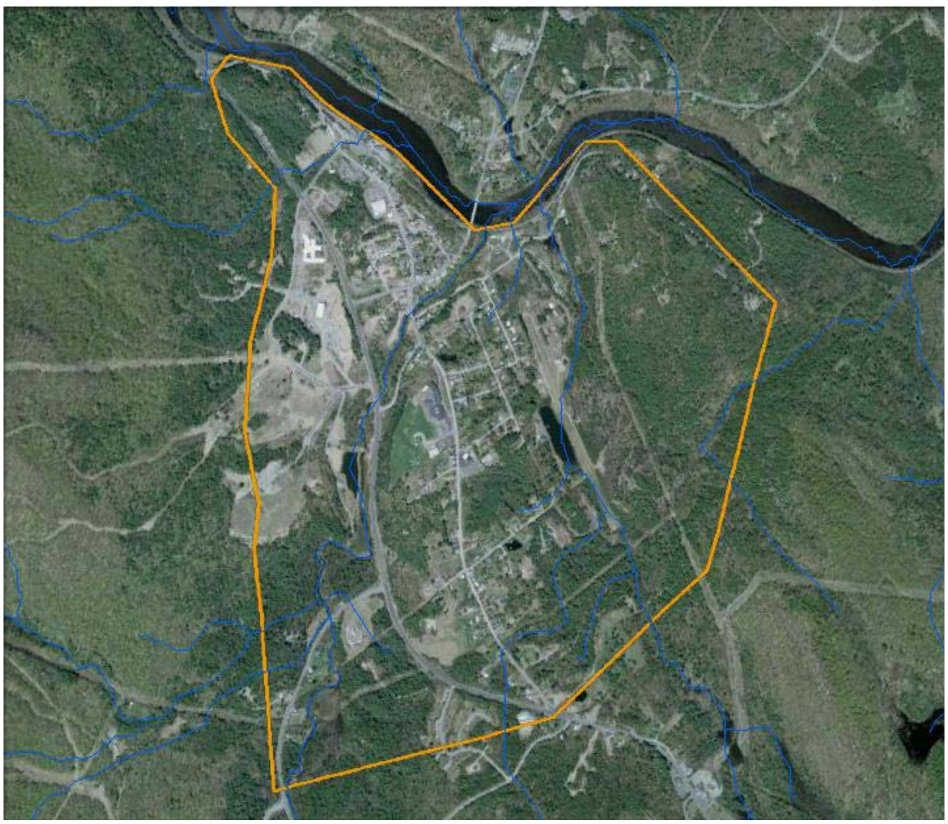
# The Town of Johnsburg Stormwater Mapping Report

**Prepared by the**

**Warren County Soil & Water Conservation District**

**December 2013**



WARREN COUNTY SOIL & WATER CONSERVATION DISTRICT

TOWN OF JOHNSBURG 1805 2005

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## Introduction and Location

The Town of Johnsburg is a rural community in the northwestern corner of Warren County. It is located in the Gore Mountain region and is completely within the Adirondack Park. The Town is bounded to the east by the Town of Chester and to south, the Town of Thurman.

Johnsburg takes pride in the rich natural resources of their community and strives to protect it. Johnsburg is improving its management of stormwater by working with Warren County Soil and Water Conservation District (District), who has extensive knowledge and experience in stormwater runoff assessments and retrofitting techniques. The District performed a comprehensive examination of roadway infrastructure within the hamlet of North Creek in relation to stormwater issues and impacts. This assessment resulted in the identification of stormwater outfalls and areas of concern.

## Stormwater Runoff

The impact of stormwater runoff on nearby waterways is a significant concern in any developed area. Runoff from roadways and parking lots is frequently channeled into drains and pipes, many of which outlet into a stream, river, or lake. Impervious surfaces such as roads, rooftops, and asphalt parking lots, do not allow water to infiltrate into the ground. As a result the sediment, phosphorus, de-icing materials (salt and sand) and other pollutants collected as stormwater flows across impervious surfaces often ends up in nearby waterbodies.

Improperly installed or poorly maintained roadside ditches can also contribute to stormwater runoff issues. A failing roadside ditch can allow the velocity of stormwater runoff to increase, resulting in higher levels of erosion and sedimentation. During warmer months stormwater can also be significantly warmer than the waterway's water. This causes thermal pollution, which will negatively impact the waterway's aquatic communities.

Stormwater is a major contributor of sedimentation and delta formation in waterways, and can also harm aquatic communities. Calcium from road salt can increase the risk of zebra mussel colonization by creating suitable habitat conditions for them. The transport of phosphorus by sediment can lead to multiple problems, including the eutrophication of waterbodies, increased habitat for invasive aquatic plants and animals, and the general deterioration of water quality.

Stormwater runoff directly impacts a waterway's long term-stability. If done incorrectly as development occurs, more stormwater runs off the land into nearby waterways, typically following a precipitation event. A large volume of water entering a stream in a short period of time can cause a widening of the stream channel in order to accommodate the increased volume of stormwater. These channel widening processes result in accelerated stream bank erosion, and may lead to increased downstream deposition (deltas).

Stormwater runoff is generally considered to be the largest water quality impact in most developed watersheds. This report will provide the Town of Johnsburg with the information that it needs to identify opportunities to address stormwater issues and to reduce their impacts within the Hudson River Watershed.

## Assessment and Methodology

This report is a comprehensive examination of the stormwater systems on the roadway network in the Town of Johnsburg. The assessment consisted of a review of the stormwater runoff from the conveyance systems along all town, county, and state roads within the hamlet area of Johnsburg. In addition, cost effective recommendations are identified that will reduce stormwater pollutants to the Hudson River and its tributaries.

District staff used Geographic Information System ArcView 9.3 (GIS) to assist with mapping of the town roads from existing data. These maps were referenced throughout the project as a guide and layout for the final stormwater identification and mapping. Each of the roads were driven to document the stormwater networks, outfalls and storm drain inlets, as well as any point and non-point source pollution in the town. Data was collected using a Global Positioning System (GPS) Trimble Juno SB. Data was logged and photographed to document the physical conditions of stormwater runoff from the conveyance systems. The collected information was then processed in the office and the GPS data was differentially corrected and exported as shapefiles for utilization in GIS maps.

Each area of concern identified as a contributor 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 stormwater runoff from the roadway network and paved roadside ditches to the conveyance system.

# Stormwater Mapping and Retrofit Recommendations

## Intersection of Ski Bowl Road and Main Street: Map 1

The intersection of Ski Bowl Road and Main Street drains a significant amount of stormwater to multiple drop inlets that are conveyed to a tributary in the Upper Hudson River watershed. Approximately 730 feet of Ski Bowl Road has paved ditching that conveys stormwater north at a high velocity. This stormwater runoff flows directly to two drop inlets at the intersection with Main Street where de-icing materials and other pollutants outfall into the tributary. The installation of two 4'x8' drywells, one at each corner of the intersection of Ski Bowl Road and Main Street, would greatly reduce the amount of stormwater and de-icing materials that drain directly to the tributary. The proposed drywells will infiltrate stormwater, collect sediment and recharge groundwater.

*Intersection of Ski Bowl Rd & Main St: Drop inlet conveys directly to tributary*

## Intersection of Main Street and Railroad Place: Map 2

The intersection of Main Street and Railroad Place receives approximately 1,060 feet of stormwater runoff from the north and 1,565 feet of runoff from the south portion of Main Street. This stormwater flows east down Railroad Place and outlets into a tributary of the Hudson River by way of three drop inlets.
The recommended retrofit for this location is the installation of two 4'x8' drywells east of the intersection of Main Street and Railroad Place. Two additional drywells installed on Main Street south of the intersection with Ski Bowl Road, will reduce the runoff volume flowing north. Stormwater retrofits to the current stormwater system will immediately benefit the water quality of the outfall tributary by capturing suspended solids and through groundwater recharge. Reducing sedimentation to tributaries also greatly improves aquatic habitats for plants and animals.

*Intersection of Main St & Railroad Place: Drop inlet that outfalls to tributary*

The south portion of Main Street is conveyed through a large stormwater system that drains north to a tributary of the Hudson River. Further research will need to be done on this system to come up with an efficient and economical solution to reduce the stormwater and pollutants that outfall into the tributary. A structure that has been successfully used as an end of pipe solution for a storm sewer system is a hydrodynamic stormwater separator. This stormwater device will capture suspended solids and floatables from a large storm sewer system that would otherwise directly outfall to a tributary. The best way to deal with stormwater runoff is to break up the stormwater in multiple locations to prevent the possibility of a large failure in one location. In certain locations and situations, an end of pipe solution may be the only feasible option due to site constraints and existing infrastructure.

**Southern Intersection of Route 28 and Ski Bowl Road: Map 3**

There is approximately 2,300 feet of sparsely vegetated ditch on each side of Route 28 that conveys large volumes of stormwater to North Creek. As stormwater flows though the ditches, it collects sediment and pollutants from the road and deposits them into the stream. Recommendations include routine ditch maintenance, utilize the District's Hydroseeding Program to establish vegetated ditches (Appendix 6) and the installation of check dams (Appendix 7).

*Route 28: Eroding roadside ditches*

The NYS DEC recognizes that successfully establishing vegetative cover will reduce sediment inputs by up to 90% and installing check dams will slow stormwater velocity, increase infiltration and add to ease of maintenance. This site should be further examined to determine what further Best Management Practices (BMPs) could be implemented. The southern intersection of Route 28 and Ski Bowl Road has stormwater runoff from portions of Ski Bowl Road, Dump Road and a small section of Return Loop Road. The Route 28 stormwater runs off into North Creek 200 feet south of the intersection with Ski Bowl Road shown in Map 3. Installing multiple BMPs in this area will have an immediate water quality improvement on North Creek. A bioretention area may be added to increase stormwater storage and infiltration which will assist in capturing and treating larger storm events in this location.

**Intersection of Main Street and River Road: Map 4**

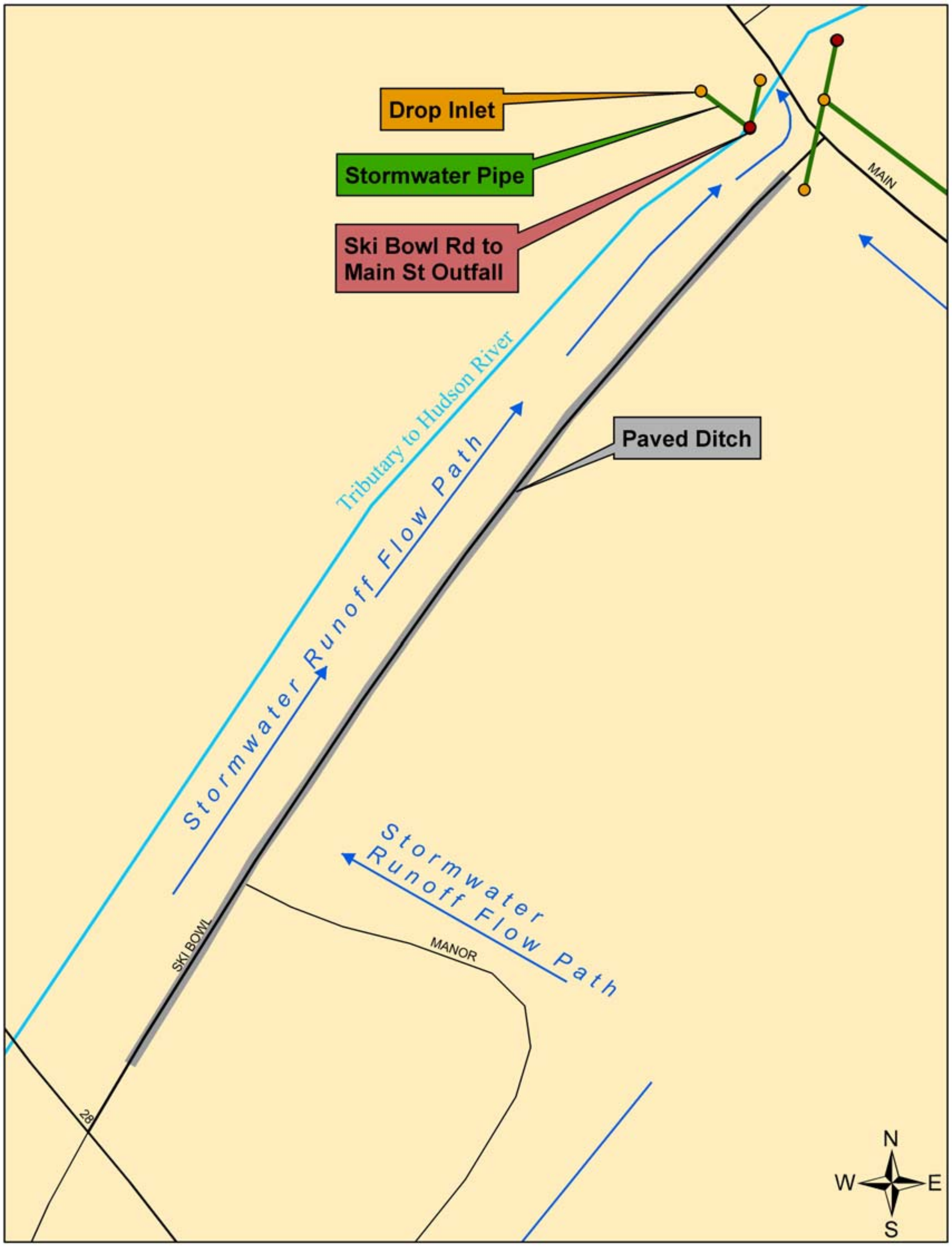
*Outfall from Main Street to North Creek*

The intersection of Main Street and River Road is another area which contributes a significant amount of stormwater to the Upper Hudson River watershed. There are five outfalls that all convey stormwater directly to North Creek. Four of the outfalls are from Main Street and one outfall is from River Road. These drop inlets capture stormwater from the north and south portions of Main Street and water flowing west on River Road. Depending on site constraints, drywells to capture runoff before entering the drop inlets that outfall to North Creek would greatly reduce stormwater inputs. With further site evaluation, this area may be a feasible location for a bioretention basin or a rain garden to reduce stormwater inputs. Main Street is a popular, high traffic area and a rain garden would serve as a functional, educational and aesthetically pleasing alternative for the community. This method of bioretention works well in areas with subsurface site constraints where excavation and subsurface infiltration with drywells may not be feasible.

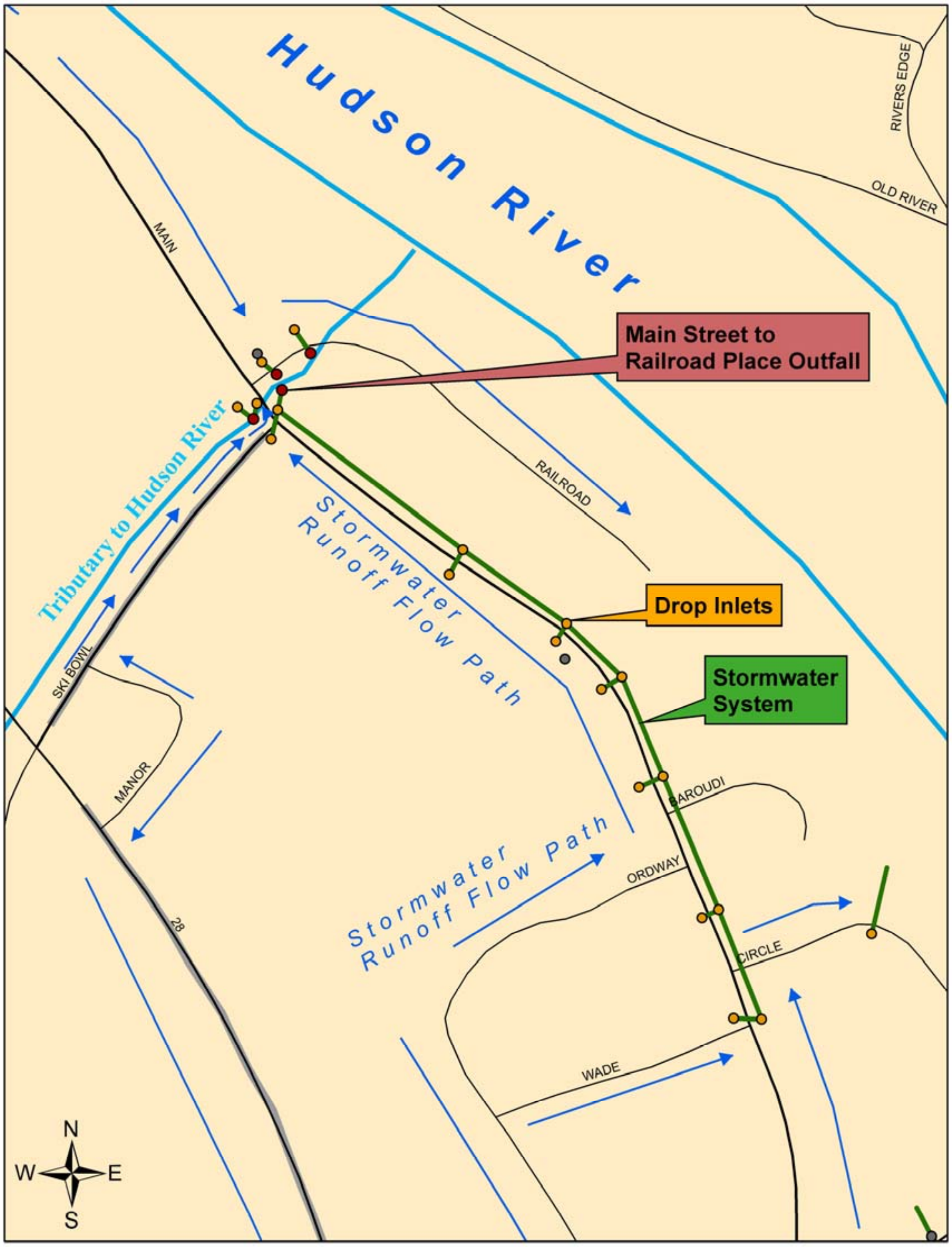
## Conclusions

The urbanized area of the Town of Johnsburg has nine drop inlets that are direct outfalls to tributaries in the Upper Hudson River Watershed. This report identifies the main areas of concern for stormwater runoff to the tributaries from these outfalls. In order to maintain and improve the water quality of these tributaries, we need to ensure that the waters that drain to it are clean. This can be done through stormwater retrofits and the use of alternative de-icing practices. It is important to keep in mind that the cooperation of municipalities, agencies, landowners and businesses is necessary in order to resolve nonpoint source pollution issues. Stormwater is one of the most significant contributors to nonpoint source pollution and by addressing the problem now will be both economically and environmentally beneficial for communities that are built around and depend upon these waterbodies.

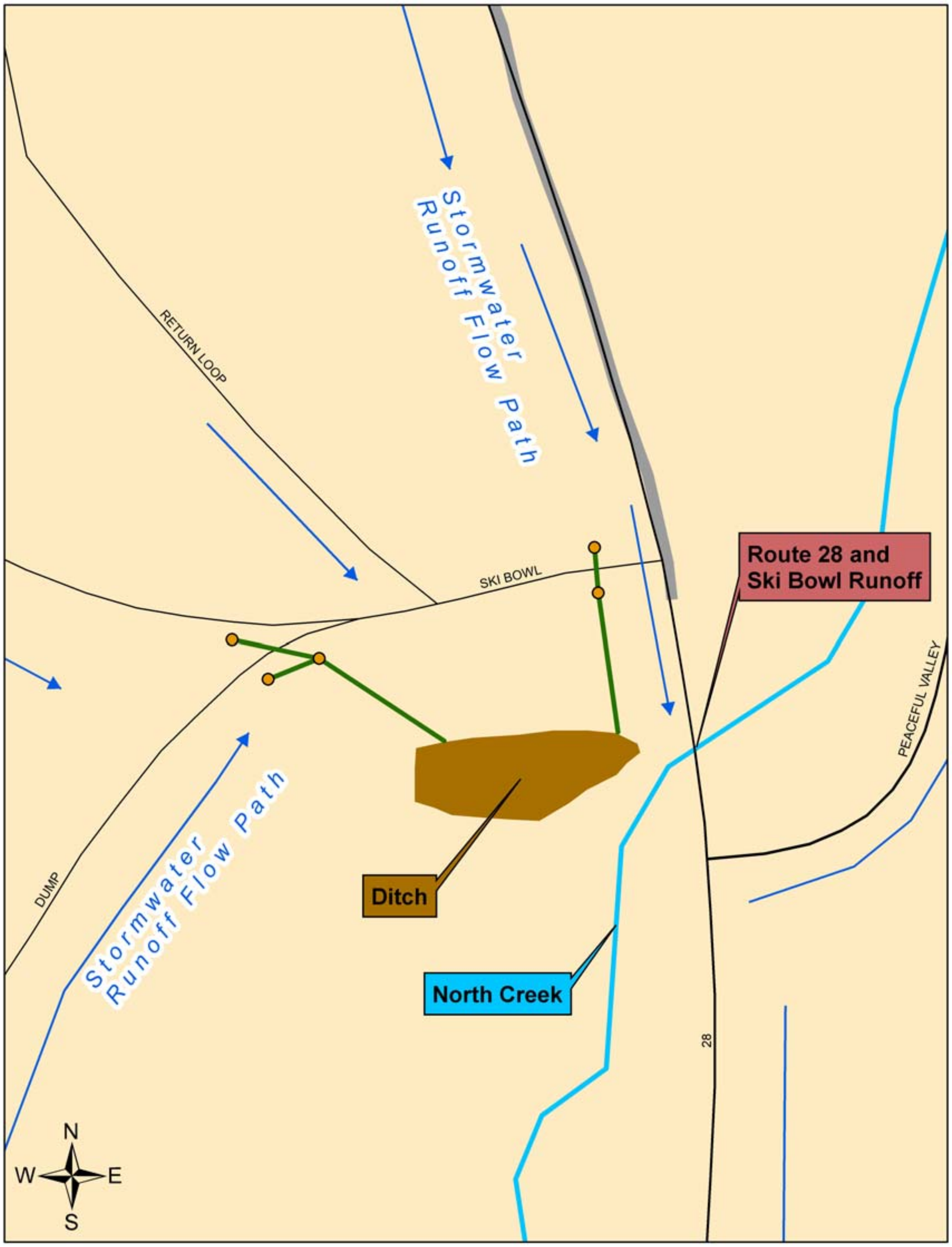
# Map1: Intersection of Ski Bowl Rd. and Main St.



# Map 2: Intersection of Main St. and Railroad Place



## Map 3: Southern Intersection of Rt. 28 & Ski Bowl Rd



## Map 4: Intersection of Main St. and River Rd.

# Stormwater Resource Websites

- DEC Division Water Stormwater Webpage:
  - 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 Stormwater Management Design Manual Current Version: August 2005

- Lake George Park Commission:
  - http://www.lgpc.state.ny.us/

- Warren County Soil and Water Conservation District:
  - http://www.warrenswcd.org/

- The Lake George Association:
  - http://www.lakegeorgeassociation.org/

- The Fund for Lake George:
  - http://www.fundforlakegeorge.org/

- Soil & Water Conservation Society – Empire State Chapter:
  - http://www.swcsnewyork.org/

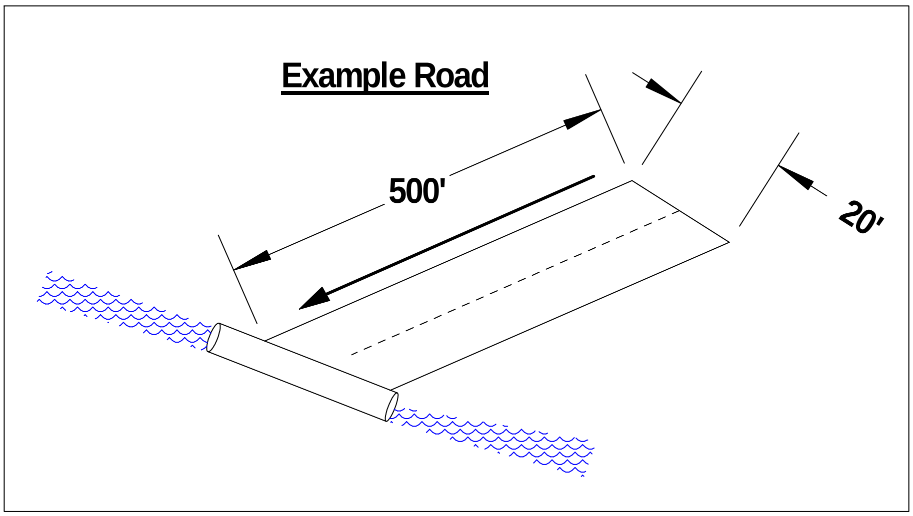
- SUNY- ESF Continuing Education – Stormwater Management Program:
  - http://www.esf.edu/outreach/stormwater/

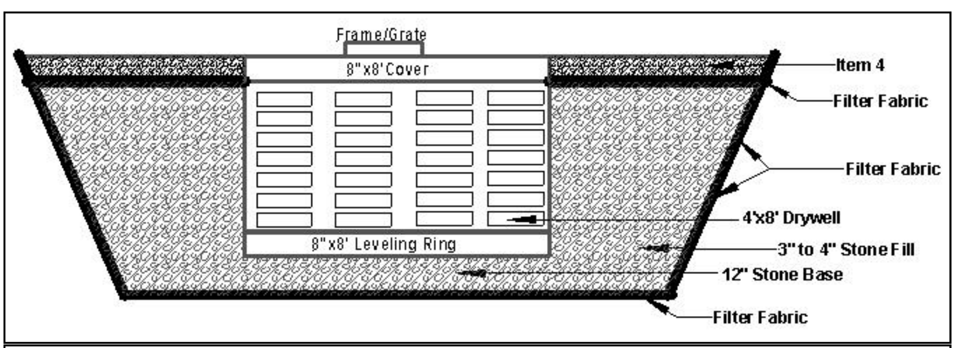
- Center for Watershed Protection:
  - http://cwp.org/

- EPA Stormwater Homepage:
  - http://cfpub.epa.gov/npdes/home.cfm?program_id=6

# Estimating Volume for Typical Roadside Treatment

Example Road drains 500’ of length and 20’ of width to the low point in the topography. The low point in Example Road is a culvert with a stream flowing under the road. This section of Example Road drains 500’ x 20’ = 10,000 square feet of road drainage. To calculate volume of stormwater in a 1” storm divide 10,000 sq ft by 12” and you get 833 cubic feet which converts to 6,231 gallons of stormwater draining to the stream.




Cross section of a typical 4’ x 8’ Drywell

# Design 1 - Vegetating Waterway

## STANDARD AND SPECIFICATIONS FOR VEGETATING WATERWAYS

### Definition

Waterways are a natural or constructed outlet, shaped or graded. They are vegetated as needed for safe transport of runoff water.

### Purpose

To provide for the safe transport of excess surface water from construction sites and urban areas without damage from erosion.

### Conditions Where Practice Applies

This standard applies to vegetating waterways and similar water carrying structures.

Supplemental measures may be required with this practice. These may include: subsurface drainage to permit the growth of suitable vegetation and to eliminate wet spots; a section stabilized with asphalt, stone, or other suitable means; or additional storm drains to handle snowmelt or storm runoff.

Retardance factors for determining waterway dimensions are shown in Table 5B.1 and "Maximum Permissible Velocities for Selected Grass and Legume Mixtures," are shown in Table 3.6.

### Design Criteria

Waterways or outlets shall be protected against erosion by vegetative means as soon after construction as practical. Vegetation must be well established before diversions or other channels are outletted into them. Consideration should be given to the use of synthetic products, jute or excelsior matting, other rolled erosion control products, or sodding of channels to provide erosion protection as soon after construction as possible. It is strongly recommended that the center line of the waterway be protected with one of the above materials to avoid center gullies.

1. Liming, fertilizing, and seedbed preparation.
   A. Lime to pH 6.5.
   B. **The soil should be tested to determine the amounts of amendments needed.** If the soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 1.0 lbs/1,000 sq. ft. of N, $P_2O_5$, and $K_2O$.
   C. Lime and fertilizer shall be mixed thoroughly into the seedbed during preparation.
   D. Channels, except for paved section, shall have at least 4 inches of topsoil.
   E. Remove stones and other obstructions that will hinder maintenance.
2. Timing of Seeding.
   A. Early spring and late August are best.
   B. Temporary cover to protect from erosion is recommended during periods when seedings may fail.
3. Seed Mixtures:

| **Mixtures** | **Rate per Acre (lbs)** | **Rate per 1,000 sq. ft. (lbs)** |
|---|---|---|
| A. Birdsfoot trefoil or ladino clover[1] | 8 | 0.20 |
| Tall fescue or smooth bromegrass | 20 | 0.45 |
| Redtop[2] | 2 | 0.05 |
| | 30 | 0.70 |
| OR | | |
| B. Kentucky bluegrass[3] | 25 | 0.60 |
| Creeping red fescue | 20 | 0.50 |
| Perennial ryegrass | 10 | 0.20 |
| | 55 | 1.30 |

[1] Inoculate with appropriate inoculum immediately prior to seeding. Ladino or common white clover may be substituted for birdsfoot trefoil and seeded at the same rate.

[2] Perennial ryegrass may be substituted for the redtop but increase seeding rate to 5 lbs/acre (0.1 lb/1,000 sq. ft).

[3] Use this mixture in areas which are mowed frequently. Common white clover may be added if desired and seeded at 8 lbs/acre (0.2 lb/1,000 sq. ft.)

# Design 2 – Check Dam

## STANDARD AND SPECIFICATIONS
## FOR
## CHECK DAM

### Definition

Small barriers or dams constructed of stone, bagged sand or gravel, or other durable material across a drainage way.

### Purpose

To reduce erosion in a drainage channel by restricting the velocity of flow in the channel.

### Condition Where Practice Applies

This practice is used as a temporary or emergency measure to limit erosion by reducing velocities in small open channels that are degrading or subject to erosion and where permanent stabilization is impractical due to short period of usefulness and time constraints of construction.

### Design Criteria

**Drainage Area:** Maximum drainage area above the check dam shall not exceed two (2) acres.

**Height:** Not greater than 2 feet. Center shall be maintained 9 inches lower than abutments at natural ground elevation.

**Side Slopes:** Shall be 2:1 or flatter.

**Spacing:** The check dams shall be spaced as necessary in the channel so that the crest of the downstream dam is at the elevation of the toe of the upstream dam. This spacing is equal to the height of the check dam divided by the channel slope.

Therefore:

$$S = h/s$$

Where:

S = spacing interval (ft.)
h = height of check dam (ft.)
s = channel slope (ft./ft.)

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows:

$$S = \frac{2\text{ ft.}}{.04\text{ ft/ft.}} = 50\text{ ft.}$$

**Stone size:** Use a well graded stone matrix 2 to 9 inches in size (NYS – DOT Light Stone Fill meets these requirements).

The overflow of the check dams will be stabilized to resist erosion that might be caused by the check dam. See Figure 5A.9 on page 5A.24 for details.

Check dams should be anchored in the channel by a cutoff trench 1.5 ft. wide and 0.5 ft. deep and lined with filter fabric to prevent soil migration.

### Maintenance

The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures, a liner of stone or other suitable material should be installed in that portion of the channel.

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam. Replace stones as needed to maintain the design cross section of the structures.