

# Town of Ticonderoga Stormwater Outfall Evaluation Report

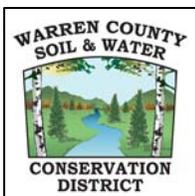


Photo by Carl Heilman II

Prepared by the Warren County SWCD

For the Town of Ticonderoga and the Lake George Park  
Commission

November 20, 2012



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## Introduction and Background

The Town of Ticonderoga is ahead of most Lake George Watershed municipalities in that it currently has a stormwater management plan. The document was prepared by the Lake George Park Commission in December of 2000. The stormwater management plan outlines the stormwater runoff issues for the town within the Lake George watershed. The plan provides a background on various stormwater issues in the town and includes specific recommendations for improvement projects on various roads.

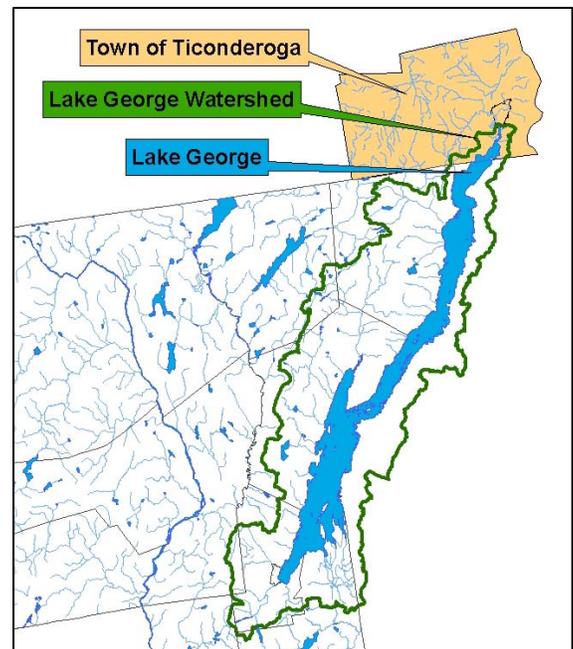
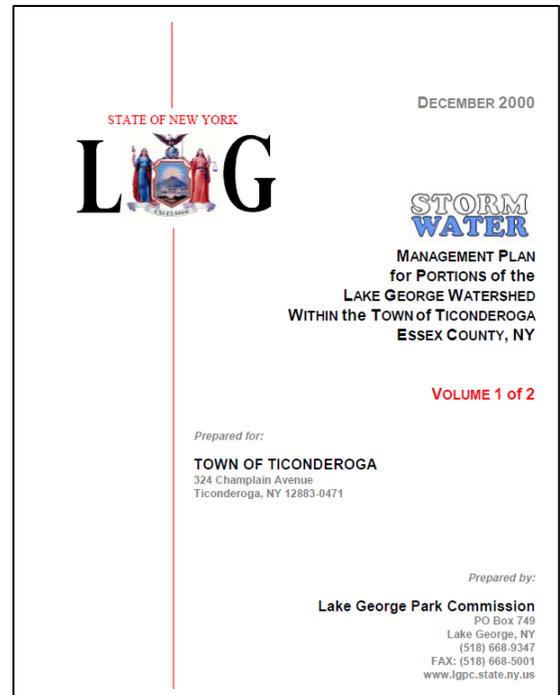
The Warren County Soil and Water Conservation District (District) reviewed the existing stormwater management plan and met with the town water and sewer Superintendent and Deputy Superintendent to determine which projects have been completed in the plan and to also identify current stormwater issues within the Lake George watershed. Following the meeting with updated information, the District completed a new site specific stormwater assessment of the road network within the watershed. The primary areas within Ticonderoga that affect Lake George are Black Point Road and Baldwin Road which are the two main roadways along the East and West side of the lake.

The District incorporated the previously developed stormwater management plan issues with the updated currently identified stormwater issues in the town's portion of the watershed to prioritize and identify stormwater outfalls and concerns. From this research the District has determined site-specific stormwater retrofit solutions. The priority area projects will be implemented based on available funding and will also serve as a reference for future projects and funding.

## Location

The Town of Ticonderoga is located in the southeast corner of Essex County. The southern boundary of Ticonderoga is the northeast corner of Warren County and more specifically the northern town line of Hague.

The northern most tip of Lake George extends into the village of Ticonderoga. The upper reaches of the Lake George Watershed does not cover a large portion of the Town of Ticonderoga but it is of importance as this is the most developed area effecting this section of a AA-Special drinking water source.



## Stormwater Runoff

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



Example of stormwater pollution

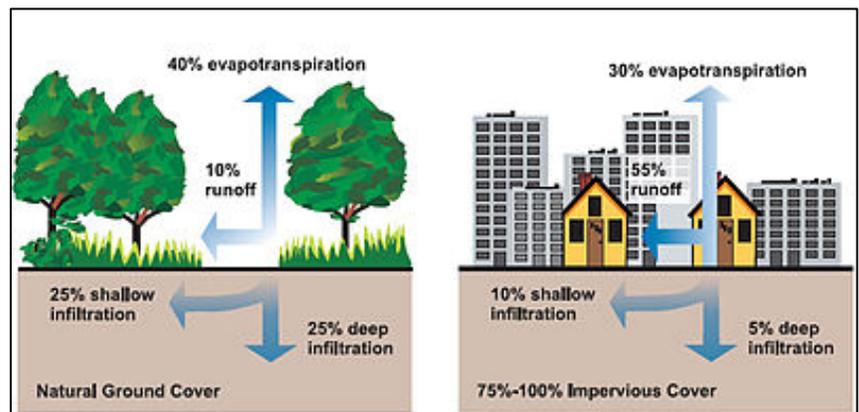
Improperly installed or maintained roadside ditches also contribute to stormwater runoff issues. A poor roadside ditch can contribute to increased stormwater runoff velocity which in turn leads to increased erosion and sedimentation issues. During summer months, this runoff can also be significantly warmer than the stream's water, causing thermal pollution which affects the stream's aquatic communities.



Salt storage/Winter sanding facility

Stormwater discharges are a major contributor to sedimentation/delta formation issues in the lake, they can also have significant negative impacts to a stream's aquatic community. Calcium from road salt (if calcium chloride is used as a deicing agent) can create habitats at the mouths of streams suitable towards zebra mussel colonization. Phosphorus transportation by sediments may create multiple problems including the eutrophication of waterbodies, a reduction of water quality and an increased habitat for invasive aquatic plants and animals.

Stormwater runoff poses additional challenges to the stream system directly, particularly related to its long-term stability. As land gets developed, there is typically more water which runs off the land into nearby streams, often very quickly following a precipitation event. This increased volume of water entering a stream in a short period of time can cause an over widening of the stream channel. These channel widening processes occur through accelerated stream bank erosion, and ultimately more downstream deposition (deltas).



Change in groundwater hydrology

An increased amount of runoff accompanied by a decrease in the infiltration of water leads to a change in the groundwater levels throughout the year. Without adequate recharge through the year, a reduced base flow for streams can have detrimental effects on aquatic organisms that rely on a steady flow of water throughout the summer months.

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

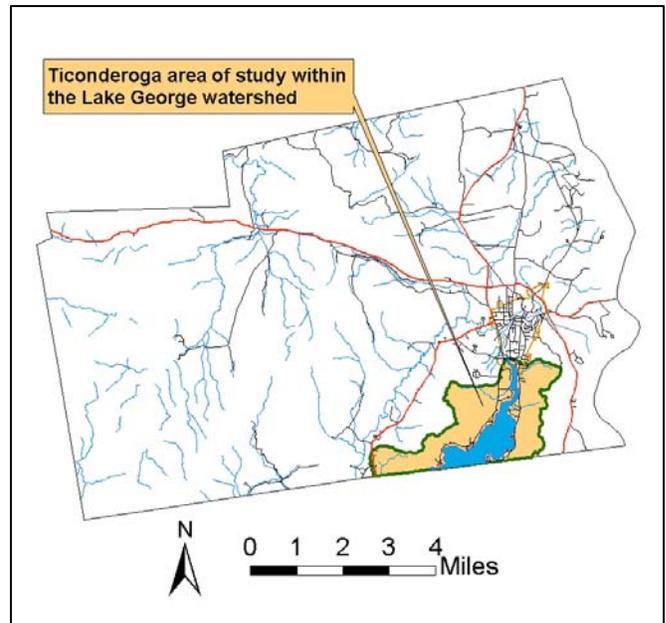
## **Assessment Methods**

This report is a comprehensive stormwater examination of the roadway network in the Town of Ticonderoga (see right map). This consisted of a review of the stormwater runoff from the conveyance system along all town and county roads within the Lake George Watershed as well as detailed cost effective recommendations that will reduce stormwater pollutants and sediment input to Lake George.

District staff met with the Town of Ticonderoga's Water/Sewer Department - Tracy Smith, Superintendent and Derrick Fleury Deputy Superintendent, to review the Town's plan and identify what changes have taken place in the last several years.

The District used Geographic Information System ArcGIS 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. All 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.



The following locations were excerpted from the December 2000 Ticonderoga Report as they specifically depicted water quality concerns:

- Baldwin Road: North end of Delano Point Road to Baldwin Dock Road – (town infiltration plant has a few areas that could use some catch basins due to steepness of the road.) See *Recommendations – Steamboat Landing*
- Baldwin Road: Baldwin Dock Road to Coates Point – Minimal stormwater impacts. Reputably incorrectly placed or lack of stormwater management in this area. This is one area that has been the subject of some complaints by the Town. – *The District looked at this area and found a natural stream drainage that was heavily vegetated.*
- Baldwin Road: Coates Point Road to the end of the road – limited opportunity for stormwater management due to stone walls on either side of the road. Ditches in place on the far side of the road, away from the lakeside. Road has minimal impact. – *The roadside here is heavily vegetated and flows to a culvert that's outlets to the lake. It appears that there are minimal stormwater impacts at this location.*
- Black Point Road from Alexandria Avenue to the Y at The Portage – minimal opportunity here for remediation because of sidewalks, ect. – See *Recommendations- Tin Pan Alley*
- Black Point Road: The Portage to Mossy Point Road – grassy swales on both sides.

Black Point Road: Weeds Bay – road close to lake. This may be an area where the road could be sloped to the far side away from the lake, and the addition of catch basins to cross culverts may be needed.

*A significant amount of Black Point Road has been redone in the last few years and have included drainage improvements and catch basins.*

- Public launch access road – some stormwater flows down paved parking lot to the lake – approximately one-third of the runoff flows off into the wetlands prior to hitting the lake. See *Recommendations – Mossy Point Boat Launch*
- Tiroga Point Road: public beach – pocket wetlands continue along this section as well as grass swales along the ditch line. Public Beach, catch basins at culverts may be needed. Supervisor Connery informs the LGPC that this road, because of litigation, will be made into a one-way road. *An outlet pipe is observed in this location, however due to the existing area conditions, there may not be the capacity to improve the outlet at this location, unless a sediment basin that is maintained is installed. Cattails are found at the outlet and are likely taking up nutrients that are entering the lake at this location.*

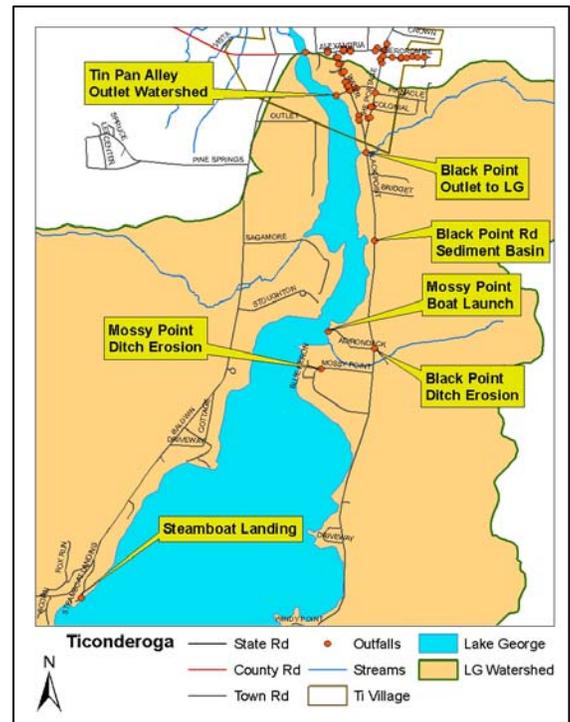
## Stormwater Mapping and Retrofit Recommendations

The District has identified 6 locations where stormwater runoff management or erosion and sediment controls could be implemented to decrease their effects on Lake George. There is a seventh location on this map that the Town had indicated that there was concern at (Black Point outlet to Lake George).

### Tin Pan Alley

The Tin Pan Alley outlet watershed is the highest priority area in Ticonderoga within the Lake George Watershed (see map below). All of the inlets within the Tin Pan Alley outlet watershed connect and drain directly to Lake George. The outlet watershed is approximately 31 acres in size and drains a significant amount of stormwater to the lake.

The best way to deal with stormwater in a watershed is to break it up by retrofitting sections to prevent runoff into a waterbody through infiltration. The Tin Pan Alley area is difficult due to existing development, steep slopes, clay soils, shallow to bedrock soils and a high water table. These conditions restrict what can be done to remediate this stormwater issue.



Identified areas of concern



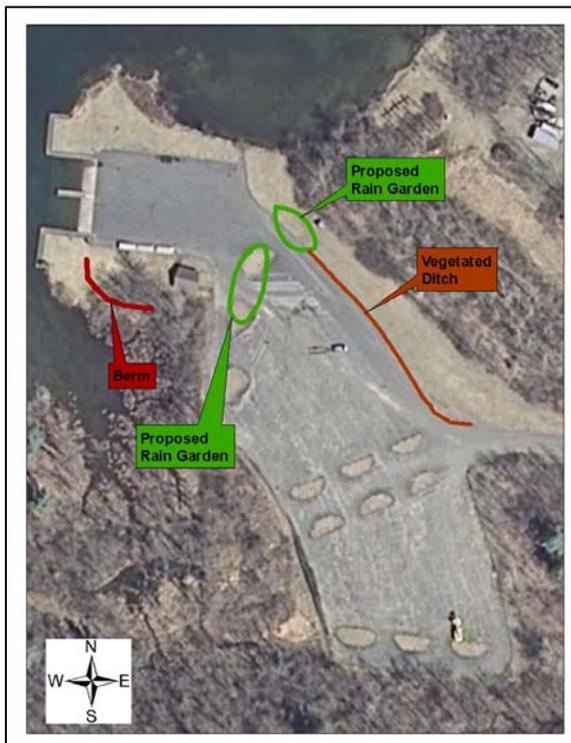
Tin Pan Alley watershed

Since clay soils are identified as Hydrologic Soil Group "D", they have a very slow infiltration rate. While some water holding capacity of soils is wanted, these soils potentially reduce the effectiveness of infiltration as a technique for stormwater treatment. The shallow to bedrock soil situation prevents any structure from going into the ground without a significant cost in blasting. The feasibility of that in this urban area is low as well. Locals with a high water table suffer from the fact that the water floods the infiltration units preventing the solids from dropping out of the stormwater and collecting in the infiltration system. Insects can also be a concern, especially if there is standing water in a unit.

The outlet of this system is less than 100' from the lake and is bordered by the alley which is still considered a car top boat launch site. The area that treatment could occur is very small which makes a typical end of pipe sediment basin unfeasible. If a basin was placed in this location, it would need maintenance after each storm event or it would simply fail with the stormwater runoff and flush out sediments to the lake. The best recommendation for addressing the outfall of Tin Pan Alley is to hire a professional engineer or architect to investigate the design of a high volume stormwater treatment system. The engineer will have to develop a system that can handle storm events from this approximate 31 acre drainage, while keeping in consideration the depth to groundwater for subsurface structures, as they can become buoyant if not installed properly.

As District staff investigated the road network around the lake, it became apparent that much of the area that has been developed and has a large impact from groundwater. Homeowners may be concerned with water quantity, but mistake it for a water quality issue. In fact the vegetated ditches and wetlands that exist are a benefit to water quality by allowing sediment to drop out of suspension and for nutrients to be taken up by the vegetation. If the volume of water in an area is a concern, the town will need to identify those locations and determine what the applicable solutions there may be for those locations, however this will be challenging with the high water table and depth to bedrock.

### Mossy Point State Boat Launch



The Mossy Point State Boat Launch is located off of Black Point Road. The boat launch is a large paved lot that leads directly to the lake. Approximately 1/3 of the paved or compacted area flows off of the east side of the parking lot and down the boat launch into the lake carrying sediments, road salt and other pollutants with it. There are twelve small grassed sections of the paved lot that assist in slowing down stormwater velocity and runoff. The remainder of the compacted or paved area sheet flows off to the west and infiltrates into a forested buffer.

The boat launch offers multiple opportunities for stormwater retrofitting to prevent large amounts of runoff from entering the lake. Rain gardens or a larger bioretention basin located at the top of the boat launch or to the east just outside the parking lot would allow stormwater to infiltrate before running down the boat

launch. A vegetated ditch on the east side of the parking lot would assist in directing stormwater into the rain garden. A small outlet located in the northwest section of the parking lot drains directly to the lake. Placing a berm in this location will allow the water to pond and infiltrate prior to reaching Lake George.



Mossy Point Boat Launch looking from lake

Future recommendations for paving would be the use of porous pavement to allow for immediate stormwater infiltration or paving in a way to direct the stormwater runoff into the vegetated areas around the boat launch. Directing the path of stormwater can be achieved by crowning the road away from the lake and building outlets along the paved edges to allow for runoff into vegetated buffers or future rain gardens.

### Black Point Road, Ditch Erosion

Black Point Road has roadside erosion on the east side across from the Mossy Point boat launch. It does not appear that there are high velocity flows in this section of ditch, so a stone lined ditch may not be necessary. Hydroseeding the eroded ditch this spring will allow vegetation to establish, preventing stormwater from washing away the soils and will help stabilize the banks.



Hydroseeding bare ditch slope

The DEC recognizes that successfully developing a vegetative cover will reduce sediment inputs by up to 90%. A general seed mix that works successfully in the Lake George basin is comprised of creeping red fescue, Kentucky bluegrass, chewing's fescue and perennial ryegrass. It is also advisable to add annual ryegrass, which will germinate quickly for short term vegetative cover, but will not come back the following year.

### Black Point Road Sediment Basins (Existing)

The sediment basin on the east side of Black Point Road just north of the Mossy Point boat launch was installed several years ago and needs to have routine maintenance conducted. In most cases with sediment basins, when their storage capacity has reached 50%, they should be cleaned out. If they are not maintained, then material that has settled out will be transported downstream following rainfall events.



Sediment migrating from basin to outlet

The basin on the west side of the road does not have the same volume of material as that on the east side. It may be that the majority of mobile sediment flows off into the eastern ditch. If that is the case, the eastern basin should be a higher priority for maintenance.

## Mossy Point Road, Ditch Erosion

Though relatively stable and vegetated a small area of ditch on this road has degraded and appears to be contributing sediment (see location map). This situation is easily fixable and require only the placement of stone fill to stabilize the eroded area. This stone should be angular between 3" and 6" and should be lightly tapped or set to prevent any mobilization.



Eroded ditch section on Mossy Point Road

## Steamboat Landing

Steamboat Landing is located off the east side of Baldwin Road. Lake George borders Steamboat Landing to the southeast with the town's pumping station at the end of the road. Approximately 650' south on Steamboat Landing from the intersection with

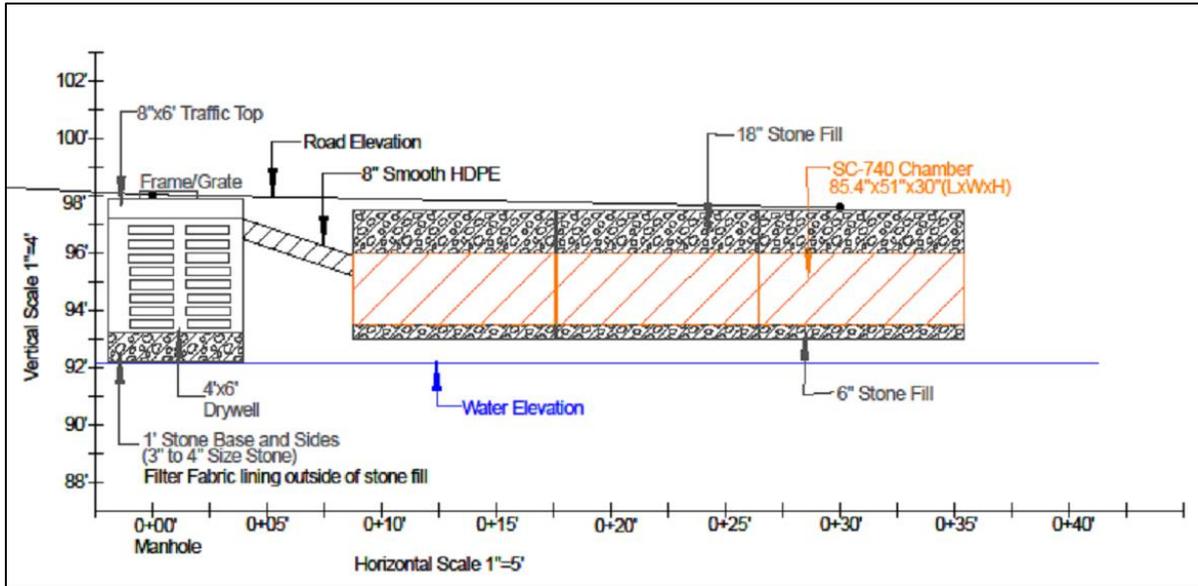
Baldwin Road is an area of stormwater concern. A series of four drywells or a drywell and infiltration chambers should be installed to collect and treat stormwater. The stormwater flowing south down Steamboat Landing drains into Lake George near the Pump Station. The runoff from storms contributes salts, sediments and other pollutants to Lake George. The drywells and chambers will collect and allow the stormwater to infiltrate preventing pollutants from draining directly Lake George.

Steamboat Landing may have a break in the drainage meaning the runoff into Lake George would come from approximately 450' of road averaging out to 5,610 gallons of stormwater in a one inch storm and 2,805 gallons in a half inch storm. If there is not a drainage break, Steamboat Landing will be draining approximately 650' of road averaging out to 8,100 gallons of stormwater in a one inch storm and 4,050 gallons in a half inch storm. The stormwater retrofit will be designed to capture the max amount of stormwater allowable within our construction location constraints. The first flush of stormwater is the most important to capture and infiltrate due to the high concentration of pollutants.



The two options for infiltration systems on Steamboat Landing consist of four drywells or a drywell connected to a series of chambers. The site limitations consist of soil types, sewer and waterlines, depth to water table, and allowable work area size. These limitations will determine size of drywells and number of drywells and or chambers used. The options for drywells are, 4'x6' drywells that hold 688 gallons, and 4'x8' drywells that hold 1,287 gallons. If chambers are used, the Stormtech SC-740 Chambers (or similar) that hold 343 gallons per section length will be the most efficient for the location. With the infiltration chambers, each section can be connected to form a line of chambers or a manifold can run the chambers side by side. This allows the chambers to be maneuvered to fit into locations with site constraints.

Example of a Drywell and Infiltration Chamber system:



The Lake George Park Commission staff have provided the following comments and information in regards to the Steamboat Landing location:

*Conceptual Steamboat Landing Infiltration Design: Prior to construction, final design plans will need to be submitted to the Commission for review. These should address the following:*

1. The report notes that sediments are being transported to the Steamboat Landing. Are there any stabilization measures that may be undertaken to address this?

**District Response-** *At this location, there does not appear to be any alternative treatment. The sediment that is referred to is sand and small stone, likely from road sanding operations and shoulder stone or stone dust from the road itself.*

2. Provide a site plan depicting the proposed infiltration devices.
3. As indicated in your email and the report, the site plan for the design should include deep test pit information for design purposes (deep dry well vs shallower stormtech system), and identify underground utilities to be considered in the construction phase.
4. The design should include pretreatment to prevent the proposed drywells from blinding (ie. catch basin).
5. The design is focused on small storms of 0.5" to 1". Please include overflow provisions to safely convey excess stormwater volume.
6. Please include maintenance provisions, and identify the party responsible for maintenance.

This information provides an excellent framework to follow for this site and should be used in the development of the system.

### **Black Point Outlet (Cold Spring)**

The District was asked by the town to see if there was an issue with Black Point outlet into the lake. This outlet into the lake is cloudy and there has been sediment deposited but it appears to be natural as it flows from a forested wetland under Black Point Road. This watershed is mainly undeveloped, but appears to have clay or silty soils. If the town was interested in determining if there are any failing streambanks that may be contributing to the sedimentation, then further investigation is required and permission from the landowners needed.

### **Conclusions**

In general most of the road systems in the Ticonderoga section of the Lake George watershed provide adequate treatment for stormwater runoff at this time, with the exception of the identified areas of concern. The suggestions put forth in the Mapping and Retrofit Recommendations section are simple and cost effective means of alleviating a majority of the stormwater runoff into Lake George. With the exception of the Tin Pan Alley area, most of the work can be completed by town employees with the assistance of the District. The District can help the Town of Ticonderoga with the sighting, design and construction oversight of the recommended stormwater repairs.

It is important to understand that as time goes by, weather patterns change, development occurs and structures age. A report such as this needs to be used as a working document to assist with stormwater management and needs to have periodic updates conducted. It is the District's hope that the town will consider evaluating their stormwater management systems every few years to determine their effectiveness in reducing nonpoint source pollution to Lake George.

## 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](http://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](http://cfpub.epa.gov/npdes/home.cfm?program_id=6)