - Minimize construction footprint
  - Pervious pavers / pavement
  - Minimize soil compaction during construction
  - Provide drainage management inclusion for impervious areas (gravel & paved driveways, and roofs) of no net increase in phosphorus export provisions for development.
  - Prohibit stormwater discharges from new driveways and new roads into an existing road or existing road drainage system unless potential impacts (i.e., TP and sediment loading) can be deemed negligible by a qualified professional engineer.

- 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.