

Appendix I
Draft Hempstead Lake Dam Operation and
Maintenance Plan

Hempstead Lake Dam

Draft Operation and Maintenance Plan

April 9, 2019

This Operation and Maintenance (O&M) Program is critical for protecting the dam, downstream communities and personnel that work at the dam. The Goals of this O&M Program are:

- ensure the safe operation of the dam,
- extend the life and achieve the intended purpose of the dam,
- protect the environment and owner's investment,
- protect the dam operator,
- promote cost-efficient operation, and
- meet legal and social obligations

I. BACKGROUND

Hempstead Lake Dam is located within Hempstead Lake State Park in Nassau County, New York. The dam was constructed in 1873 as part of the water supply system for the city of Brooklyn. Hempstead Lake Reservoir and South Pond were both used as water storage facilities and are interconnected by brick pipe arch tunnels to other water supply facilities. In the early 1900's the reservoir was abandoned by the Brooklyn Water Company and eventually sold to New York State.

Hempstead Lake Dam is approximately 17 feet high at the downstream toe. The upstream side of the earthen dam is lined with an 18-inch-thick stone facing. The original crest of the dam was reputedly 24' wide but was later widened to accommodate a 40' wide roadway with 10' +/- wide grassed areas on either side. The roadway is Lakeside Drive and features a concrete base with asphalt wearing surface. The gatehouse is the outlet to the dam and features gates and overflow weirs discharging to twin 36" diameter pipes to South Pond.

Hempstead Lake Dam is classified Class C High Hazard, DEC ID#: 234-0193. Hempstead lake Dam is regulated by the New York State Department of Environmental Conservations, Division of water, Bureau of Flood Protection and Dam Safety.

II. OPERATION

Currently, the water level for Hempstead lake Dam is set at elevation 20 (NAVD 88). During a normal year, the lake's water surface elevation can fluctuate by approximately 3 to 4 feet, typically between approximate elevation 18 and 22 (NAVD 88). Hempstead Lake historically has a higher average water surface elevation in the winter/early spring after the fall storms and snowmelt of the previous winter. The water surface elevation usually falls through the late spring and summer seasons. The initial operation and maintenance plan for the dam's gates are proposed to provide more stable water surface elevation (less fluctuation) than noted in previous years.

OPERATION PROCEDURE

Procedure	Action Required
Upper Sluice Gates	Remain open unless required for impounding water as required.
Middle Sluice Gates	Open December 1 and close March 1 st to maintain consistent water level.
Lower Sluice Gates	Remain closed unless required to release impounding water.
Record Keeping	Damkeeper records should be on file at the Park Managers office within Hempstead Lake State Park with copies sent to Director of Engineering at the NYS Office of Parks Recreation and Historic Preservation, 625 Belmont Avenue, Babylon, NY 11702-0247.

The time periods that drive the opening and closing of the sluice gates were chosen to increase potential storm water runoff storage in the Lake, but they occur outside the typical wetland growing season. The upper two gates of the dam will remain open year-round and will only be closed and reopened for maintenance/exercising purposes unless required for impounding water. The middle gate will be opened in the Fall and closed in the Spring. Opening the middle gate will lower the water surface of Hempstead Lake prior to the typical rise in groundwater due to snowmelt runoff, thus maintaining a more consistent water surface elevation in the lake over the course of the year. Lowering the water surface levels will provide room for additional runoff storage in the Lake and to ensure adequate continued flow of water out of the lake so as to sustain downstream habitats.

Although the annual 4-month drawdown of the Lake level may eventually result in a slightly lower equilibrium point with groundwater, it is anticipated such a change would occur gradually thereby allowing time for wetlands to adapt to it.

III. INSTRUMENTATION

The water surface elevation of the Lake will be monitored by a new USGS gauge at the dam recording real-time data. This data will allow dam owners to study the impact of the winter drawdown and to make changes to the operation schedule if adverse impacts are detected.

Gages will be instrumented with a water-level sensor (pressure transducer), water-temperature sensor, an electronic-data recorder or DCP (records data from the sensors every 15 minutes), and a cellular transmitter. Real-time data are transmitted via satellite and/or telephone and cellular service to USGS computers, which download and process

data on average once every hour. Through this telemetry network, data are available in near-real time on the USGS NWISWeb system (<http://waterdata.usgs.gov>) and through the USGS New York Water Science Center (NYWSC) web page at <http://ny.usgs.gov>. Equipment and site maintenance are performed by the USGS.

IV. INSPECTION

This section indicates personnel responsible for inspection and how frequent and what is involved in an inspection. A form must be included in the Appendix for each inspection. The owner shall maintain records on applicable forms of all inspections and monitoring is required.

INSPECTION SCHEDULE

Inspection Type	Frequency	Item to Monitor	Personnel
Informal - weather basis (storm event/snowmelt)	As needed after event	Gatehouse, spillways, Seepage	Damtender/Owner
Bi-monthly	Bi-monthly	Seepage, wet areas, flow, pool level, trash rack, debris, slides, cracks, rodent activity, vegetation, brick, surfaces, vandalism	Damtender/Owner
Maintenance	Annually	In addition to the above items: Slope protection, outlet erosion, condition of vegetative cover, spillway and embankment condition, settlement of the roadway along the top of the dam	Damtender/Owner
Technical	Periodic – every 2 years*	Safety Inspection (see part 673.12)	Engineer
Technical	Periodic – after initial, every 10 years	Engineering Assessment (see Part 673.13)	Engineer

*Class C dam – typical Safety Inspection every 2 years
 Class B dam – typical Safety Inspection every 4 years

I. MAINTENANCE

This section indicates maintenance to be performed and at what frequency. A form must be included in the Appendix, as listed in the table above, for each inspection. Existing

DEC inspection reports should be included, and corrective action was completed should be noted. The owner shall maintain records on applicable forms of all inspections and monitoring event required.

MAINTENANCE SCHEDULE

Item	Frequency
Mow embankment	Two times per year
Lubricate lake drain valve mechanism and repair as needed	As Needed
Remove Woody Vegetation including rootballs and repair embankment	As Needed
Re-establish Vegetative Cover	As Needed
Repair Erosion	As Needed
Clean Trash rack	As Needed
Concrete maintenance	As Needed
Repair Gates, Valves or Other Mechanical Equip	As Needed
Maintenance of Gate Operator Stems, grease	Twice a Year
Maintenance of Gate Operator, grease	Three times per year
Lubricate Gates and Valves	Annually
Other Mechanical Equipment	Annually
Replace / Replenish Riprap	Annually

I. APPENDICES

- a. Pictures of the Dam
- b. Construction Drawings (Reduced to 11" x 17")
- c. Reservoir Stage/Storage/Area Table
- d. Spillway and Outlet Rating Table, and Cumulative Reservoir Drawdown Time Table
- e. Instrumentation Construction Drawings
- f. Weir and Flume Rating Tables
- g. Maintenance Forms
- h. Inspection Forms
- i. Equipment Replacement Parts (Part No and Order Form of Phone number).
- j. Summary of Updates or Revisions to the O&M Manual

Hempstead Lake Dam Operation Narrative April 9, 2019

The project proposes to remove all woody vegetation from the dam embankments and to restore functionality of the Hempstead Lake dam outlet controls. Woody vegetation has several negative impacts on an earthen dam. Extensive tree root systems provide seepage paths for water and trees can blow down or fall over leaving large voids weakening the embankment. Brush and vegetation also obscure the surface of the dam, thereby limiting visual inspections, provide a home for burrowing animals, and inhibit the growth of mowable grassy vegetation. In addition, the non-functioning outlet gates do not allow for any control over the outlet flow from the Lake.

Trees will be removed from the upstream and downstream embankments of the dam. This will be followed by a full visual inspection of the dam. An assessment will be made at that time as to whether any additional repairs to the dam embankments are needed. Once repairs (if needed,) have been completed and with NYSDEC approval, the rehabilitation of the outlet gatehouse structure will commence.

The Hempstead Lake dam gatehouse contains five existing sluice gates that serve as the outlets from the Lake. These gates have been non-functional for decades. The project proposes to replace all five of the existing non-functional gates with similar cast iron manually operated sluice gates at the same elevations. The result of this replacement will restore functionality to the outlet control of the Lake, allowing the increase or decrease of flow exiting Hempstead Lake. The Maintenance and Operation Draft Plan (see appendix XXX) provides the necessary direction to ensure the continued maintenance of the new functioning gates.

In addition to restoring functionality to the outlet control of the Lake, an opportunity exists to obtain a more stable water surface elevation in the Lake. Based on field observations and record data from a USGS monitoring gauge previously located at the gatehouse, Hempstead Lake historically has a higher average water surface elevation in the winter/early spring. The normal water surface elevation for most of the year is typically around elevation 20 (NAVD 88). The water surface elevation usually drops through the late spring and summer seasons. Currently, the water level is determined by the two fixed openings cut into the non-functional upper gates. During a normal year, the Lake's water surface elevation appears to fluctuate by approximately 3 to 4 feet, typically between approximate elevation 18 and 22 (NAVD 88.).

At the completion of the project, the upper two gates of the dam will remain open year-round and will only be closed and reopened for maintenance/exercising purposes. The middle gate will be opened in the Fall and closed in the Spring. Opening the middle gate will increase the outflow of water from Hempstead Lake during the time of year when there is typically rise in groundwater due to snowmelt runoff, thus maintaining a more consistent water surface elevation in the Lake over the course of the year. Attempting to lower the water surface from its current high winter levels, also provides room for additional runoff storage in the Lake.

It is anticipated the middle gate will be opened from the end of November to the beginning of March. The gates will be adjusted in early March and late November. The middle gate will be closed from mid-March to mid-November and outflow through the dam will be similar to the current conditions. The time periods were chosen to increase potential storm water runoff storage in the Lake on a seasonal basis. Any gradual lowering of the water surface elevation would occur outside the typical wetland growing season. It is not anticipated that lowering the water level during the winter dormant/hibernation period will adversely affect the wetlands.

Although the annual 3-month drawdown of the Lake level may eventually result in a slightly lower equilibrium point with groundwater, it is anticipated such a change would occur gradually over years, thereby allowing time for wetlands to adapt to it. A new water surface elevation monitoring gauge is proposed for the Lake and will be monitored by the USGS at the dam recording real-time data. This data will allow dam owners to study the impact of the gate operations and to make changes to the operation schedule if adverse impacts are detected.

Predicting more specific potential Lake level change-related impacts to wetlands would require performing additional hydrologic analysis and modeling. Hydrologic data available for Long Island would be utilized to conclude, on a semi-quantitative basis, how the Lake level may change over time and how long it may take to see significant water level changes.

Changing the outflow Hempstead Lake will also impact the South Pond inflow. This increase/decrease of flow, during normal conditions to South Pond through the brick pipe arch between the outlet gatehouse of Hempstead Lake and the inlet gatehouse of South Pond is not anticipated to have any measurable effect on the areas surrounding the Pond. South Pond is fed by flow from Hempstead Lake as well as flow from Schodack Pond and groundwater base flow. The water surface elevation in South Pond primarily affected by the fixed outlet weir of the pond and the groundwater elevation. The size and capacity of South Pond provides surface area and storage to attenuate any normal flow changes caused by gate operations at the Hempstead Lake Dam.