Maidstone Lake Watershed Action Plan

PROJECT NO.

2021-1221

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Maidstone Lake Watershed Action Plan

Cover Photo: Maidstone Lake State Park Beach

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1. Introduction

The Maidstone Lake watershed is located in Essex County, Vermont and drains a small community of seasonal camps, year-round dwellings, and a state campground along the shores of Maidstone Lake. The area historically was a large logging operation that has shifted towards recreation and private camps. Unfortunately, long-term monitoring data show increasing nutrient enrichment trends in Maidstone Lake. This is a similar issue across many lakes in Vermont due to extensive shoreland development and increased stormwater inputs. To better identify and organize efforts to improve lake water quality the Vermont Department of Environmental Conservation (VTDEC) Lakes and Ponds Program developed the Lake Watershed Action Plan (LWAP) assessment to guide the field data collection, community outreach, prioritization, and reporting. Essex County Natural Resources Conservation District (ECNRCD) received a grant from VTDEC to complete an LWAP for Maidstone Lake to identify and prioritize projects to help restore the lake.

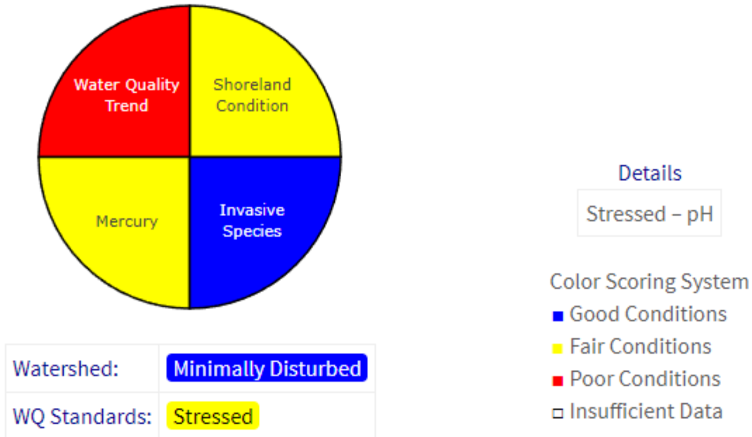
ECNRCD contracted Stone Environmental, Inc. (Stone) in 2021 to help them complete the LWAP by performing shoreline and stormwater assessments, develop associated project prioritization and concept designs, and drafting the LWAP report. The Maidstone Lake Watershed Action Plan follows the VTDEC LWAP Technical Guidelines for shoreland, roadway, and tributary assessments. This LWAP was developed over the course of 2022 and 2023 through field work as well as interacting with stakeholders from the Town of Maidstone and ECNRCD to identify and prioritize projects that will help improve the health of Maidstone Lake.

1.1. Watershed and Planning Background

Maidstone Lake is part of the Upper Connecticut River watershed and is covered by the Upper Connecticut River Basin 16 Tactical Basin Plan (June 2021). This plan provides an update on the strategies and actions to address protection and restoration of surface waters identified in the 2014 Basin 15/16 plan. Maidstone Lake is the second largest lake in the basin and was identified as a key area for protection and restoration due to its concentrated residential and roadway development along the lakeshore. The basin plan generally states that Developed Lands – Roads, Wastewater, and Natural Resources – Lakes are the focus areas and priorities for the lake with more focused priorities around completing Road Erosion Inventories, training the town and road crews around road maintenance, promoting septic system maintenance, and completing an LWAP for Maidstone Lake.

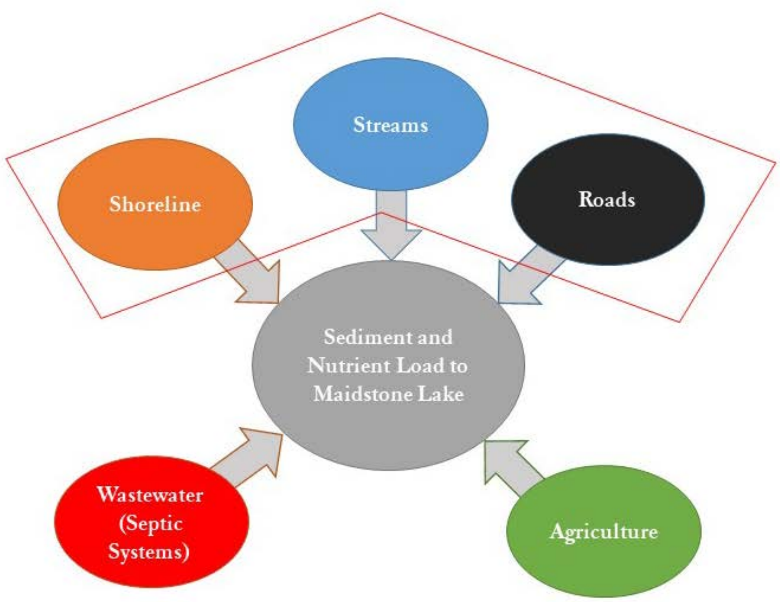
Water quality data for phosphorus has been collected in Maidstone Lake since 1980 and the data show an increasing trend in phosphorus concentration in both the spring and summer months. The lake scorecard from the "VT Inland Lakes Scorecard" currently shows the lake in Good condition for invasive species, Fair condition for mercury and shoreline condition, and Poor condition for water quality trends as shown in Figure 1 below. This information and other local concerns prompted several efforts to protect and rehabilitate the lake such as the formation of the Maidstone Lake Association, an effort to reclassify the lake as an A(1) designation for aesthetics and primary contact/swimming (Town of Maidstone 2021) and the funding of the Maidstone Lake Watershed Action Plan.

Figure 1: Maidstone VT Inland Lake Scorecard.



Additional concerns around Maidstone Lake include erosion and degradation of streams from logging operations, road/ditch erosion, lakeshore encroachment and erosion, lakeshore clearing on private properties, soil erosion, and nutrient loading. This watershed assessment focused on the shoreland, tributary, and roadway sources of sediment and nutrients as well as any other serious sources of stormwater runoff in the watershed as shown in Figure 2.

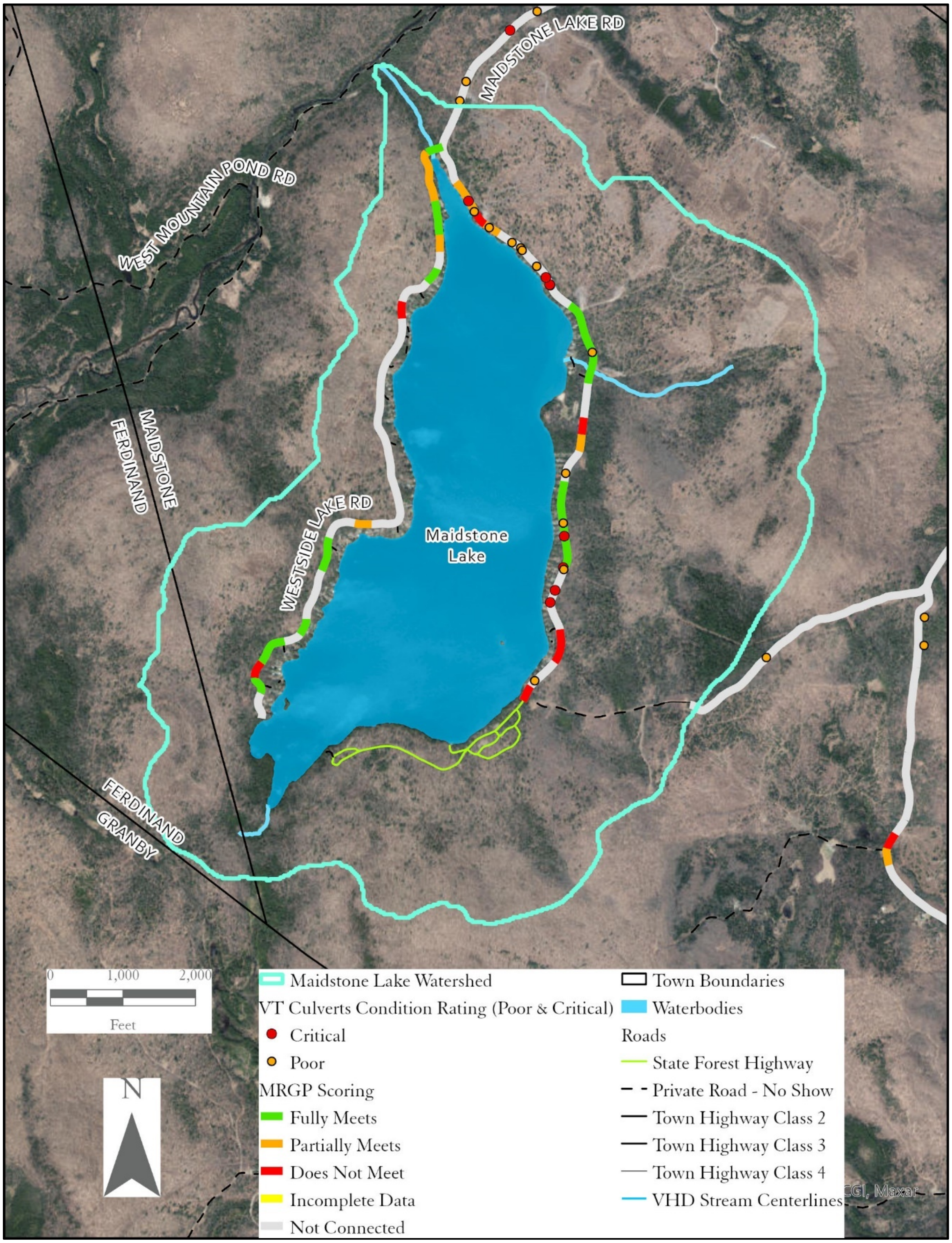
Figure 2: Contributing sources of sediment and phosphorus to Maidstone Lake.



1.2. Maidstone Lake Project Goals

The goal of this project was to assess the Maidstone Lake watershed and identify any sources of increased stormwater runoff that would contribute to increased sediment and nutrient loadings to the lake. Due to the water quality concerns in the lake, erosion and phosphorus reduction projects are the most important areas to focus on. To do this, Stone identified many sources of water quality impacts and prioritized those sources based on environmental, economic, and social criteria. From this prioritized list, projects with the most impact were selected for design. To deal with excess stormwater runoff projects try to manage and treat stormwater at the source through Green Stormwater Infrastructure (GSI), stormwater retrofits, road erosion projects, shoreline erosion projects, and increasing vegetation along shorelines for habitat restoration and/or erosion stabilization. The initial project goals were to identify at least 30 projects and to develop conceptual designs at a roughly 30% design level for ten projects.

Figure 3: Maidstone Lake Watershed Map



2. Study Area Description

Maidstone Lake is a 756-acre lake with depths over 120 ft located in the Town of Maidstone, VT (Figure 2). The contributing watershed area is approximately 3,135 acres located in the towns of Maidstone and Ferdinand. The lake drains through a dam discharge to Maidstone Brook into Paul Stream and then directly to the Connecticut River and is part of the Upper Connecticut (HU8) sub-watershed. The lake sits at approximately 1,350 feet above sea level and is surrounded by steep slopes leading up to hills 200-300 ft above the lakeshore. Maidstone is a small town with a population of 211 according to the 2020 census with over 200 building lots and 40 homes occupied year-round (U.S. Census Bureau 2020, VTANR 2021). Many of the properties have less than 100 ft of shoreline, however, most have been cleared, hard armored, or built to the edge of the lake.

There are 7.51 miles of roads in the Maidstone Lake watershed (Table 1) made up of state forest highways (21%), private roads (18%), and town highways (60%). Road types and lengths are based on road centerline data from VTrans (2021). Land cover data from the 2016 National Land Cover Database for the watershed are shown in Table 2. The watershed is primarily forested and development is concentrated along Maidstone Lake Road and West Side Lake Road in the form of steep private driveways, residences, and seasonal camps.

Table 1: Road length by AOT class in the Maidstone Lake Watershed

AOT Class	Description	Length (miles)	% of Watershed Road Length
2	Class 2 Town Highway	1.91	25
3	Class 3 Town Highway	2.49	33
4	Class 4 Town Highway	0.15	2
5	State Forest Highway	1.59	21
8	Private Road	1.38	18

Table 2: Land cover in the Maidstone Lake Watershed

Land Cover/Land Use Type	% of Watershed
Forest	72.0
Developed	1.5
Open Water	24.1
Shrubland	1.1
Grassland/Herbaceous	1.3

The Maidstone Lake Protected Shoreland Area, land within 250 feet of the mean water level for lakes greater than 10 acres, has a high level of development along two thirds of the shoreline. This is primarily in the form of impervious surfaces such as buildings, roads, and driveways as well as developed pervious areas such as lawns as shown in Figure 4. In comparison to other lakes assessed as part of the effort to develop Lake Watershed Action Plans, Maidstone Lake is about average for percent impervious area, below average for grasses and shrublands, and above average for forest cover as shown in Table 3. A comparison to similarly sized lakes (700-800 acres) displays comparable relationships between the land cover categories as shown in Table 4.

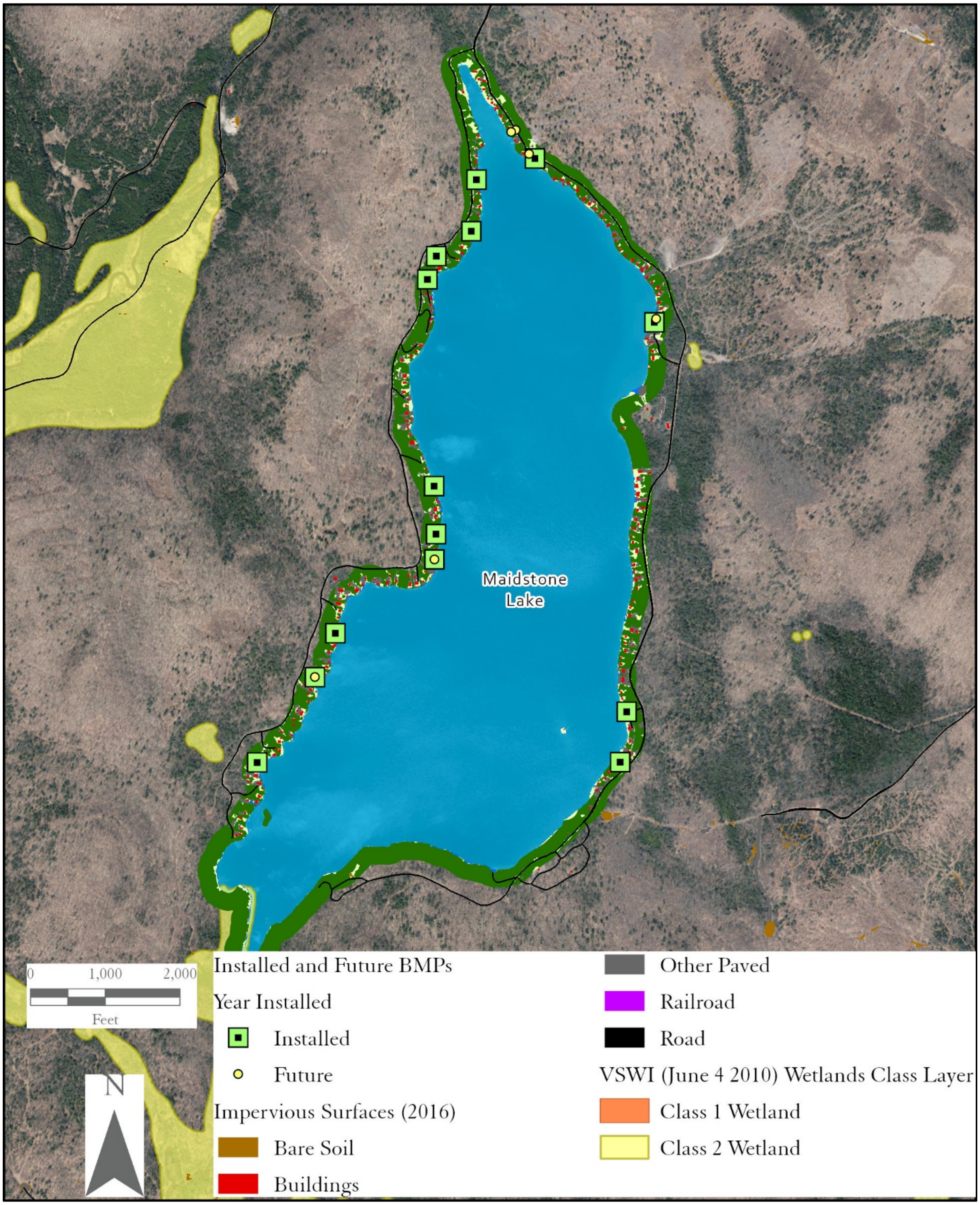
Table 3: Lake characteristics and shoreland land cover for lakes assessed using LWAP/Stormwater Master Plan Approach (Adapted from Fitzgerald Environmental 2020).

Lake	Watershed Area (sq. mi.)	Lake Area (Acres)	Tree Canopy (%)	Grass/Shrub (%)	Impervious (%)
Maidstone Lake	**4.9**	**756**	**79**	**9**	**12**
Lake Elmore	8.4	222	50	34	16
Fern Lake	0.8	67	84	8	8
Lake Eden	7.2	198	65	22	13
Little Lake/Lake St. Catherine	14	1085	58	30	12
Lake Dunmore	20.8	1040	74	14	12
Lake Bomoseen	37.5	2415	61	26	13

Table 4: Lake characteristics and shoreland land cover for lakes of similar lake size to Maidstone Lake.

Lake	Watershed Area (sq. mi.)	Lake Area (Acres)	Tree Canopy (%)	Grass/Shrub (%)	Impervious (%)
Maidstone Lake	**4.9**	**756**	**79**	**9**	**12**
Chittenden Lake	14.7	702	94	5	1
Crystal Lake	22.5	763	59	27	14
Salem Lake	131.8	764	64	28	8
Lake Caspian	5.6	789	61	31	8
Great Averill Lake	10.9	828	82	12	6

Figure 4: Maidstone Lake Watershed Map



3. Watershed Data Library

As a preliminary assessment, Stone developed a "digital library" by gathering and reviewing existing documents and data related to shoreland conditions, stormwater runoff, and watershed management in the Maidstone Lake Watershed. The lists below summarize the available data, mapping, and documentation. The full library containing links to digital sources is included in Appendix D and the resulting maps are presented throughout this report. Many of the datasets have already been compiled or summarized in the Vermont Natural Resources Atlas and this is a great resource for up to date information.

- Town and Regional Plans and Datasets
  - Maidstone Town Plan 2016
  - Northeast Kingdom Regional Plan 2015 (Amendment 2018)
  - Maidstone MRGP and Road Erosion Inventory (Updated 2022)
  - Vermont Town Bridge and Culvert Inventory 2019

- State Data and Plans
  - Upper Connecticut River Direct Tributaries Basin 16 Tactical Basin Plan
  - Maidstone Lake Score Card – 2020
  - Vermont Integrated Watershed Information System (VIWIS) Water Quality Results (6 sites)
  - NRCS Soil Survey
  - Vermont Land Cover 2016
  - Lake Wise Program, The Lakes and Ponds Program maintains a map containing current Lake Wise projects and certificates.

4. Water Quality Problem Areas

The primary purpose of the watershed assessment was to investigate the environmental issues and potential land use impacts that might be affecting water quality in Maidstone Lake. Stone conducted a total of three (3) field tours of Maidstone Lake including stream walks on mapped "blue-line" streams as well as some unmapped streams, lakeshore assessments, and assessments of public and private roads. The stream and road assessments were conducted with representatives from ECNRCD while the lakeshore assessment was carried out with the assistance of a Maidstone Lake property owner and member of the Maidstone Lake Association.

4.1. Identification of Problem Areas

Initially, the Maidstone Lake watershed was assessed with a desktop exercise looking at the aerial imagery, NRCS soils data, infrastructure mapping, contour data, and road erosion risk in a GIS. Areas that were considered potential problem areas were flagged for further review during site visits.

Field visits were performed for the flagged areas identified as well as a more general survey of the watershed and approximately 60 project areas were identified and can be seen on the map in Appendix B. The projects were grouped into three (3) categories described below:

- Roads (10 Projects) – Projects relating to sediment and nutrient loading due to road drainage erosion or faulty road drainage culverts.
- Stream (6 Projects) – Projects relating to undersized culverts and culverts with erosion present as well as stream bank clearing on private property.
- Lakeshore (48 Projects) – Projects relating to eroding or cleared shorelines.

4.1.1. Roads Assessment

In Spring of 2021, Stone and ECNRCD highlighted areas of concern for both Maidstone Lake Road and West Side Road based on the Municipal Roads General Permit Road Erosion Inventory (MRGP REI) and general observation. This included Stone and ECNRCD staff inspecting all road sections and culverts with a "Does not Meet" score in the MRGP REI as well as walking the rest of the roadways to identify any other issues. This included the forest roads within the Maidstone Lake Campground.

In 2022, the West Side Road was added to the Department of Environmental MRGP Portal. ECNRCD conducted the Road Erosion Inventory in Fall of 2022 and then had a meeting with Stone to see if similar concerns were flagged. A component of the methodology of this inventory was to reference the Vermont Agency of Natural Resource's Municipal Roads General Permit Scoring Layer. Through the analysis of the road's slope, soil erodibility, and proximity to stream, the data shown are segments of roads in Maidstone which are hydrologically connected. Each segment of (328 ft.) was color coded purple but as the inventory was conducted each purple segment is given a different color based on the rating. Those parameters include observation of the crown, grader berm, drainage, conveyance areas, and culvert types. Each segment was scored based on the standards in the Municipal General Roads Permit, as Does not Meet (RED), Partially Meets (YELLOW), or Fully Meets (GREEN) to highlight the town's priorities over the next several years.

4.1.2. Stream Assessment

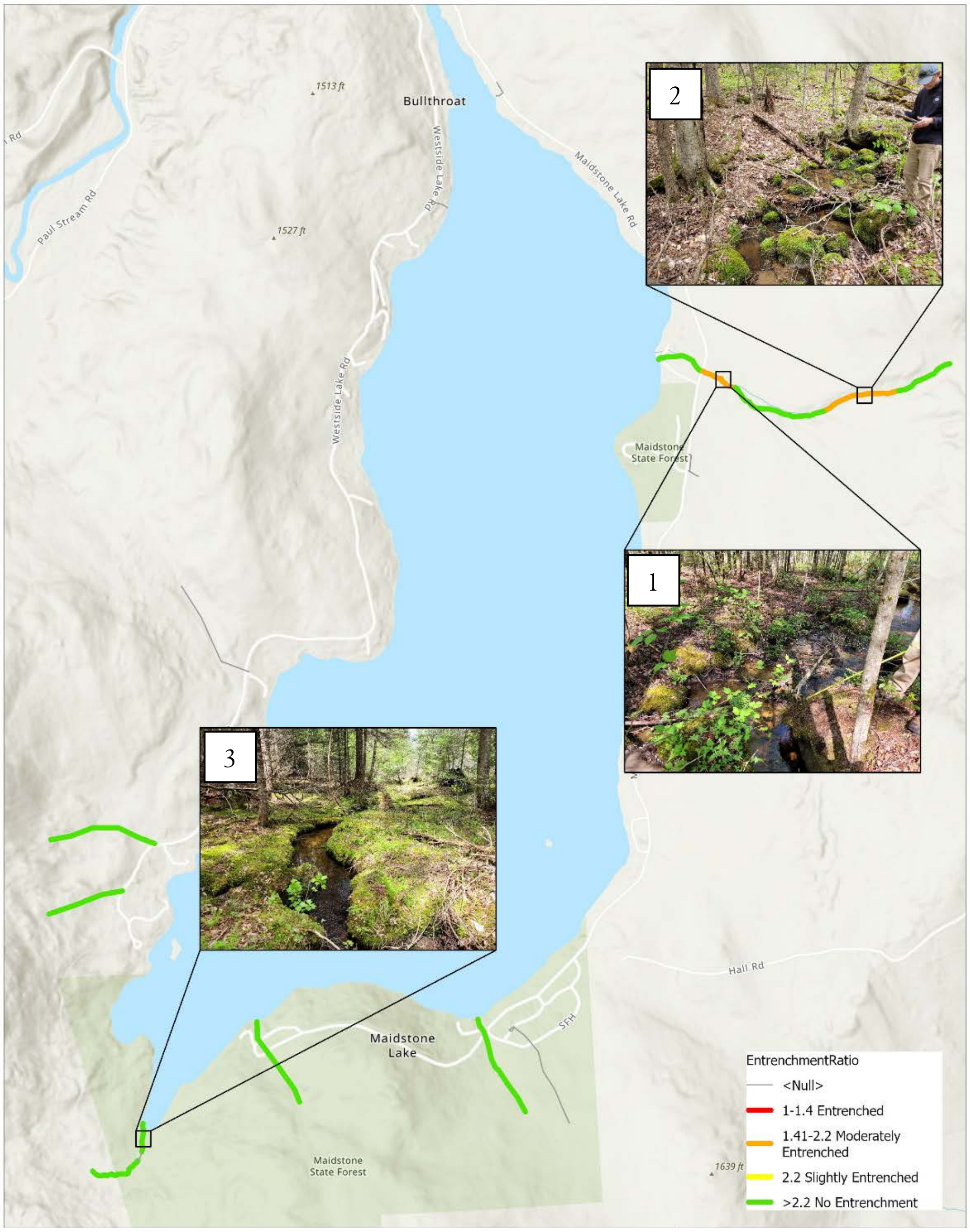
For the stream walk assessment, two blue-line and four unmapped tributaries were assessed. The stream walks were a less extensive version of the stream geomorphic assessment and focused on potential sediment sources or floodplain disconnection such as channel and bank erosion, small riparian buffer zones, point features such as stormwater inputs, stream crossings, legacy issues from forestry, and channel characteristics.

The methodology was a simplified version of the Phase 2 Rapid Stream Assessment, an SGA Lite Assessment. The first portion of the assessment consisted of collecting bankfull width and depth measurements along the length of the stream to determine entrenchment ratios. This allowed Stone to get a general sense of geomorphic conditions along the stream. Flood-prone widths were measured at an elevation equal to twice the bankfull depth at each location. Entrenchment ratios were calculated by dividing the flood-prone width by the bankfull width. Per the Rosgen Stream Classification Technique (USDA, 2007), entrenchment ratios of greater than 2.2 are considered 'Slightly Entrenched', indicating the stream is generally well connected to adjacent floodplains.

Entrenchment ratios for the assessed reaches at Maidstone Lake ranged from 1.7 to 46, with the majority of reaches showing high floodplain connectivity. The lowest entrenchment ratios were recorded in the longest assessed stream on the eastern side of Maidstone Lake. The downstream reach, with an entrenchment ratio of 1.71, has been altered due to the culverted road crossing and the parking area to the north. As shown in photograph 1 in Figure 5, however, there is very little sign of erosion or bank instability in this area. The upstream reach, entrenchment ratio equal to 2.1, may have been altered from legacy forestry activities but also shows very little sign of erosion or bank instability as shown in photograph 2.

In general, the streams assessed were in good condition with great floodplain connectivity and almost no identifiable channel and bank erosion, particularly in the upper parts of the watershed. Very few projects were identified from the stream walks and tended to be along the lower sections of the tributaries where impacts from road crossings and clearing on private property were present. Figure 5 shows a map of the assessed streams and the measured entrenchment ratio. Only the unnamed stream north of the Maidstone Lake public beach measured in the "Moderately Entrenched" category. This is possibly due to historic logging operations, however, the stream showed little to no signs of bank erosion and only minimal disturbance to its natural flow pattern.

Figure 5: Maidstone Lake Stream Entrenchment



4.1.3. Lakeshore Assessment

The shoreline was inspected for water quality impacts by boat, traveling approximately 10-30 ft from the shoreline. Photos, notes, and GPS points were collected along the way documenting any evidence of lakeshore erosion or hard armored banks, small or non-existent buffer zones, stormwater inputs, and invasive vegetation. This assessment identified a significant number of projects due to an abundance of cleared lawns and buffer areas as well as actively eroding shoreline on private property. Many of the camps and residences along Maidstone Lake Road and West Side Lake Road have cleared the buffer zones up to the lake edge, hard armored the banks (some of which are failing), as well as adding sand to the shoreline to create private beaches. These activities are likely a very significant contributor to water quality degradation in Maidstone Lake and should be a focus area for future Lake Wise assessments and projects.

4.2. Evaluation and Prioritization of Problem Areas

4.2.1. GIS-Based Site Screening

From the field data collected during the watershed field assessments, key characteristics for each site were evaluated to show the potential for stormwater runoff and pollutant loading using the geospatial data available as described below. Field observations of site characteristics are summarized in the project summaries in Appendix A.

- Subwatershed Mapping – The drainage area for each project was mapped (if necessary) based on field observations and 1-foot contours derived from 2013-2017 lidar data.
- Aerial Photography – The 0.3 m imagery collected in 2019 and 2021 to review the site land cover characteristics.
- Impervious Surfaces Data – Used to estimate impervious area contributing to each project.
- NRCS Soils
- Parcel Data – Used to estimate the limits of potential projects based on parcel boundaries and road right of way.
- VT Culverts – Used to identify problem areas for further inspection related to poorly performing culverts.
- MRGP Road Erosion Inventory – Used to identify problem areas for further inspection related to road erosion.

4.2.2. Unified Evaluation and Prioritization of Problem Areas

After further investigation of the identified project areas and potential treatment options it was determined that Green Stormwater Infrastructure (GSI) were not appropriate for many of the locations due to physical constraints in the watershed. In Stone's best engineering judgement, basic road upgrades, bioengineered shoreline stabilization, and riparian/shoreline plantings will improve water quality in the watershed far more than GSI due to the lack of large contiguous impervious or sediment contributing areas. Most impervious or sediment contributing areas are broken up into a single road segment or camp building and already drain to a forested area. Many areas are also far enough away from the shoreline or contributing tributary that any sediment or nutrients is likely getting caught in the forested buffer.

Although GSI were not deemed appropriate for any of the projects, it was still possible to use the Unified Scoring Prioritization for Stormwater Master Plans for prioritizing the projects in a modified form. The Unified Matrix is typically used for Stormwater Masterplans but has been used for LWAPs in the past both in the full form and in modified forms (Fitzgerald Environmental 2020). The projects were prioritized based on their ability to improve water quality and reduce environmental impact, project feasibility, and co-benefits such as habitat creation and educational benefits. The following criteria were assessed and projects were given a % score out of the total 41 points:

Water Quality/Environmental Impact (12 total points):

- **Sediment reduction (Score of 0 – 4)** – Potential for sediment removal with project implementation with 0 representing none to very low reduction in sediment and 4 representing very high sediment reduction.

- **Phosphorus/nutrient reduction (Score of 0 – 4**) – Potential for phosphorus removal with project implementation with 0 representing none to very low reduction in phosphorus and 4 representing very high phosphorus reduction.
- **Impervious Area Managed (Score of 0 – 4)** – Natural grouping of impervious surface managed for project implementation. A score of 0 represents no impervious surface managed (typically used for shoreline restoration projects) and 1 to 4 representing the natural grouping.

Feasibility Criteria (20 total points):

- **Public land or Private landowner support (Score of 0-3)** – This criteria measures landowner willingness to support project implementation.
  - **3** – public land
  - **2** – willing private landowner
  - **0** – unwilling or unknown willingness of private landowner
- **Project and Permitting Complexity (Score of 0 – 2)** – This criteria measures the project complexity due to permitting or construction constraints.
  - **2** – Simple permitting/construction requirements
  - **1** – moderate permitting/construction requirements
  - **0** – Complex permitting/construction requirements
- **Infrastructure Conflicts (Score of 0 – 1)** – This criteria measures whether there will be conflicts with existing infrastructure.
  - 1 – No infrastructure conflicts
  - 0 – Yes infrastructure conflicts
- **Project Efficiency, $/lbs of P removed (Score of 1 – 12)** – This criteria ranks the projects from low efficiency (1) to high efficiency (12) of phosphorus removal. See descriptions of phosphorus removal and cost estimation below.
- **Ease of O&M (Score of 0 - 2)** – This criteria measures the ease and access of operation and maintenance of the project.
  - **2** – Low/Easy maintenance
  - **1** – Medium/Moderate maintenance
  - **0** – High/Hard maintenance

Other/Co-benefits (9 total points):

- **Educational or Recreation benefits (Score of 0 – 1) –** This criteria measures whether the project provides educational or recreational benefits.
- **Natural habitat creation/protection (Score of 0 – 1) –** This criteria measures whether the project provides natural habitat creation or protection.
- **Infrastructure improvement (Score of 0 – 1) –** This criteria measures whether the project provides infrastructure improvement such as a culvert replacement.
- **Outfall erosion control (Score of 0 – 1) –** This criteria measures whether the project provides outfall erosion control.
- **Connected to receiving water (Score of 0 – 3) –** This criteria measures whether the project provides some infiltration or other treatment to runoff before entering a receiving waterbody.
  - 3 – All runoff infiltrates on site
  - 2 – Runoff receives some treatment before entering receiving water
  - 1 – runoff drains via infrastructure directly to receiving water with no erosion or additional pollutant loading

- 0 – runoff drains directly to the receiving water

- **Flood mitigation (known problem) (Score of 0 - 1)** – This criteria measures whether the project alleviates a known flooding issue.
- **Existing local concerns (Score of 0 – 1)** – This criteria measures whether the project addresses an existing local concern.

Phosphorus and sediment load reduction is a large component of the prioritization and feeds into the project efficiency score ($ / lb of P). To estimate P reduction, the "Interim Phosphorus Reduction Calculator Tool_V1.0" developed by VTDEC was used. The tool compiles sediment and phosphorus loading rates and load reduction rates for different practices from a number of watersheds in Vermont into a single place. Since P loading rates for the Maidstone Lake watershed and the wider Upper Connecticut River Basin have not been developed or included in this tool, Stone decided to use the Lake Memphramagog watershed loading rates as an approximation. It should be noted that using this method may not produce accurate loading rates for sediment and phosphorus in the Maidstone Lake watershed, however, their relative amounts and load reductions allow for the comparison of different projects and practices across the watershed in a consistent manner.

Cost estimates for the projects were based on the Vermont Agency of Transportation 2 and 5 year Averaged Price Lists from the 2018 specifications as well as values derived from previous Stone projects. The highest value was chosen for each line item and total costs are presented in the conceptual designs. The calculated total was then increased 20% for inflation from 2018 to 2022 values based on the Consumer Price Indicator Inflation Calculator. An additional contingency value of 20% was also added onto the total cost to account for unforeseen construction costs.

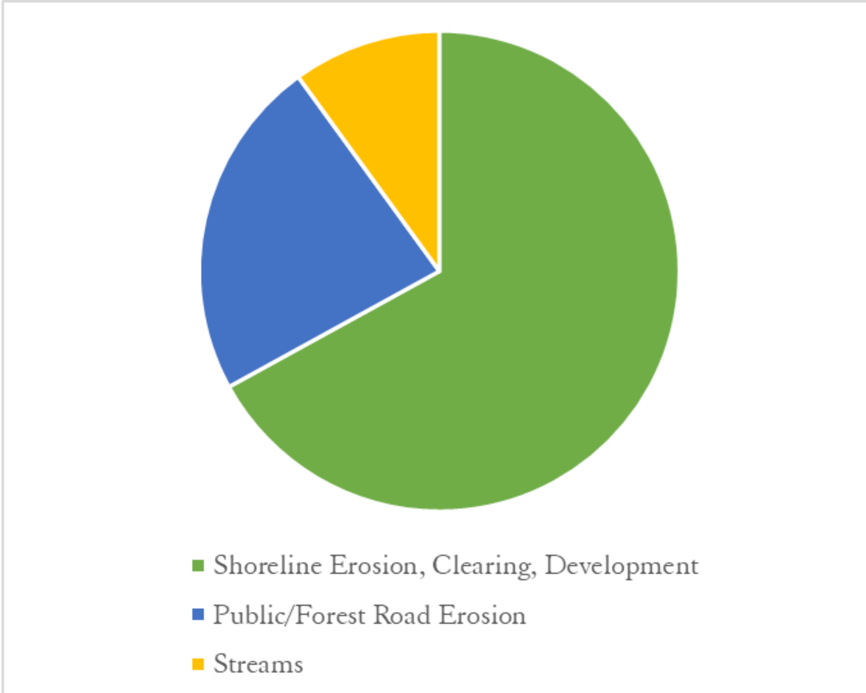
4.2.3. Problem Area Summary Sheets

Problem area summary sheets were developed for 30 of the high and medium priority projects, with an additional 34 medium and low priority projects summarized with photos and some brief descriptions in Appendix A. These locations were selected based on the prioritization categories shown in the Unified Evaluation and the Project Prioritization Table in Appendix C and from input from ECNRCD. The problem area summary sheets include a location map, site photographs, descriptions of the existing issues and proposed improvements, as well as the final prioritization score.

4.3. Sediment and Nutrient Loads to Maidstone Lake

Based on the quantity and spatial spread of the project types as well as their relative contributing drainage areas and loading potentials, the relative load from each of the project types (roadways, shoreline, and streams) were estimated. The majority of the projects identified during field investigations at Maidstone Lake were shoreline related including shoreline erosion, long stretches of cleared lawns and shoreline, as well as buildings and driveways with direct runoff to the lake. Therefore, it was estimated that approximately 2/3 of the total sediment and nutrient load to Maidstone Lake is from shoreline activities. Municipal and forest roads were the next largest contributor and were estimated to make up less than a quarter of the total load, while streams were estimated at 10% of the total load. Figure 6 illustrates the estimated sediment and nutrient contributions to Maidstone Lake.

Figure 6: Relative contributions of sediment and nutrient loads to Maidstone Lake.



4.4. Project Prioritization and Conceptual Designs

After ECNRCD and Stone reviewed and approved the list of preliminary projects, the top ten ranked projects were chosen to continue to conceptual design. These projects are representative of the relative contribution of sediment and nutrient loadings with six projects addressing shoreline erosion and clearing, and four addressing public or forest road erosion. The conceptual designs are included in Appendix E and include the following components:

- A site plan with existing contours based on VT Lidar, existing infrastructure, and proposed design
- Typical details for proposed site improvements and practices
- Preliminary cost opinion

The 10 projects chosen to continue to conceptual design included the following:

1. **525 West Side Lake Road** – This site is regularly maintained by the road crew due to loss of road material and the roadside ditch terminates at an 18" culvert leading to the lake.

2. **69 Lake East 1** – This is a cleared shoreline on private property totaling approximately 100 ft. Two foot banks are eroding into the lake due to lack of stabilization.

3. **Snowmobile Road/Maidstone Lake Campground** - This site in the Maidstone Lake Campground and is an undersized, poorly constructed culvert that is showing signs of erosion and failure.

4. **Maidstone Lake Campground, Dogwood Site** – This site in the Maidstone Lake Campground is a combination of forest road and campsite that is showing signs of erosion on the road, through the campsite and down to the lake.

5. **Private West 6** - This location is at the top of Private West 6 Road and is showing signs of road surface erosion channelizing into driveway ditches, likely making it to the lake.

6. **Maidstone Lake Campground Toilet Block** - This site in the Maidstone Lake Campground is the road section near the campground toilets. There is evidence of roadway erosion plugging culverts and running off into the woods within 100' of the lake shore.

7. **Maidstone Lake Campground Culvert Replacement Area B #1 -** This 28" corrugated metal culvert is located in the Maidstone Lake Campground Area B and is showing signs of failing headwalls, undercutting, and perching. The culvert is also undersized for the stream running through it.

8. **Maidstone Lake Campground Culvert Replacement Area B #2 -** This 30" corrugated metal culvert is located in the Maidstone Lake Campground Area B and is showing signs of failing headwalls, undercutting, and perching. The culvert is also undersized for the stream running through it.

9. **Maidstone Lake Campground Culvert Replacement Area A #1 -** This 28" corrugated metal culvert is located in the Maidstone Lake Campground Area A and is showing signs of failing headwalls, sediment blockage, and undercutting. The culvert is also undersized for the stream running through it.

10. **4076 Maidstone Lake Road** - This site is cleared up to the edge of the lake for 40 ft and sand has been delivered and used to build up the beach. A wooden retaining wall is shown to be close to failure.

5. Next Steps

As with many lakes in Vermont, the primary issue identified at Maidstone Lake and likely the greatest contributor to its water quality degradation is the development and clearing of natural vegetation along the shoreline (VTDEC 2022). The desire for a manicured lawn, beachfront properties, and uninterrupted views of the lake leaves shorelines unstable and inhospitable to wildlife. This issue contributes sediment from eroding shorelines and nutrients from rooftop, driveway, and lawn runoff.

Based on the proportion of shoreline issues encountered at Maidstone Lake, Stone hoped to recommend more private property shoreline restoration projects and designs for these shoreline projects were prepared with the hope that landowners could be contacted. However, due to lack of landowner interest and inability to reach some landowners only two shoreline restoration projects on private property were included in the top 10 list. Stone hopes that these project sites will reinforce attitudes and continue the great messaging and outreach that ECNRCD has already performed as part of the Maidstone Lake Wise program. These projects are only a fraction of the properties in need of improvement and the ECNRCD should continue this outreach to landowners and encourage participation in the Lake Wise program.

Forest and public roads are also a significant contributor to sediment and nutrient loading to the lake, however, we recognize the outstanding efforts on the part of the State of Vermont campground staff and the town highway department in maintaining their roads and drainage. A few changes and techniques in problem areas as specified in Appendix E will greatly reduce sediment loadings to the lake from these sources. These projects could potentially be implemented with resources from the town highway department or Maidstone State Park, however, outside funding should be pursued if necessary to aid in construction.

Stone and ECNRCD appreciate the chance to contribute to the protection and restoration of Maidstone Lake. The projects identified in this LWAP and the ongoing efforts to engage community members through the Lake Wise program will provide significant sediment and nutrient load reductions in the lake to the benefit of the community and lake water quality. This assessment will hopefully be used as a guide for advancing the identified projects as well as future projects. When land changes hands or landowners become interested in how they can contribute to maintaining water quality in the lake this LWAP can provide a framework for how to move forward.

6. References

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7. Appendices