Memorandum

Memo To:	Joe Coffey & Harry Ermides	**Date:**	November 5, 2014
From:	Nadine Medina	**File:**	967.002.001
Re:	Technical Memo 1 Task 1: Targeted Natural Resource Inventory		

This memo serves as the deliverable for Task 1: Targeted Natural Resource Inventory for the Buckingham Pond Conservancy pond evaluation project. Included in this task were three separate evaluations (Ecology and Biology, Water Quality, and Desktop Survey) performed by various members of the project team. The Project Team for Task 1 remained consistent with the project proposal, and consisted of the following:

- Biology & Ecology Assessment: Johanna Duffy, AWB (Senior Project Environmental Scientist)
- Water Quality Assessment: Shaun McAdams (Project Environmental Scientist)
- Desktop Survey: Nadine Medina, PE, CPESC, LEED AP (Project Engineer)

The format of this memo includes three general headings: 1) Introduction; 2) Observations and Findings; and 3) Conclusions. Each section includes information from each of the three assessments.

1.0 Introduction

Three assessments were performed under Task 1: Data Collection and Field Verification. This included the following:

- *Biology & Ecology Assessment (Performed by Johanna Duffy on October, 14, 2014)* The purpose of this assessment was to complete a general ecological walkover and identify any areas of concern. Accompanying Ms. Duffy was Mr. Harry Ermides, President of the Buckingham Pond Conservancy (BPC). They walked the perimeter of most of the pond using the existing walking trail, assessed the adjacent stilling basin area, and walked through a portion of the wooded section located to the northwest/west of the stilling basin. The Davis Avenue Pump Station was also observed. The three aerators that are located within the pond during the spring/summer months had already been removed in preparation for the winter season.

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- *Water Quality Assessment (Performed by Shaun McAdams on October 13, 2014)*
  The purpose of the site assessment was to observe any physical evidence or indicators of water quality conditions, particularly with regard to the results of ongoing Citizens Statewide Lake Assessment Program (CSLAP) water quality monitoring being conducted at the Pond. Features of the pond and surrounding areas were evaluated in order to identify any existing or potential risks to water quality, and to assess opportunities for implementation of potential corrective/remedial actions to help facilitate improvements to water quality in the Pond. Accompanying Mr. McAdams was Mr. Harry Ermides.
- *Desktop Survey (Performed by Nadine Medina)*
  The purpose of the desktop survey was to evaluate existing reports and documents, and to utilize online tools that serve to enhance and augment information gleaned from field visits as well as to provide a greater level of detail for future project tasks. Existing reports and online tools that were evaluated include:
  - "Buckingham Pond Pollution Source and Restoration Assessment: A Student Internship Project for the Buckingham Pond Conservancy," prepared by Ms. Sarah Schaefer and Dr. Katherine Meierdiercks, dated December 2010.
  - CSLAP results and an associated presentation by Mr. Scott Kishbaugh, P.E. of the NYSDEC.
  - A presentation titled Buckingham Lake Berkshire Pond Raft's Pond "Some Historical Facts and Other Information about This Waterbody," prepared and presented By: Daniel R. Hershberg, P.E. & L.S., dated July 13, 2009.
  - Stilling basin sediment depth findings, dated November 16, 2013.
  - NYSDEC stormwater interactive map (To review presence of state wetlands.)
  - NYSDEC Environmental Resource Mapper (To review presence of wetlands, classified waterbodies, sensitive habitats, and other environmentally sensitive areas.)
  - U.S. Fish and Wildlife Service (USFWS) National Wetland Mapper
  - USDA National Resource Conservation Service (NRCS) Web Soil Survey (To review soil types and characteristics.)
  - Google Earth (To review watershed elevations, location of potential hot spots, and perform a street view walk to look for potential pollutant sources as well as verify completeness of mapped catch basins.)
  - U.S. Geological Survey Stream Stats (To review topographic-based watershed of pond and obtain general watershed characteristics.)
  - Center for Watershed Protection "Watershed Treatment Model."

2.0 Observations and Findings

2.1 Biology and Ecology Assessment

During the site visit, Mr. Ermides described the project and various components of the pond ecosystem and historical elements. Those of particular importance to the assessment of Buckingham Pond are:

- The water within Buckingham Pond does not drain; a 15-foot long pipe exists between the Pond and the stilling basin to allow for water to fluctuate back and forth depending on water levels.
- If the water level becomes too high, then a pump in the stilling basin turns on to drain the water down. This water is sent to the NYSDOT's storm sewer system.
- The entire Pond and stilling basin typically freeze over in winter with the exception of one stormwater culvert discharge point located in the southwest corner of the stilling basin. Water with a high iron content (presumably - orange in color) is often noted discharging from this location, even during winter.
- At least portions of the City of Albany's stormwater system outlet into Buckingham Pond. In addition, multiple areas of overland flow and natural runoff contribute to the Pond and stilling basin.
- Koi and carp populations were mentioned to live in the Pond (both are regulated as invasive species by the New York State Department of Environmental Conservation (NYSDEC)). Residents fish at the site, but target species and species commonly captured are not known.
- Algae and aquatic vegetation populations within the Pond are treated on an annual basis using sonar and copper sulfate herbicide.
- Though none were observed during the site visit, observations of snapping turtles in the Pond are reportedly common. Painted turtles and mallard ducks were observed in the stilling basin and mallard ducks were also observed in the southwest and southeast portions of the Pond. Canada geese are reportedly observed on the Pond during spring migration.
- A variety of invasive vegetative species were observed in multiple locations around the site, including common buckthorn (*Rhamnus cathartica*), Japanese knotweed (*Fallopia japonica*), purple loosestrife (*Lythrum salicaria*), multiflora rose (*Rosa multiflora*), and common reed (*Phragmites australis*).

- The Pond is primarily surrounded by deciduous shrub and tree species, particularly along the south side and northwest/west portion. The stilling basin is surrounded by a denser collection of deciduous trees and shrubs. An uncharacteristic collection of tree species were noted along the east edge of the Pond (parallel to Berkshire Boulevard), and are assumed to have been intentionally planted.

Based on the above site observations and a working knowledge of ecology and freshwater systems, detailed findings associated with the pond ecosystem have been formulated. These findings pertain to concerns and general topics, including wildlife, water quality, maintenance issues, stormwater, and vegetation, and are as follows:

Wildlife

Mr. Ermides noted that, at one time, larger populations of ducks and frogs utilized Buckingham Pond. He also mentioned that in recent years there have been ducks laying eggs under bushes on his property. This nesting behavior may be occurring due to lack of suitable waterfowl nesting habitat surrounding the Pond or the noted prevalence of snapping turtles that now reside in the area. While populations of ducks and geese continue to visit Buckingham Pond throughout the year, the feeding of these waterfowl populations by adjacent residents and visitors creates a water quality concern. Waterfowl feces are a noted contributor to eutrophication (a condition that occurs when excess nutrients stimulate plant growth in a waterbody), particularly in slow-flowing waterbodies. While not usually to detrimental levels, inorganic nitrogen and phosphorus levels can increase in freshwater areas as a result of accumulating waterfowl feces. In addition to the water quality considerations, the aesthetics and recreational opportunities of the pond and immediate area may be compromised if an abundance of waterfowl feces collect along the Pond perimeter. The supplemental feeding of waterfowl encourages an ecosystem imbalance such that greater numbers of waterfowl may be present due to an augmented food source, yet may not be adequately supported by the naturally existing habitat.

Water Quality and Vegetation

In addition to the issues already identified, the absence of flow within Buckingham Pond provides optimal conditions for the build-up of nutrients that stimulate aquatic plant growth. The healthy populations of duckweed and watermeal that were observed on the Pond's water surface, and the noted blue-green algae blooms that have occurred intermittently, are strong indications that a surplus of nutrients exist within the system. As previously stated, it is known that herbicides are added to the system to control the algal blooms and to reduce the density of submerged and floating aquatics, like duckweed. It was observed that the majority of the Pond's water surface was devoid of

floating vegetation; however, given the absence of flow and the shallow water depths throughout the Pond, it is likely that the turning of water by the three aerators may play more of a significant role in this observation than the herbicide application. It should be noted, however, that an unintended consequence of a reduction in aquatic plant growth would be a decrease in available food sources for the waterfowl that use the area. If the main objective of the BPC is to improve pond water quality, with wildlife habitat being of secondary concern, the availability of natural food sources for waterfowl will need to be balanced with this primary objective.

According to the NYSDEC Region 4 Lake Map Series, Buckingham Pond ranges from 1-5 feet in depth, with a reported mean water depth of 3 feet. The NYSDEC lists that bluegill, largemouth bass, and pumpkinseed fish species are present within the Pond. Though the presence of these species could not be confirmed in the field, these potential fish populations may be impacted by the eutrophication of Buckingham Pond as excess nutrients can create a harmful and oxygen-deficient environment. Given the dominance and density of deciduous trees and shrubs around the perimeter of the Pond, the input of leaves and woody debris (organic matter) is significant. As decomposition of this material occurs, oxygen levels in the water column are slowly reduced. Notably, the input of oxygen to the Pond system is assisted through the use of the three seasonal aerators. Eutrophication in the area may also be linked to fertilizer applications at adjacent residential properties, contamination from the stormwater sewer system, and/or runoff from adjacent impervious surface areas, all of which can increase nutrient loads to the waterbody. At least one storm sewer grate was observed to discharge directly into the Pond. During a rain event, salts and other roadway pollutants near this grate will immediately be washed into Buckingham Pond.

Maintenance Issues

As previously stated, site observations indicate that a significant amount of organic matter enters Buckingham Pond. Due to the absence of flow, the organics settle to the Pond bottom where they slowly decompose and likely contribute an excess of nutrients into the water column. There is no regular maintenance program at Buckingham Pond that serves to remove all or a portion of this organic material; therefore, the material has accumulated over time which has largely added to the eutrophication of the Pond system. The City of Albany maintains the lands considered Buckingham Pond Park. City employees were observed during the site visit using high-powered leaf blowers to remove fallen debris out of the parking areas and adjacent grass areas, and off the playgrounds and the walking trail, improving the aesthetics of the area. However, the leaves and other debris were blown in the direction of the Pond and adjacent vegetated areas, creating a berm/wall of leaves and debris, some of which will likely be carried downslope and into the Pond during the next rain or wind event.

Stone dust applied to the walking trail was observed within the water column of the Pond. This material may be conveyed to the pond via stormwater runoff, human activity along the banks/slopes of the Pond, and inputs from the nearby stormwater system. Given the significant slopes that exist around the pond, this material may not be ideal for use. Evaluation of the suitability of, and/or frequency and amount of, stone dust reapplication along the trail is recommended.

2.2 Water Quality Assessment

The site visit consisted of a tour around the pond, with particular attention given to elements of the area immediately adjacent to, and surrounding, the Pond that may be negatively affecting water quality. Overall, observations were consistent with those indicative of eutrophic conditions. Namely, these included:

- Remnants of recent algal blooms along portions of the shore, including a majority of the northern shoreline as well as eastern and southeastern portions of the pond.
- Absence of reasonably expected aquatic vegetation in spite of the relatively shallow depth of the pond, which should allow adequate sunlight to reach the bottom to support aquatic vegetation. This finding, however, may be a result of the application of herbicides necessitated by algal blooms and unwanted aquatic vegetation.
- Inadequate vegetated buffer in vulnerable locations around the pond (northern shoreline).

The presence of a healthy native vegetated buffer around the pond would not only improve water quality by filtering overland stormwater flow, but would also enhance habitat for wildlife and decrease localized erosion and subsequent sediment deposition. Mr. Ermides informed Mr. McAdams that the City installed timber cribbing along the shoreline to prevent shoreline erosion, much of which has since decayed or is in disrepair. Throughout the existing buffer, several species of non-native invasive plants were observed, in particular Japanese knotweed. Removal of invasive species and reestablishment of a native species buffer could be accomplished by using dormant cuttings of existing native wetland plant species as live stakes. There is also potential to utilize specific wetland, or even aquatic plant species, to target removal of specific pollutant sources (such as phosphorus) from overland flow.

Also observed was evidence of overland flow. While a contributor of sediment, pollutants, and localized erosion (as observed adjacent to the trench drain located near the northwestern shoreline), it may not be as significant a contributor as the direct inlets that convey stormwater from the contributing watershed comprised primarily of residential neighborhoods.

2.3 Desktop Survey

Several resources were reviewed and/or consulted to identify findings of significance. Significant findings from each of the resources, that have not already been presented herein, are identified below:

- "Buckingham Pond Pollution Source and Restoration Assessment: A Student Internship Project for the Buckingham Pond Conservancy," prepared by Ms. Sarah Schaefer and Dr. Katherine Meierdiercks, dated December 2010.

  Through further investigation, and consultation with City personnel, it was discovered that the contributing watershed area originally included in the study was much larger than the actual contributing watershed to Buckingham Pond. The specific information provided within the report focuses on pervious areas and neighborhoods selected as study areas for the report's findings. Because some of these are located in areas determined not to contribute to Buckingham Pond, some of the assessments within the report may not be relevant to the objective(s) of this project.

  Contributing catch basin and storm sewer mapping within the report was obtained by the City of Albany, and includes five stormwater outfalls into the Buckingham Pond stilling basin. This mapping will prove helpful for hydraulic modeling, as well as for tracing any future suspect discharges into the pond. However, no direct outfalls to Buckingham Pond itself were shown. Anecdotal information, further confirmed via field visits, indicates that direct stormwater outfalls into Buckingham Pond may exist. Because these outfalls presumably bypass the stilling basin, and to better understand potential stormwater and pollutant contributors to the pond, these outfalls and their associated stormwater conveyances and upstream catch basins should be confirmed. Mr. Justin Schievelbein with the City of Albany has been consulted and will investigate this further.

  The Siena report accurately concludes that areas within the Buckingham Pond watershed primarily consist of residential uses with a high percentage of maintained turf. Additionally, many of the neighborhoods assessed include residences with disconnected down spouts (roof drains not directly connected to the storm sewer). This finding is of importance in understanding land uses of the contributing watershed, which have been presented in prior sections of this memo.

- CSLAP results and an associated presentation by Mr. Scott Kishbaugh, P.E. of the NYSDEC.

  Results of CSLAP data and findings identified within the presentation are consistent with those of the field visit findings. Potential phosphorus sources, as well as management actions, are consistent with those determined during field visits and identified herein.

- A presentation titled Buckingham Lake Berkshire Pond Raft's Pond "Some Historical Facts and Other Information about This Waterbody," prepared and presented By: Daniel R. Hershberg, P.E. & L.S., dated July 13, 2009.

  This presentation provided valuable insight into the history of the pond and associated City projects, including the Berkshire Boulevard Sewer Separation that took place between 1993 and 1995, which diverted much of the associated separation area to the stilling basin. The pump station was installed at that time, which directs stormwater from the stilling basin/pond to the west. The presentation also indicated that the lake was last dredged in 1977/1978, and correspondence included within the presentation indicated that sediment thickness was 2-3.5 feet at the time of dredging.

- E-mail correspondence dated November 17, 2013 included sediment depth photos and findings from a field visit made by Buckingham Pond Conservancy volunteers. Measurements were taken, in the stilling basin only, using a Secchi Disk and pole and sediment thickness ranged from 1.5-4 feet. The location of the pipe connecting the stilling basin to the pond could not be confirmed in the field.

- NYSDEC stormwater interactive map (To review presence of state wetlands and significant natural communities.)

  - No findings of significance.

- NYSDEC Environmental Resource Mapper (To review presence of state wetlands, classified waterbodies, sensitive habitats, and other environmentally sensitive areas.)

  - No findings of significance.

- U.S. Fish and Wildlife Service (USFWS) National Wetland Mapper

  - Indicates the presence of three federal wetlands onsite, two of which are listed as freshwater ponds and one of which is listed as freshwater forested/shrub. This will be of importance when determining mitigation measures and in future implementation projects, as disturbance of wetlands will need to be carefully considered.

- USDA National Resource Conservation Service (NRCS) Web Soil Survey (To review soil types and characteristics.)

  - The Buckingham Pond watershed, which was determined to be approximately 265 acres, consists of soils within the well-drained Hydrologic Soil Group A (33%) with the remainder of soils not rated. Soils in Hydrologic Soil Group "A", that are not covered by an impervious surface such as a road other structure, allows water to infiltrate a higher rates than other types of soils. These soils are viewed as "beneficial" due to their infiltrative nature, and care should be taken to preserve them to the greatest extent practicable.

- Google Earth (To preliminarily review watershed elevations, locate potential hot spots, and perform a street view walk to look for potential pollutant sources within the watershed as well as verify completeness of mapped catch basins.)
    - Google Earth was used to aid in refining the contributing watershed boundary, and provided important elevation data coupled with useful aerial images to confirm drainage assumptions. It was through use of Google Earth, and subsequent confirmation with Mr. Justin Schievelbein, that the original watershed boundaries (from the Siena report) were revised. Additionally, a google "street view" walk was performed to survey the watershed for hot spots (gas stations, dump sites, etc.) as well as verify the catch basin mapping included in the earlier referenced Siena Report. Some catch basins were identified during the street view walk that were not included in the mapping, while others that were included on the mapping could not be located in street view. There is low likelihood that this finding will have a significant impact on the study, unless they are determined to convey stormwater directly to the pond. No hot spots or suspected illegal discharges into the storm sewer system were identified. Aerial images confirmed the findings of the Siena report that the watershed contains a significant number of pools and landscaped lawns and gardens, and primarily residential uses. The significance of this finding has been previously discussed.
- U.S. Geological Survey Stream Stats (To review topographic-based watershed of pond and obtain general watershed characteristics.)
    - Stream Stats indicated that approximately 1.38% (3.5 acres) of the watershed is covered by forest and that the associated mean annual runoff for the watershed is 17.2 inches (of a mean annual precipitation of 37.2 inches). This means that, from the data available in Stream Stats and the revised watershed boundaries, over 2 million gallons of precipitation are conveyed via overland flow, annually, to a downstream point (presumably Buckingham Pond). This does not take into account the existing storm sewer network, but does provide an approximation of the volume of stormwater (and associated constituents) conveyed to the point of interest.
- Center for Watershed Protection "Watershed Treatment Model"
    - The Watershed Treatment Model is a widely-accepted model for estimating an area's annual runoff including: total nitrogen (lb/yr) total phosphorus (lb/yr), total suspended solids (lb/yr), and fecal coliform (billion/yr). It takes into account existing land uses, existing stormwater management practices, future (planned) stormwater management practices, and new development. Estimates were inputted to the system based on aerial imagery. Because the model was based on the watershed contributing to Buckingham Pond, it can be assumed that the final

loading rates of the pollutant/nutrient sources are reaching the outfalls into the stilling basin and Buckingham Pond. It should be noted that no future stormwater management practices were included in this analysis. The results are as follows:

- Runoff Volume: 342 acre-feet/yr (approximately 2 million gallons; consistent with Stream Stats)
- Total Nitrogen: 2,441 lb/yr
- Total Phosphorus: 491 lb/yr
- Total Suspended Solids: 78,408 lb/yr
- Fecal Coliform: 84,665 lb/yr

- The model also indicated that, due to inputted watershed characteristics, fertilizer use may be above the recommended rate of 150 lb/acre.

3.0 Conclusions

Buckingham Pond provides many benefits to, and serves multiple functions within, the surrounding residential community. Areas of concern that were noted during the site assessment include wildlife, water quality, maintenance issues, stormwater, and vegetation. Eutrophication is often a systemic problem and, in the case of Buckingham Pond, the inputs of stormwater from the heavily-developed watershed represent a significant impact to water quality. Conditions observed at the Pond are consistent with the CSLAP water quality data, indicating a trend toward over-enriched conditions. While not within the scope of this task, B&L personnel preliminarily identified several measures that could be implemented to not only improve water quality, but provide a range of benefits from shoreline stabilization to enhanced fish and wildlife habitat and aesthetics. Some of these suggested preliminary measures have already been presented to BPC and City personnel in previous meetings and memos, and this list is in inclusive of all potential options that may be explored during later phases of this project. Preliminary mitigation measures include:

- *Continued public awareness/education (i.e., additional waterfowl feeding signage, education on fertilizer usage and residential vehicle washing, etc.)* – could be accomplished through mailers, postings on the BPC website, or sponsoring a lecture series on topics important to the Pond system and surrounding community.
- *Bioengineered shoreline stabilization* – improves water quality by eliminating sedimentation due to shoreline erosion, enhances habitats and aesthetics, and provides areas and structural support for buffer establishment. This could be implemented in areas where timber cribbing is in poor condition or where shoreline erosion is evident. Stabilization practices could also be used in areas where the buffer may be widened outward from the existing shoreline.

- *Native buffer establishment* – improves water quality, aesthetics and habitats. Buffers should be comprised of native species and can be augmented with dormant cuttings taken from stock plants already on site. Existing signage around the Pond advises against mowing of the existing buffer. Expanding both the breadth (width) and the extent of the buffer would maximize the benefits of this effort.
- *Invasive species survey and removal* – improves habitats and aesthetics by removing risk of colonization and competition with beneficial native plants. A critical target species should be Japanese knotweed, which appears to be in early stages of establishment around the southern side of the Pond.
- *Phytoremediation* – opportunities to establish plants around and within the pond that specialize in metabolizing those nutrients found in excess.
- *Bioretention/infiltration* – there may be opportunity to utilize adjacent available area to for bioretention, infiltration, or other treatment measures.
- *Sediment removal* – the depth of this sediment in the stilling basin, ranging from 1.5-4 feet, reduces available storage as well as efficacy of sediment and nutrient removal. Field observations confirm that sedimentation is also occurring within the pond. While reducing the amount of sediment entering the pond system will improve the future condition, removal of existing sediment will serve to greatly enhance the current effectiveness of the stilling basin.
- *Deepening of the pond* – this would simultaneously provide greater storage volume and lower light levels reaching the pond bottom, and may be performed simultaneously to sediment removal activities.
- *Provision of a formal pond outlet* – this will provide a "flow-through" within the stilling basin and pond structure, which will encourage regular flushing and circulation.

Historic water quality data from CSLAP monitoring shows phosphorus to be the primary nutrient of concern resulting in over-enrichment of the Pond. Observations at the Pond support this point. Phosphorus is delivered to aquatic environments both freely or attached to soil and sediment particles. Commonly, sources of phosphorus in developed settings such as the Buckingham Pond drainage basin include lawn fertilizers (lawn care) and detergents (vehicle washing) that discharge to the stormwater system. However, the NYS Dishwasher Detergent and Nutrient Runoff Law that, effective as of date of January 1, 2012, restricts the use of dishwasher detergents and fertilizers that contain phosphorus. It includes provisions such as:

- Prohibit the use of phosphorus lawn fertilizer unless establishing a new lawn or a soil test shows that the lawn does not have enough phosphorus.

- Prohibit the application of lawn fertilizer on impervious surfaces and require pick up of fertilizer applied or spilled onto impervious surfaces.
- Prohibit the application of lawn fertilizer within 20 feet of any surface water except: where there is a vegetative buffer of at least 10 feet; or where the fertilizer is applied by a device with a spreader guard, deflector shield or drop spreader at least three feet from surface water
- Prohibit the application of lawn fertilizer containing nitrogen, phosphorus, or potassium between December 1st and April 1st.

This provision does not impact fertilizer for gardens and its enforcement is unclear. While retailers are required to add labeling/signage, it cannot be guaranteed that homeowners are aware of, or fully implementing, the law. With a variety of potential phosphorus inputs to Buckingham Pond and varying solubility and uptake of contributed phosphorus, the amount of phosphorus that may remain in the pond for extended lengths of time due to the varying inputs and cycles is unknown. Non-soluble phosphorus that is transported to the pond and not used may remain indefinitely.

The suggested action items are aimed at improving water quality by reducing the inputs of sediment and nutrients delivered to the Pond and are intended to improve the function of Buckingham Pond without sacrificing the features of the natural ecosystem that the community has come to appreciate. As such, some of the preliminary mitigation measures identified herein may need to be balanced with community perception and access (physical and visual) to the pond. Additionally, this memo was prepared based on the current function of the pond with the understanding that the application of herbicides may interfere with observations related to aquatic vegetation.

4.0 Next Steps

This memo will help form the basis of future prioritization, selection, and design of mitigation measures. The next task within the project scope is to perform Hydraulic and Hydrologic modeling of the watershed and associated pump station. Results of the analysis will be presented in Technical Memo #2.

NRM/akg
Attachments

Attachment 1

Photo Log

Site Photo 1: Equalization pipe between stilling basin and pond

Site Photo 2: North side of stilling basin

Site Photo 3: Culvert in southwest corner of stilling basin

Site Photo 4: Culvert in southwest corner of stilling basin

Site Photo 5: Culvert in southwest corner of stilling basin

Site Photo 6: Culvert in southeast corner of stilling basin

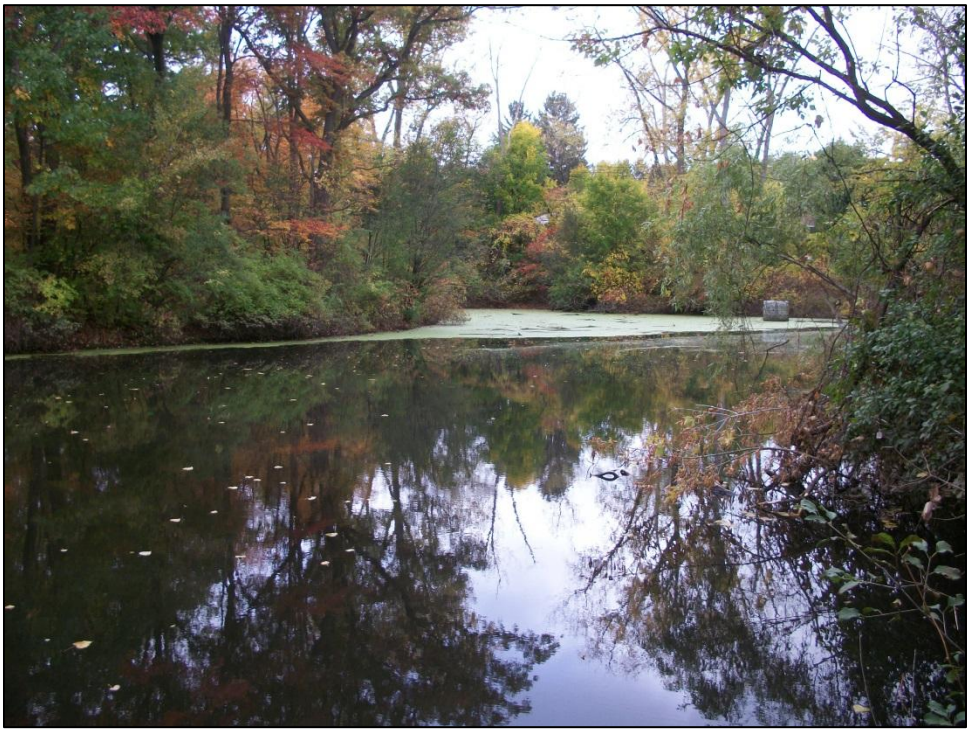
Site Photo 7: Catch basin and outlet from parking lot

Site Photo 8: Outlet area from parking lot catch basin
(erosion and sediment deposition evident)

Site Photo 9: Trench drain on northeast end of pond (near walking trail)

Site Photo 10: Erosion west (downgradient) of trench drain

Site Photo 11: Stilling basin



Site Photo 12: Stilling basin (drainage structure visible)

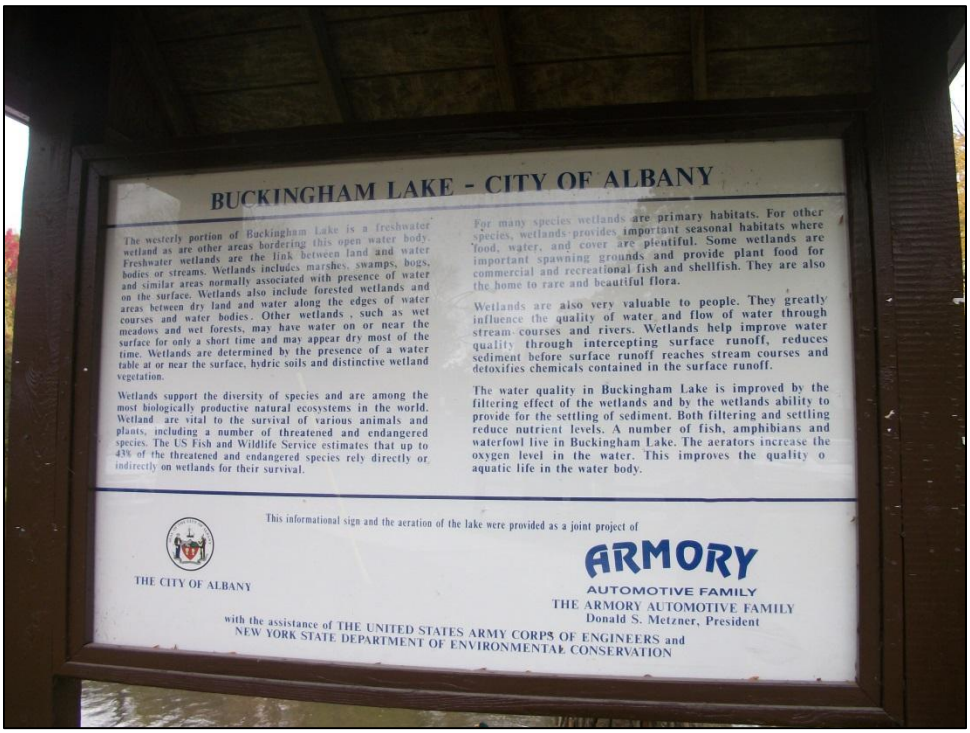
Site Photo 13: Pump Station

Site Photo 14: Sediment and organic matter in pond

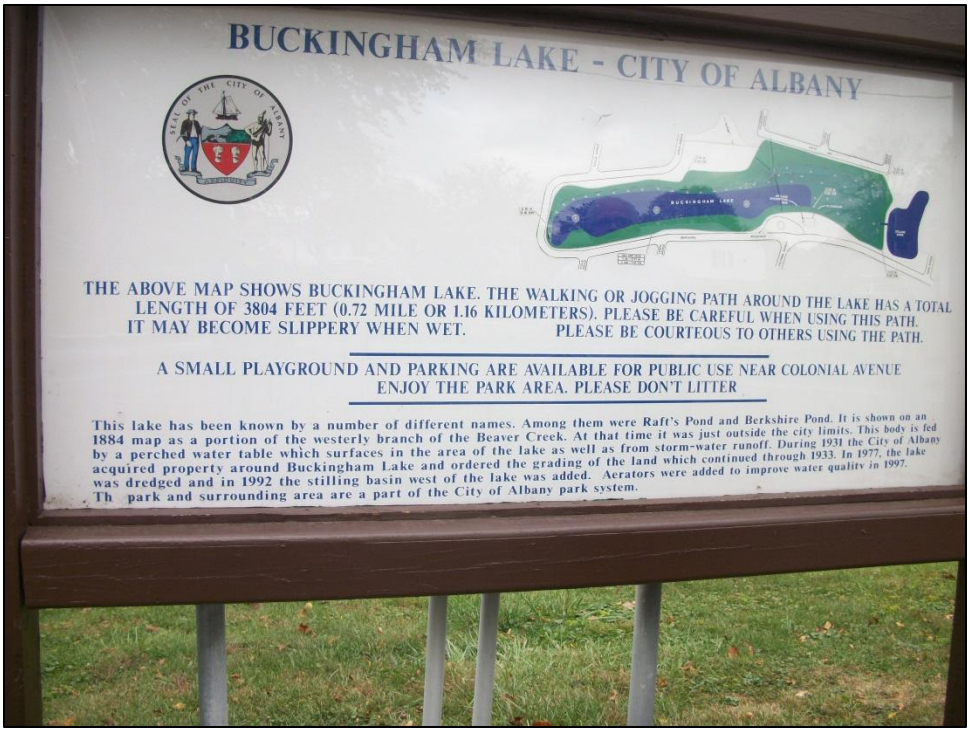
Site Photo 15: Existing pond vegetation

Site Photo 16: Pond overflow structure

Site Photo 17: Direct outlet into Buckingham pond on east end of pond



Site Photo 18: Pond signage

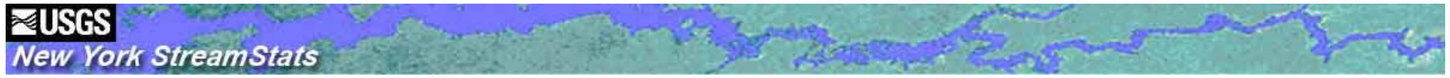


Site Photo 19: Pond signage

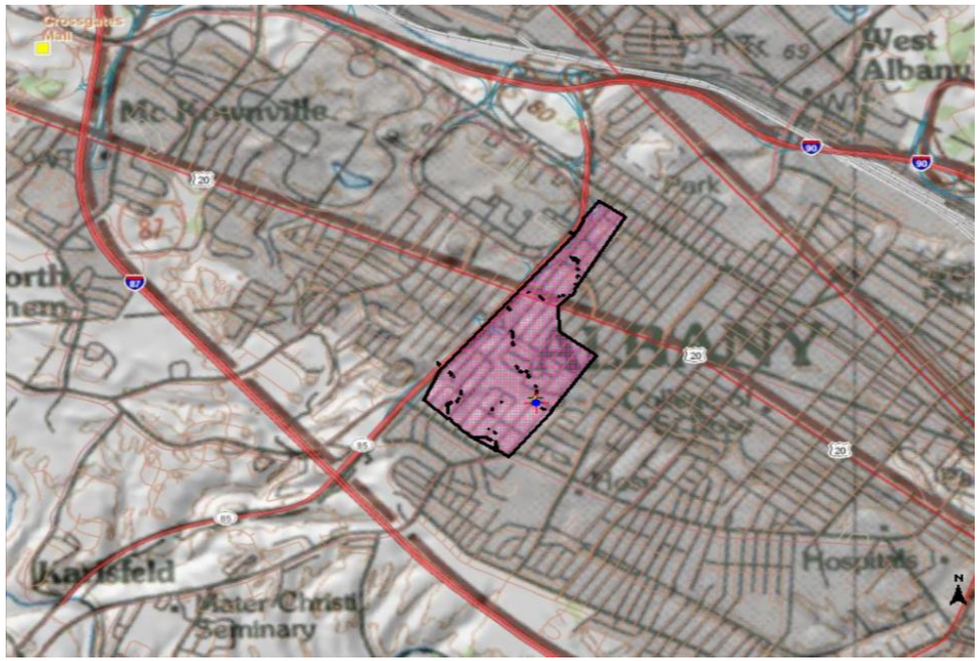
Site Photo 20: Pond signage

Attachment 2

Watershed Area



Buckingham Pond



Explanation

- NHDHGage2
- NHDHDam2
- GlobalWatershedPoint
- Slp1085Point
- MainFlowPath3D
- Stream Grid
- GlobalWatershed
- Excludepoly
- Gaging Station, Continuous Record
- LowFlow, Partial Record
- Peak Flow, Partial Record
- Peak and LowFlow, Partial Record
- Stage Only
- LowFlow, Partial Record, Stage
- Miscellaneous Record
- Unknown

10/31/2014 2:17:40 PM

USGS New York StreamStats

Basin Characteristics Report

Date: Fri Oct 31 2014 14:20:20 Mountain Daylight Time
NAD27 Latitude: 42.6636 (42 39 49)
NAD27 Longitude: -73.8070 (-73 48 25)
NAD83 Latitude: 42.6636 (42 39 49)
NAD83 Longitude: -73.8066 (-73 48 24)
ReachCode: 02020006002456
Measure: 42.54

Basin has been edited

Parameter	Value
Area that drains to a point on a stream in square miles.	0.44
Main-channel 10-85 slope, in feet per mile	16.4
Main-channel stream length, in miles	1.57
10-85 slope of lower half of main channel in feet per mile.	15.9
10-85 slope of upper half of main channel in feet per mile.	42
Total length of all elevation contours in drainage area in miles	0.00000000
Average basin slope, in feet per mile.	0
Slope ratio. Ratio of main channel slope to basin slope	717000
Basin Lag factor.	0.0584
Percentage of basin at or above 1200 ft elevation	0
Basin storage. Percentage of total drainage area shown as lakes, ponds and swamps	0.57
Percent of area covered by forest	1.38
Mean annual runoff in inches.	17.2
Seasonal maximum snow depth, 50th percentile, in inches	15.3
Mean annual precipitation in inches.	37.2
Urban Land Use percentage (1992)	65.4