Stewart Brook / Dula Pond Watershed Assessment

Prepared For the Town of Bolton

by the Warren County Soil and Water Conservation District

through the

Lake George Park Commission
Community Stormwater Grant Program

February 2012

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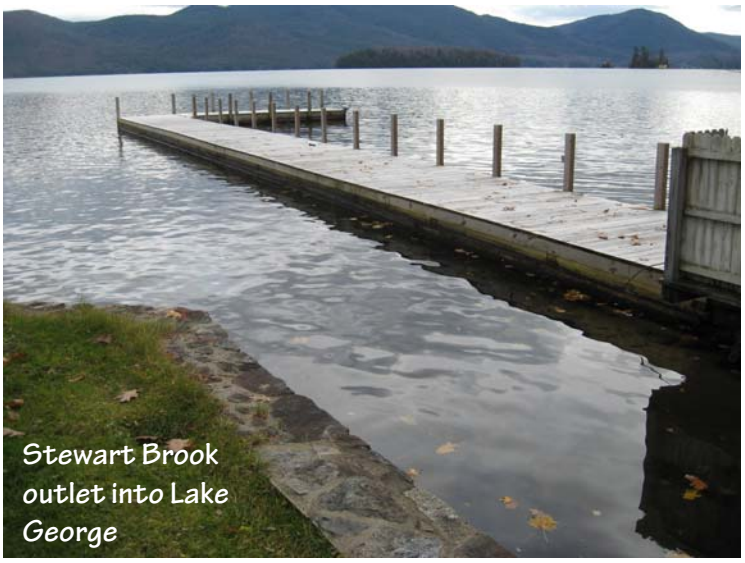
Introduction and Background

Stewart Brook (otherwise known as Dula Pond Brook) is a relatively small stream located just south of the hamlet of Bolton Landing in Warren County. This stream is approximately 1.6 miles in length, and flows easterly until its confluence with Lake George. It flows through both pristine and highly developed portions of the town, and exhibits impacts from land use practices within the watershed. Approximately 650 feet upstream of the stream's confluence with the lake is Dula Pond, which is a well known feature in the Town of Bolton. Many groups have expressed concern over the rate at which Dula Pond is filling in with sediment over the past decade or so, and this issue is a principal reason for this watershed assessment.

Through funding obtained from the Lake George Park Commission Community Stormwater Grant Program, the Warren County Soil and Water Conservation District (District) has undertaken an assessment of the Stewart Brook Watershed. This assessment includes stream bank erosion, stormwater runoff from roadways and properties, and other negative water quality impacts within the Stewart Brook Watershed as well as recommendations for remediation. The stream is an AA-Special Classified tributary by the NYS Department of Environmental Conservation.



Stewart Brook outlet into Lake George

Stewart Brook Watershed is a relatively small watershed at approximately 450 acres. The watershed itself is more than 50% light residential by land use category (see Land Use Classification Chart in appendix). The soils in the watershed are primarily a sandy loam which is typical in Warren County. These soils are typically well drained with moderate to rapid permeability. (See Soils map in appendix). This characteristic makes the soils viable for stormwater infiltration and retrofitting projects.

In year 2000, the Lake George Association commissioned Meyers Engineering to conduct a review of Stewart Brook and its watershed, which resulted in two reports on the status of the brook and pollutant inputs. Those reports outline issues within the watershed which impact the brook, and also note the sedimentation of both Dula Pond and Lake George itself. Those reports are available from the LGA.

In the *2009 Stream Assessment Report* conducted by Dawn Keppler, Stream Assessment Project Director for the Lake George Waterkeeper, water quality

studies conducted in Stewart Brook showed degraded water quality or impairments. Some of these parameters included macro invertebrates, specific conductivity, mean habitat, available cover, water temperature and many more. That report is available from the office of the Lake George Waterkeeper.

With the results of both of these studies showing the impacts to the brook, it was the focus of this Watershed Assessment to more closely explore the nonpoint source pollutant sources and to recommend specific solutions to address them where feasible.

Assessment Methods

This reports seeks to identify and confirm where sources of pollutants are entering the brook, and to detail cost effective recommendations that will reduce stormwater pollutants and sediment input to Dula Pond and Lake George.

After gathering information from existing reports, the Stewart Brook Watershed was delineated and mapped by District staff using USGS topography at 20 foot contours. This information was compared with existing watershed coverages, field checked and adjusted accordingly.

District staff walked the stream system documenting areas of channel degradation, aggradation and erosion of the bed and banks, as well as any obstructions to the stream channel and in stream culverts. Using a Global Positioning System Trimble GeoXT (GPS), data was logged along with photographs to document the physical conditions of the stream. Personal communication with landowners along the way added valuable insight to past conditions pertaining to flooding and erosion at particular locations.

Each of the roads was driven, documenting the stormwater network, outfalls, and storm drain inlets along with any point and non-point source pollution in the Stewart Brook Watershed. This information collected was post processed in the office and the GPS data was differentially corrected and exported as shapefiles for utilization in Geographic Information System 9.3 (GIS).

Each area which was identified as contributory to erosion or stormwater pollution was reviewed for potential solutions. The recommendations identified in this report primarily lean towards roadside stormwater runoff infiltration, which can address both the quality and quantity of runoff entering the brook. These recommendations are based on the success of similar initiatives in the Village of Lake George, which has over 40 separate stormwater infiltration systems installed in their roadside areas at very reasonable cost. However, there are many site specific challenges in the hamlet of Bolton (high water table, poor soils, bedrock, underground utilities) which will merit site specific discussions with the town highway department.

At the request of Town Supervisor Ron Conover, District staff also conducted a basic bathymetric (bottom contour) survey of Dula Pond via canoe. The purpose of this survey was to provide a quick overview of the current depth of the pond, primarily in the inlet location. This information can be utilized to determine the volume of sediment which could be removed (excavated) to restore a more original pond depth.

Three cross sections were run roughly north to south at the shallowest locations; two were placed at the northern end of the pond and one at the southern tip. A profile was run from the northwestern end of the lake approximately 520 feet southeast to the Land Conservancy dock and outlet of the pond. Depths were taken with a survey rod approximately every 20 feet. GPS coordinates were logged at these points. These GPS points were post-processed and brought into GIS. The profile and three cross sections were plotted in AutoSketch drafting program. The approximate volume of sediment to be removed can be extrapolated from cross section / profile data when the desired depth of excavation is determined by all parties.

General Stream Condition

Many portions of Stewart Brook from the mouth at Lake George to the first major tributary above Bradley Lane were armored with vertical stone and concrete walls and constricted by houses, culverts and other infrastructure. This confined condition is along the lower half of the stream system, whereas the upper half is generally unmanaged and in a more natural state. The channel confinement

lends itself to bank scour and channel degradation, as the stream does not have easy access to its floodplain.

In most cases bank "protection" activities are placed along streambanks to reduce flooding and erosion of adjacent properties. Unfortunately, by changing the channel hydraulics, the erosion problems are simply translated downstream to a less protected section, or the channel simply downcuts into its bed. Accordingly, there are several areas where scoured stream banks have been located.

As Stewart Brook runs through the heavily developed hamlet of Bolton, stormwater runoff from these developed areas discharge into the brook in many locations. The road network in the Stewart Brook Watershed crosses and parallels the stream for the majority of its length. The stormwater pipes from the road network outlet directly to Stewart Brook, emptying large quantities of stormwater, sediment and pollutants directly to the stream. This rapid increase in flow to the channel only exacerbates the erosion and flooding issues along the brook length.

The vast majority of development in the Bolton hamlet was long before stormwater regulations for development were in place. As such, a considerable percentage of rainwater does not get infiltrated, and runs off of private properties, down roads, and ultimately into the brook. There is no mandate to retrofit private properties with stormwater improvements, so the best way to address the stormwater quality and quantity issue is through retrofitting the road network with stormwater infiltration systems.

Given the proximity of Stewart Brook to the roadway network, there are fairly significant inputs of road de-icing materials (sand and salt) which directly discharge into this stream in several locations. These inputs are a component of the delta sediment material building up in the inlet of Dula Pond, but the percentage this delta attributed to this source is unknown.

There are a few locations within the watershed where road ditches are eroding and contributing sediment to the brook, primarily on Potter Hill Road. These sites

are fairly easy to remedy, either through use of the SWCD's hydroseeding program or a channel lining effort (stone or rolled erosion control product). These efforts would both reduce the sediment and phosphorus inputs to the brook, and reduce the long-term maintenance required for the ditches.

Lastly, within this relatively small watershed are most of the DEC permitted Town of Bolton municipal wastewater treatment plant infiltration beds, which are less than 800 feet down gradient of Dula Pond. While the proximity of this system to the brook and the pond could merit closer inspection in relation to nitrogen and other pollutants, the scope of this study does not encompass this issue.

Recommendations

Although the existing condition of Stewart Brook in the hamlet area of Bolton is impacted, there are opportunities to address some of these issues. The three identified areas which, if addressed, would dramatically improve the condition of Stewart Brook are stormwater discharge from roadways, stream channel confinement (bed and bank erosion), and an upland development site on private property.

Stormwater Discharge from Roadways

There are a number of areas where the brook receives direct stormwater discharge and the pollutants it contains. By installing roadside stormwater retrofit systems to capture and infiltrate this stormwater, the discharge is eliminated and the soil acts to filter, adsorb and break down the pollutants. However, the challenge in the hamlet of Bolton is to find sites without limitations such as shallow water table, bedrock, or underground utilities in the way. Each site recommended for stormwater retrofitting will merit inspection for these issues prior to construction, including a test pit, soils review, and underground facilities markouts.

The highest concentration of drop inlets are located along Brook Street, Goodman Avenue and Cross Street, most of which drain into the stream. There is an opportunity to retrofit several of the existing drop inlets with drywells or other

infiltration devices to filter this stormwater into the ground before it is outlet into the stream.

The best sites for retrofitting with roadside drywells have been identified by SWCD staff, based upon ability to capture and infiltrate stormwater and reasonable ability to construct improvements based on site observations and limitations. The drainage areas and recommended locations of proposed drywells are shown on Appendix A. Each drywell installation costs approximately $3,000, using a contracted excavator and operator and town trucking and labor assistance.

Streambank Erosion and Channel Issues

There were several areas along the stream that were experiencing bank erosion or channel degradation (bottom scour). The challenge of Stewart Brook in the hamlet is its confinement and alteration by landowners, to a point where it is channelized considerably beyond natural conditions. When landowners "harden" a stream's banks through protection measures (retaining walls primarily), the stream's floodplain is often cut off. It may protect a landowner from flood events, but the volume of water and its energy often does even more damage downstream. In addition, the channel often cuts down into its bed, eroding and undermining those walls and leading to failure. The sediments that are eroded are deposited downstream as the velocity slows, in areas such as Dula Pond.

While there is no mandate that landowners modify their streambanks to restore a more natural condition, this practice could greatly benefit Stewart Brook, Dula Pond, and ultimately Lake George. As these walls deteriorate and fail over time, landowners need permits from DEC and other regulatory entities to do work on the banks of streams. New standards are in place at DEC which largely eliminate the use of vertical walls. Over time, the stream may hopefully come back to a more natural condition. If any landowner is interested in restoring a channelized section of stream, Warren County SWCD staff can assist in the design of these projects at no fee to the owner.

As each eroding site on the brook is distinct and varies in its size, nature and complexity, individual recommendations for site work are impractical in a document such as this. Also, while many locations of stream erosion are present, none are significantly large enough to merit an agency or municipal effort to improve. As there is no means to force landowners to repair an eroding bank or to restore a stream, these efforts are best conducted individually at landowners' request. At such request, SWCD staff will conduct site visits to any and all landowners who are interested in working to improve their portion of Stewart Brook. The SWCD is a technical assistance agency (not a regulatory one), and offers guidance and assistance on these issues.

Upland Erosion Issues

Just northwest of Bradley Lane a tributary enters the main stem of Stewart Brook. Approximately 200 feet upstream is the site of a fairly large land disturbance for a planned but apparently stalled development project owned by Mountain Aire Management LLC. The largest identified source of sediment to the brook and Dula Pond is contributed by this development. This site has historically been a significant source of sediment to the stream, even as far back as year 2000 as this issue was noted in a Dula Pond watershed study by Myers Engineering.

At the time of this current assessment, a considerable portion of the property was disturbed in some capacity related to construction activities. In some areas, the soils were unvegetated and unprotected. There was a series of silt fences being used as check dams that were in some cases filled to capacity or failing (see picture). During the assessment, numerous downstream landowners on the Stewart Brook voiced concerns over this the practices being employed at this location.

Not only is the site itself a concern for erosion and stream sedimentation, but the channel which conveys this tributary to the mainstem is also unstable. SWCD Manager Dave Wick was requested by the property owner Jeff Tennent on two occasions (2010 and 2011) to review the site and develop a solution. The District provided written recommendations to protect and improve this channel, but to date, these improvements have not been implemented. The result is that the site is still eroding and causing silt and sand to enter the brook, ultimately being deposited in Dula Pond.

Other than this property, there were no other significant upland sources of sediment identified from private properties in the Stewart Brook watershed which were seen as impacting the stream.

The landowner should take immediate action to address the erosion and sedimentation issues associated with this property. The Town of Bolton should review the site and determine the need for the failing access road, and should direct the landowner to stabilize all aspects of the site. The earlier recommendations communicated through the District to the landowner in regard

to the outlet channel are still valid. The soil material placed in the wetland should be removed and the impacted wetland restored.

Dula Pond – Feasibility of Dredging


Sedimentation at inlet of Dula Pond

The residents who live around Dula Pond have expressed concern over the past number of years about sedimentation of the pond from upstream sources. Various individuals interested in this issue have visually confirmed this as an issue, but very little has been done to date to document or quantify the specific nature of the problem. This is an issue that the Town of Bolton is concerned with and requested more information on through this study.

Visual inspections confirm that there is a fairly sizeable sediment delta at the inlet of Stewart Brook into Dula Pond. Based on the volume of sediment and the relatively rapid growth of this delta as reported by local landowners, it is fair to say that this delta results from upland erosion and stormwater runoff issues, exceeding what would be expected from natural conditions. This assertion is confirmed by the evidence of erosion issues within the stream system and on some private properties within the watershed.

SWCD staff took one longitudinal transect and three cross section transects of pond depths in Dula Pond to get an overall status of the general depths in the pond at various locations (Appendices D and E). The pond depth for the first 200 feet or so of the pond below the inlet ranges from zero to three feet, and then the depth slowly drops off to a maximum depth of six to seven feet towards the outlet. The SWCD does not have historical information on original pond depth or excavation, so comparisons to original condition are not reported herein.

Where feasible and cost effective, it is the intention of the Town of Bolton and its water quality partners to identify and correct the upland issues causing this sedimentation. These groups also seek to identify potential cost, permits required and logistics necessary to remove the sediments built up at the stream's entrance to the pond.

From a logistical standpoint, the dredging of the inlet sediments would be feasible with traditional heavy equipment (excavators and trucks). Physical access to the site is possible from Evergreen Lane, between the houses at the northeastern tip of

the pond (tax parcel 171.19-1-58, property owned by Patricia Lamb according to tax records). A temporary access road of approximately 70 feet would need to be constructed across the property for trucks to enter and leave the pond dredging site. Temporary landowner access agreements and post-project site restoration would need to be worked out, but a project of this scale is not logistically difficult. As wetland vegetation has grown on the sediments over the years, it is highly likely that this area would be determined to be a regulated wetland by the Adirondack Park Agency. Their involvement and permit determination would be necessary before proceeding much further with logistics and project costing.

On a broader scale, the feasibility of undertaking a pond-wide dredging initiative is more difficult, but again appears logistically possible from a construction standpoint. Whether this would be permitted by regulatory agencies has not been explored. To undertake such a project, the options are mechanical or hydraulic dredging techniques. Both methods would have benefits and difficulties, due to relatively dense development around the pond, the scale of the project, the cost versus the benefit, and other factors.

Given the fact that there is significant sediment settling capacity within the current pond characteristics, there appears little or no water quality benefit to Lake George in such an undertaking. This initiative would be simply to restore a more original pond depth condition, or to reduce the significant aquatic plant community in the pond for aesthetic purposes. If a project of this scale were to be considered, a frank discussion of permits, costs and available funding sources should be had right up front.

Conclusions

Stewart Brook and Dula Pond suffer the fate of many small streams in relatively heavily developed watersheds: channelization and elevated pollutant levels entering the system. While it is unlikely that the channelization issue will likely be rectified in the near term due to landowner flooding and erosion concerns, there is hope for the long term. As retaining walls fail and landowners seek permits to do work along the banks, opportunities arise to correct past problems. With newer NYS DEC permitting standards related to this topic, the situation may improve in the future.

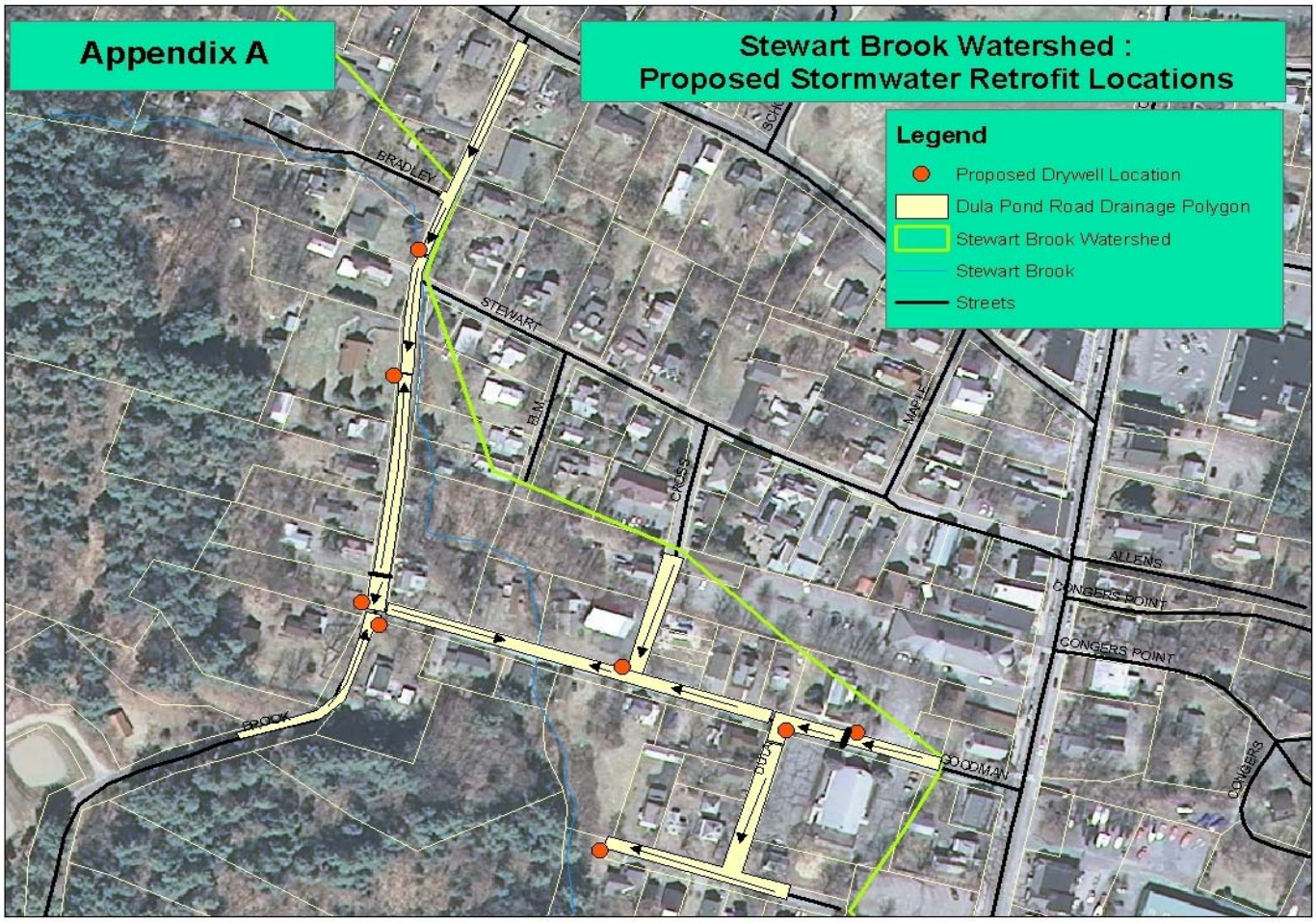
With relation to the pollutant inputs into Stewart Brook, there are many opportunities to reduce these loads. Stormwater retrofitting and infiltration, winter street sweeping operations, regular catch basin cleanouts, and ditch stabilization practices are methods which can be employed by the town and county on their streets in this watershed. On the private side, the property owned by Mountain Aire Management should be addressed and stabilized immediately, which will

reduce a fairly significant sediment load to the brook. On other private properties, there is opportunity to improve stormwater runoff from their properties through infiltration practices, although there is no mandate currently in place to do so and all actions would be voluntary.

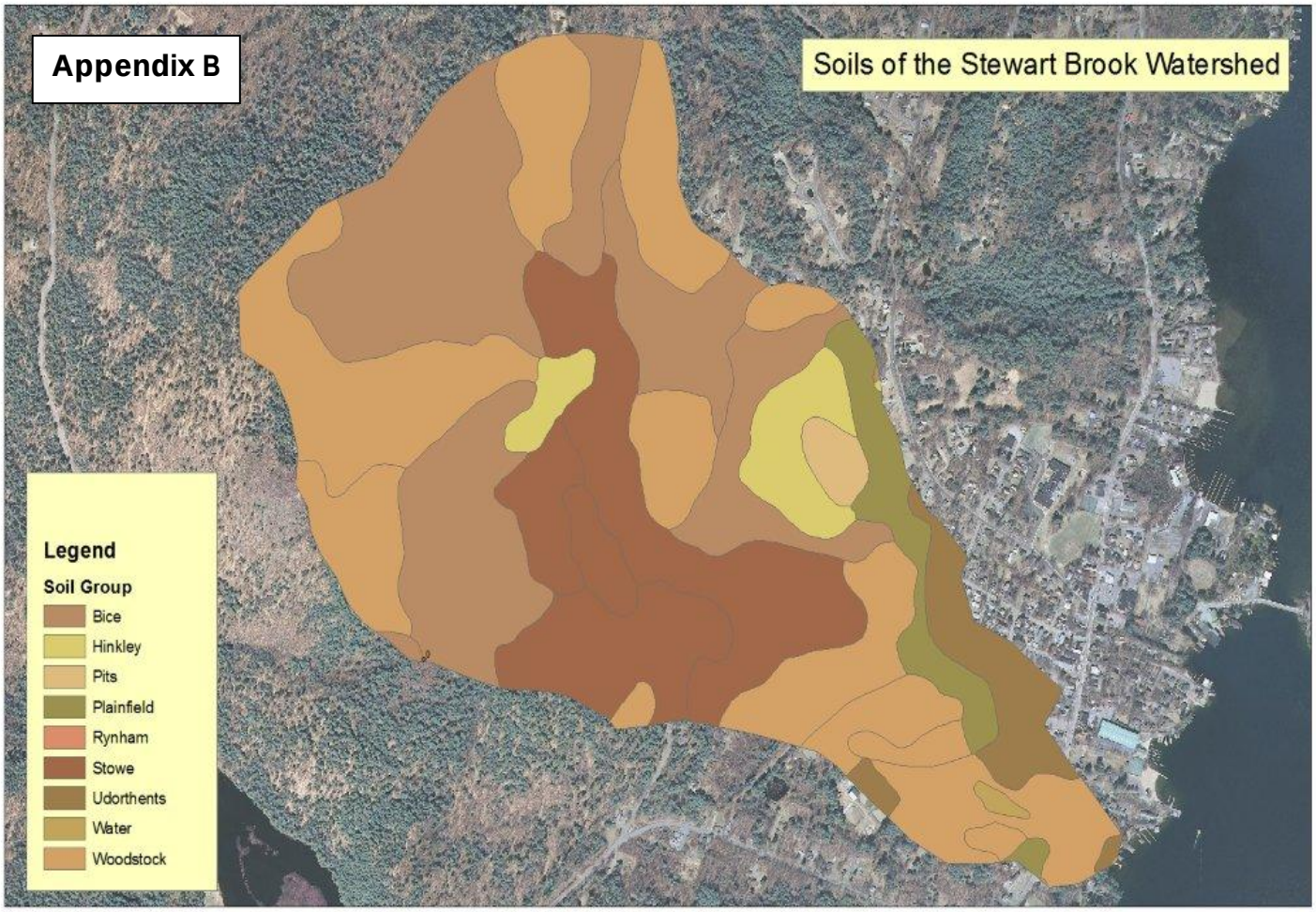
Regarding Dula Pond, while it is logistically feasible to dredge sediments out of the inlet area and perhaps even the a larger area, the costs versus benefits need greater discussion. This pond is on private property, and all actions to work on or within this pond need landowner consent. While these efforts may not provide significant benefit to Lake George, they could restore the pond to a more original condition.

Appendices

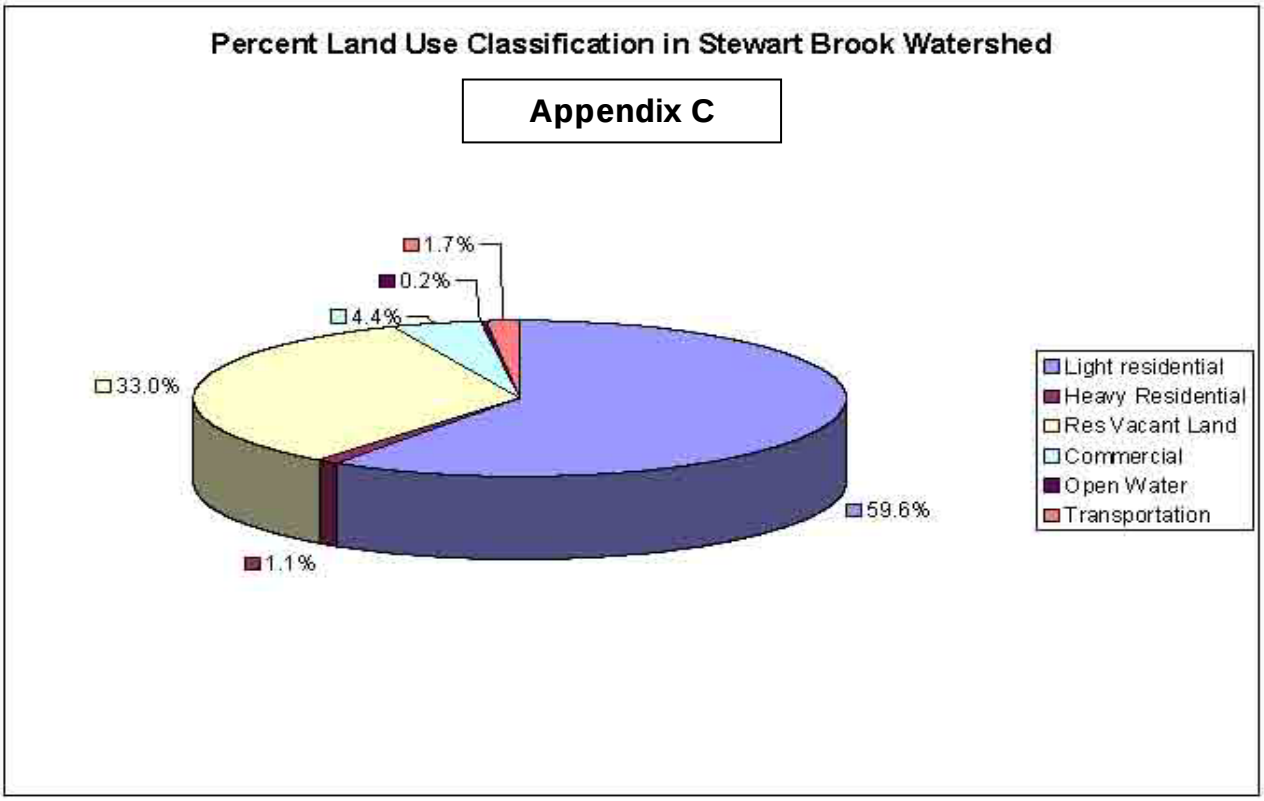
A: Proposed Stormwater Retrofit Locations
B: Soils Map of the Stewart Brook Watershed
C: Land Use Chart
D: Dula Pond Aerial – Sediment Removal Logistics
E: Dula Pond Bathymetry Profile and Location Map



Appendix B

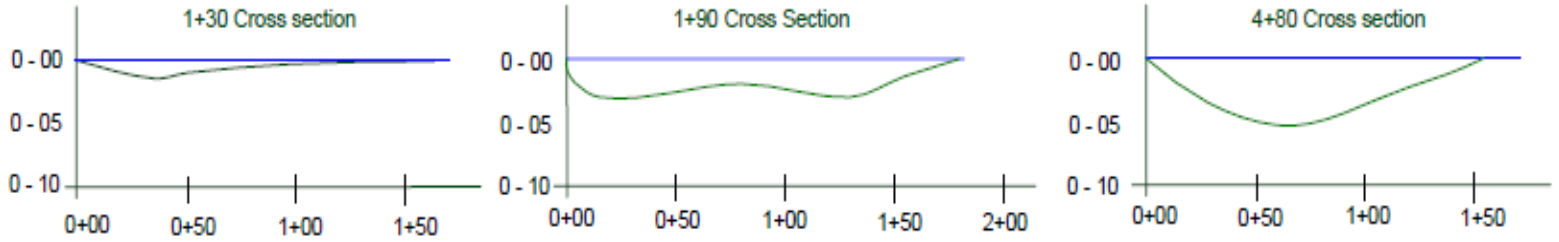


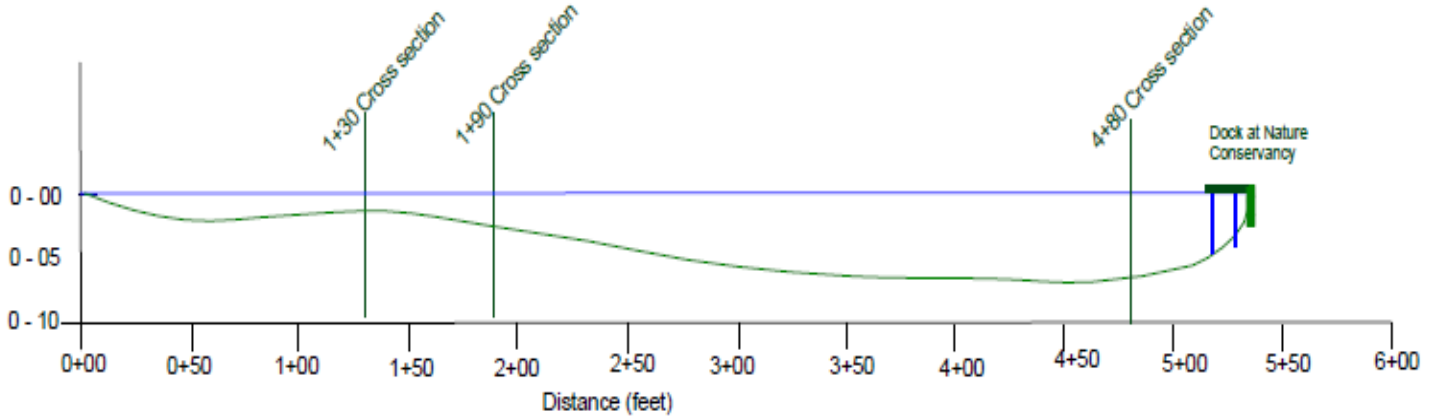
Appendix C




Dula Pond Access for Sediment Removal
Legend
Bolton parcels
Max reach from access site
Proposed access to site
0 25 50 100 150 200 Feet
N
Appendix D
ROGERS MEMORIAL PARK
THE ANCHORAGE
LAKE SHORE
EVERGREEN
HERITAGE
Parcel 171.19-1-58
19 Evergreen Lane
Patricia A. Lamb
1+30
1+90
4+80

Dula Pond Bathymetry





Prepared by:
Warren County Soil &Water
Conservation District
Warrensburg, NY 12885

Signature
Approved by

Dula Bathymetry
Profile and Crosssections
12/6/2011, edits 2/14/12

drawn by: DLM

1"=50'

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