

Town of Hague Stormwater Outfall Evaluation Report

*Prepared by the
Warren County Soil and Water
Conservation District*

*For the Town of Hague and the
Lake George Park Commission*

November 2012

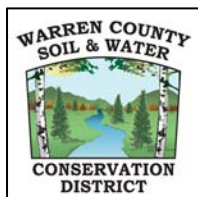


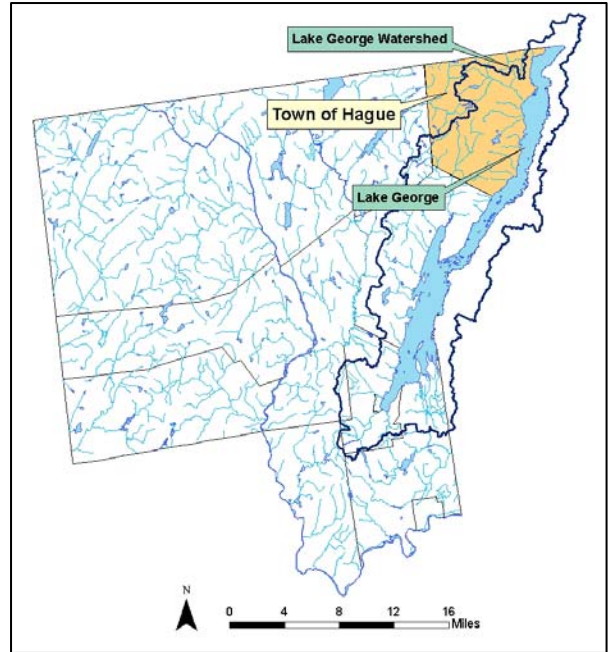
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Introduction and Background

The town of Hague is a rural community in Northern Warren County. A significant portion of the Town drains to Lake George, including 95% of the developed roads and the hamlets of Hague and Silver Bay. The Town has been very active in the field of natural resource protection. Hague is improving its management of stormwater in the Lake George Basin with assistance from the Lake George Park Commission through its stormwater grants program.

The Town of Hague worked with the Warren County Soil and Water Conservation District (District), who has extensive experience in stormwater runoff assessments and retrofitting techniques. This project permitted the town to fully examine their roadway infrastructure in relation to stormwater issues and their impacts. This assessment resulted in the determination of stormwater retrofit opportunities in high priority areas.



Location

The Town of Hague is located in the Northeast corner of Warren County. The Northern end of Lake George encompasses the entire east side of Hague with the Lake George Watershed boundary extending northwest (see above map). Hague's north town line borders Essex County and south town line borders the Town of Bolton. NYS Route 9N (Lake Shore Drive) runs along the shore of Lake George through the entire Town of Hague.

Stormwater Runoff

A significant concern in any developed area is stormwater runoff impact of the nearby waterbodies. Along roadways and parking lots, runoff is often channeled into drains and pipes, which most often outlet into a stream or a lake. Impervious surfaces such as roads, rooftops, and asphalt parking areas do not allow water from precipitation or snowmelt to infiltrate into the ground. As the water courses across these impervious surfaces, it can collect sediment, phosphorus, deicing materials (sand and salt), petrochemicals and other pollutants.

Roadside ditches also contribute to stormwater runoff issues when improperly installed or poorly maintained. A poor roadside ditch can contribute to increased stormwater runoff velocity leading to increased erosion and



sedimentation. During warmer months, runoff can also be significantly warmer than the stream's water, causing thermal pollution affecting the stream's aquatic communities.

These stormwater discharges are a major contributor to sedimentation/delta formation issues in the lake, and can also have significant negative impacts to a stream's aquatic community. An example is when calcium from road salt reaches a waterbody (if calcium chloride is used as a de-icing agent) the outlet area can be altered and made suitable for the colonization of zebra mussels. Another example is the phosphorus transportation by sediments, which may create multiple problems including the eutrophication of waterbodies, leading to a reduction in water quality and habitat for aquatic plants and animals.

Stormwater runoff directly affects the stream systems long-term stability. As land gets developed, typically more water runs off the land into nearby streams, following a precipitation event. This large volume of water entering a stream in a short period of time can cause an overwidening of the stream channel in order to accommodate the increased volume of water. These channel widening processes occur through accelerated streambank erosion, and ultimately more downstream deposition (deltas).

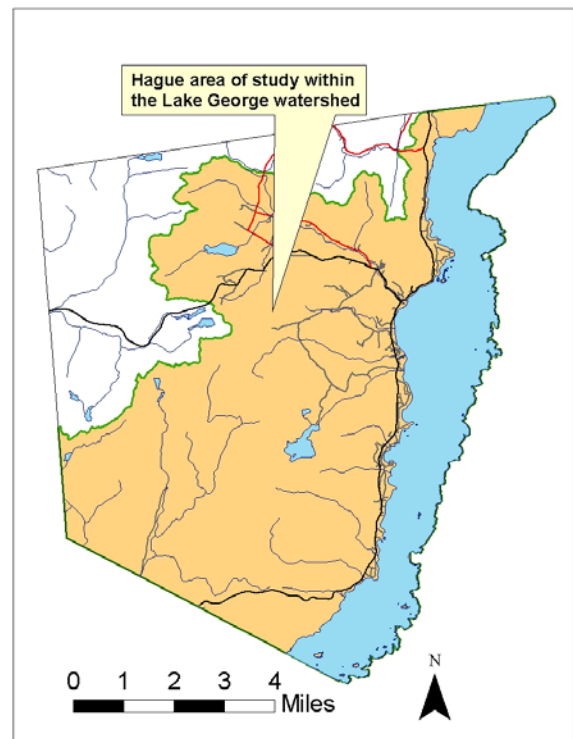
Stormwater runoff is considered to be the largest water quality impact in the Lake George Watershed. This report will provide the Town of Hague the ability to identify opportunities to address stormwater issues and their impacts within the Lake George watershed.

Assessment Methods

This report is a comprehensive stormwater examination of the roadway network in the Town of Hague (see right map). We reviewed the stormwater runoff from the conveyance system along all town roads within the Lake George Watershed with detail cost effective recommendations that will reduce stormwater pollutants and sediment input to Lake George.

District staff used Geographic Information System ArcView 9.3 (GIS) to map the Town roads within the Lake George Watershed. These maps were referenced throughout the project as a guide and layout for final stormwater identification mapping.

Each of the roads were driven, documenting the stormwater network, outfalls and storm drain inlets along with any point and non-point source pollution in the Town within the Lake George Watershed. Data was collected using a Global Positioning System Trimble Juno SB (GPS). Data was logged along with photographs to document the physical conditions of stormwater runoff from the conveyance system. The information collected



was post processed in the office and the GPS data was differentially corrected and exported as shapefiles for utilization in GIS maps.

Each area identified as a contributory to erosion or stormwater pollution was reviewed for potential solutions. The recommendations identified in this report involve areas of direct discharge to a waterbody, inlets that receive significant amounts of stormwater runoff from the roadway network, and roadside ditch erosion to the conveyance system.

Stormwater Mapping and Retrofit Recommendations

NYS Route 9N (Lake Shore Drive, NYSDOT)

It would seem that the largest stormwater impacts to Lake George are from NYS Routes 9N. The road ditches are placed along tributaries of Lake George or flow directly to the lake. It is difficult to address stormwater issues with state roads when there are no capital projects planned and in this case, the routes are limited by depth to bedrock, existing development and topography. However these inputs cannot be ignored.

Rt. 9N runs north-south along the shoreline of Lake George making it an area of constant concern when it comes to stormwater runoff. It was determined that nearly half of the outfall points mapped on Route 9N, drain directly to Lake George or to a tributary to the lake. Most of these ditches were in relatively good condition with stable slopes and heavy vegetation. Obvious sediment issues can arise when vegetation is stripped from the ditches for routine state maintenance.



The majority of the outlets from Rt. 9N to the lake are located on private property making it difficult to collect data on the health of the lake at each outlet location. It would be extremely important for the Town and the LGPC to work with the downstream landowners to allow data collection of these tributaries to see what impacts to the lake are occurring below Route 9N. In addition, the Town should begin discussing what maintenance activities are planned by the NYSDOT within the boundaries and if there are any planned improvements that may be modified to improve the stormwater runoff situation.

NYS Route 8 (NYSDOT)

Route 8 has several areas that are of concern. The largest area is near the town center where nearly all stormwater that flows off of Rte 8 is discharged to Hague Brook. This stormwater system begins at the town hall and continues to the intersection with Route 9N. There are few effective alternative treatments at this time, as this area is built out (both roadway and buildings). There are several parking lots that are between Route 8



and Hague Brook where test pits could be done to determine if the soils would be conducive for infiltration. While not a town issue (state route), this is something that the town should investigate to determine if there are any benefits.

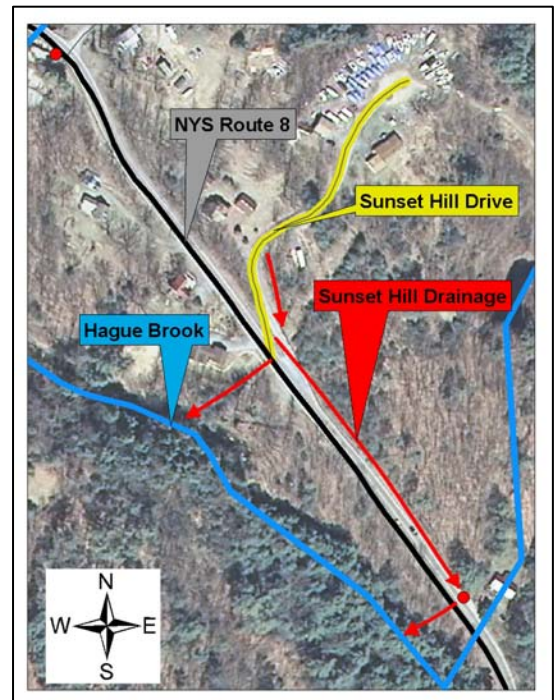
NYS Route 8/Route 9N Intersection (NYSDOT)

Likely the worst area for stormwater in the town is the intersection of Rte 8 and 9N. Within 100 yards there are 5 significant outfalls into Hague Brook, all contributing stormwater from the state roads. As mentioned in the Route 9N write up, this is an area that needs to be discussed in detail with the NYSDOT to determine what can be done to reduce water quality impacts. The DOT would likely not do anything unless there was a capital project involved. The Town should engage the DOT at this time to see if there any proposed work plans for this location or any capital projects.



Sunset Hill Drive (Town)

Sunset Hill Dr. is a 650', fairly steep town road that drains to NYS Route 8 (Graphite Mountain Road). The location where Sunset Hill connects and drains to Rt. 8 is an area of significant concern, with Hague Brook flowing alongside Rt. 8 directly to Lake George. Sunset Hill drains approximately a ¼ acre of stormwater to combine with Rt. 8 which is draining over a ¼ acre section of road along Hague Brook. The additional drainage from the mountainside Sunset Hill is built on has been calculated into the stormwater volumes from the road, but has not been fully measured due to relatively small amount of contributing runoff in our wide spread study. Sunset Hill has well vegetated ditches on both sides of the road with steep slopes which enables the stormwater to reach a high velocity. With high velocity stormwater draining south, the runoff does not infiltrate properly, enabling the flow to travel a greater distance and end up in Hague Brook. As Sunset Hill and Rt. 8 merge, half of the stormwater drains into a drop inlet on the eastside of Rt. 8, which outlets directly to Hague Brook. The other half of Sunset Hill drains to the west side of Rt. 8 where the stormwater has eroded small sections of the road creating drainage outlets directly to Hague Brook. In addition, on the eastside of Rt. 8 there is an additional 550' to another drop inlet that outlets directly to Hague Brook.

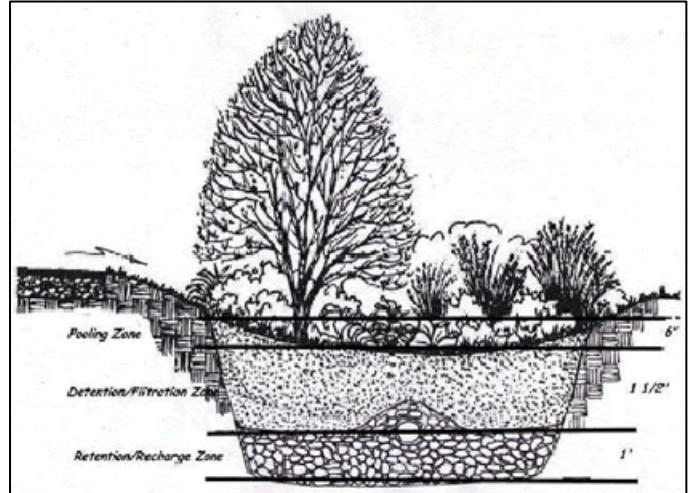


Sunset Hill currently has two collapsed culverts that if functioning properly, help slow the velocity and disbursement to assist with stormwater infiltration. These culverts are

approximately located 100' and 350' uphill from the intersection of Rt. 8 and Sunset Hill. Due to the high bedrock located 1' under the surface elevation in this area, stormwater infiltration systems are unable to be installed. In an area with high bedrock and well vegetated ditches, the recommended stormwater retrofit for Sunset Hill is to replace the two 12" culverts.

Hague Parking Lot NYS Route 8 (Town, et. al.)

A proposed rain garden in the Hague Baptist Church parking lot would allow stormwater to infiltrate and prevent it from adding runoff into Hague Brook across the street. The rain garden design and native plants used to capture and infiltrate stormwater will also serve as an educational site for the residents by showing a simple, aesthetically pleasing way to prevent stormwater runoff on their own property. This is a community project in which the town estimates to spend around \$1,000. The District will assist in the design and construction of the rain garden.



Courtesy of City of Des Moines, IA
Parks and Recreation

Darrin Sediment Basin (Town)

A small sediment basin exists in the Darrin property located off of Route 9N, across from the town's boat launch. This basin was installed approximately 8 years ago and has been cleaned out once. At this time it is in need of maintenance dredging and the town may consider adding a weir board to the pipe, which will allow more sediment volume capacity. It is critical that this basin be maintained regularly to limit additional sediment via the outflow for the Hague Boat launch area.

Hague Post Office (Town)

During this assessment, it was discovered that a small culvert towards the rear of the Post Office property was overwhelmed by stormwater from Route 8. Stormwater runoff flows through this area and into a vegetated swale leading to the Darrin sediment basin. At this time the culvert has failed and is contributing additional sediment into the system.

A design should be done to determine the proper size of the culvert which would be placed to handle the water volume for Route 8 while including the consideration that this is a parking area and a minimum amount of fill necessary over the pipe.



Hague Highway Garage (Town)

The Town of Hague Highway Garage located on West Hague Road takes a significant amount of stormwater from West Hague Road the highway garage parking lot and

driveways. To the south of the highway garage is a 1/3 acre plot of grass situated between driveways and borders West Hague Road (see diagram). The entire 1/3 acre grassy plot is encompassed by eroded edges from stormwater runoff. In addition, the southeast corner of the highway garage property receives significant stormwater runoff from the driveway, garage roof, and dirt road. The stormwater runoff from this location continues to flow east to a tributary of Hague Brook.

This is an ideal location for a rain garden to capture and infiltrate stormwater runoff. Also, constructing vegetated swales around the highway garage driveways would prevent eroding ditches and added sediment to stormwater runoff. Vegetated swales around the 1/3 acre plot of grass would slow and infiltrate stormwater while collecting pollutants. An estimated 565' of vegetated swales with check dams would be necessary to collect the stormwater from West Hague Road and the highway garage. In addition, check dams will slow stormwater velocity allowing for increased infiltration. At the northern end of the 1/3 acre grass plot, 139' section should not have vegetated swales due to winter plowing.



Pudding Island Road (Town)

Stemming east off NYS Route 9N (Lake Shore Drive) is Pudding Island Road, an unpaved road where the Arcady Bay sediment basin is located. The basin is located approximately 700' south of the intersection of Rt. 9N and Pudding Island. The basin receives water from a concrete culvert running under Rt. 9N, and from ditches along Pudding Island Road. The sediment in the basin has risen to the bottom of the outlet culvert permitting sediment to flow out towards the lake. Once sediment fills the basin to 50% capacity, the basin should be cleaned out to become functional and prevent sediment from migrating downstream.

The outlet flows to a stone-lined ditch that meanders east directly to Lake George. North of the sediment basin, the first 80' of ditch is vegetated and filled with sediment, followed by 350' of roadside erosion with steep banks. The last section of ditch is 270' is well vegetated with

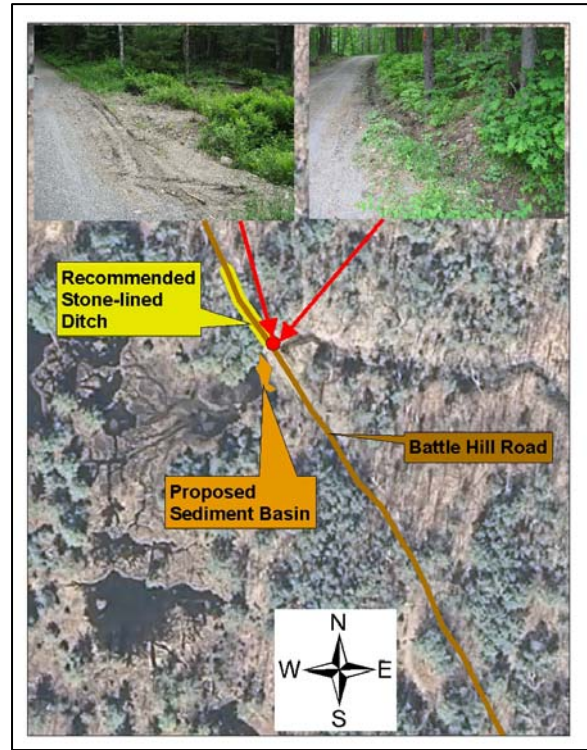


grassy slopes. The existing ditch is approximately 4' wide by 1½' deep. Stone-lined ditching is needed along the west side of Pudding Island Road to stabilize the roadside and bank, and prevent erosion from flowing into the sediment basin.

Battle Hill Road (Town)

Battle Hill Road is a narrow unimproved town road and is an area of concern due to the fact that it is located upstream of Lake George and has erosion issues. The road crosses the outlet of a pond/wetland complex and forms the headwaters of an unnamed tributary that flows to Lake George. This crossing is severely impacted by flooding and road runoff.

Flooding of this crossing occurs during severe spring runoff, because the culvert is undersized in capacity. In addition, the town has had issues with beavers obstructing the culvert. Sediment from the east reaches the stream as vehicles continually wear away at the soft sides of the road and form ruts that scour during heavy rainfall events. The town has attempted to temporarily fix the situation, however more solid solutions are necessary.



Approximately 100' of stone-lined ditching is needed on both sides of this section of road. The stone-lined ditching will help with the stabilization of the road and permit stormwater to infiltrate, reducing roadside erosion. In addition, the town should consider replacing this outlet with a larger culvert to increase volume capacity. The APA would need to be involved as this is most likely a jurisdictional wetland.

New Hague Road (County)

The north side of New Hague Road, east of Coldwater Canyon Road has a significant head cut that has formed, which has begun eroding the sides of the ditch. A section of the non-eroded ditch bottom should be lowered and lined with filter fabric. Compactable material should then be placed on the cut in a consistent positive grade towards the outlet from the headcut. Angular stone fill (4-6") should be backfilled into the bottom of the ditch where the filter fabric lays (Appendix Design1).



Snug Harbor (NYSDOT)

Upon meeting with the Hague Committee, it was explained there were two drop inlets of concern in the Snug Harbor area of Rte. 9N. During the data collection for this report, District staff did not observe any discolored water from these outlets, which may only be seen during storm events.

Monitoring this area and photo-documenting the discolored water would be important to note the issue. It may be challenging to reduce the impacts, as bedrock and high water tables are found in this section of 9N.



Route 9N Wastewater Facility (Town)

A second area of concern that was discussed with the Hague Committee was the wastewater pump station and the drop inlets located just north of the Rte 8/Rte 9 intersection. The concern is, if the pumps fail a discharge of the waste will be directly sent to the lake, via the stormwater system.

District staff spoke to Paul Belden, Hague Wastewater Treatment Plant Operator to determine what safety features are there to reduce the likelihood of sewage impacts. Paul stated that there are two alarms that cause an automatic dialer to contact him and several other individuals, if there is a power failure at the site or if there is high water (pumps not functioning). If there is a power failure then a portable generator is brought down and is set up to power the station. At this time the Town is looking to place a generator permanently at this location to reduce potential power failures.

Stormwater Outfalls and Maintenance Locations-Appendix Map 2

The maintenance issues numbered in Map 2 are not areas of high priority, but are areas worth mentioning for their stormwater runoff and recommended maintenance. Points 1 and 2 located on West Hague Road have culverts directing stormwater to an eroding ditch that flows to point 3 which is a 24" corrugated metal pipe outlet. The recommended maintenance for points 1 and 2 are hydroseeding or rock lining the ditches. Point 4 is the Hague Highway Garage on West Hague Road which is discussed in the "Stormwater Mapping and Retrofit Recommendations" section. We suggest vegetated swales with check dams throughout the property. Point 5 on West Hague Road is an eroding ditch that leads to an 18" corrugated metal pipe. Hydroseeding or a rock lined ditch is the recommended fix for this location. Points 6, 7 and 8 are inside the designated "Route 8 & 9 Intersection of Concern". Points 6 and 7 are drop inlets that contribute to the stormwater runoff that flows into Hague Brook off Route 8. Point 8 is an undersized 12" HDPE pipe that has been blown out due to stormwater runoff. Point 8 is located on Route 8 in the Hague Post Office parking lot. Our recommendation for this location would be to properly size a new culvert that is able to handle the stormwater from the mountain and parking lot. Located on Pine Orchard Road, point 9 is a paved roadside ditch on a steep slope. Our recommendation would be to construct a vegetated ditch with check dams to slow stormwater velocity on the steep slope. Point 10 is a sediment filled pipe resulting from an eroding roadside ditch. For this location the recommended fix would be hydroseeding or rock lining the ditch, and the removal of sediment from the pipe to restore proper functionality.

Conclusions

In general, most of the town roads in Hague are in good shape in regard to water quality protection, erosion and sediment control with the exceptions noted in the report. There are a number of cost effective projects that the Town of Hague can undertake to improve stormwater runoff to Lake George.

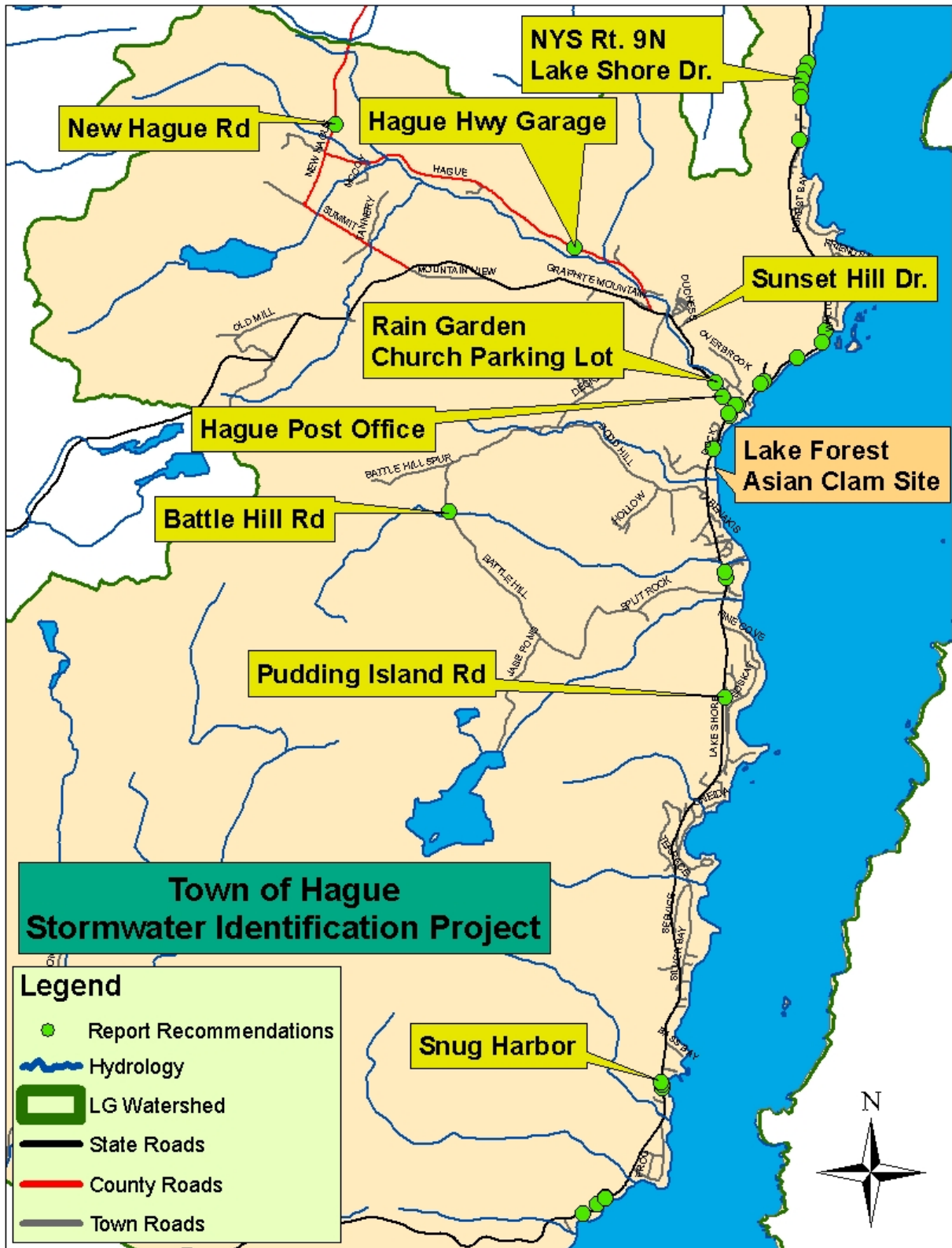
The Town's challenge will be getting NYSDOT to address Route 9N and 8. These roads are by far the most critical to address, specifically at their intersection. This discussion needs to begin immediately to receive a commitment from the NYS DOT to address the water quality impacts from the state's road network. The District would be happy to assist the Town in these discussions.



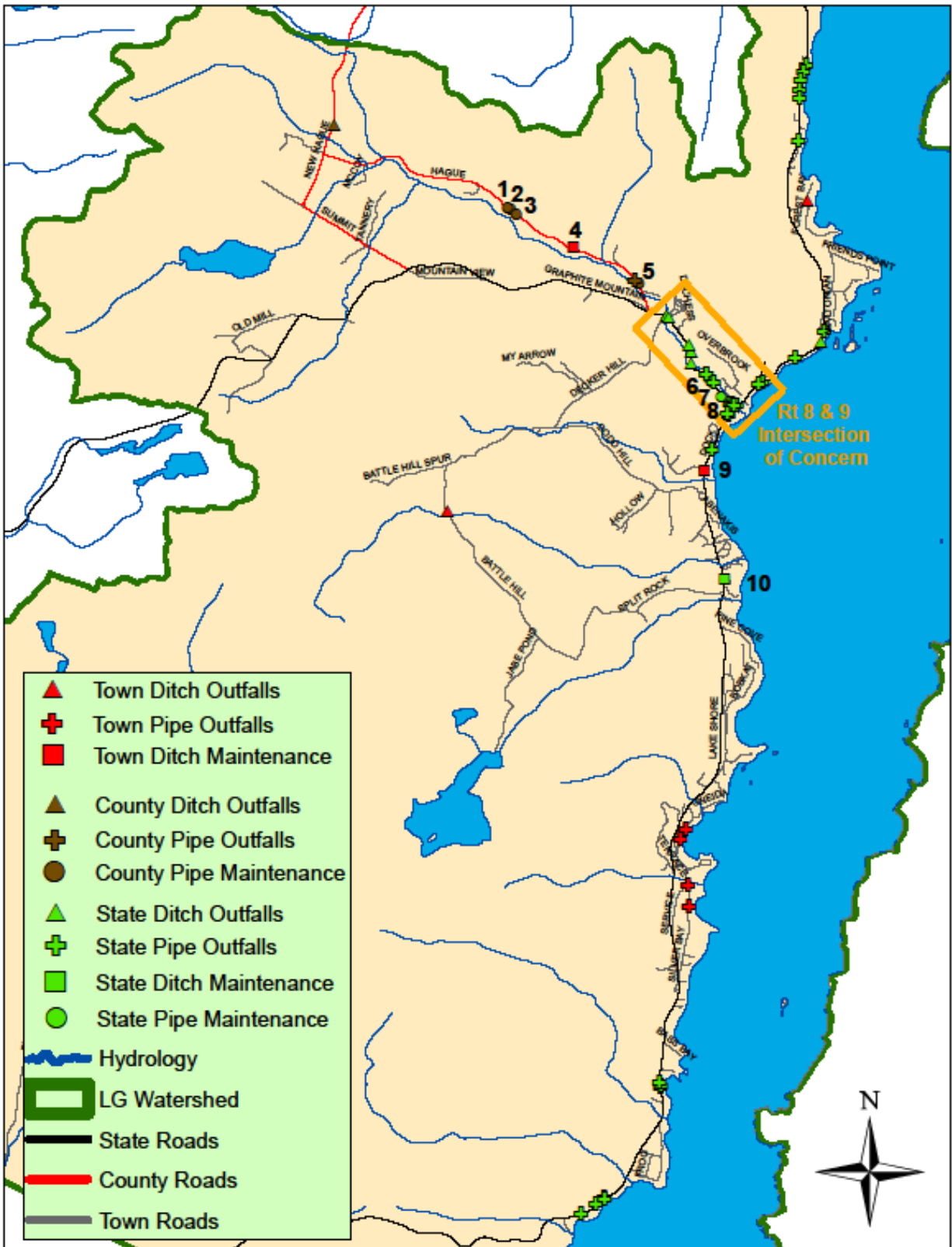
An unnamed inlet from natural drainage and stormwater runoff from Route 9N to the Hague Boat Launch

The high water quality found in the northern section of Lake George is often used as a comparison to the southern end of the lake, but how long can that comparison be made if stormwater runoff continues to impact Lake George? No one knows for certain. Regardless, it is imperative that all the groups involved in the community and the lake, work together to remediate stormwater impacts or the favorable comparisons and the high water quality, will be gone.

Map 1- Stormwater Areas of Concern

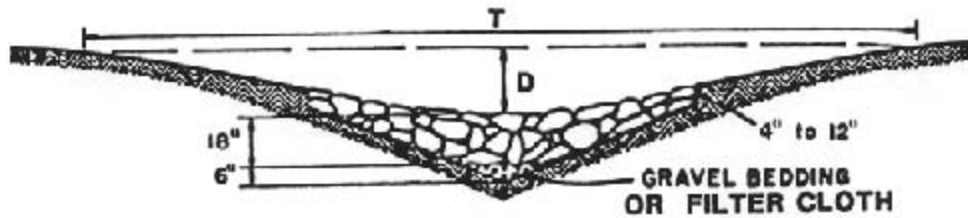


Map 2- Stormwater Outfalls & Maintenance Locations

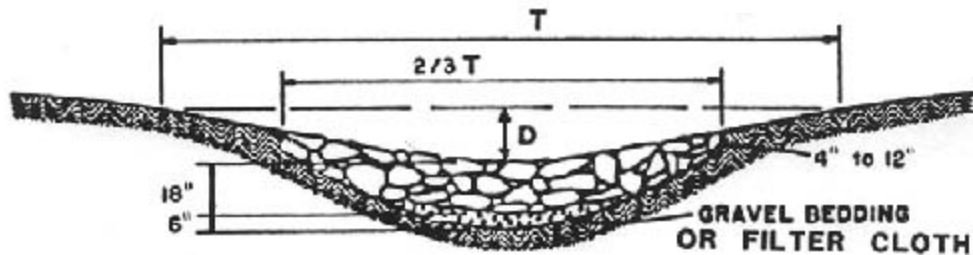


Design 1- Grassed Waterway: Courtesy of the NYS DEC Standards and Specification for Erosion and Sediment

Figure 5B.8
Typical Waterway Cross Sections



Waterway with stone center drain. "V" section shaped by motor grader.



Waterway with stone center drain. Rounded section shaped by bulldozer.

Appendix

Stormwater Resource Websites

- DEC Division of Water Stormwater Web Page
<http://www.dec.ny.gov/chemical/8468.html>
 - *New York State Standards and Specifications for Erosion and Sediment Control* ("Blue Book") *Current Version: August 2005*
 - *New York State Stormwater Management Design Manual*
Current Version: August 2010
- Lake George Park Commission:
<http://www.lgpc.state.ny.us/>
- Warren County SWCD:
www.warrenswcd.org
- The Lake George Association:
<http://www.lakegeorgeassociation.org/>
- The Fund for Lake George:
<http://www.fundforlakegeorge.org/>
- Soil and Water Conservation Society – Empire State Chapter
<http://www.swcsnewyork.org/>
- SUNY-ESF Continuing Education - Stormwater Management Program:
<http://www.esf.edu/outreach/stormwater>
- Center for Watershed Protection:
<http://www.cwp.org>
- EPA Stormwater Homepage:
http://cfpub.epa.gov/npdes/home.cfm?program_id=6