

Lake Waukewan | Watershed Survey Results



TO: Angela Labreque, Town of Meredith
FROM: Evan Ma & Maggie Kosalek, FB Environmental Associates (FBE)
SUBJECT: Lake Waukewan Watershed Survey Results
DATE: January 14, 2026
CC: Laura Diemer, FB Environmental Associates

FB Environmental Associates (FBE) was contracted by the Town of Meredith to complete a watershed survey that identifies and documents nonpoint source (NPS) pollution sites in the Lake Waukewan watershed in Meredith, Holderness, and Center Harbor, New Hampshire. This survey is an update of a 2014 watershed survey which identified sixty-one (61) sites. NPS sites require implementation of best management practices (BMPs) to address impacts from stormwater, erosion, lack of infiltration (impervious cover), culvert restrictions, and/or lack of vegetated riparian buffer. On July 21 and 22, 2025, technical staff from FBE (Evan Ma, Maggie Kosalek, and Tim Kirsten) along with Meredith PWD staff (Craig Hale) surveyed the watershed. There was a total of 0.13 inches of rainfall for the previous 72 hours in the area. Documentation included describing the problem, recommending fixes, rating the site’s impact to water quality, logging the site’s location via GPS, and taking photographs. Each of the sixty-one (61) sites from the previous survey were revisited and assessed for stormwater issues. In the original survey, several sites were split into sub-sites (e.g., the upstream side of a culvert was site A and the downstream side was site B). FBE opted to combine these co-located sites when an implementation project was likely to include both. Sites at which no stormwater issues were identified were delisted. Forty-four (44) previous sites had their recommendations updated (some sites were combined, resulting in 39 sites), 17 sites were removed from the NPS site list, and 38 new sites were documented during the survey. The updated survey thus includes 77 total sites.

Following the watershed survey, pollutant load reduction estimates were determined to help prioritize implementation at 15 highest priority NPS sites. NPS sites were assessed as having either a “Direct” or “Limited” impact on water quality based on field observations; Sites where stormwater and/or sediment was observed to be leading directly into Lake Waukewan, Lake Winona, another lake/pond, a tributary, or stormwater infrastructure that discharges directly to surface waters (ex. catch basins) were considered to have a “direct” impact on water quality. Of all 77 sites with recommendations, 44 had a direct impact on water quality and 33 had a limited impact (Figure 1). Most sites were on state or town roads, with few sites on private property (Figure 1). Sites are organized into the following sections: “Updated Nonpoint Source Sites from the 2014 Survey,” “New Nonpoint Source Sites,” and “Delisted Nonpoint Source Sites.” At the end of this memo, Table 1 provides load reduction estimates for all sites. A map of all NPS site locations is provided in Figure 2.

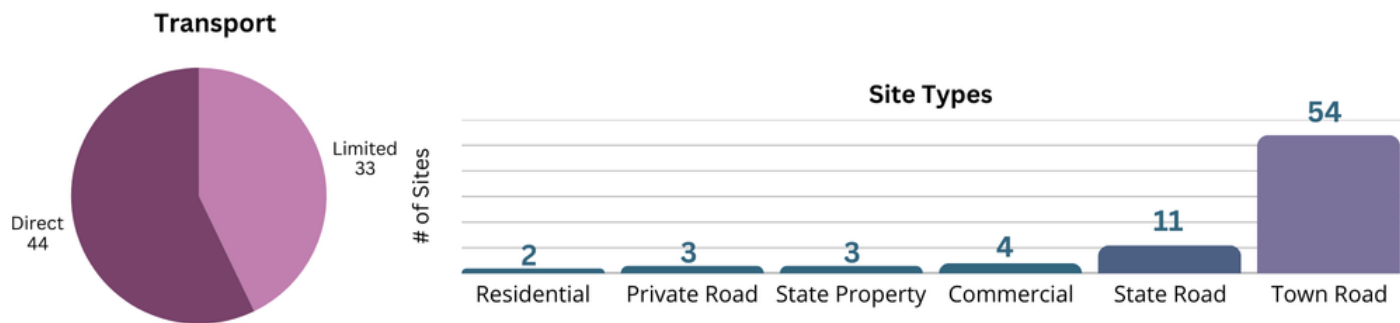


Figure 1. Transport to waterbody (left) and property type (right) category totals for NPS sites. Note that some sites were on two types of property, but only the main type is shown. See each site description for more details.

UPDATED NONPOINT SOURCE SITES FROM THE 2014 SURVEY

Site 1-01: Water Street #1 (Meredith)

Location (latitude, longitude): 43.6523, -71.5090

Transport: Direct

Land use: Town Road

Observations: A catch basin on Water Street is completely blocked by debris with clear signs of sediment transport from the road shoulder into the catch basin. The catch basin leads to a culvert that crosses Water Street to a half-culvert that delivers sediment-laden runoff directly to the lake.

Recommendations: Clean out the catch basin and re-vegetate the road shoulder, diverting runoff to the wooded area on the upstream side of the road where possible. Remove the half-culvert that leads to the lake and vegetate the area to allow for runoff infiltration. Add a plunge pool and level spreader to the downstream side of the culvert if needed. Consider installing a sediment bag in the catch basin if there is excessive sediment or restrictions due to private property.



Visible sediment transport (left) to clogged catch basin (middle) that leads to half-culvert across the street (right) and delivers runoff directly to lake.

Site 1-02A and 1-02B: Water Street Stream Crossing (Meredith)

Location (latitude, longitude): 43.6566, -71.5101

Transport: Limited

Land use: Town Road

Observations: A paved swale on the east side of Water Street carries untreated stormwater down the roadside before forming a deep gully. Paved swales do not allow for any stormwater infiltration, producing large volumes of high temperature, high velocity stormwater that can worsen erosion downhill. This site is located near the stream crossing on Water Street when entering the road from the north.

Recommendations: Stabilize the gully with rip rap and vegetation on the upstream side of the road. Remove the asphalt from the swale if possible and replace it with a vegetated or rip rap-lined ditch.



Paved swale on road shoulder (left) that creates a gully downstream (right).

Site 1-02C: Unknown Stream (Meredith)

Location (latitude, longitude): 43.6524, -71.5092

Transport: Direct

Land use: Town Road & Residential

Observations: There is some recent land clearing at the site next to stream crossing that has exposed bare, loose soil. A small silt sock is in place to prevent sediment transport to the stream. Few gullies were observed on site, which is evidence of sediment transport to the stream. The 2014 watershed survey found a plethora of issues at the site including undercut banks and lack of shoreline buffer near the stream.

Recommendations: Extend the sediment silt sock to the road. Revegetate the shoreline and road shoulder and implement rip rap where needed to stabilize the road shoulder.



New construction (left) with stream on other side of rock wall and small silt sock. Some visible gully on side of road (right).

Site 1-03A: Red Gate Lane Culvert (Meredith)

Location (latitude, longitude): 43.6587, -71.5133

Transport: Limited

Land use: Town Road & Residential

Observations: The culvert, which was determined to be unstable in 2014, is still unstable and is filled with sediment. The road is not properly crowned, which may lead to road surface erosion or disproportionate amounts of stormwater entering at the culvert inlet/outlet, which can erode loose sediment. Impact at the site is "low" because the intermittent stream at the outlet disperses into the forested area and does not seem to continue as a channel to the lake. Impact in 2014 was specified to be "high" due to severe ditch and road shoulder erosion and the condition of the gravel road. The gravel road still lacks a proper crown, but the erosion issues observed in 2014 were not observed during this survey.

Recommendations: Clear the clogged culvert, vegetate the ditch, and/or armor the ditch with rip rap. Install check dams and turnouts to reduce stormwater runoff volumes.

Site 1-04: Red Gate Lane Ditch Near End of Road (Meredith)

Location (latitude, longitude): 43.6583, -71.5126

Transport: Limited

Land use: Town Road

Observations: The road ditch on Red Gate Lane is full of sand, though evidence of erosion is sparse. The sediment built up around the culvert inlet washes into a wetland rather than Lake Waukegan, which likely provides some pollutant and storm flow attenuation; sedimentation can degrade the functions/values of wetlands despite this benefit to the lake. There appears to be a plunge pool (whether or not intentionally constructed) at the site that has filled with sand. Severe erosion was found at the site during the 2014 watershed survey; the same levels of erosion were not observed here.

Recommendations: Regularly remove sediment to maintain culvert and add an intentional plunge pool.



Ditch filled with sediment (left) that leads to a pool of water filled with sediment (right).

Site 1-05: Red Gate Lane (Meredith)

Location (latitude, longitude): 43.6579, -71.5120

Transport: Limited

Land use: Town Road

Observations: The unpaved road surface and shoulders of Red Gate Lane are heavily eroding, leading down to a partially blocked culvert. Stormwater from the culvert leads across a private driveway near the lake, causing additional erosion downstream of the site.

Recommendations: Clean out sediment from the culvert. Recrown the road to prevent gullies from forming along the road surface. Armor the road ditch with vegetation (grass) or rip rap, especially near the culvert inlet.



Severe road surface erosion (top left and top right) leading to clogged culverts (bottom left and bottom right) and ample sediment transport to lake across road.

Site 1-06: Waukegan Street Near Railroad (Meredith)

Location (latitude, longitude): 43.6481, -71.5058

Transport: Limited

Land use: Town Road

Observations: There currently appears to be less road shoulder erosion and more vegetation at the site compared to the 2014 watershed survey (though the vegetated buffer is mostly poison ivy). There is still some sediment build-up and transport along the railroad crossing, which is evidence of stormwater pooling at this area.

Recommendations: Include this site in regular street sweeping.



Slight sediment transport to ditch (left) and sediment build-up on road surface (right).

Site 1-07: Beach South End

Location (latitude, longitude): 43.6471, -71.5077

Transport: Direct

Land use: Town Road

Observations: The erosion noted in the 2014 survey is still present. It appears that this area is used to access the lake, preventing vegetation from re-establishing and leads to continued erosion when combined with foot traffic.

Recommendations: Recommendations for the site are similar to those from 2014. Install a runoff diverter, establish a shoreline buffer, and discourage people from using the steep slope as an access point. If access cannot be re-directed to a better location, consider establishing a proper access point by building infiltration steps and stabilizing soils as needed, some of which may require permitting given the shoreline location.



Bare soil area on side of road (left and right) with foot path down to water (left).

Site 1-08B: Corner of Railroad Tracks and Waukegan Street (Meredith)

Location (latitude, longitude): 43.6469, -71.5079

Transport: Direct

Land use: Town Road

Observations: A small gully was observed leading from the road to a catch basin on Waukegan Street that outfalls to the lake. Eroded sand is deposited in the gully, and there is minimal vegetation around the catch basin.

Recommendations: Revegetate the road shoulder and around the catch basin. Stabilize the gully near the catch basin. Alternatively, a portion of the grassy area could be dug out into a wider vegetated ditch that can slow and infiltrate stormwater to prevent erosion at the site.



Bare soil area and gully on side of road (left). Sediment build-up around catch basin (right).

Site 1-09A: Stream Crossing West of Beach Area (Meredith)

Location (latitude, longitude): 43.6467, -71.5084

Transport: Direct

Land use: Town Road

Observations: Although there is ample vegetation here (invasive knotweed), the road shoulder at the culvert inlet is bare. The culvert inlet is rusted, and the surrounding bank is still being undercut.

Recommendations: Reseed the shoulder with grass. Install turnouts to divert stormwater away from the culvert. Replace the rusted-out culvert. Remove knotweed if feasible and replace it with native plants (though this is a lower priority).



Bare road shoulder (left) that leads directly to rusted culvert and stream (right).

Site 1-09C: Waukegan Street, West of Site 1-09B (Meredith)

Location (latitude, longitude): 43.6458, -71.5108

Transport: Limited

Land use: Town Road

Observations: This site is still a bare lot with piles of wood chips, fine sand, and gravel. Sediment appears to have migrated from the lot into the road.

Recommendations: Ensure sediment piles are properly managed and retained. Regularly remove sand at this site.



Bare soil lot with piles of sediment (left and right).

Site 1-10B: House next to Carder Lane on Waukegan Street (Meredith)

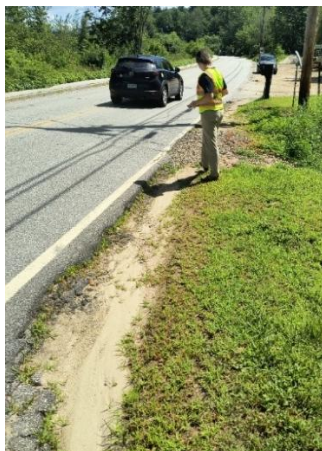
Location (latitude, longitude): 43.6458, -71.5108

Transport: Direct

Land use: Town Road & Residential

Observations: The stream bank appears to be more vegetated now than in 2014; however, erosion and sediment transport to the culvert inlet on the road shoulder are still present. Erosion and deposited sediment were observed along the driveway of house #96 and up to the next driveway.

Recommendations: Repave surrounding driveways. Revegetate / stabilize the road shoulders. Plant native vegetation / a rain garden in the grassy area next to the stream to capture and infiltrate stormwater.



Road shoulder erosion and sediment transport straight to culvert (left and middle). Area where a rain garden could be planted to divert stormwater to (right).

Site 1-11: Waukegan Street Stream Crossing (Meredith)

Location (latitude, longitude): 43.6460, -71.5204

Transport: Direct

Land use: Town Road & Residential

Observations: The culvert outlet is adequately vegetated, although mostly with poison ivy, making it inaccessible for closer inspection during the survey. There is moderate erosion at the culvert inlet; sediment was observed to be building up in the culvert. Trees in the upstream riparian buffer appear to have been cut down.

Recommendations: Stabilize the road shoulder and inlet with rip rap and revegetate bare areas. The culvert inlet appears to be in good condition but should be checked more closely to confirm. Consider focused outreach to inform and discourage cutting vegetation in riparian corridors.



Adequate vegetation (although poison ivy) at downstream side of culvert (left). Moderate erosion and sediment build-up at upstream side of culvert (right).

Site 1-12: Wall Street and Waukegan Street Intersection (Meredith)

Location (latitude, longitude): 43.6456, -71.5209

Transport: Direct

Land use: Town Road & Residential

Observations: In the 2014 watershed survey, road shoulder erosion was observed at the site, and the stream bed was composed of sand that had washed in from the road. In 2025, there is still some sediment in the stream and some erosion on the road shoulder. Poison ivy and knotweed obscure the view of the culvert.

Recommendations: Revegetate the small section that is bare. This is not a priority site as it is well-vegetated.



Erosion on road shoulder (left) and sediment visible in stream (right).

Site 1-14 and 1-15: Wall Street #1 (Meredith)

Location (latitude, longitude): 43.6474, -71.5236

Transport: Direct

Land use: Town Road & Residential

Observations: A Wall Street resident provided an anecdote about how increased development on the upstream side of the road (between Wall Street and Winona Road) has caused a large increase in runoff volume over the past years. Before, the runoff would infiltrate on the upstream side of the road, causing the area between Wall Street and the lake to be a marsh. With the increased impervious surface, culverts have been added under the road, thus channelizing stormwater flow instead of dispersing runoff and allowing it to infiltrate. The resident also noted sediment entering the lake from the watershed near their home has caused a beach to form on their property. They also noted biological changes to the lake, such as the absence of freshwater mussels that were previously found in the lake. Site observations appeared consistent with this description.

Recommendations: Add level spreaders at the culvert outlets to disperse flow throughout the forest. Add check dams near the banks of the stream as needed to slow and disperse flow. Investigate options on the uphill side of Wall Street to slow and infiltrate runoff before it reaches Wall Street. Stabilize bare soil areas with vegetation.



New construction on the upstream side of road (left). A culvert under the road to drain water from the upstream side (right; there are several of these along the road).

Site 1-19A and 1-19B: Reservoir Road (Meredith)

Location (latitude, longitude): 43.6408, -71.5015

Transport: Direct

Land use: Town Road

Observations: Reservoir Road contains a closed drainage system through which all stormwater from the traffic circle is routed. This underground drainage system was installed three years ago. Surface runoff on Reservoir Road travels through a vegetated ditch, all on the east side of the road. The end of each driveway has a new catch basin that ties into the underground drainage. A paved swale has been installed on the opposite side of the road, likely due to homeowner request from flooding issues. This paved swale terminates into a bare corner where stormwater then crosses the road and enters a brook. Meredith PWD uses this bare area on the corner of the road to stage material. The subsurface stormwater flow from the closed drainage system becomes surface water at a culvert on the road which crosses Parade Road to form a brook that cuts through a residential property. The homeowner specified that the brook seldom floods and the existing 8-inch PVC pipe can handle current stormwater flows. The chambered systems that are part of the closed drainage system slow down the water and appear to be a large improvement since the original watershed survey. There is some sediment deposition where the closed drainage system outlets, but much of it settles out before stormwater reaches the brook.

Recommendations: Install engineered BMPs near the traffic circle to treat as much runoff as possible at the top of the road before it travels downhill. Maintain the closed stormwater system. Revegetate the bare soil area.



Catch basin to underground drainage system (left). Paved swale (middle). Loose dirt on corner for DPW material staging (right).

Site 1-21: Ditches on Waukegan Street at Bruce's Landscaping (Meredith)

Location (latitude, longitude): 43.6437, -71.5240

Transport: Limited

Land use: Town Road & Commercial

Observations: There is moderate road shoulder erosion due to scraped roadside ditches. Sediment appears to be washing out from the road and a nearby unpaved driveway. There are also man-made sediment piles at the nearby landscaping business, which may lead to additional sedimentation.

Recommendations: Vegetate the ditch and install check dams and vegetation mats or rip rap to stabilize the ditch. Refrain from scraping the ditch as this practice loosens soil, making it more susceptible to erosion. Consider working with the landowner to pave their driveway and use sediment control practices near sediment piles



A commercial driveway is eroding and transporting sediment (left) to the downstream ditch, causing erosion and sediment build-up (right).

Site 1-22: Unpaved Section of Red Gate Road (Meredith)

Location (latitude, longitude): 43.6589, -71.5085

Transport: Limited

Land use: Town Road

Observations: There is a long gully down the right side of this unpaved section of Red Gate Road with fine sand and exposed boulders/bedrock in the channel. There are a few turnouts at the site that direct stormwater and eroded sediment into the forested area, which prevents pollutants from reaching a waterbody.

Recommendations: Stabilize the road shoulder and ditch with vegetation. Install and maintain check dams along the ditch. Ensure turnout areas remain adequately vegetated and remove sediment as needed.



Erosion and sediment build-up in ditches (left and middle) leading to turnouts into woods (right).

Site 1-23: Bonney Shore Road (Meredith)

Location (latitude, longitude): 43.6631, -71.5146

Transport: Direct

Land use: Town Road

Observations: No changes were observed at the site since 2014. There is moderate road surface and ditch erosion on Bonney Shore Road. Stormwater transports eroded sediment through a nearby culvert which ultimately connects to a nearby stream.

Recommendations: Vegetate and/or armor the ditches. Line the turnouts with rip rap and remove sediment periodically. Install plunge pools at the end of turnouts to capture and filter out sediment.



Road shoulder/ditch erosion and sediment transport (left and middle) leading to culvert that is partially filled with sediment (right).

Site 1-24A: Upstream Side of Stream Crossing on Waukewan Street (Meredith)

Location (latitude, longitude): 43.6454, -71.5137

Transport: Direct

Land use: Town Road

Observations: Dirt driveways on both sides of the culvert outlet are eroding and transporting sediment to the culvert. The outlet of the culvert is not visible in the photos due to the presence of knotweed.

Recommendations: Armor the road shoulder with crushed stone. Engage with homeowners on paving driveways or sediment control practices.



Road shoulder/ditch erosion and sediment transport (left and right).

Site 1-24B: Downstream Side of Stream Crossing on Waukewan Street

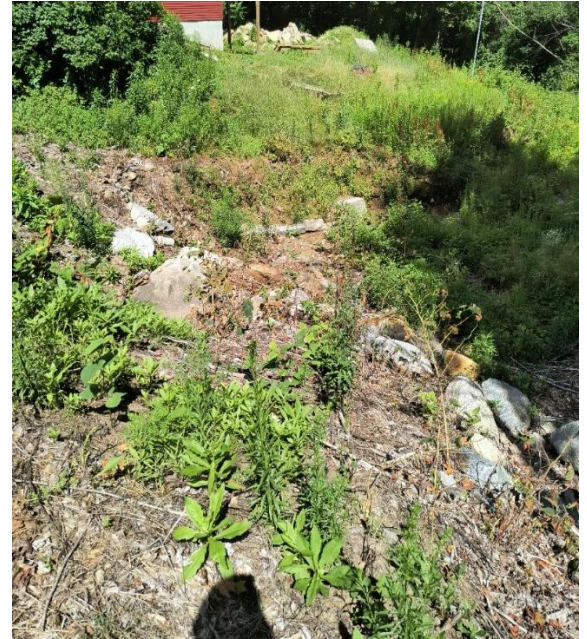
Location (latitude, longitude): 43.6454, -71.5142

Transport: Direct

Land use: Town Road

Observations: There is an intermittent stream at the site, though it was not flowing at the time of the survey. There is sediment accumulated at the perched culvert outlet. The steep stream bank is lacking vegetation; invasive knotweed is present

Recommendations: Armor road shoulder with crushed stone. Engage with homeowners to encourage paving driveways that are currently contributing to pollutant loading at the site.



Road shoulder/ditch erosion and sediment transport (left and right).

Site 2-01: 9 Winona Shores Road (Meredith)

Location (latitude, longitude): 43.6444, -71.5326

Transport: Direct

Land use: Residential

Observations: An intermittent stream cuts through a residential yard, entering through a cross-road culvert. There appears to be less erosion at the site than mentioned in the 2014 survey, though there is still a lack of a buffer.

Recommendations: Increase the amount of vegetation on the road shoulder and engage with the homeowner to add more vegetation around the culvert and stream bank.



Culvert inlet with minimal vegetation.

Site 2-02: Robin Way (Meredith)

Location (latitude, longitude): 43.6474, -71.5310

Transport: Limited

Land use: Residential

Observations: Little has changed at the site since the 2014 watershed survey. The road shoulders on both sides of Robin Way are eroding, with large gullies leading to a culvert. The culvert likely leads to a small stream on the southwest side of Lake Waukegan. Some runoff is directed to a wooded area where there are large sediment piles.

Recommendations: Install U-shaped road ditches that are lined with rip rap to prevent further erosion and improve stormwater management. Install check dams and turnouts along the ditch to divert stormwater into the forest. A level spreader may be used to disperse the channelized stormwater at the end of each turnout. Remove the accumulated sediment and revegetate the area, if possible.



Gullies and erosion along road shoulder (left and middle) that lead to sediment deposits (right).

Site 2-03B: 28 Forest Hill Road (Meredith)

Location (latitude, longitude): 43.6530, -71.5355

Transport: Limited

Land Use: Town Road & Residential

Observations: A gully forms at base of the driveway of 28 Forest Hill Road and transports road material into the ditch. There are several other gullies along the road that lead into the same ditch. The gullies continue until the road flattens.

Recommendations: Engage with the homeowner to direct stormwater from the driveway into the wooded area or to the ditch using a rubber razor or broad-based dip. Stabilize the ditch with rip rap. Install check dams in steeply sloped portions of the ditch.



Gullies along bottom of driveway (left) lead to ditch erosion and sediment transport (middle and right).

Site 2-04: 36 Forest Hill Road (Meredith)

Location (latitude, longitude): 43.6534, -71.5359

Transport: Direct

Land use: Town Road

Observations: The road shoulder of Forest Hill Road is eroding, causing sediment to be transported into a cross-road culvert that forms an intermittent stream channel. The culvert inlet is lacking vegetation. The culvert outlet is perched with visible sediment deposition; stormwater exiting the culvert travels down a steeply sloped area toward the lake.

Recommendations: Stabilize the road shoulders, culvert inlet, and culvert outlet with vegetation and/or rip rap. Install a level spreader at the outlet to disperse and reduce the velocity of the culvert outflow.



Sediment transport to culvert inlet (left) with lack of buffer and sediment accumulation (middle). Culvert outlet is perched and sediment deposit is visible (right).

Site 2-05: Opposite Side of 36 Forest Hill Road (Meredith)

Location (latitude, longitude): 43.6539, -71.5360

Transport: Direct

Land use: Town Road

Observations: The check dams installed at the site have been washed out, causing a gully to form in the road ditch. Several additional rills on the road surface lead into the gully which has caused a buildup of sediment at the culvert inlet. The culvert outlet drains to a wetland in a vegetated channel. The outlet is not visible, so evidence of erosion or sediment deposition could not be determined.

Recommendations: Improve the check dams and ensure maintenance after storm events. Reshape the road ditch into a U-shape and armor it with rip rap. Consider installing a larger check dam near the culvert inlet or using a plunge pool to capture stormwater before it enters the culvert. In cases where a check dam may not be suitable, consider using a silt sock.



Washed out check dams caused gullies to form in ditch (left and middle) leading to sediment buildup at the culvert inlet (right).

Site 2-09: Seminole Ave Near Railroad (New Hampton)

Location (latitude, longitude): 43.6598, -71.5422

Transport: Direct

Land use: Private Road & Residential

Observations: Gullies run down the length of the road surface and along the road ditches, leading directly to a stream as concentrated flow. The road is poorly crowned. The double culverts are partially crushed at the outlet, have scour on the bank surrounding them, and lack an adequate riparian buffer. Both culverts are partially blocked by built-up debris. The stream has severe bank cutting on the downstream side.

Recommendations: Recrown the road or consider super-elevating it to direct all stormwater runoff to one side. Stabilize the ditches with vegetation or rip rap; check dams may be installed, if necessary, to reduce the velocity of water to the stream. Replace the culverts if they are at risk of collapse and regularly clear debris to prevent blockages. Stabilize the culvert inlet and outlets with rip rap and vegetate the road shoulder. Perform restoration on the eroding stream bank downstream.



Gullies on road surface and shoulder (top left and top right) lead to outlet of a double culvert (bottom left) and a stream that leads directly to the lake (bottom right).

Site 2-10: Railroad off Winona Shores Road (New Hampton)

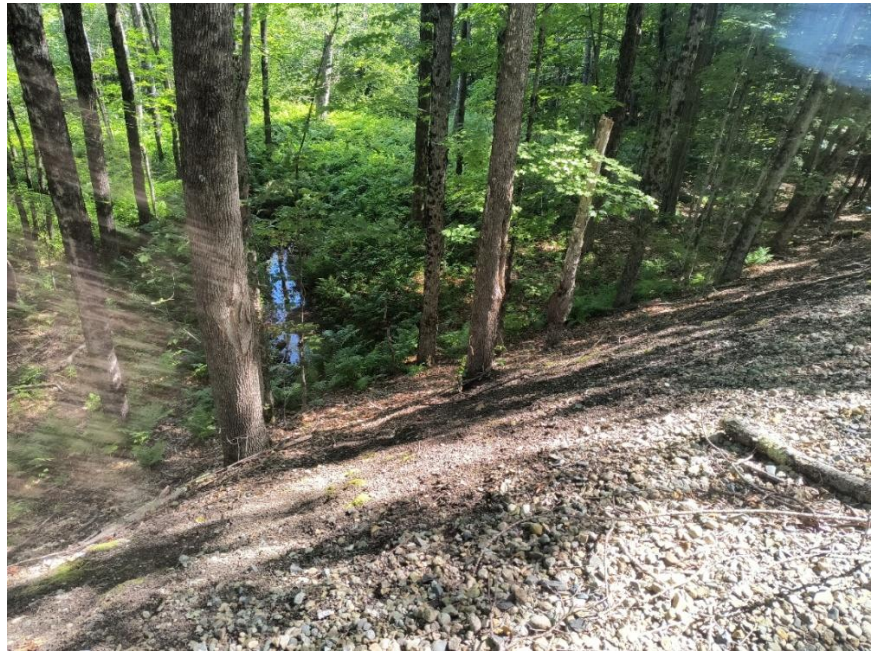
Location (latitude, longitude): 43.6656, -71.5576

Transport: Direct

Land use: Commercial & Town Property

Observations: In the original 2014 watershed survey, there was excessive sediment observed moving through the stream channel. In 2025, there were no obvious signs of erosion down to the stream crossing under the railroad. The stream is somewhat incised and has a sandy substrate, but it does not appear to be related to erosion. The slope from the railroad down to the stream is bare, sandy, and very steep.

Recommendations: Check the outlet point of this tributary to the lake to see if there are patterns of sediment deposition. If the forest hillslope is eroding, a larger stabilization project may be needed. The site impact is currently considered moderate due to proximity to a lake tributary. If patterns of sediment deposition are not observed at the tributary mouth over repeated visits, the site could be changed to low impact.



Sloped side of raised railroad leading down to a stream which travels under the railroad by a culvert (left and right).

Site 2-11: Bay View Beach (New Hampton)

Location (latitude, longitude): 43.6724, -71.5687

Transport: Direct

Land use: Residential & Private Road

Observations: The site appears to have changed since the original 2014 survey. Photos from the 2014 survey show that a stream cut through the property, leading down to the beach. In 2025, the stream channel did not appear to be in the same place and instead cuts through the forest. The area presumed to be the former stream channel is now a residential lawn. It is uncertain to what extent the site has changed over the past ten years. There are small piles of debris (soil) near the new stream channel. This site is private property within the Lake Winona watershed.

Recommendations: Engage homeowners to remove sediment piles from the site. Encourage homeowners to implement property-level stormwater management in the town of New Hampton. Engage with homeowners to determine whether the site has changed in the past ten years, especially regarding the stream channel.



Yard waste piles (left) alongside of mowed lawn that leads down to beach (right).

Site 2-12A and 2-12B: Winona Lake Outlet Canoe Launch (Center Harbor)

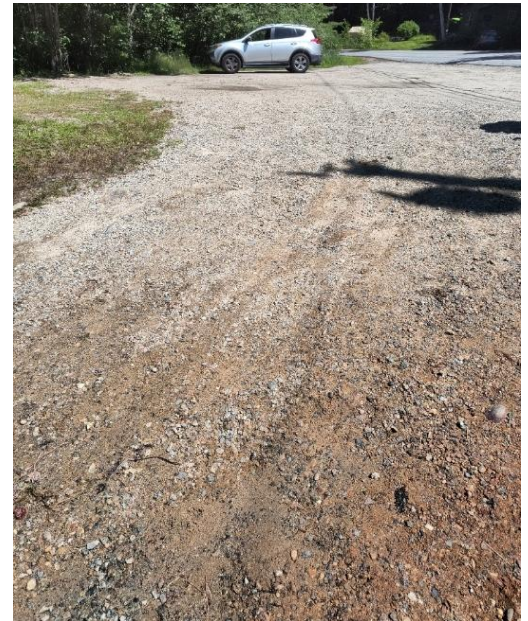
Location (latitude, longitude): 43.6715, -71.5615

Transport: Direct

Land use: State Property

Observations: There were few changes at the site since 2014, in which sediment was observed to wash into the lake via the boat ramp with some small gullies directly down the ramp. The parking lot appears to be a loose material that could be easily mobilized. The culvert under the road was noted as an issue in the 2014 survey, but that issue appears to be resolved.

Recommendations: Regrade the parking lot to divert water to small wetland at foot of parking area instead of boat ramp. If the size of the parking lot can be reduced at all, increase the width of the vegetated area by the wetland. If the launch area is only for small boats and kayaks, reduce the boat launch footprint and consider vegetating it or using interlocking pavers. Add more vegetation around the launch and/or cease mowing the grass. If mowing is necessary, keep to four inches minimum.



Boat launch (left) with slight gullying from parking lot (right).

Site 2-13A and 2-13B: Winona Road Bordering Winona Lake (Center Harbor)

Location (latitude, longitude): 43.6766, -71.5647

Transport: Direct

Land use: State Road

Observations: Winona Road is extremely close to Winona Lake and is constrained by a steep slope on the opposite side. There is severe shoreline/bank erosion and several large gullies leading down to the water. There is substantial sand built up along the lake shoreline (from erosion and/or stormwater runoff); this sand was observed to originate from watershed sources as there is a clear dividing line between the sand and the lake muck.

Recommendations: A larger engineering study may need to be conducted at the site to determine the appropriate recommendations for the entire road. Potential recommendations may include live stake plantings or rip rap to stabilize the shoreline, super-elevating the road to direct all runoff to the upslope side and installing cross-culverts or, with significant engineering and permitting, building the land out into the lake to support the road.



Eroding roadside down a steep bank (top left, top right, bottom left) leading to sediment deposition into Lake Winona (right).

Site 2-15: Lambert Road (Ashland)

Location (latitude, longitude): 43.6932, -71.5921

Transport: Direct

Land use: Town Road

Observations: Lambert Road is a long, unpaved road that has two large hills at either end. There is a stream crossing at the low point of the road, between the two hills. There are gullies along the length of each hill on each side of the road (four gullies total). There is no buffer directly around the culvert on either side, allowing sediment to be transported directly into the stream, which is the main tributary to Winona Lake.

Recommendations: Add check dams to the ditches on both sides of the road and turnouts into the meadow, which can be used to infiltrate stormwater before it reaches the stream.



Culvert at bottom of hills (left) and gullies along ditch (middle and right).

Site 2-16A: Hawkins Pond Parking Lot (Center Harbor)

Location (latitude, longitude): 43.6864, -71.5624

Transport: Direct

Land use: State Property

Observations: The sandy parking lot near Hawkins Pond leads straight to a boat ramp. There is a ditch along the edge of the parking lot that leads from site 2-16B down to the boat ramp. There is a sediment pile in the woods to the left of the boat ramp area.

Recommendations: Vegetate the ditch along the parking lot edge. Install check dams in this ditch if necessary to slow flow. Re-grass the full boat launch area and make the access narrower and more defined. Remove sediment piles in the woods.





Large sandy parking lot (top left) leading to boat ramp which has some erosion (top right and bottom right). A gully along parking lot (bottom left) leads to boat ramp (bottom middle).

Site 2-16B: Piper Hill Road at Hawkins Pond Parking Lot (Center Harbor)

Location (latitude, longitude): 43.6862, -71.5627

Transport: Limited

Land use: Town Road

Observations: Stormwater is forming a gully along the road shoulder of Piper Hill Road and leads to the parking lot near Hawkins Pond. Stormwater from this road creates gullies in the parking lot. Some flow appears to travel through the ditch on the side of the parking lot from site 2-16A.

Recommendations: Armor the road shoulder ditch with rip rap and add check dams to attenuate flow. Add turnouts into the woods, if possible.



Gully along edge of road (left) leading to more gullies in parking lot (right).

Site 2-18: Bear Pond Stream Crossing of Piper Road (Center Harbor)

Location (latitude, longitude): 43.6835, -71.5514

Transport: Direct

Land use: Town Road

Observations: An undersized culvert connects a roadside ditch to a wetland on Piper Road. Road shoulder erosion transports sediment to the wetland in concentrated flow paths. Road work may be planned as there was pink flagging tape and paint on the road.

Recommendations: Add curbing to the road to prevent stormwater from directly entering the water resource. Turnouts may also be installed to direct stormwater into the wooded area to infiltrate stormwater. Repave the eroding road surface. Remove excess sediment from the road and road shoulder.



Edge of road and wetland with lack of buffer (left). Eroding road shoulder with ample sediment buildup (right).

Site 2-19: Intersection of Piper Hill Road & Hawkins Pond Road (Center Harbor)

Location (latitude, longitude): 43.6859, -71.5628

Transport: Direct

Land use: Town Road

Observations: A gully has formed in the road ditch at the site, and sediment has built-up within each gully signaling that sediment is traveling down the road and into one of the catch basins. Sediment from the road intersection island transports to another catch basin. Winter sand likely also accumulates in this catch basin.

Recommendations: Vegetate the road shoulder and stabilize the ditch. Add check dams and turnouts to the woods if necessary/possible. Add a filter bag to the catch basin in the roadway. Remove sediment from catch basins and shoulder. Increase vegetation in the road intersection island and remove the sandy gravel. Evaluate if the entire impervious area is needed for car travel and consider replacing with a smaller right-angle tee intersection without an island and with much less asphalt surface area; remove excess impervious cover and replace it with vegetation where possible.



A gully full of sediment (left) leads to catch basin (middle). Road intersection island with catch basin in roadway (right).

Site 2-20: Hawkins Pond Outlet Stream Crossing (Center Harbor)

Location (latitude, longitude): 43.6861, -71.5631

Transport: Direct

Land use: Town Road

Observations: There is some sediment built up along the bridge at the outlet of Hawkins Pond that deposits directly into the stream during storms. There is also some road surface erosion at the site; crumbling asphalt and sediment enters the stream at this location.

Recommendations: Replace the road shoulder, which is composed of loose asphalt, with a more stable material and rip rap, if needed. Add curbing to the sides of the bridge to direct stormwater to vegetated areas on either side of the stream crossing.



Loose asphalt material on road shoulder with some small gullies (left and middle). Sediment buildup on bridge (right).

Site 2-21A & 2-21B: Winona Drive Hawkins Pond Stream Crossing (Center Harbor)

Location (latitude, longitude): 43.6819, -71.5675

Transport: Direct

Land use: State Road & Residential

Observations: This site has a large culvert that conducts the stream from Hawkins Pond into Winona Lake. On the upstream side, a gully runs down the shoulder of Hawkins Pond Road, through a mowed patch of grass, and down a steep slope to the upstream side of the stream crossing. Sand has accumulated in this mowed area, and the gully continues down the steep, bare slope, eroding the stream bank. It appears this mowed area may be an area where plow piles are left. At the outlet of the culvert, the bank is incising around the abutment. The house next to the downstream side has a paved swale along the road that directs stormwater straight to the stream. There is also a black pipe that leads from the neighboring house to the stream, between the culvert and Winona Lake.

Recommendations: Remove sand from gully and inlet area. Implement a rain garden or at least more vegetation to this corner area as well as above the culvert inlet. Stabilize the stream bank at the outlet and investigate the use of the private pipe. Replace the paved swale with an infiltration structure.



Sediment buildup at end of gully that transports to stream (left). Lack of vegetation at culvert inlet (middle). Paved swale on downstream side that directs stormwater to stream (right).

Site 2-24: Mayo Shore Campground Stream Crossing

Location (latitude, longitude): 43.6696, -71.5339

Transport: Direct

Land use: State Road & Commercial

Observations: The stream through the Mayo Shore Campground has minimal buffer. Stormwater has created a small gully on the side of the road that leads to the stream area.

Recommendations: Engage with the landowner to increase the buffer along the stream as much as possible. Add vegetation around both the inlet and outlet of the culvert.



Culvert inlet with lack of vegetation (left) and upstream with narrow buffer through campground (right).

NEW NONPOINT SOURCE SITES FROM THE 2025 SURVEY

Site 3-01: Lake Waukegan Boat Launch (Meredith)

Location (latitude, longitude): 43.6496, -71.5054

Transport: Direct

Land use: Town Road & Town Property

Observations: Polluted stormwater is entering the lake through the boat ramp; both the boat ramp and the adjacent park are eroding. Stormwater travels directly down the boat ramp from the north. There are signs in the park that a buffer was established as part of a past NHDES grant project, but the buffer has deteriorated and there is little vegetation in the park.

Recommendations: Consult an engineer to redesign the boat ramp. Divert runoff from the street into the park with a broad-based dip. Add a rain garden to the park to direct the stormwater into. Re-grass all other areas of the park. Potentially add storm drains to the road north of the boat ramp; directing stormwater to the park area is preferred to infiltrate stormwater. Revegetate the buffer along the shoreline of the park. Collaborate with the Meredith gardening club to maintain buffer and rain gardens.



Boat ramp (left) and adjacent park (right).

Site 3-02: Waukegan Street Kayak Launch (Meredith)

Location (latitude, longitude): 43.6483, -71.5057

Transport: Direct

Land use: Town Road & Town Property

Observations: This site appears to be used as a canoe/kayak launch. The bank surrounding the steps and bare soil is eroding.

Recommendations: Formalize the launch by adding wide, stable steps to discourage people from stepping on the bare ground; revegetate the bare areas. Add a slight curb to road to prevent stormwater from entering the lake from the road. Consider establishing a formal canoe launch at the site to prevent shoreline erosion.



Launch gate from road (left) and steps for launch to water (right).

Site 3-03: Sidewalk Above Waukegan Beach (Meredith)

Location (latitude, longitude): 43.6472, -71.5079

Transport: Direct

Land use: Town Road & Town Property

Observations: The sidewalk on Waukegan Street is collapsing; pavement is eroding down to the beach, and some sediment is accumulating along the wooden berm at the base of the fence. Four narrow gullies (one foot wide each) lead from the berm down to the beach.

Recommendations: Repave the sidewalk and regularly remove sediment from this area.



Eroding edge of sidewalk with sand accumulation and bare soils (left, middle, and right).

Site 3-04: Railroad Tracks South of Waukegan Beach (Meredith)

Location (latitude, longitude): 43.6466, -71.5085

Transport: Direct

Land use: Town Road & Town Property

Observations: Along this section of the railroad, there were four areas observed to have gaps in shoreline buffer. Some areas seem to be adequately stabilized with rip rap, but some are bare and potentially transporting sediment through them.

Recommendations: Restore the vegetated buffer in these gaps, if possible. Otherwise, maintain current conditions (prevent deterioration) or add additional rip rap to stabilize the shoreline. Live stake plantings may be used if establishing vegetation is difficult.



Breaks in the shoreline buffer are either bare (left) or stabilized by rip rap (right).

Site 3-05: Driveway of 98 Waukewan Street (Meredith)

Location (latitude, longitude): 43.6456, -71.5112

Transport: Direct

Land use: Town Road & Town Property

Observations: House #98 has an unpaved driveway that is actively eroding. Sediment is transported through a gully forming in the road ditch. Eroded sediment from the driveway builds up on the driveway of house #96. Stormwater from the site, which carries sediment and other pollutants, ultimately leads to a stream crossing.

Recommendations: Engage with the landowner to pave their driveway, add crushed stone to stabilize the surface, or use water bars to direct stormwater into the nearby wooded area. Armor the road ditch with crushed stone to repair the gully and add a turnout to the vegetated area near the stream down the road. Remove eroded sediment from the area.



Erosion of house #98 driveway (left) that travels down the road, gullying the ditch (middle) and erodes and deposits sediment on the driveway of house #96 (right).

Site 3-06: Road Ditch at 110 Waukegan Street (Meredith)

Location (latitude, longitude): 43.6454, -71.5140

Transport: Limited

Land use: Town Road & Town Property

Observations: The ditch in this area is scraped yearly, exposing bare sediment. This ditch has a very steep backslope that makes it more susceptible to erosion. Both the road shoulder and the backslope are eroding.

Recommendations: Discontinue ditch scraping practices. Reshape the ditch into a U-shape and stabilize the steep backslope with rip rap. It may not be possible to flatten the backslope at the site due to the neighboring properties. Armor the ditch with rip rap or coir logs.



The road ditches are scraped annually (left) causing erosion in the ditch and the backslope (right).

Site 3-07A and 3-07B: Pollard Shores Road (Meredith)

Location (latitude, longitude): 43.6458, -71.5149

Transport: Limited

Land use: Town Road

Observations: A gully starts on the driveway of 2 Pollard Shores Road and continues down the road for about 230 feet to the railroad crossing, widening as it approaches the railroad, then leads to a culvert. Stormwater passing through the culvert discharges to a wetland along the railroad. There is a similar gully on the opposite side of the road (site B).

Recommendations: Armor the ditch with rip rap and vegetate the road shoulder. Install check dams and turnouts to divert stormwater into the wooded area to slow and disperse flow.



Gully beginning on the driveway of 2 Pollard Shores Road (left) and continuing down the road (middle and right).

Site 3-08: Winona Shores Road & Indian Trail Intersection #1 (Meredith)

Location (latitude, longitude): 43.6584, -71.5337

Transport: Limited

Land use: Town Road

Observations: The ditch at this site is heavily eroded and the road shoulder is completely bare. There has been substantial sediment transport downhill due to the lack of vegetation. Given the proximity, the disturbance may be associated with power line maintenance.

Recommendations: Revegetate the road shoulder. Stabilize with rip rap if needed. Ensure all areas that are disturbed due to maintenance are revegetated, and that temporary erosion and sediment control practices are used during construction.



Scouring on road shoulder (left) leads to a large, disturbed area with sediment built up (right).

Site 3-09: Winona Shores Road & Indian Trail Intersection #2 (Meredith)

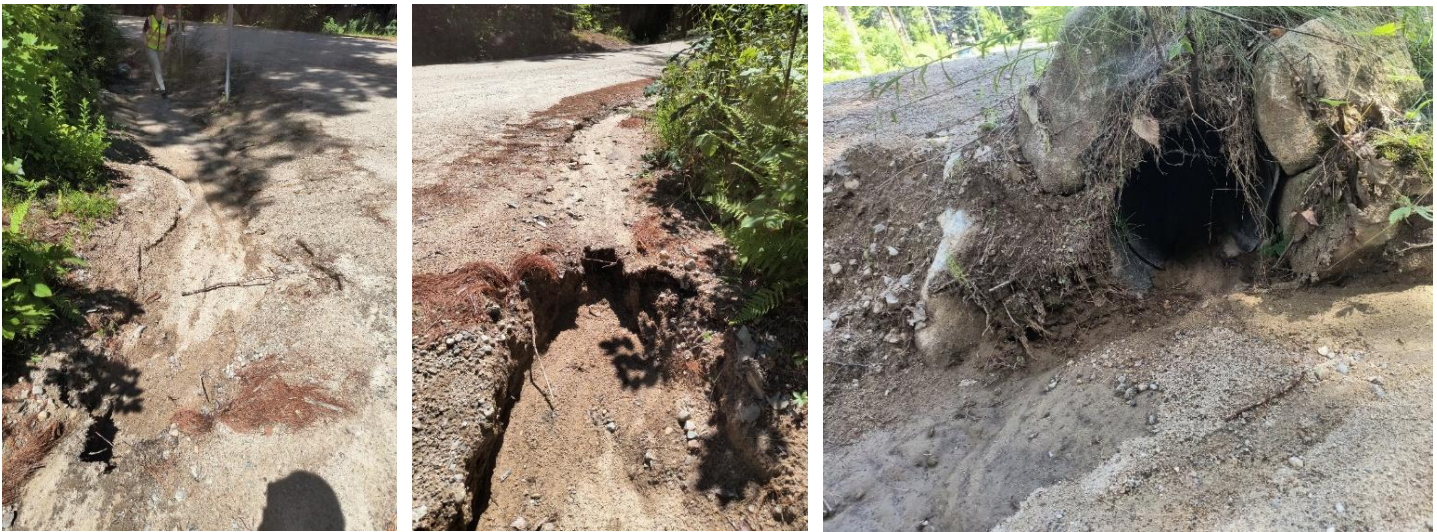
Location (latitude, longitude): 43.6584, -71.5341

Transport: Limited

Land use: Town Road

Observations: Stormwater directed to the road shoulder on Winona Shores Road has formed a large gully, leading to sediment deposition at a culvert.

Recommendations: Stabilize the road shoulder with rip rap and add check dams with turnouts to the wooded area to disperse stormwater flow. Ensure the ditch is U-shaped.



Gully along ditch (left) leads to heavier erosion (middle) and transports sediment down through a culvert (right).

Site 3-10: Vittner Beach (New Hampton)

Location (latitude, longitude): 43.6603, -71.5350

Transport: Direct

Land use: Private Road & Private

Observations: Vittner Beach is a water access point for residents of the surrounding roads. It appears that plow piles are pushed here in the winter, as evidenced by the large sediment piles. There is no buffer between these piles and the lake. This site also has a boat launch (which appears stable) and a large parking area (which has loose surface material). The whole area is unpaved.

Recommendations: Remove sediment piles annually and improve the vegetated buffer. Consider using a new location far from the lake, tributaries, or wetlands for plow piles or installing a berm between plow piles and the lake to prevent direct sediment transport from the piles into the lake. Remove or reduce the footprint of shoreline access points (other than the boat ramp).



Sediment piles apparently from plowing at the south end of the water access area (left) with direct transport to the water (middle). The boat ramp at north side of area appears to be stable (right).

Site 3-11: Road by Vittner Beach (New Hampton)

Location (latitude, longitude): 43.6604, -71.5349

Transport: Limited

Land use: Private Road

Observations: There is a large pool of water in the road by the boat ramp and Vittner Beach that formed due to road surface erosion. There is another similar pool about 50-100 feet further down road.

Recommendations: Regrade and crown the road. Add crushed stone if necessary to better stabilize the surface.



A large pool in road (left) and rills in the road surface (middle) lead to the boat ramp (right).

Site 3-12: Waukegan Road Near Waukegan Golf Club (Center Harbor)

Location (latitude, longitude): 43.6825, -71.5226

Transport: Direct

Land use: State Road

Observations: The road ditch on Waukegan Road is deeply incised, with a gully in the road shoulder and crumbling asphalt leading south down the road and likely eventually reaching the large wetland to the north of Lake Waukegan. Some rip rap is present onsite but does not appear to be maintained and has filled with sediment. Further down the road, the ditch is vegetated and the gully stops.

Recommendations: Vegetate the ditch, if possible, to slow flow and stabilize the ditch; this may require removing coarse road shoulder material. Otherwise, stabilize the ditch with rip rap and check dams and ensure the ditch is U-shaped. Consider super-elevating the road to direct runoff to the opposite side which is a meadow/mowed area.



A gully has formed in the road shoulder (left), which is filled with sediment (right).

Site 3-13: Wood Ridge Road Near Waukegan Golf Club (Center Harbor)

Location (latitude, longitude): 43.6834, -71.5236

Transport: Limited

Land use: Town Road & Commercial

Observations: There is a gully along the road shoulder next to the golf course, which transports sediment across the intersection at the bottom of Wood Ridge Road. This stormwater likely flows to site 3-12.

Recommendations: Engage with the golf club about adding vegetation along the roadside to help slow and infiltrate runoff.



Roadside erosion (left) that becomes wider further down the road (middle) and deposits sediment at the intersection (right).

Site 3-14: Wood Ridge Circle (Center Harbor)

Location (latitude, longitude): 43.6860, -71.5299

Transport: Limited

Land use: Town Road

Observations: There is erosion in the road surface of Wood Ridge Circle and in the road ditch around the middle island. Stormwater appears to concentrate here, leading to gullies in the middle island and downhill at site 3-13.

Recommendations: Vegetate the road shoulders in the whole area. Direct as much stormwater as possible to the middle island and increase vegetation to create a rain garden or engineered swale. Repave eroded road surface. Add check dams and turnouts along ditch further down the road to slow and dissipate flow.



Erosion in the road ditch of the island (left). Road surface erosion (right).

Site 3-15: Railroad Crossing on Winona Road (New Hampton)

Location (latitude, longitude): 43.6658, -71.5577

Transport: Direct

Land use: State Road

Observations: Runoff washes down Winona Road, through a loose, crumbling parking area, and creates a gully down to a clogged catch basin. The steep railroad bank consists of very loose material that also erodes into the catch basin. The catch basin across the street is clogged as well. These catch basins likely outfall directly to a nearby stream or the lake itself.

Recommendations: Stabilize the parking area and consider paving if it is used frequently. Repair the gully by regrading the road shoulder and stabilizing it with vegetation or rip rap if needed. Clean out the catch basins and stabilize the railroad bank with rip rap.



Loose asphalt parking area (left) uphill of a gully (middle) that leads to a clogged catch basin by the railroad bank (right).

Site 3-16: Winona Road Parking Area #1 (New Hampton)

Location (latitude, longitude): 43.6660, -71.5581

Transport: Limited

Land use: State Road

Observations: There is a gully in the parking area that leads down to the stream. The gully is filled with gravel displaced from the parking area, which has loose surface material. There are sediment piles, potentially from plowing, at the edge of the parking area and across the road in the ditch. Some yard waste is dumped near the stream as well. This stream flows to the Snake River.

Recommendations: Divert stormwater from under the railroad bridge to the side of the road opposite the stream using a rubber razor or broad-based dip. Utilize the vegetated swale on the opposite side of the road for stormwater storage and infiltration. Fill in the gully with vegetation to deter stormwater from concentrating here. If water access is required, consider creating a formal water access point with stable infiltration steps. Remove sediment piles on both sides of road and ensure plow piles are removed each spring. Ensure yard waste, which is a source of nutrients to the lake, is not placed near the stream.



Gully to stream (left) from parking area and railroad crossing (middle). Sediment pile in vegetated swale across street (right).

Site 3-17: Winona Road Parking Area #2 (New Hampton)

Location (latitude, longitude): 43.6664, -71.5584

Transport: Limited

Land use: State Road

Observations: The culvert inlet is partially blocked by vegetation. This culvert drains the area where it is suggested to divert water to in site 3-16.

Recommendations: Clean out the culvert and assess if it is appropriately sized. Confirm good condition at the culvert outlet.



Partially clogged culvert (left) that drains vegetated swale (right).

Site 3-21: Winona Road Culvert (Center Harbor)

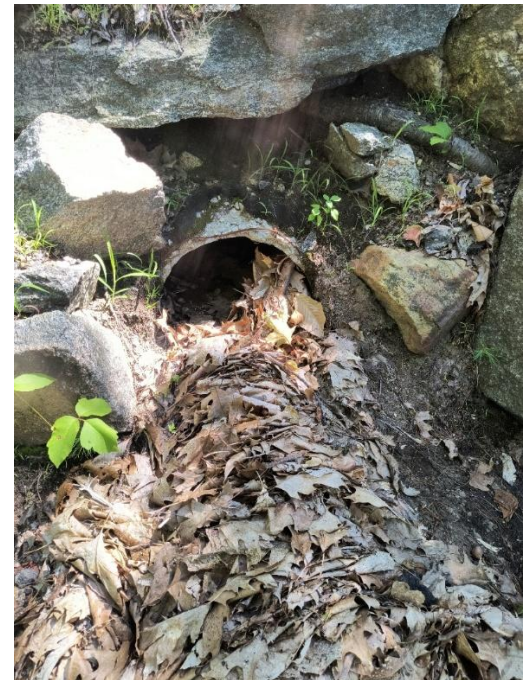
Location (latitude, longitude): 43.6768, -71.5647

Transport: Limited

Land use: State Road

Observations: This site is next to site 2-13A. There is road ditch erosion; the ditch transports sediment through a culvert with an unstable inlet and outlet. There is a silt fence below the outlet of the culvert which is full of sediment and appears to be ineffective.

Recommendations: Stabilize the culvert and potentially replace it, if needed. Clean out the silt fence and ensure it is regularly maintained to keep sediment from entering the lake. Stabilize the surrounding ditches with vegetation or rip rap if needed.



Eroded culvert inlet and road shoulder (left) transporting sediment and organic material through to the outlet and lake (right).

Site 3-23: Parking Pull Off on Winona Road (Center Harbor)

Location (latitude, longitude): 43.6874, -71.5725

Transport: Limited

Land use: State Road

Observations: This is a small, unpaved parking pull off area with a steep drop-off from the road. There is erosion in the parking area and on the road shoulder. Eroded sediment enters a steep wooded area.

Recommendations: Remove the parking area if it is unused and fill it in with vegetation. If it is used, stabilize the area preferably with crushed stone or, if necessary, with pavement.



Eroding road shoulder and parking area (left and right).

Site 3-24: Winona Road & Hawkins Pond Road Intersection (Center Harbor)

Location (latitude, longitude): 43.6814, -71.5671

Transport: Limited

Land use: Town Road & State Road

Observations: A gully runs down the south side of Hawkins Pond Road to an eroding paved swale which leads to a culvert. The bank above the shoulder is eroding at some points. The culvert outlets to a meadow area on the west side of the road, next to Winona Lake.

Recommendations: Armor the ditch with vegetation and rip rap if needed. Remove the paved swale as it accelerates and heats stormwater. Vegetate the eroding bank above the road shoulder. Stabilize the culvert inlet.



Eroding road shoulder (left) which leads to a paved swale and culvert (right).

Site 3-25: South of Winona Road & Hawkins Pond Road Intersection (Center Harbor)

Location (latitude, longitude): 43.6813, -71.5672

Transport: Limited

Land use: State Road

Observations: There is a gully in the road ditch that leads to the culvert in site 3-24, from the opposite direction (from the south).

Recommendations: Armor the ditch with vegetation and rip rap, if needed. Vegetate the eroding bank above the road shoulder.



Erosion of ditch and bank with evidence of sediment transport.

Site 3-26: Fire Truck Pull Off at Hawkins Pond Dam (Center Harbor)

Location (latitude, longitude): 43.6864, -71.5631

Transport: Direct

Land use: State Property

Observations: This site appears to be an area where fire trucks pull into for extracting water from Hawkins Pond. There is no shoreline buffer around this pull off area, and the parking area consists of loose sediment which can directly enter the lake. There were waterfowl congregating here during the survey.

Recommendations: Reduce the size of the parking area as much as possible while still maintaining use. Improve the shoreline buffer. Consider clearly defining the boundaries of the parking area using wooden water bars, which also serve as an erosion control measure.



Parking area with no buffer to pond (left and right).

Site 3-27: Piper Hill Road by Hawkins Pond Wetland (Center Harbor)

Location (latitude, longitude): 43.6833, -71.5588

Transport: Limited

Land use: Town Road

Observations: There are multiple gullies along the wide, sandy road shoulder on Piper Hill Road. Stormwater at the site carries pollutants to a wooded area, opposite the wetland that abuts Hawkins Pond. The road condition is poor and likely needs to be repaved; flagging along the road indicates that this work may already be planned.

Recommendations: Repave the road and super-elevate it so drainage is directed toward the forested area instead of the wetland. Stabilize the road shoulder with vegetation.



Road shoulder erosion and sediment deposition on Piper Hill Road (left and right).

Site 3-28: Piper Hill Road by MacDonald Excavation (Center Harbor)

Location (latitude, longitude): 43.6833, -71.5431

Transport: Limited

Land use: Town Road

Observations: A nearly 300-foot gully runs through the road shoulder of Piper Hill Road. Stormwater from the road drains through several individual gullies before forming a formal ditch. The bottom of the ditch is very deeply incised. The road shoulder material is too soft and erodible, which allows the gullies to form.

Recommendations: Stabilize the shoulder and ditch with more suitable roadside material that is less loose. Consider digging a wider road ditch that is armored with vegetation and check dams.



Stormwater forms a gully along the road shoulder that deepens (left and middle) until it travels into the road ditch through several gullies (right).

Site 3-29: Bonney Shores Road & Ledgewood Drive Intersection (Meredith)

Location (latitude, longitude): 43.6600, -71.5086

Transport: Limited

Land use: Town Road & Private Road

Observations: There is an approximately 200-foot-long gully down the north side of Bonney Shores Road. The gully is deeply incised at some points with exposed bedrock. Eroded sediment washes out to a culvert. The culvert outfalls to the forested area; no stream channel was identified at the culvert outlet and minimal impact to water quality was determined.

Recommendations: Remove accumulated sediment and vegetate the road shoulder. Improve the buffer around the culvert. Add rubber razors or super-elevate the road to drain stormwater to the other side of the road into the wooded area.



Gully along roadside (left and middle) that drains to culvert (right).

Site 3-30: Bonney Shores Road & Beth Lane Intersection (Meredith)

Location (latitude, longitude): 43.6623, -71.5124

Transport: Limited

Land use: Town Road & Private Road

Observations: There is moderate erosion on Bonney Shore Road, forming a gully in the road shoulder that is filling with sediment. There are multiple turnouts to divert stormwater into the forested area. Plunge pools were installed at the end of each turnout to capture and filter out sediment. The final turnout creates a small channel in the forested area.

Recommendations: Regularly inspect and maintain the beneficial stormwater turnouts and plunge pools that have been installed. To further improve the site, add level spreaders at the end of plunge pool areas to disperse flow into the woods and prevent channels from forming. Add vegetation downhill of the level spreader to encourage stormwater filtration. Install check dams along the ditch if needed to slow flow.



Gully along roadside with sediment transport (left) that is turned out to a plunge pool (middle) and continues as concentrated flow into the woods (right).

Site 4-01: Fortier Street (Meredith)

Location (latitude, longitude): 43.6453, -71.5129

Transport: Direct

Land use: Town Road

Observations: Stormwater from Fortier Street drains to Monkey Pond. The Meredith Public Works Department recently repaved Fortier Street and improved stormwater management by installing seven catch basins. Fortier Street is steeply sloped, and there used to be severe erosion on the road into road ditches, which have been replaced with curbing. Stormwater from the bottom of Fortier Street and Waukewan Street flows through a paved drainage swale which enters a cross culvert into Monkey Pond.

Recommendations: Major stormwater improvements were recently made at the site. Additional improvements could include the addition of green stormwater infrastructure, such as planter bump-outs along the curb to treat and infiltrate stormwater. Other engineered options may be available, especially toward the bottom of the road where the paved swale is located. While providing a stable surface that resists erosion, paved swales accelerate stormwater, carrying pollutants downstream and increasing water temperature.

Site 4-03: Birch Hill Road (Meredith)

Location (latitude, longitude): 43.6436, -71.5169

Transport: Limited

Land use: Town Road

Observations: The road ditch on Birch Hill Road is eroding, with a large gully running from the ditch into the forested area. The ditch is wide, filled with sand, and has ample space for improvements. Birch Hill Road is only paved at its most downhill section; the rest of the road is unpaved

Recommendations: Install a U-shaped, vegetated swale at the site to infiltrate and filter pollutants. Add a check dam at the end of the ditch, where it outlets to the forest, to filter sediment and slow stormwater movement.



A gully in the road ditch (left) leads to an intersection (middle) and outlets into the woods (right).

Site 4-04: Piper Lane (Meredith)

Location (latitude, longitude): 43.6446, -71.5157

Transport: Limited

Land use: Town Road

Observations: Road ditches on Piper Lane are mostly vegetated but filled with invasive plants. One of the road ditches has a drainpipe which potentially comes from one of the uphill ditches, though there was too much vegetation to confirm; the drain was filled with sediment. The ditch is eroding.

Recommendations: Install check dams to slow flow and mitigate ditch erosion. Investigate the source of the pipe.



Pipe draining from unknown source (left). Erosion on road shoulder in ditch (right).

Site 4-07: Ocean State Job Lot (Meredith)

Location (latitude, longitude): 43.6419, -71.5120

Transport: Direct

Land use: Commercial

Observations: There is a large and apparently unused section of parking lot with an unmaintained appearance. All surface runoff is directed to a large plunge pool (through multiple catch basins) which then continues in concentrated flow through the woods to another culvert, forming a stream. There is also stormwater that pools in the road shoulder by the culvert outlet.

Recommendations: Remove unused pavement and install green stormwater infrastructure in the parking lot, such as stormwater planters, rain gardens, and tree boxes. Design work may require engineering. Refer to the [2025 New Hampshire Stormwater Manual](#) for concepts.



Large, unused parking lot (left). Used portion of parking lot with lack of green stormwater infrastructure (right).

Site 4-08: Footlight Circle (Meredith)

Location (latitude, longitude): 43.6373, -71.5076

Transport: Direct

Land use: Commercial

Observations: Stormwater from the parking lot drains to a vegetated ditch which enters a culvert and forms a headwater stream. A second pipe also appears to connect to the ditch, though the origin of the pipe is unknown,

Recommendations: Create a bio retention area/rain garden and plant wetland species. A check dam may also be installed uphill of the culvert to detain stormwater in the vegetated area and allow it to infiltrate.



Stormwater from uphill enters the vegetated area (left). Another pipe of unknown origin leads to the ditch.

Site 4-09: Med Urgent Care at Traffic Circle (Meredith)

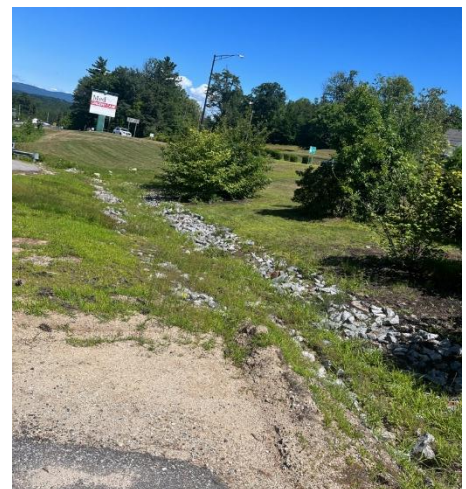
Location (latitude, longitude): 43.6405, -71.5001

Transport: Direct

Land use: Commercial

Observations: Stormwater enters the site through a concrete culvert and travels down the hillside, eroding the hill slope until it reaches a rip rapped area. From this area, stormwater enters catch basins at the hospital and travels down Reservoir Road, which leads to the lake. The town maintains this lawn.

Recommendations: Implement green stormwater infrastructure in this area, such as a rain garden or a detention swale. Stabilize eroded areas and vegetate all mowed areas, assuming they are not used for recreational or other purposes.



Large lawn area with erosion and sparsely placed rip rap (left, middle, and right).

Site 4-10: Parade Road Near Tracy Way (Meredith)

Location (latitude, longitude): 43.6330, -71.5011

Transport: Limited

Land use: State Road & Residential

Observations: The culvert under a driveway on Parade Road is clogged with sediment and trash. Sediment has accumulated downstream of the culvert, but the road shoulder there is extremely vegetated which likely filters pollutants.

Recommendations: Remove sediment and trash from the culvert. Reshape the ditch and repair the roadside erosion by adding vegetation.



Sediment deposition in the road ditch and on a driveway (left) clogs the culvert under the driveway, along with trash (right).

Site 4-12: Lower Ladd Hill Road Near Daniel Webster Highway (Meredith)

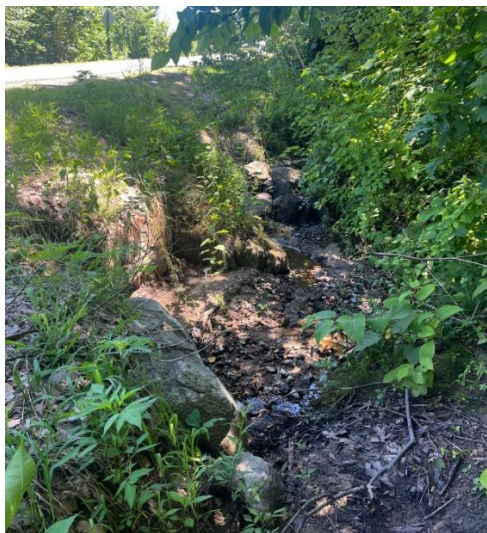
Location (latitude, longitude): 43.6478, -71.5007

Transport: Limited

Land use: Town Road

Observations: Stormwater from the Hillrise Lane road ditch leads to a stream at the corner of Lower Ladd Hill Road and Daniel Webster Highway. A culvert under a nearby driveway is completely clogged with sediment.

Recommendations: Vegetate the ditch to attenuate flow and install check dams or rip rap if needed. Unclog the culvert.



Bank cutting of ditch (left) leads to sediment buildup in stream (middle) and clogged culverts (right).

Site 4-13: West View Drive (Meredith)

Location (latitude, longitude): 43.6464, -71.5030

Transport: Limited

Land use: Town Road & Residential

Observations: This short road is lined by paved swales, likely because this area is pitched towards the homes which puts them at risk of flooding. The end of the north side of the road has a catch basin which outlets at a culvert across the street. The south side outlets into a highly vegetated area where stormwater is likely treated.

Recommendations: For the outlet on the north side of the road, route the catch basin into the vegetative area where it will be treated, or install a plunge pool to capture and filter sediment on the property. Another option is to divert stormwater into a rain garden on the property that would need to be created and maintained by the homeowner. The location of BMPs should be scrupulously planned to avoid flooding septic system leachfields.



Paved swales lining the road (left and middle) and sediment has accumulated on the road shoulder (right).

Site 4-14: Massachusetts Avenue Catch Basin #1 (Meredith)

Location (latitude, longitude): 43.6477, -71.5025

Transport: Direct

Land use: Town Road & Residential

Observations: A culvert is completely blocked with leaves. Water comes from a stream that cuts through the woods from Hillrise Lane down to the culvert. The stream crosses the road and leads to Lake Waukegan. There is not a very well-defined stream channel, and only minor erosion around the culvert inlet and outlet. The outlet is mostly vegetated.

Recommendations: Unblock the culvert.



Blocked culvert (left and right).

Site 4-15: Massachusetts Avenue Catch Basin #2 (Meredith)

Location (latitude, longitude): 43.6482, -71.5017

Transport: Direct

Land use: Town Road

Observations: This catch basin is in the middle of pavement and collects untreated stormwater, discharging it to form a headwater stream which leads down to the lake. It appears that the surrounding catch basins drain to the same outlet.

Recommendations: Consider options to treat stormwater before discharging to the lake. This may include retrofitting the catch basin with a filter system, or removing or relocating the catch basin and directing stormwater to a vegetated area that has an overflow drainage feature. Consult an engineer for more options.



Catch basin in the middle of pavement (left) and the stream to which it discharges (right).

Site 4-16: Lower Ladd Hill and Massachusetts Avenue Intersection (Meredith)

Location (latitude, longitude): 43.6483, -71.5011

Transport: Direct

Land use: Town Road

Observations: Untreated stormwater from Lower Ladd Hill Road enters catch basins in the middle of pavement, which ultimately discharge to the lake. At the last catch basin, it seems the stormwater skips over the grate and erodes the road shoulder, forming a gully that spans 135 feet before reaching the next catch basin.

Recommendations: Direct stormwater to the open grassy areas on the road to capture, filter, and treat it before it enters the catch basins. Implement rain gardens or bioinfiltration basins in these areas, working with landowners as needed. Create a vegetated ditch in the area where stormwater skips over the catch basin. Consider removing this catch basin if it cannot capture stormwater, transforming the whole road shoulder into a vegetated swale.



Catch basins on the street (top left, middle, and right) and erosion gullies on road shoulder (bottom left and right).

DELISTED NONPOINT SOURCE SITES FROM THE 2014 SURVEY

Site 1-03B: 88 Pike Island Road #1

Location (latitude, longitude): 43.6587, -71.5133 Land use: Town Road & Residential

Observations: The driveway near here does not appear to be eroding anymore.

Site 1-03C: 84 Pike Island Road #2

Location (latitude, longitude): 43.6587, -71.5133 Land use: Town Road & Residential

Observations: The driveway here does not appear to be eroding anymore.

Site 1-08A: Waukegan Swimming Bath House Parking Lot

Location (latitude, longitude): 43.6470, -71.5079 Land use: Town Road

Observations: Although there is some sand in the parking lot (likely from beach recreation), runoff is diverted to a rain garden.

Site 1-08C: Railroad Tracks Behind Beach Bath House

Location (latitude, longitude): 43.6471, -71.5077 Land use: Town Road

Observations: The ditch is well vegetated with wetland plants. There are no signs of erosion.

Site 1-09B: Culvert West of Site 1-09A

Location (latitude, longitude): 43.6466, -71.5081 Land use: Town Road

Observations: Although there is some shoulder erosion on the non-lake side of the road, it is not impacting water quality, and the lake side is well vegetated. Stormwater drains to the woods near the railroad.

Site 1-10A: Waukegan Street next to Carder Lane

Location (latitude, longitude): 43.6458, -71.5105 Land use: Town Road

Observations: In 2014, this site was observed to have no vegetation on the road shoulder likely due to the survey being completed in April. There is adequate vegetation now.

Site 1-13: Wall Street Culvert

Location (latitude, longitude): 43.6481, -71.5255 Land use: Town Road

Observations: The culvert appears to be an adequate size (~48") and leads to an intermittent stream channel. There is no erosion observed.

Site 1-16: Wall Street #2

Location (latitude, longitude): 43.6462, -71.5217 Land use: Town Road

Observations: The site has enough vegetation and there is no scour.

Site 1-20: Right Branch of Sawmill Shores

Location (latitude, longitude): 43.6640, -71.5168 Land use: Town Road

Considering this road goes directly through the wetland, there is as much vegetation as possible already. The road could be raised if regular flooding is an issue.

Site 2-03A: 28 Forest Hill Road Driveway

Location (latitude, longitude): 43.6530, -71.5355 Land use: Residential

Observations: In 2014, this driveway was eroding. It has since been paved and is no longer an issue.

Site 2-06: Indian Trail Road & Chapman Point Intersection

Location (latitude, longitude): 43.6590, -71.5353 Land use: Town Road

Observations: The road appears to have been rebuilt since the 2014 survey as it is now in decent condition with good crowning. There are minor gullies on the surface which lead to ditches that turn into woods, but they are not impacting water quality.

Site 2-07: Winona Shores Road

Location (latitude, longitude): 43.6546, -71.5325 Land use: Town Road

Observations: In 2014, ditch erosion was observed, but now there are no signs of erosion and grass has grown in.

Site 2-08: Winona Shores Road Near Pickett Fence Road

Location (latitude, longitude): 43.6546, -71.5325 Land use: Town Road

Observations: In 2014, severe ditch erosion was observed, but now the shoulder is well vegetated and there is no significant ditch erosion.

Site 2-14: Winona Drive Road Shoulder

Location (latitude, longitude): 43.6875, -71.5726 Land use: Town Road

Observations: there is still some shoulder erosion at this site, but it is discharging into vegetated area, so it is not impacting water quality.

Site 2-17: Culvert at Waukegan Road & Winona Road Intersection

Location (latitude, longitude): 43.6571, -71.5521 Land use: Town Road

Observations: There is adequate vegetation along the culvert bank.

Site 2-22: Snake River Inlet Stream Crossing

Location (latitude, longitude): 43.6653, -71.5455 Land use: Town Road

Observations: There are no major gullies or unstable stream banks at the site anymore and it is well vegetated.

Site 2-23: Waukegan Road

Location (latitude, longitude): 43.6680, -71.5365 Land use: Town Road

Observations: There is adequate vegetation along the road shoulder.

BMP MATRIX

Table 1. Site ID, location description, water quality impact, estimated load reduction, and implementation costs for the 77 nonpoint source sites identified in the Lake Waukegan and Lake Winona watersheds. 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 1-77 based on environmental, social, and economic factors. Scoring criteria were developed for the Lake Waukegan and Lake Winona watershed survey and are presented in Appendix A.

Site ID	Location	Town	Transport	Feasibility	TP (kg/yr)	TN (kg/yr)	TSS (metric tons/yr)	Low Cost Est.	High Cost Est.	Avg. Cost Est.	Avg. Cost per kg-P	Score	Rank
3-01	Lake Waukegan Boat Launch	Meredith	DIRECT	HIGH	0.8	4.1	0.2	\$40,000	\$70,000	\$55,000	\$71,760	12	1
2-05	Opposite Side of 36 Forest Hill Road	Meredith	DIRECT	HIGH	1.4	3.7	5.5	\$15,000	\$20,000	\$17,500	\$12,289	11	2
3-08	Winona Shores Road & Indian Trail Intersection #1	Meredith	LIMITED	HIGH	1.3	3.5	5.1	\$10,000	\$15,000	\$12,500	\$9,375	10	3
2-02	Robin Way	Meredith	LIMITED	HIGH	1.8	4.5	6.8	\$30,000	\$60,000	\$45,000	\$25,313	10	4
2-15	Lambert Road	Ashland	DIRECT	HIGH	0.5	1.3	1.9	\$10,000	\$20,000	\$15,000	\$30,068	10	5
3-07	Pollard Shores Road	Meredith	LIMITED	HIGH	0.6	1.4	2.1	\$15,000	\$20,000	\$17,500	\$31,372	9	6
2-19	Intersection of Piper Hill Road & Hawkins Pond Road	Center Harbor	DIRECT	HIGH	0.4	1.1	1.5	\$15,000	\$30,000	\$22,500	\$51,680	9	7
4-09	Med Urgent Care at Traffic Circle	Meredith	DIRECT	LOW	1.1	5.9	0.6	\$40,000	\$80,000	\$60,000	\$53,133	9	8
1-08B	Corner of Railroad Tracks and Waukegan Street	Meredith	DIRECT	HIGH	0.1	0.4	0.5	\$5,000	\$10,000	\$7,500	\$55,125	9	9
2-24	Mayo Shore Campground Stream Crossing	Center Harbor	DIRECT	MEDIUM	0.5	2.7	0.2	\$20,000	\$40,000	\$30,000	\$60,136	9	10
3-04	Railroad Tracks South of Waukegan Beach	Meredith	DIRECT	HIGH	0.0	0.2	0.0	\$1,000	\$5,000	\$3,000	\$66,150	9	11
1-23	Bonney Shore Road	Meredith	DIRECT	HIGH	0.1	0.3	0.3	\$5,000	\$15,000	\$10,000	\$76,563	9	12
4-07	Ocean State Job Lot	Meredith	DIRECT	LOW	2.2	12.2	0.8	\$100,000	\$300,000	\$200,000	\$89,634	9	13
1-24A	Upstream Side of Stream Crossing on Waukegan Street	Meredith	DIRECT	HIGH	0.1	0.2	0.2	\$5,000	\$15,000	\$10,000	\$91,875	9	14
1-09C	Waukegan Street, West of Site 1-09B	Meredith	LIMITED	HIGH	0.1	0.5	0.1	\$1,000	\$2,000	\$1,500	\$12,721	8	15
3-10	Vittner Beach	New Hampton	DIRECT	LOW	0.1	0.5	0.0	\$1,000	\$5,000	\$3,000	\$30,068	8	16
4-03	Birch Hill Road	Meredith	LIMITED	HIGH	0.3	0.8	1.1	\$15,000	\$20,000	\$17,500	\$59,365	8	17
2-12	Winona Lake Outlet Canoe Launch	Center Harbor	DIRECT	MEDIUM	0.2	0.5	0.6	\$10,000	\$15,000	\$12,500	\$59,918	8	18

Site ID	Location	Town	Transport	Feasibility	TP (kg/yr)	TN (kg/yr)	TSS (metric tons/yr)	Low Cost Est.	High Cost Est.	Avg. Cost Est.	Avg. Cost per kg-P	Score	Rank
3-09	Winona Shores Road & Indian Trail Intersection #2	Meredith	LIMITED	HIGH	0.3	0.7	1.1	\$10,000	\$25,000	\$17,500	\$62,238	8	19
3-14	Wood Ridge Circle	Center Harbor	LIMITED	HIGH	0.3	0.9	1.3	\$15,000	\$30,000	\$22,500	\$67,962	8	20
4-04	Piper Lane	Meredith	LIMITED	HIGH	0.1	0.3	0.4	\$5,000	\$10,000	\$7,500	\$68,906	8	21
1-06	Waukegan Street Near Railroad	Meredith	LIMITED	HIGH	0.0	0.0	0.0	\$1,000	\$2,000	\$1,500	\$75,000	8	22
2-03B	28 Forest Hill Road	Meredith	LIMITED	MEDIUM	0.6	1.6	2.4	\$30,000	\$65,000	\$47,500	\$76,451	8	23
3-12	Waukegan Road Near Waukegan Golf Club	Center Harbor	DIRECT	MEDIUM	0.4	1.0	1.5	\$20,000	\$40,000	\$30,000	\$77,824	8	24
1-12	Wall Street and Waukegan Street Intersection	Meredith	DIRECT	MEDIUM	0.0	0.1	0.0	\$1,000	\$5,000	\$3,000	\$82,688	8	25
2-16B	Piper Hill Road at Hawkins Pond Parking Lot	Center Harbor	LIMITED	HIGH	0.2	0.5	0.7	\$10,000	\$20,000	\$15,000	\$82,688	8	26
2-16A	Hawkins Pond Parking Lot	Center Harbor	DIRECT	MEDIUM	0.1	0.4	0.5	\$10,000	\$15,000	\$12,500	\$86,133	8	27
3-28	Piper Hill Road by MacDonald Excavation	Center Harbor	LIMITED	HIGH	0.1	0.3	0.5	\$10,000	\$15,000	\$12,500	\$98,438	8	28
3-06	Road Ditch at 110 Waukegan Street	Meredith	LIMITED	HIGH	0.1	0.3	0.5	\$10,000	\$15,000	\$12,500	\$98,438	8	29
1-07	Beach South End	Meredith	DIRECT	HIGH	0.1	0.2	0.4	\$5,000	\$15,000	\$10,000	\$105,000	8	30
3-05	Driveway of 98 Waukegan Street	Meredith	DIRECT	HIGH	0.1	0.2	0.3	\$5,000	\$10,000	\$7,500	\$110,250	8	31
1-19	Reservoir Road	Meredith	DIRECT	HIGH	0.3	0.7	1.1	\$20,000	\$50,000	\$35,000	\$122,500	8	32
3-03	Sidewalk Above Waukegan Beach	Meredith	DIRECT	HIGH	0.1	0.2	0.0	\$5,000	\$10,000	\$7,500	\$137,813	8	33
1-14 & 1-15	Wall Street #1	Meredith	DIRECT	MEDIUM	0.1	0.4	0.0	\$10,000	\$15,000	\$12,500	\$162,132	8	34
1-24B	Downstream Side of Stream Crossing on Waukegan Street	Meredith	DIRECT	HIGH	0.0	0.1	0.1	\$5,000	\$10,000	\$7,500	\$165,375	8	35
1-09A	Stream Crossing West of Beach Area	Meredith	DIRECT	HIGH	0.1	0.4	0.0	\$10,000	\$15,000	\$12,500	\$177,823	8	36
2-04	36 Forest Hill Road	Meredith	DIRECT	HIGH	0.1	0.2	0.3	\$10,000	\$15,000	\$12,500	\$196,875	8	37
4-15	Massachusetts Avenue Catch Basin #2	Meredith	DIRECT	HIGH	0.1	0.0	0.1	\$10,000	\$50,000	\$30,000	\$236,250	8	38
3-02	Waukegan Street Kayak Launch	Meredith	DIRECT	HIGH	0.0	0.1	0.0	\$5,000	\$10,000	\$7,500	\$236,250	8	39
4-16	Lower Ladd Hill and Massachusetts Avenue Intersection	Meredith	DIRECT	HIGH	0.2	0.8	0.6	\$40,000	\$80,000	\$60,000	\$259,412	8	40

Site ID	Location	Town	Transport	Feasibility	TP (kg/yr)	TN (kg/yr)	TSS (metric tons/yr)	Low Cost Est.	High Cost Est.	Avg. Cost Est.	Avg. Cost per kg-P	Score	Rank
4-01	Fortier Street	Meredith	DIRECT	HIGH	0.2	1.2	0.1	\$40,000	\$80,000	\$60,000	\$281,489	8	41
2-01	Winona Shores Road	Meredith	DIRECT	LOW	0.1	0.3	0.3	\$1,000	\$5,000	\$3,000	\$20,672	7	42
4-08	Footlight Circle	Meredith	DIRECT	LOW	0.1	0.7	0.0	\$1,000	\$5,000	\$3,000	\$41,344	7	43
3-13	Wood Ridge Road Near Waukegan Golf Club	Center Harbor	LIMITED	MEDIUM	0.1	0.3	0.4	\$5,000	\$5,000	\$5,000	\$44,100	7	44
4-10	Parade Road Near Tracy Way	Meredith	LIMITED	MEDIUM	0.1	0.1	0.0	\$1,000	\$5,000	\$3,000	\$55,125	7	45
3-16	Winona Road Parking Area #1	New Hampton	LIMITED	MEDIUM	0.2	0.6	0.4	\$10,000	\$25,000	\$17,500	\$70,159	7	46
3-25	South of Winona Road & Hawkins Pond Road Intersection	Center Harbor	LIMITED	MEDIUM	0.3	0.7	1.1	\$15,000	\$30,000	\$22,500	\$82,688	7	47
3-29	Bonney Shores Road & Ledgewood Drive Intersection	Meredith	LIMITED	MEDIUM	0.2	0.5	0.7	\$10,000	\$25,000	\$17,500	\$91,875	7	48
1-02AB	Water Street Stream Crossing	Meredith	LIMITED	HIGH	0.1	0.2	0.3	\$5,000	\$10,000	\$7,500	\$110,250	7	49
3-27	Piper Hill Road by Hawkins Pond Wetland	Center Harbor	LIMITED	HIGH	0.2	0.6	0.9	\$20,000	\$40,000	\$30,000	\$120,273	7	50
1-11	Waukegan Street Stream Crossing	Meredith	DIRECT	MEDIUM	0.1	0.2	0.1	\$10,000	\$15,000	\$12,500	\$125,284	7	51
1-02C	Unknown Stream	Meredith	DIRECT	MEDIUM	0.1	0.3	0.0	\$5,000	\$10,000	\$7,500	\$127,212	7	52
1-22	Unpaved Section of Red Gate Road	Center Harbor	DIRECT	HIGH	0.1	0.4	0.6	\$15,000	\$25,000	\$20,000	\$137,813	7	53
2-21	Winona Drive Hawkins Pond Stream Crossing	Meredith	LIMITED	MEDIUM	0.2	0.6	0.6	\$20,000	\$30,000	\$25,000	\$137,813	7	54
1-10B	House next to Carder Lane on Waukegan Street	Meredith	DIRECT	MEDIUM	0.1	0.8	0.0	\$15,000	\$30,000	\$22,500	\$165,375	7	55
3-15	Railroad Crossing on Winona Road	New Hampton	DIRECT	MEDIUM	0.1	0.3	0.3	\$15,000	\$35,000	\$25,000	\$212,019	7	56
1-05	Red Gate Lane	Meredith	LIMITED	HIGH	0.2	0.4	0.7	\$20,000	\$60,000	\$40,000	\$232,105	7	57
2-13	Winona Road Bordering Winona Lake	Center Harbor	DIRECT	MEDIUM	0.1	0.4	0.6	\$20,000	\$50,000	\$35,000	\$241,172	7	58
2-20	Hawkins Pond Outlet Stream Crossing	Meredith	DIRECT	HIGH	0.0	0.2	0.0	\$10,000	\$15,000	\$12,500	\$393,750	7	59
1-01	Water Street #1	Center Harbor	DIRECT	HIGH	0.0	0.1	0.0	\$10,000	\$15,000	\$12,500	\$393,750	7	60
3-26	Fire Truck Pull Off at Hawkins Pond Dam	Center Harbor	DIRECT	HIGH	0.0	0.1	0.0	\$5,000	\$10,000	\$7,500	\$413,438	7	61
2-18	Bear Pond Stream Crossing of Piper Road	Center Harbor	DIRECT	HIGH	0.0	0.1	0.0	\$5,000	\$30,000	\$17,500	\$643,125	7	62

Site ID	Location	Town	Transport	Feasibility	TP (kg/yr)	TN (kg/yr)	TSS (metric tons/yr)	Low Cost Est.	High Cost Est.	Avg. Cost Est.	Avg. Cost per kg-P	Score	Rank
1-21	Ditches on Waukegan Street at Bruce's Landscaping	Meredith	LIMITED	MEDIUM	0.1	0.4	0.5	\$10,000	\$20,000	\$15,000	\$106,694	6	63
3-17	Winona Road Parking Area #2	New Hampton	LIMITED	MEDIUM	0.0	0.1	0.0	\$1,000	\$5,000	\$3,000	\$132,300	6	64
3-24	Winona Road & Hawkins Pond Road Intersection	Center Harbor	LIMITED	MEDIUM	0.1	0.3	0.4	\$10,000	\$25,000	\$17,500	\$154,350	6	65
3-30	Bonney Shores Road & Beth Lane Intersection	Meredith	LIMITED	MEDIUM	0.1	0.2	0.3	\$10,000	\$20,000	\$15,000	\$194,559	6	66
1-03A	Red Gate Lane Culvert	Meredith	LIMITED	MEDIUM	0.1	0.2	0.3	\$10,000	\$20,000	\$15,000	\$194,559	6	67
2-11	Bay View Beach	New Hampton	DIRECT	LOW	0.0	0.0	0.0	\$1,000	\$5,000	\$3,000	\$220,500	6	68
4-12	Lower Ladd Hill Road Near Daniel Webster Highway	Meredith	LIMITED	HIGH	0.0	0.1	0.1	\$10,000	\$15,000	\$12,500	\$393,750	6	69
1-04	Red Gate Lane Ditch Near End of Road	Meredith	LIMITED	HIGH	0.0	0.0	0.0	\$1,000	\$5,000	\$3,000	\$661,500	6	70
4-14	Massachusetts Avenue Catch Basin #1	New Hampton	DIRECT	MEDIUM	0.0	0.0	0.0	\$1,000	\$1,000	\$1,000	#DIV/0!	6	71
2-10	Railroad off Winona Shores Road	Meredith	DIRECT	MEDIUM	0.0	0.0	0.0	\$0	\$0	\$0	#DIV/0!	6	72
3-11	Road by Vittner Beach	New Hampton	LIMITED	LOW	0.4	0.9	1.4	\$25,000	\$50,000	\$37,500	\$104,668	5	73
2-09	Seminole Ave Near Railroad	New Hampton	DIRECT	LOW	0.2	0.5	0.7	\$50,000	\$70,000	\$60,000	\$322,683	5	74
3-23	Parking Pull Off on Winona Road	Center Harbor	LIMITED	MEDIUM	0.0	0.0	0.0	\$5,000	\$10,000	\$7,500	\$413,438	5	75
3-21	Winona Road Culvert	Center Harbor	LIMITED	MEDIUM	0.0	0.1	0.0	\$5,000	\$50,000	\$27,500	\$2,021,250	5	76
4-13	West View Drive	Meredith	LIMITED	MEDIUM	0.0	0.0	0.0	\$5,000	\$20,000	\$12,500	\$2,756,250	5	77
TOTAL					19.2	65.2	50.1	\$987,000	\$2,135,000	\$1,561,000	\$81,454		

Watershed Survey

-  Waukegan Watershed
-  Winona Watershed
-  Town Boundary
-  State Road
-  Local Road
-  Private Road
-  Unmaintained Road
-  Waterbody
-  Stream/River
-  Wetland
-  Watershed Survey Site


 Data Source: NH GRANIT, NHD, NWI, ESRI
 Coordinate System: NAD 1983 State Plane
 NH FIPS 2800 ft
 Map Created By: A. Wallis
 FB Environmental
 Date Created: 11/24/2025

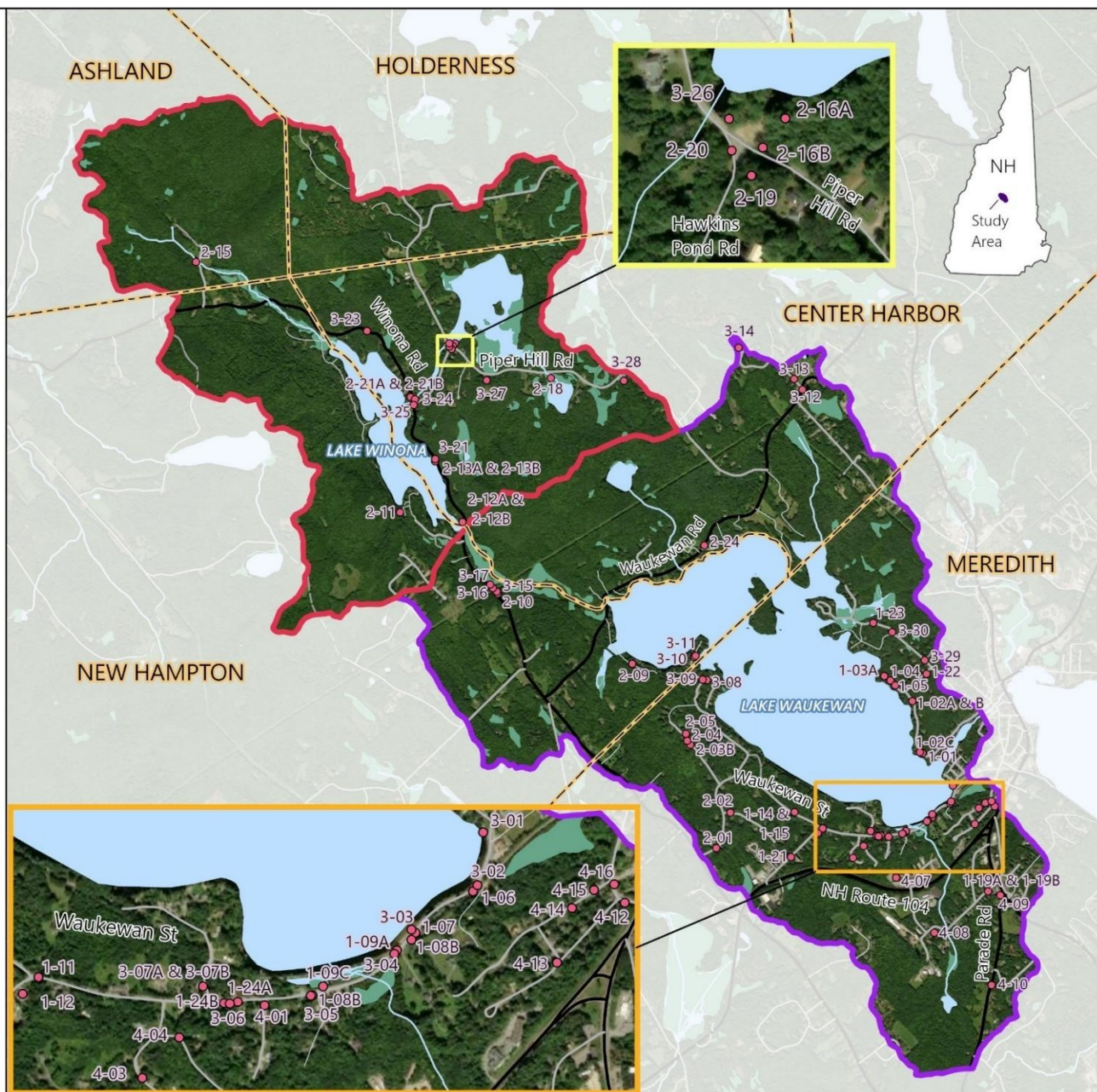


Figure 2. NPS pollution sites in the Lake Waukegan and Lake Winona watersheds.

APPENDIX A: BMP MATRIX SCORING CRITERIA

Following a Steering Committee meeting on 12/10/2025, FBE, with assistance from Horsely Witten Group (HW) (who will be preparing a 10% conceptual design for one site identified during the watershed survey), re-prioritized sites in the BMP matrix based on environmental, social, and economic factors that were not considered in the original ranking. Qualitative and quantitative ranking criteria were assigned scores between 1-3 for each factor; the sum of all factors served as the final score for each site. For sites attaining the same final score, sites were prioritized using the average cost per kilogram of phosphorus reduced, which reflects the most efficient use of funds in terms of phosphorus reduction. The ranking criteria are as follows:

Environmental Factors:

- Total Phosphorus Reduction. Sites where reductions of > 1.5 lbs of phosphorus per year (0.68 kg-P/yr) are possible were considered "High Impact" and received a score of 3. Sites with reductions between 1.5 lbs/yr and 1.0 lbs/yr (0.45 kg-P/yr) were considered "Moderate Impact" and received a score of 2. Site with reductions below 1.0 lbs/yr were considered "Low Impact" and received a score of 1.
- Transport to the waterbody. Sites where stormwater and/or sediment was observed to be leading directly into Lake Waukegan, Lake Winona, another lake/pond, a tributary, or stormwater infrastructure that discharges directly to surface waters (ex. catch basins) were considered to have a "direct" impact on water quality and received a score of 2. Sites where erosion or other stormwater issues were present but there was minimal evidence of direct transport to the waterbody were considered to have a "limited" impact on water quality and received a score of 1.

Social Factors:

- Feasibility. Feasibility to implement the remedial actions recommended for the site are considered in the scoring system. Sites fully located within town-owned land or roads were considered "high" feasibility. Sites that would require collaboration between the town and private landowners or sites that are on state-owned land/roads were considered "medium" feasibility. Sites on private land were considered "low" feasibility.
- Community Input. The Steering Committee identified sites of local importance during the 12/10/2025 meeting, which included the Lake Waukegan Boat Launch and Vittner Beach as two high impact areas. During the watershed survey, a resident of Wall Street identified specific issues related to drainage and flooding. Each site specifically identified by a community member was given a score of 1.

Economic Factors:

- Average cost per kilogram of phosphorus reduced. The average cost per kilogram of phosphorus reduced represents the most effective use of funds solely based on phosphorus reduction. In this way, sites are ranked not based on their overall cost, but on how much funding is needed to reduce phosphorus loading by one kilogram at that site. Sites where the average cost per kilogram of phosphorus is <\$100,000 received a score of 3 for the most efficient use of funds. Sites where the average cost per kilogram of phosphorus is between \$100,000 and \$300,000 received a score of 2. Sites where the average cost per kilogram of phosphorus is >\$300,000 were assigned a score of 1.