

Lake Monomonac | Watershed Survey Results



TO: Don Wilson and Midge Romanow, MLPOA
FROM: Grace Little, FB Environmental Associates (FBE)
SUBJECT: Lake Monomonac Watershed Survey Results
DATE: February 20, 2026
CC: Laura Diemer, Tim Kirsten, & Amelia Wallis, FB Environmental Associates

FB Environmental Associates (FBE) was contracted by the Monomonac Lake Property Owners Association (MLPOA) with funding from the NHDES Watershed Assistance Section to complete a watershed survey that identifies and documents nonpoint source (NPS) sites in the Lake Monomonac watershed in Rindge and New Ipswich, NH and Winchendon, MA. NPS sites require implementation of best management practices (BMPs) due to impacts from stormwater, erosion, lack of infiltration (impervious cover), culvert restrictions, and/or lack of vegetated riparian buffer. On October 20th, 2025, technical staff from FBE (Grace Little, Tim Kirsten, Sierra Guite, and Amelia Wallis) along with Rindge Director of Public Works (Michael Sr. Cloutier) surveyed the watershed. It rained from 6:30 am to 12:30 pm that morning, for a total of 0.86 inches of rainfall in the area. Documentation included describing the problem, making recommendations for fixing the problem, rating the site's impact to water quality, logging the site's location via GPS, and taking photographs. A total of 20 NPS sites were documented during the survey, with the addition of four sites of interest (Figure 1).

Following the watershed survey, pollutant load reduction estimates were calculated using the EPA's Pollutant Load Estimation Tool (PLET) which aids in the prioritization of addressing the NPS sites. NPS sites were given an impact score of Low, Moderate, or High based on field observations (proximity to surface waters, severity of the NPS problem, habitat connectivity, etc.) and pollutant loading estimates. Six were ranked as "High" impact during this survey, six were ranked as "Moderate," and the remaining eight sites were "Low" impact. At the end of this memo, Table 1 provides load reduction estimates for all of the surveyed sites, and Table 2 provides potential partners to implement improvements.

General Road Maintenance Recommendations and Resources

In addition to the site-specific recommendations presented in this report, sustaining general road maintenance practices is important both for mitigating erosion and sediment loads as well as keeping roads safe. These practices also apply to private driveways. Regular road maintenance activities include, but are not limited to:

- Regrading and maintaining the road crown (a 4% crown is recommended).
- The periodic addition of material to maintain sufficient base and surface layers on gravel roads.
- The addition of suppressants such as calcium chloride or magnesium chloride if dust becomes an issue on gravel roads.
- Filling potholes with new material, ensuring that it has the appropriate balance of fines and surface gravel to promote proper drainage.
- Removing debris (sand, leaves, branches, etc.) from roadside ditches, culverts, and other stormwater management practices to maintain proper flow and infiltration. This should be done at least annually in the spring, and more often if needed after large storm events.
- Removing excess winter sand and salt before spring thaw.

- Ensuring that the road shoulders are not too steep and replacing armoring materials as needed (vegetation or riprap) if ditch erosion occurs.
- Replacing crushed culverts and cleaning out clogged culverts. If water is observed regularly pooling at a culvert that is not crushed or blocked with debris, the culvert is too small and should be replaced with a larger culvert.

A number of resources are available to provide guidance on gravel road maintenance and solutions to common issues with gravel roads, such as washboarding, soft spots, and potholes. The University of New Hampshire maintains a [database of resources for gravel roads](#). Other helpful resources include the Maine Department of Environmental Protection's [Gravel Road Maintenance Manual](#), the US Environmental Protection Agency's [Gravel Road Maintenance and Design Manual](#), and [A Ditch in Time](#) gravel road manual. Additionally, the University of Kentucky and Kentucky Transportation Center have a guidance document on [When to Pave a Gravel Road](#), which provides a detailed step-by-step process to consider if paving may be a better long-term solution to gravel road maintenance.

Nonpoint Source Sites

Site M-1: West Monomonac Road

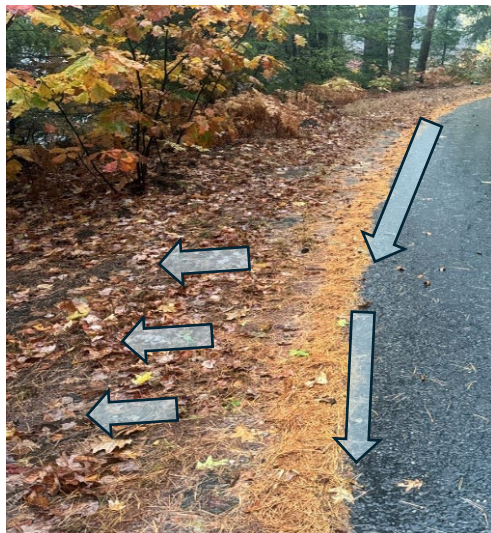
Location: 42.70583, -72.01007

Impact: Low

Land use: Road, Residential

Observations: The shoreland riparian buffer between 85 West Monomonac Road and Lake Monomonac is very narrow. Two minor gullies have formed in this area, although the shoulder is reasonably well-vegetated and likely slows some of the runoff entering the lake at this location. There is however a break in the shoreline buffer where vegetation cover is lower; this area appears to be a path leading from the road to a private dock on the lake. There is an unpaved driveway uphill of this site (on the east side of the road), which is a possible sediment source to this site. West Monomonac Road is a town owned road of Winchendon, MA.

Recommendations: Continue engaging shoreline property owners to maintain adequate shoreline buffers that include a variety of native shrubs, trees, and herbs. Where lake access is desired, encourage private landowners to add some level of stormwater treatment at the base of the access path, or to create turnouts into more vegetated areas. If the area is used as a path to the water, consider installing infiltration steps and/or a meandering access pathway that minimizes erosion to the lake. Provide technical assistance to shoreline property owners so they are aware of these stormwater management options, why it is important to reduce sedimentation into the lake, and the permits that would be required to work in the shoreland zone.



A break in shoreline vegetation that likely receives moderate foot traffic, providing access to a private dock (left). Runoff from West Monomonac road drains to the lake through the narrow shoreline buffer, as indicated by the blue arrows (middle). Small channels (obscured by leaves in this photo) lead from the road shoulder to the lake through the vegetated buffer (right).

Site M-2: Bridge on Island Road

Location: 42.71081, -72.00528

Impact: Moderate

Land use: Road, Shrubland

Observations: Island Road is the only road located on Blueberry Island, connected to West Monomonac Road by a narrow causeway/bridge. There are at least eight short gullies that lead from the roadside ditches directly down to the lake on both sides of the road. Island Road is a privately owned and maintained road. o

Recommendations: We recommend installing riprap and live stakes in the gullies, particularly on the western side of the road. Live stakes can either be installed vertically through the riprap or placed horizontally beneath the riprap. Native shrubs that can be used for live stakes include dogwoods, willows, buttonbush, elderberries, and white meadowsweet.



Visible sediment transport (left) directly adjacent to the lake (middle). A channel at the end of an erosion gully extends through the wetland on the west side of Island Road (right).

Site M-3: Second Street

Location: 42.71038, -72.0006

Impact: Moderate

Land use: Road, Residential

Observations: Second Street is an unpaved road off West Monomonac Road with several gullies leading through private properties to the lake. Multiple properties have inadequate shoreline buffers (large lawns with no trees), and several gravel driveways provide sediment transport from Second Street to the lake. This area is relatively flat, which limits the formation of deeply incised gullies. Second Street is a town owned road of Winchendon, MA.

Recommendations: We recommend Winchendon DPW investigates options to pave or recrown the road. Refer to the general road BMPs recommended at the top of this memo. Encourage property owners to enhance their shoreline buffers by planting more shrubs and trees, and to install cost-effective stormwater BMPs on their properties to capture and treat stormwater runoff.



A view of the unpaved Second Street. Most of the area is privately owned.

Site M-4: Fourth Street

Location: 42.71424, -71.99575

Impact: High

Land use: Road, Residential

Observations: The whole gravel road is eroding in places and the slope from the road down to the lake is steep. There are several gullies between houses and down gravel driveways leading straight to the lake. There is also a parking area with unvegetated, steep slopes. Water is also pooling in sections of the road. Most of the land here is privately owned. Fourth street is a privately owned and maintained road.

Recommendations: Repair or rebuild the road to prevent the large scale erosion currently occurring. Refer to the top of this memo for general unpaved road BMPs; pooling water indicates the road may need to be regraded to superelevate or crown the surface. Through public education and outreach, seek opportunities for rain gardens and infiltration basins between houses. Encourage enhanced vegetation on shoreline properties. Vegetate the base of the steep parking area to capture sediment. The road traverses both Winchendon and Rindge, so work with both Towns to improve stormwater management along this road.



Gullies along the center of the Fourth Street (left) contribute to bank erosion beside the road (middle). Water pools downstream from the eroding roadway and directly below the unstable bank (right).

Site M-5: East Monomonac Road

Location: 42.71288, -71.99179

Impact: Moderate

Land use: Road

Observations: A small road shoulder gully runs from 255 East Monomonac Road to a stream crossing that discharges to the lake approximately 200 feet downstream. Some pooling of water was observed on the shoulder. The final part of the gully is a narrow ditch/gutter. The crossing is just south of the MA/NH border. East Monomonac Road is a town owned road of Winchendon, MA.

Recommendations: Install riprap in the final part of the gully to capture sediment before it reaches the stream crossing.



Small roadside gully that transitions into a gutter (left), leading to a pool of water (middle) filled with plant debris (right) that drains into the stream crossing.

Site M-6: 376 East Monomonac Road Culvert

Location: 42.71433, -71.99049

Impact: High

Land use: Road

Observations: A large corrugated metal pipe connects Lake Monomonac to a backwater pond/scrub-shrub emergent wetland on the east side of East Monomonac Road. According to Rindge DPW director, Cloutier, this culvert was replaced recently. The culvert is treated to prevent rust and has a metal grate on both ends that requires regular debris clearing maintenance. This area has experienced beaver activity in the past. The road shoulder is unvegetated above the headwalls at both the inlet and outlet. This has caused four short gullies to form, one on each side of each headwall. Both the inlet and outlet require some level of access for maintenance of the grates. East Monomonac Road is a town operated road of Rindge, NH.

Recommendations: Install riprap in the gullies to stabilize the soil surface. Plant herbaceous vegetation in the narrow strip of road shoulder between the road and the culvert headwalls, as there is limited space for shrub plantings. Plantings should use seed only. Do not apply fertilizer, compost, or mulch, and avoid any soil disturbance, as these activities could impact the lake. Enhance the herbaceous plant layer on the inlet side by planting more sedges in the gaps between those already established on this bank. Regularly maintain the riprap to ensure it does not get dislodged when accessing the metal grates over the inlet and outlet.



A metal grate over the culvert outlet (top right), and a view of the unvegetated shoulder above the culvert outlet's headwall (top left). Gullies in the road shoulder in the vicinity of the culvert (bottom left and right). Sedges on the bank above the culvert inlet (bottom middle).

Site M-8: Bancroft Road Crossing

Location: 42.74823, -71.95014

Impact: Low

Land use: Road

Observations: Bancroft Road is an unpaved, sandy road in the northwestern portion of the watershed. A culvert conveys the outlet stream of Bancroft Reservoir beneath the road. The stream ultimately discharges into Converse Meadow Pond and then into Lake Monomonac, roughly 2 miles downstream of the reservoir. The road shoulder slopes steeply (> 10%) from the road to the Bancroft Reservoir, and a section of riprap has washed out from the shoulder down the slope. This has exposed a patch of unvegetated soil where fast-flowing runoff can transport sediment to the waterbody. Sediment is transported from the surface of the unpaved Bancroft Road. Bancroft Road is a town owned road of Rindge, NH.

Recommendations: Re-install riprap and revegetate exposed, unstable slopes near the Bancroft Road crossing. Live stakes may be an ideal low-cost option here given the steepness of the slope. Consider using native New England place species including native dogwood, willow, elderberry, and buttonbush. These plants have well-established roots and will stabilize the soil below the riprap and reduce the likelihood of future riprap washouts.



Small erosion gully leading to Bancroft Reservoir, with riprap washed out and leading towards the lake (left). Exposed sediment and sand from the road, leading towards to the reservoir in a section with minimal vegetative buffer (right).

Site M-9: Perry Road

Location: 42.75183, -71.96792

Impact: Low

Land use: Road, Residential

Observations: A narrow road shoulder gully has formed above the gravel driveway of 176 Perry Road. While most of this drains to a formal ditch and then a cross-driveway culvert, some runoff continues flowing across the driveway, which is beginning to erode. This runoff then discharges into a wooded, low-elevation area on the south side of Perry Road. It was unclear if this wooded area connects to a stream or wetland, or if it is an isolated depression. The cross-driveway culvert which transports the bulk of runoff from this site has a well-riprapped outlet that slows water movement. Perry Road is a town owned road of Rindge, NH.

Recommendations: Install small-sized riprap along the road shoulder in sections that are eroding, including near the base of the depression downslope of 176 Perry Rd. Enhance native vegetation in this area. If it is too steep for regular plantings, utilize live stakes.



Runoff flows down the shoulder above the driveway, where there is some erosion, and either flows into the grass-lined ditch or crosses the driveway (top left). Runoff that bypasses the ditch flows across the driveway and into the wooded depression (top right). A view of the riprapped driveway culvert outlet and of minor shoulder erosion below the driveway (bottom left). Scour and exposed soil caused by Perry Road runoff in the wooded depression (bottom right). Blue arrows indicate dominant direction of runoff flow. Top photos are taken from Google Street View imagery dated August 2025.

Site B-1: Boat Launch

Location: 42.71466, -72.01529

Impact: High

Land use: Road, Commercial

Observations: A boat launch located on the western shore is privately owned by the "North of the Border Food Mart," located along New Hampshire Route 202 in Rindge. The road leading down the boat launch channels upstream stormwater from the gas station and Route 202 directly into the lake. There are no turn offs or catch basins, and paved curbs direct all stormwater into the lake with no vegetated buffer to treat stormwater or opportunity for infiltration. The project group also observed that wind frequently blows trash from the Mart's trash bins onto the banks of Monomonac Lake, where it can enter nearby waterways.

Recommendations: Add check dams along the driveway that divert water into a vegetated swale. Add gravel or porous pavement to the area closest to the boat launch and as much of the driveway as possible. Install a vegetated buffer along the shoreline. Consider trash management strategies to avoid trash from getting blown from trash bins to the water banks. Discuss with private Mart owner on moving bins farther from shoreline or find wind-resistant lids (weighted lids).



Visible runoff flows down the impervious surface of a paved road, draining from a nearby gas station and major roadway directly toward the lake (left). The asphalt road transitions directly into the boat ramp with no vegetated buffer along the sides (right). Paved curbs channel runoff from the surrounding impervious surfaces straight into the lake (both images).

Site B-2: Dolly Lane

Location: 42.71664, -72.01443

Impact: Moderate

Land use: Road, Residential

Observations: An erosion gully has formed alongside Dolly Lane, which flows directly into a stream bed that outlets to Lake Monomonac. Some of water upstream of the gully runs across the dirt road and towards the lake, though there is more vegetation here to buffer that input. Dolly Lane is a privately owned and operated road.

Recommendations: Install check dams along the road that outlet into the forest before water reaches the stream channel. Add a plunge pool at the base of the gully. Consider re-grading the road at the top of the hill to direct runoff into the check dams and plunge pool on left hand side and prevent sediment erosion.



Facing uphill of Dolly Lane, a roadside gully has formed, with some smaller erosion gullies at the top of the hill running across the gravel road and towards the lake (left). The roadside gully discharges directly into a stream channel, which is shown at the top of the photo on the right.

Site B-4: Paradise Island Road Shorefront

Location: 42.71727, -72.00446

Impact: High

Land use: Road

Observations: The section of Paradise Island Road that spans the lake via a bridge has fourteen (14) small erosion ditches that pour directly into the lake. While the road shoulder is well vegetated considering the limited area of land, ditches have formed in-between shrubs, exposing roots and directing road-side sediment and stormwater directly into the lake.

Recommendations: Re-establish vegetation at each gully site. Use live-stakes with native shrub species to ensure the roots are well established and to support bank stabilization. Consider armoring selected points along the shoreline with rocks to slow the rate shoreline erosion, though avoid adding sediment as much as possible. Shrubs native to New England that can be used for live stakes include native dogwoods, willows, buttonbush, elderberries, and white meadowsweet.



Small erosion gullies along the roadside, cutting through established vegetation, transport sediment and debris from the road shoulder into the lake.

Site B-5: Paradise Island Road Hill

Location: 42.71729, -72.00444

Impact: Moderate

Land use: Road, Residential

Observations: A steep portion of Paradise Island Road, just before crossing over the lake, has formed a roadside gully which flows down to the lake. A few perpendicular gullies have formed, acting like turnouts, to bring the stormwater into a residential lawn. However, the majority of the gullies lead to a driveway catch basin which outlets directly into the lake. The lower section of Paradise Island Road where this site is located is privately owned. However, shortly uphill from the site the road is owned and maintained by the town of Rindge, NH.

Recommendations: Vegetate or riprap the gully, and work with the property owner on establishing vegetation on their property to form a buffer where some of the stormwater is entering their property. Install an infiltration basin at the outlet of the catch basin and ensure the shoreline is properly vegetated.



Roadside ditch erosion with some gullies draining into private property (left) and others directing flow into a catch basin that discharges directly to the lake.

Site B-6: Hubbard Hill Road

Location: 42.72024, -72.00267

Impact: Moderate

Land use: Road, Residential

Observations: There is a large area of exposed soil along the road ditch on Hubbard Hill Road near the entrance to Kingfisher Terrace. While no signs of construction were noted during the survey, the absence of established vegetation upstream suggests recent disturbance. Erosion gullies have developed in the exposed soils within the road ditch, which drains to a culvert. At the lower half of the road ditch, established vegetation with no significant gullies indicates that re-vegetation upstream should be feasible. A large bank erosion was observed underneath a telephone pole, indicating the area is unstable and susceptible to erosion under large precipitation events or high-flow conditions. Hubbard Hill Road is owned by the town of Rindge, NH, while Kingfisher Terrace is privately owned and maintained.

Recommendations: Establish vegetation across all areas of exposed soil, using live stakes to enhance slope stabilization, especially where bank erosion is occurring. Native shrubs that can be used for live stakes include dogwoods, willows, buttonbush, elderberries, and white meadowsweet. Riprap can be used if vegetation is insufficient. Consider planting larger trees in the exposed area near Kingfisher Terrace (uphill) where the lower grade and reduced flow provide favorable conditions for tree establishment, though be mindful of the telephone pole.



Exposed sediment along the road shoulder with visible erosion gullies (left), and an unstable sediment bank eroded by high-flow conditions (right).

Site B-8: Colburn Lane Hill

Location: 42.72557, -71.99889

Impact: Low

Land use: Road, Residential

Observations: Several erosion gullies are present along the moderately sloped dirt section of Colbert Lane, which drains downhill toward the lake. Riprap from prior road construction is visible but has become partially filled with sediment, and some runoff now flows over the road instead of through the roadside ditch. Although the slope levels out before reaching the lake, reducing immediate transport of sediment into the lake, stormwater management issues are evident and should be addressed given the proximity of the road to the lakeshore. Colburn hill is privately owned and maintained.

Recommendations: Remove sediment from the riprap and perform regular maintenance. Regrade the road to ensure runoff drains into the side ditch rather than along the road surface. Install check dams and turnouts to redirect flow into the woods.



Erosion gullies formed in the road ditch and across the dirt road (left and middle). Road gravel is visibly washed into the ditch (right).

Site B-9: Colburn Lane Shorefront

Location: 42.72278, -71.99773

Impact: Low

Land use: Road, Residential

Observations: Colburn Lane runs very close to the lake shore, and has been previously flagged for having erosion issues. No gullies leading to the lake were observed here, though obvious drainage issues are present.

Recommendations: Improve vegetated buffer between the road and the lake in some areas. Educate property owners on proper stormwater management. Conduct regular road maintenance to ensure no erosion issues arise during large storms. Consider adding woven geotextiles under surface materials to reduce pooling issues. Consider plastic-free woven geotextiles, for example coconut fiber. Consider enforcing beach laws in this area, as some properties may have imported sand on moderately sloped shoreline areas. Artificial sandy beaches are unsustainable because the sand will wash away or settle into the lake, accelerating lake aging and harming aquatic ecosystems by smothering organisms, disrupting food webs, damaging fish habitat, and increasing plant growth as the lake becomes shallower.



Drainage issues and pooling on the road, directly adjacent to the lake. Vegetated buffer to the lake could be improved in places (bottom right).

Site B-10: Swan Point Road

Location: 42.73735, -71.97979

Impact: High

Land use: Road, Residential

Observations: A road-side ditch gully filled with sediment-laden water and visible bank erosion. Two pipes from a residential property outlet into the ditch. A crushed culvert is causing water to back up, increases bank erosion, and prevents proper drainage. Large portions of exposed sediment are present in the abutting property, which is currently under construction with minimal sediment control measures. Swan Point Road is a town owned road of Rindge, NH.

Recommendations: Riprap and vegetate the road ditch. Replace and upsize the culvert and educate property owners on upstream stormwater practices. Investigate the use of the private pipe.



Eroding road side ditch (left). Pipes from residential property leading to clogged culvert that is backed-up and causing bank erosion (top right). The crushed culvert is visible downstream of the pool, with additional pooling, erosion, and exposed sediment (bottom right).

Site B-11: Route 119

Location: 42.74119, -71.98447

Impact: High

Land use: *State Road*

Observations: Large gully runs next to New Hampshire Route 119, flanked by a road shoulder consisting of a large and poorly vegetated slope. The gully travels down-hill to a catch basin, which outlets near a stream.

Recommendations: Install riprap and vegetate the gully with salt-tolerant plant species. Road salt can inhibit or kill typical grasses, which may explain the lack of vegetation at this location. Add an infiltration basin before the water reaches the catch basin.



Large erosion gully alongside New Hampshire Route 119. Gully leads to catch basin at the bottom of the hill (right) with a stream down the hill.

Site B-12: Lord Hill Road

Location: 42.74216, -72.01555

Impact: Low

Land use: Road, Residential

Observations: A moderately large gully runs along the entirety of the hill down the dirt road of Lord Way. There is no established road ditch on this side of the road, so the water runs on the road instead. While multiple turnouts are present upstream, they are slightly clogged and poorly pitched so the water does not flow into them. Additional gullies are located on other portions of the road. The majority of the stormwater outlets into the woods at the bottom of the hill attenuating sediment transport, though stormwater under high flow likely reaches the stream. Lord Hill Road is a town owned road of Rindge, NH.

Recommendations: Re-dig turnouts so the water flows into them rather than down the hill and add sandbags to help control flow direction. Install an established plunge pool or infiltration basin at the bottom of the hill.



Large erosion gully running on the side of the road located on the road and not in an established road ditch (left and middle). Smaller gullies running down other parts of the road (right).

Site B-13: Goddard Road

Location: 42.73578, -71.99413

Impact: Low

Land use: Road, Residential

Observations: A long, narrow gully runs along a substantial stretch of Goddard Road before discharging into a grass area that slopes down to Little Crowcroft Pond, a small waterbody that drains to Lake Monomonic. Sediment transport is visible along the entirety of the gully and at the outlet where sediment overlays grass. During high-flow conditions, stormwater from Goddard Road is likely carried directly into Little Crowcroft Pond, flowing over the mowed section between the road and waterbody. Goddard Road is a town owned road of Rindge, NH.

Recommendations: Improve the vegetated buffer between the road and Little Crowcroft Pond, which is primarily grass and a few trees. Consider establishing a plunge pool or infiltration basin at the bottom of the hill before the water reaches the pond.



The erosion gully running alongside Goddard Road, with Lake Monomonic to the right. Sediment transport is visible in the gully, and the mowed area between the gully and pond is visible.

Site DPW-4: Coot Bay Drive

Location: 42.72731, -71.99792

Impact: High

Land use: Residential, Road

Observations: Coot Bay on the west side of Lake Monomonac has elevated chloride levels from road salt. Coot Bay Drive is a very steep road leading from Wellington Road to the lake. It is a residential road with relatively low traffic and deicing salt applied in the winter. Rindge DPW has calibrated its sand and salt mixture for all roads in the Town based on road length, width, and slope in contrast to the salt-only mix NHDOT applies to Routes 109 and 202 (according to the DPW Director). The portion of the road closest to the lake is privately owned, which limits the Town's ability to install stormwater runoff treatment measures and ensure well calibrated salt application along this critical lakeside section of the road. Because the road is steep and largely impervious, it is a priority concern area, as sand, sediment, and road salt are readily washed downhill toward the lake.

Recommendations: Contact private property owners at the end of Coot Bay Road and work with them to identify options to treat stormwater and reduce chloride pollution to the lake. Opportunities may include enhancing shoreline buffers or installing compact stormwater control measures. Additionally, coordinate with NHDOT and MassDOT to review their road salting practices in the watershed and ensure they align with their respective states' guidance. The Town of Rindge should also evaluate how salt and sand are applied at the top of the hill on Coot Bay Road, as materials readily travel downslope, and adjust downward where feasible the application rates and timing while still maintaining winter road safety. Consider having Town of Rindge staff participate [Green SnowPro](#) training, which educates and certifies winter maintenance professionals in salt reduction practices which improve water quality while protecting public safety.



Looking up Coot Bay Drive, where runoff (with high road salt concentrations in winter) flows down the road surface (top left). Water pools in a low point in the road (bottom) before flowing to the lake through a small, steep wooded area with limited ground cover and minimal pollutant attenuation (bottom and top right).

Site B-14: Goddard Road Private Driveway

Location: 42.73644, -71.99438

Impact: Low

Land use: Road, Residential

Observations: A deep gully has formed downstream of a large, paved driveway on a property with a lush green lawn and lots of impervious surface. The gully has deeply eroded part of the road shoulder and leads into a grassy area towards Little Crowcroft Pond which is a small waterbody that drains to Lake Monomonic. This gully is directly in-line with the paved driveway and is the only gully of its type in the area.

Recommendations: Conduct outreach and education to property owners on driveway best management practices. Add a plunge pool to the base of the gully before the water reaches Little Crowcroft Pond, and enhance the buffer in this area. Consider working with the property owner to re-pitch the driveway to re-direct stormwater into a catch basin uphill of the dirt road, combined with a plunge pool or settling basin at the outlet before reaching the lake.



Deep erosion gully that flows into a grassed area along the shoreline of Little Crowcroft Pond (left). A portion of the large, sloped driveway which channels stormwater directly into the road (middle). The proximity of the gully to Little Crowcroft Pond, and the minimal vegetation between the two (right).

Points of Interest

FBE staff Grace Little and Tim Kirsten met with Rindge Director of Public Works Michael Cloutier. Michael showed them numerous culverts and roads throughout Rindge and explained which ones have been newly replaced, and general road salting and sanding protocols used by the Town. According to DPW, all the catch basins in downtown Rindge drain to vegetated wetlands or detention ponds. Catch basins are cleaned out once a year. Street sweeping in Rindge, New Hampshire occurs once per year, usually in mid-May depending on weather conditions. The sweeping is generally limited to the town center common and nearby parking lots. The Town of Rindge does not own its own street sweepers and relies on contracted services. Maintenance of gravel roads involves grading, and calcium is not applied to these roads because of water quality impacts associated with runoff.

The following sites were visited during the watershed survey but were not considered nonpoint source pollution concerns. As such, no pollutant load reductions were calculated for these sites, and they are not in the BMP Matrix (Table 1). Nonetheless, maintenance recommendations are provided below. Sites are numbered based on the order they were visited; some have been removed because they were incorporated into NPS site descriptions and therefore site numbers are not all consecutive.

Site DPW-1: East Monomanac Road Culverts

Location: 42.74940, -72.00921

Impact: N/A

Land use: Road, Forest

Observations: There are several culverts beneath East Monomanac Road, including the one described in Site M-6. Most of these are two feet in diameter, which appears well-sized for their sub-watersheds. They are generally made of plastic or corrugated steel, but none are concrete. Many have a stone headwall. Headwalls appeared in good condition although at least one culvert appears partially crushed (see photos). Rindge DPW has placed crushed stone at culverts where siltation and erosion were occurring. Debris is cleaned out as needed. Most of the culverts drain to meandering streams in forested land between the road and the lake.

Recommendations: Continue regular observation and maintenance of culverts, including clearing debris and placing crushed stone when scour occurs. Assess whether partially crushed culverts should be replaced or rehabilitated.



One of the 2-foot corrugated steel culverts with a stone headwall beneath East Monomanac Road (left). One of the streams at the outlet of a culvert on this road, flowing through a forested area (middle). A partially crushed plastic culvert with a stone headwall on the same road (right).

Site DPW-3: Swan Point Road Culvert

Location: 42.73079, -71.97952

Impact: N/A

Land use: Road, Forest

Observations: A large culvert conveys a perennial stream from north of Lake Monomonac to a cove near Swan Point, crossing beneath Swan Point Road. Stormwater runoff from a ditch on the north side of Swan Point Road also discharges to this culvert inlet. The culvert appears well-sized to handle large storm events and the stone headwall is stable, although some bank undercutting was observed at the outlet. Some riprap has been installed to stabilize the banks around the culvert. The stream bank and the end of the roadside ditch is well vegetated with wetland plants, providing a good buffer to treat stormwater runoff. However, there is limited ground cover in the road shoulder on the outlet side.

Recommendations: While this culvert is generally good, the scour at the outlet could become an NPS concern in the future. We recommend planting live stakes of shoreline species such as native willows, dogwoods, elderberries, and buttonbush. These are generally more cost-effective than container plantings and can be harvested from species already growing on site. Planting these in the spring is ideal, although late fall is also an option. These plantings would supplement the riprap already in place and further stabilize the site, in addition to providing benefits to wildlife. We also recommend seeding the shoulder above the outlet with native herb species to treat runoff that enters the stream from this side of the road.



A view of the culvert inlet, a corrugated metal pipe with a stone headwall (top left). The roadside ditch with an herbaceous buffer before draining to the stream (top right). The downstream side of the culvert, which has limited vegetation along the road shoulder and some bank scour at the outlet (bottom).

Site DPW-5: Paradise Island Road (Private)

Location: 42.71990, -72.00246

Impact: High

Land use: Residential, Road

Observations: The private roads around Paradise Island (e.g. Paradise Island Road, Monomonac Terrace) are steep and unpaved. Many properties here have inadequate shoreline buffers and fertilized lawns. While the Town of Rindge is addressing sedimentation and runoff on Town-owned roads in the area, they are not able to control NPS pollution on the private roads.

Recommendations: Host education and outreach events for shoreline property owners, emphasizing the need for watershed-wide improvements to sustain the water quality of the lake. Encourage participation in the NH Lakes' LakeSmart Program. Assess road management practices and whether there are opportunities for roadside BMPs.

MONOMONAC LAKE

Watershed Management Plan

Watershed Survey

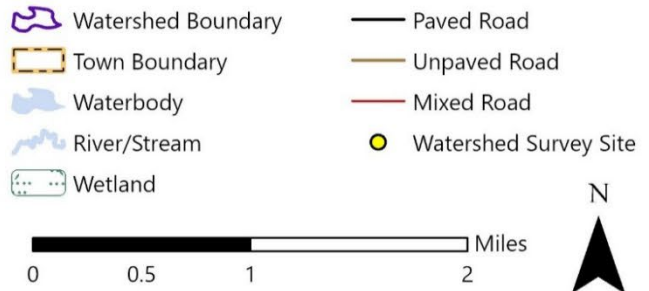


Figure 1. Location of identified nonpoint source sites in the Lake Monomonic watershed.

Table 1. Site ID, location description, water quality impact, estimated load reduction, and implementation costs for the 20 nonpoint source sites identified in the Lake Monomonac watershed. Pollutant load reduction and cost estimates are preliminary and are for planning purposes only. Cost estimates are based on pre-COVID19 ranges (adjusted for 2025 inflation), and thus actual construction costs could be highly variable at this time. Sites are priority ranked from lowest to highest cost per pound of phosphorus load (using average cost reduced with remediation).

SITE	LOCATION	IMPACT	LOAD REDUCTION			ESTIMATED COST			RANK
			TSS (metric tons/yr)	TP (kg/yr)	TN (kg/yr)	Est. Low Cost	Est. High Cost	Est. Avg. Cost	
DPW-4	Coot Bay Drive	High	0.44	0.80	4.54	\$8,000	\$16,000	\$12,000	1
M-5	East Monomonac Road	Moderate	0.37	0.10	0.25	\$1,000	\$3,000	\$2,000	2
B-11	Route 119	High	1.80	0.47	1.22	\$38,000	\$77,000	\$57,500	3
B-14	Goddard Road Private Driveway	Moderate	0.41	0.11	0.28	\$2,000	\$4,000	\$3,000	4
B-12	Lord Hill Road	Low	1.63	0.43	1.11	\$8,000	\$16,000	\$12,000	5
B-1	Boat Launch	High	0.15	0.27	2.05	\$59,000	\$119,000	\$89,000	6
M-6A-C	E. Monomonac Rd. Culvert, Gully #1-3	High	0.35	0.10	0.24	\$6,000	\$13,000	\$9,500	7
M-2	Bridge on Island Road	Moderate	0.56	0.15	0.38	\$5,000	\$10,000	\$7,500	8
M-4	Fourth Street	High	0.06	0.19	1.00	\$15,000	\$29,000	\$22,000	9
M-3	Second Street	Moderate	0.13	0.21	1.24	\$9,000	\$17,000	\$13,000	10
B-13	Goddard Road	Low	2.05	0.54	1.39	\$16,000	\$32,000	\$24,000	11
M-9	Perry Road	Low	0.37	0.10	0.25	\$4,000	\$7,000	\$5,500	12
B-8	Colburn Lane Hill	Low	1.22	0.32	0.83	\$14,000	\$28,000	\$21,000	13
B-2	Dolly Lane	Moderate*	0.53	0.14	0.36	\$12,000	\$25,000	\$18,500	14
B-10	Swan Point Road	High	0.29	0.08	0.20	\$20,000	\$39,000	\$29,500	15
M-8	Bancroft Road Crossing	Low	0.15	0.04	0.10	\$3,000	\$7,000	\$5,000	16
B-9	Colburn Lane Shorefront	Low	0.05	0.10	0.55	\$16,000	\$32,000	\$24,000	17
B-6	Hubbard Hill Road	Moderate	0.03	0.04	0.09	\$9,000	\$19,000	\$14,000	18
B-4	Paradise Island Road Shorefront	High	0.39	0.10	0.27	\$107,000	\$129,000	\$118,000	19
B-5	Paradise Island Road Hill	Moderate	0.47	0.12	0.32	\$50,000	\$100,000	\$75,000	20
M-1	West Monomonac Road	Low	0.01	0.00	0.00	\$12,000	\$23,000	\$17,500	21
TOTAL			11.47	4.38	16.67	\$414,000	\$745,000	\$579,500	

Table 2. Site ID, Location description, water quality impact, and potential partners for BMP implementation. Potential partners are identified based on the road ownership and other entities that may have ownership of the land. Sites are priority ranked from lowest to highest cost per pound of phosphorus load (using average cost reduced with remediation).

SITE	LOCATION	IMPACT	POTENTIAL PARTNERS	RANK
DPW-4	Coot Bay Drive	High	Landowners at the end of Coot Bay Road	1
M-5	East Monomonac Road	Moderate	Town of Winchendon, MA	2
B-11	Route 119	High	New Hampshire DOT	3
B-14	Goddard Road Private Driveway	Moderate	Landowner upstream of site, along Goddard Road	4
B-12	Lord Hill Road	Low	Town of Rindge, NH	5
B-1	Boat Launch	High	New Hampshire DOT, North of the Border Food Mart, Town of Rindge, NH	6
M-6A-C	E. Monomonac Rd. Culvert, Gully #1-3	High	Town of Rindge, NH, NH Fish and Game	7
M-2	Bridge on Island Road	Moderate	Landowners	8
M-4	Fourth Street	High	Landowners	9
M-3	Second Street	Moderate	Town of Winchendon, MA	10
B-13	Goddard Road	Low	Town of Rindge, NH	11
M-9	Perry Road	Low	Town of Rindge, NH	12
B-8	Colburn Lane Hill	Low	Landowners	13
B-2	Dolly Lane	Moderate*	Landowners	14
B-10	Swan Point Road	High	Town of Rindge, NH	15
M-8	Bancroft Road Crossing	Low	Town of Rindge, NH	16
B-9	Colburn Lane Shorefront	Low	Landowners	17
B-6	Hubbard Hill Road	Moderate	Town of Rindge, NH and Landowners	18
B-4	Paradise Island Road Shorefront	High	Landowners	19
B-5	Paradise Island Road Hill	Moderate	Town of Rindge, NH and Landowners	20
M-1	West Monomonac Road	Low	Town of Winchendon, MA	21
TOTAL			11.47	