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# 2022 REGULAR INSPECTION REPORT

for

## SENECA LAKE DAM (NJDEP File No. 22-183)

Sparta Township  
Sussex County, New Jersey

*Owner*

Seneca Lake Club, Inc.  
P.O. Box 505  
Sparta, NJ 07871

***Prepared by:***

**GZA GeoEnvironmental, Inc.**

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**SENECA LAKE DAM  
VISUAL INSPECTION CHECKLIST**

**NJ INSPECTION YEAR: 2022**

**TYPE OF INSPECTION:** Regular

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**Dam Name:** Seneca Lake Dam  
**Dam File Number:** 22-183  
**Location:** Sparta Township, Sussex County  
**Owner:** Seneca Lake Club, Inc.  
**Operator:** Seneca Lake Club, Inc.  
**Date of Inspection:** October 28, 2022

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**Reservoir Information:**

<b>Normal Reservoir Elevation (ft.)</b>	858.1 (See note below.)
<b>Reservoir Elevation at time of Inspection (ft.)</b>	858.1± (Flow was slightly over spillway crest.)

Note: The Normal Reservoir Elevation is at the spillway crest elevation which is based on the October 2004 Record Drawings for the Re-Construction of Seneca Lake Dam prepared by Civil Dynamics. The drawings reference the elevation datum as USGS, or NGVD29.

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**Weather Conditions (including recent rainfall)**

Mid-50s and mostly sunny. About 0.01 inch of rainfall occurred on October 27, 2022.

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**INSPECTION PERSONNEL**

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**New Jersey Licensed Professional Engineer(s):**

<b>Name</b>	<b>Affiliation</b>	<b>Area of Expertise</b>
Jess Bergmann, PE	GZA GeoEnvironmental, Inc.	Dam Engineering
Mia Hildebrandt, PE	GZA GeoEnvironmental, Inc.	Civil Engineering

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**Non-Licensed Technical Expert(s) and Advisor(s):**

<b>Name</b>	<b>Affiliation</b>	<b>Area of Expertise</b>
None		

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**New Jersey State Representative(s):**

<b>Name</b>	<b>Affiliation</b>	<b>Area of Expertise</b>
None		

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**Dam Owner Representative(s):**

<b>Name</b>	<b>Affiliation</b>	<b>Area of Expertise</b>
Dave Mazzella	President, Seneca Lake Club, Inc.	General Maintenance

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**Others:**

<b>Name</b>	<b>Affiliation</b>	<b>Area of Expertise</b>
None		

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# SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

## GENERAL INFORMATION

<b>Name of Dam:</b> Seneca Lake Dam	
<b>Federal I.D. Number:</b> NJ00768	<b>NJ Dam Number:</b> 22-183
<b>River Basin:</b> Musconetcong River	
<b>Town:</b> Sparta Township	<b>County:</b> Sussex
<b>Block:</b> 3001	<b>Lots:</b> 112, 113, 114, 118, 125, 126, 127
<b>Nearest Downstream</b>	
<b>City or Town:</b> Sparta Township	
<b>Stream Name:</b> Unnamed	
<b>Tributary of:</b> Lubbers Run	
<b>Latitude:</b> N 40° 59' 58.5"	<b>Longitude:</b> W 74° 38' 52.8"
<b>Type of Dam:</b> Earthfill	
<b>Purpose of Dam:</b> Recreation	
<b>Hazard Category:</b> Class II, Significant	<b>Drainage Area (sq.miles)</b> 1.8
<b>Height (ft):</b> 14 (maximum at dam)	<b>Length (ft):</b> 360 (Dam) 140 (Dike)
<b>Normal Surface (ac):</b> 24	<b>Normal Capacity (af):</b> 99 @ El. 858.1
<b>Maximum Capacity (af):</b> 208 @ El. 861.1	<b>Spillway Capacity (cfs):</b> 1,286 @ El. 861.1

Note: Portions of General Information are based on previous inspection reports, Civil Dynamics' October 24, 2003 letter to the Bureau of Dam Safety regarding modifications to the design of the dam and the October 2004 Record Drawings for the Re-Construction of Seneca Lake Dam prepared by Civil Dynamics.

## HISTORY

<b>Date Constructed:</b> Unknown	<b>Date(s) Reconstructed:</b> 2004-2005
<b>Designed by:</b> Unknown	<b>Reconstruction Designed by:</b> Civil Dynamics, Inc.
<b>Constructed by:</b> Unknown	<b>Reconstructed by:</b> Ritacco Construction, Inc.
<b>Owner:</b> Seneca Lake Club, Inc.	
<b>Owner's Address:</b> Seneca Lake Club, Inc. P.O. Box 505 Sparta, NJ 07871	
<b>Owner / Operator present during inspection:</b>	Yes <u>  X  </u> No <u>      </u>

## PREVIOUS INSPECTION

<b>Date of Last Inspection:</b> <u>  Oct. 2, 2020  </u>	<b>Date of Last Regular Inspection:</b> <u>  Oct. 2, 2020  </u>
<b>Date of Last Phase I Inspection:</b> <u>  June 1981  </u>	<b>Date of Last Formal Inspection:</b> <u>  2005  </u>

Dam was rehabilitated in 2004-

**SENECA LAKE DAM  
VISUAL INSPECTION CHECKLIST**

**EMERGENCY ACTION PLAN** (Required for all Class I and Class II dams)

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**Date of Approved Plan:** July 26, 2012  
**Date of Plan Revision:** January 29, 2023

**Is the notification flowchart complete and current?** Yes  
**Is inundation mapping or a description included?** Yes  
**Are emergency materials and equipment identified?** Yes  
**When was the plan last tested?** Not tested.

**DOWNSTREAM HAZARD CLASSIFICATION**

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**Present Hazard Classification:** Class II, Significant

**Changes in downstream Land Use and Habitation:** None apparent based on site visit and a review of Google Earth historical aerial imagery.

**Is the present classification appropriate?** Yes

**OPERATION AND MAINTENANCE**

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**Date of Operation and Maintenance Plan:** 2009

**Are instructions adequate?** Yes

**Do operating personnel follow instructions?** Unknown, but the Club keeps the dam generally well maintained.

**What are the operating personnel capabilities?** General maintenance and low level outlet operation.

**EXAMINATION OF EMBANKMENT DAMS AND DIKES**

**MAIN DAM**

**DESCRIPTION OF STRUCTURE**

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**Embankment Material:** Earthfill  
**Cutoff Type:** None  
**Impervious Core:** None  
**Internal Drainage system:** None

**Movement (Horizontal and Vertical Alignment):** No signs of movement were observed or apparent.

**Junctions with Abutments or Embankments:** Appeared stable at contacts with the abutment and toe areas. No significant erosion observed.

**Miscellaneous:** None

# SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

## CREST

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<b>Description:</b>	Well-maintained grass cover throughout the crest on both sides of the dam.
<b>Vertical Alignment:</b>	Appeared level.
<b>Horizontal Alignment:</b>	Curved with a uniform crest width of about 13 feet. Crest width adjacent to the spillway was slightly narrower at about 12 feet. Crest was wider on the left side near the restaurant.
<b>Surface Cracks:</b>	None observed.
<b>Settlement:</b>	None observed.
<b>Unusual Conditions:</b>	None observed.

## UPSTREAM SLOPE

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<b>Description:</b>	Well-maintained grass cover throughout the slope on both sides of the dam.
<b>Slope Estimate (H:V):</b>	3:1 with a bench (about 12 feet wide) below the normal pool level on the left side.
<b>Trees, Undesirable Growth or Debris, Animal Burrows:</b>	Cattails along lake edge on both sides of the dam were cut prior to this inspection. The Owner reported that there were muskrat burrows in the upstream slope that were filled in. No other burrows were observed.
<b>Sloughing, Subsidence or Depressions:</b>	Minor erosion of the slope was observed along the lake edge on the right side of dam. Minor vertical scarping was observed along the lake edge on both sides of the dam.  Minor settlement was observed on the upstream slope on the left side adjacent to the spillway training wall.
<b>Slope Protection:</b>	Some scattered stone was observed on the right side of dam along the lake edge between the spillway and the bend in the dam.  Large stone was observed along the lake edge to the left of the spillway.
<b>Surface Cracks or Movement at Toe:</b>	Toe was submerged. Unable to observe.
<b>Unusual Conditions:</b>	A small erosion gully was observed along the right side upstream slope at the contact with the right abutment/beach area during the 2016 and prior inspections. Small stone was placed in the erosion area prior to the 2018 inspection. The stone was covered with leafy debris but the area appeared stable and no significant erosion was apparent.  Chain link fence fabric was laid on the upstream slope on the right side of dam to prevent muskrats from burrowing into the slope. The top edge of the fabric was about 15 inches above the normal lake level and continued into the lake. However, as noted above, the Owner stated that muskrats are still burrowing into the slope above the fence.  A short segmental block retaining wall was constructed

# SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

along the outdoor dining area just upstream of the restaurant between the 2016 and 2018 inspections. Prior to the 2020 inspection, an additional section of retaining wall was added to the left to expand the outdoor dining area. Based on a comparison with photos from 2020, no significant additional modifications were observed in the outdoor dining area during this inspection.

## DOWNSTREAM SLOPE

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<b>Description:</b>	Well-maintained grass cover throughout the slope on both sides of the dam. Large riprap lines the bottom of the slope adjacent to the spillway training walls on both sides of the dam. The slope adjacent to the restaurant consists of a partially buried rock rubble wall.
<b>Slope Estimate (H:V):</b>	3:1 on the right side and immediately left of the spillway structure. Slope was steeper (approximately 2:1) adjacent to the restaurant on the left side with a partially buried rock rubble wall.
<b>Trees, Undesirable Growth or Debris, Animal Burrows:</b>	None observed.
<b>Sloughing, Subsidence or Depressions:</b>	None observed.
<b>Surface Cracks or Movement at Toe:</b>	None observed.
<b>Seepage:</b>	None observed. Slopes were dry during this inspection.
<b>External Drainage System (Ditches, Trenches, Blanket):</b>	None
<b>Condition Around Outlet Structure:</b>	Earthen contact with the spillway training walls appeared stable.
<b>Unusual Conditions:</b>	<p>There was filter fabric exposed at the bottom of the slope beneath the riprap at the contact with the spillway training walls on both sides. Riprap may have become displaced in these locations. This condition was observed during previous inspections and no significant change was apparent during this inspection.</p> <p>Some smaller stones in the rock rubble wall near the restaurant were displaced mid-slope. This condition was observed during the 2018 and 2020 inspections. Some additional stones appeared to be displaced from the wall since the 2020 inspection.</p> <p>A localized area of sparse grass cover was observed on the downstream slope immediately left of the spillway.</p>

## ABUTMENTS AND TOE AREA

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<b>Erosion at Contact:</b>	No significant erosion observed. Abutments and downstream toe areas appeared stable.
<b>Seepage or Wet Area Along Contact:</b>	During past inspections, the downstream toe on the right side was noted to be soft and moist. This condition was likely due to the relatively flat terrain with very little positive drainage throughout the downstream toe area.

## SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

During the 2018 inspection, there was a soft, wet area along downstream toe on the right side starting about 25 feet right of the spillway training wall. The area was measured to be about 60 feet long by 20 feet wide. Similar conditions were observed during the 2022 inspection. The downstream toe area was noted to be dry during the 2020 inspection.

**Signs of Movement:** None observed.

**Depressions, Sinkholes:** A few small, shallow depressions were observed along the downstream toe, likely due to mowing equipment.

**Unusual Conditions:** Minor vehicular rutting was observed in the downstream toe area.

### SEEPAGE AND TOE DRAIN / RELIEF WELL FLOW SUMMATION

Location	Estimated Flow:	Color (Turbidity)
None observed.	N/A	N/A

## SADDLE DIKE

### DESCRIPTION OF STRUCTURE

The saddle dike is a 140-foot long earthen embankment located about 250 feet to the east (or left) of the primary spillway. The dike appeared stable and in generally good condition. The crest and slopes appeared to be well maintained with good grass cover. 6-foot high PVC privacy fencing is located over the berm between Lots 111 and 112 and Lots 112 and 113 of Block 3001. Short sections of wrought iron fencing extend from the ends of the PVC fencing into the lake. Rocks line the lake edge from the spillway to the left end of the dike. No problems were observed or apparent at the dike and conditions appeared similar to the 2020 inspection.

## EXAMINATION OF SPILLWAYS AND OUTLET WORKS

### TYPES AND DESCRIPTION OF SPILLWAYS

**Primary:** 70-foot long semi-circular concrete overflow weir.

**Secondary:** None

**Emergency:** None

**Other:** None

### ENTRANCE CHANNEL

**Description :** Open to lake.

**Vegetation (trees, bushes, etc.):** None observed.

**Debris:** None observed.

**Channel Side-Slope Stability:** Spillway approach was submerged but no problems were apparent.

**Slope Protection/Erosion:** Riprap protects the approach to the low level outlet, but the approach was submerged and riprap could not be observed.

**Unusual Conditions:** None observed.



# SENECA LAKE DAM

## VISUAL INSPECTION CHECKLIST

### SPILLWAY CREST AND DOWNSTREAM FACE

**Description:** 70-foot long semi-circular concrete overflow weir.

**Condition of Material:** Concrete appeared intact and in generally good condition. No significant cracks or spalls were observed on the crest or downstream face of the spillway. Efflorescence was observed along the base of the downstream face of the spillway. Conditions appeared similar to the 2020 inspection.

**Signs of Movement:** No signs of movement were observed or apparent. Spillway crest appeared level.

**Joints:** Joint filler material within the two joints in the downstream face of the spillway appeared intact but were showing continuing signs of weathering and deterioration (drying, cracking).

Joint filler material at the joints between the spillway and the training walls was missing along the bottom 2 feet of both walls during the 2020 inspection. Prior to this inspection, the Owner repaired the joint material but the material was showing signs of weathering and deterioration (drying, cracking).

The contact between the spillway downstream face and concrete footing appeared intact. Some minor voids were observed between the concrete footing and grouted riprap. Voids were mainly located in the center of the spillway between the right and left joints. One void measured 8 inches deep near the left joint and another void measured 12 inches deep near the low level outlet. Voids were difficult to observe due to flow conditions.

**Unusual Conditions:** None observed.

### SPILLWAY TRAINING WALLS

**Description:** Reinforced concrete walls connected to ends of spillway crest.

**Condition of Material:** Shrinkage cracks were observed along both walls. Pattern or map cracking of the concrete was observed in various locations on both training walls, but the walls appeared intact. Rusting discoloration was observed along the base of the training walls. These conditions were observed during previous inspections and no significant change was apparent.

Several vertical cracks with efflorescence were observed at various spacing along both training walls. A few minor horizontal cracks with efflorescence were observed at the contacts between the training walls and spillway. Efflorescence appeared more prevalent on the right training wall. One 5-foot long (measured this inspection) horizontal crack and minor spall with efflorescence was observed at the downstream end of the right training wall. These conditions were observed during previous inspections and there did not appear to be any significant change in conditions since the 2020 inspection. A new horizontal crack was observed in the top of the right training wall extending from the downstream end of the wall to the fence post. The crack was open and significant, but it was just below the top of the wall and not a structural concern.

**Signs of Movement:** No signs of movement were observed or apparent. Walls appeared straight and no displacement was observed at the contact with the spillway or grouted riprap apron.

**Joints:** No joints in training walls. As noted above, the joint filler material

## SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

was missing at the joints between the spillway and the training walls. Contacts between training walls, concrete footing and spillway appeared intact and in good condition.

**Drains:** None

**Unusual Conditions:** Chain link fence located along top of both training walls. The fence appeared to be in good condition. The loose upstream post on the left side observed during the 2020 inspection was repaired. The fence on the downstream right training wall was loose due to the crack.

### SPILLWAY DISCHARGE CHANNEL

**Description:** Consists of a grouted riprap apron between concrete spillway footing and training wall footings, extending to the end of training walls.

**Condition of Material:** Difficult to fully observe the footings at the base of the spillway and training walls due to flow conditions, but the footings appeared intact with no significant cracks or spalls. Some minor erosion of the concrete footing was observed at the contact with the grouted riprap and at the footing joints. As noted above in the Spillway Crest and Downstream Face section, some minor voids were observed between the concrete footing and grouted riprap. The voids were mainly located near the center of the spillway.

Grouted riprap appeared intact and in good condition with some missing stones near the downstream end of the training walls. No voids or significant cracks were observed in the grouted riprap. In general, conditions appeared similar to the 2020 inspection.

**Vegetation (trees, bushes):** None observed.

**Debris:** Minor leafy debris was observed within the grouted riprap channel.

**Channel Side-Slope Stability:** Channel sides protected by concrete training walls. Training walls were stable.

**Erosion:** No significant erosion observed. Grouted riprap was in generally good condition, but some stones were missing toward the downstream end of the discharge channel as noted above.

**Unusual Conditions:** None observed.

### DOWNSTREAM APRON

**Description:** Grouted riprap discharge channel transitions into loose riprap apron at the end of the training walls.

**Condition of Material:** The apron area appeared stable and no significant additional movement of riprap was apparent since the 2020 inspection.

**Signs of Movement:** As observed during previous inspections, an area of the riprap apron was displaced. The Owner reported that some 12-inch riprap was recently added to the apron but the new riprap was submerged and not visible. Similar to previous inspections, the area of missing stone was measured at about 16 feet wide by 10 feet long by 1.5 feet deep. The apron needs to be repaired by adding larger riprap (at least 18-inch diameter) and grouting the voids to full depth.

Exposed filter fabric was observed on the left side of the apron. This condition appeared similar during this inspection.

**Unusual Conditions:** Transition area from discharge channel to apron is relatively steep, which could contribute to the movement of the riprap.

## SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

### PLUNGE POOL

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- Description:** Downstream riprap apron transitions into a riprap-lined plunge pool.
- Vegetation (trees, bushes):** Stand of thick cattails was established in the plunge pool. Several large trees and grassy vegetation were observed along the sides of the channel.
- Condition of Material:** The riprap was overgrown and difficult to observe, but riprap appeared to be in good condition where visible along the left side slope.
- Signs of Movement:** No movement was apparent other than the displaced riprap from the apron.
- Erosion:** No signs of erosion were apparent. Riprap in pool appeared to be stable but was difficult to observe due to overgrown conditions.
- Unusual Conditions:** None observed.

### DOWNSTREAM CHANNEL

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- Description:** Winding, clean and flowing full with some rock.
- Vegetation (trees, bushes):** Several large trees, brush and grassy vegetation were observed along the channel banks.
- Debris:** None observed.
- Channel Side-Slope Stability:** Appeared stable.
- Erosion:** No significant erosion was observed.
- Unusual Conditions:** None observed.

### LOW LEVEL OUTLET

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- Description:** 18-inch square sluice gate mounted on the downstream face of spillway. Sluice gate is controlled by a remote hydraulic operator that is located within an enclosure on the crest of the dam immediately right of the spillway training wall.
- Condition:** The Owner indicated that the sluice gate was operable, and no problems were encountered with the hydraulic operator during past operations. The enclosure was not opened during this inspection, but previous inspections noted that some rust was observed on the hydraulic cylinder encasement.
- Trash Rack:** None

#### Leakage

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Location	Estimated Flow
Unknown. Unable to properly observe due to flow over spillway.	N/A

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**Unusual Conditions:** None observed or reported.

**Was the Low Level Outlet operated during the inspection?** No

**Were there difficulties operating the Low Level Outlet?** Owner indicated that there are no problems with the low level outlet system.

## SENECA LAKE DAM VISUAL INSPECTION CHECKLIST

**When was the Low Level Outlet last operated and did this conform with the Operation and Maintenance procedures?** The Owner indicated that the low level outlet was operated on May 14, 2022 and November 20, 2022. The Owner typically operates the gate twice a year (Spring and Fall).

**Miscellaneous:** The hydraulic operator enclosure is located on the right-side dam embankment crest adjacent to the right spillway training wall. A steel plate covers a missing section of the enclosure's concrete footing. The lock on the operator enclosure was in place.

### EXAMINATION OF OTHER FEATURES

**INSTRUMENTATION** (Monumentation / Surveys, Observation Wells, Weirs, Piezometers, Etc. location, condition)

Item	Location	Condition
Remote Hydraulic Sluice Gate Operator	The operator box is located on the right dam embankment crest adjacent to the right spillway training wall.	See Low Level Outlet above.

### RESERVOIR

**Slopes (H:V):** Appeared stable.

**Sedimentation:** Unknown

**Unusual Conditions Which Affect the Dam:** During previous inspections, the Owner indicated that beavers have historically blocked the low level outlet and the Owners occasionally remove debris. No beaver activity were observed during this inspection.

**Unusual Conditions:** None observed.

### APPURTENANT STRUCTURES

Item	Location	Condition
None		

**SENECA LAKE DAM  
VISUAL INSPECTION CHECKLIST**

**CONCLUSION**

**DAM INSPECTION PROGRAM GUIDELINES**

The following new guidelines have been established by the NJDEP Bureau of Dam Safety & Flood Control to help meet the requirements of the National Inventory of Dams condition assessment of existing dam structures. Please follow the guidelines/definitions below and select the appropriate checkbox.

**SATISFACTORY**

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria. Minor maintenance items may be required.

**FAIR**

Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Minor deficiencies may exist that require remedial action and/or secondary studies or investigations.

**POOR**

A dam safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.

**UNSATISFACTORY**

Considered unsafe. A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary.

I hereby state that the dam structure referenced herein was personally inspected by me and in my professional opinion based on the visual inspection, the dam was found to be in the following condition (**select one only**):

- SATISFACTORY
- FAIR
- POOR
- UNSATISFACTORY

**SENECA LAKE DAM  
VISUAL INSPECTION CHECKLIST**

**CONCLUSION (continued)**

I recommend the following repairs be made immediately:

1. **Repair the area of eroded downstream apron. Add large stone (18-inch diameter) and grout voids to full depth.**
2. **Cut the cattails in the plunge pool.**

The following long term improvements should also be undertaken:

1. **Continue to visually monitor cracks in the concrete spillway training walls.**
2. **Fill the minor voids between the spillway concrete footing and the grouted riprap apron.**

The following studies are recommended:	<input type="checkbox"/> Hydrologic and Hydraulic analysis <input type="checkbox"/> Stability analysis <input type="checkbox"/> Failure/Inundation analysis <input type="checkbox"/> Other <input checked="" type="checkbox"/> None
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Have the recommendations above included those from the Phase I Inspection Report or previous Regular or Formal Inspection Reports? If not, indicate why. **Yes**

<p><b>EMERGENCY ACTION PLAN (This section must be completed for all Class I &amp; II dams)</b></p> <p>Date of Approved Plan: <b>July 26, 2012</b> Date of Last Plan Revision: <b>January 29, 2023</b> Is the notification flowchart complete and current? <b>Yes</b> (If the notification flow chart is not complete and current, all modifications, corrections, and additions must be made and replacement pages submitted with this report) Is inundation mapping or a description included? If not, why? <b>Yes</b></p>
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**NJ Dam Safety Compliance Schedule Form** (attached).  
This form must be completed or the Inspection Report will be deemed incomplete. **Yes**

Name of Professional Engineering Company/Consultant Representing the Owner:

**GZA GeoEnvironmental, Inc.  
55 Lane Road, Suite 407  
Fairfield, New Jersey 07004  
(973) 774-3300**

New Jersey Licensed Professional Engineers representing the dam owner in responsible charge of the inspection:

**Jessica A. Bergmann, P.E.**

Sign \_\_\_\_\_ Date \_\_\_\_\_  
New Jersey Professional Engineer License Number: **24GE04842200** SEAL

**Christopher S. Adams, P.E.**

Sign \_\_\_\_\_ Date \_\_\_\_\_  
New Jersey Professional Engineer License Number: **24GE03130000** SEAL

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 1: Right side dam crest looking left toward the spillway.**



**Photo No. 2: Right side dam crest looking right toward the right abutment.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 3: Left side dam crest looking right toward the spillway.**



**Photo No. 4: Left side dam crest looking left toward the restaurant and dike.**



**Seneca Lake Dam  
2022 Inspection**



**Photo No. 5: Right side upstream slope of the dam  
looking right toward the bend.**



**Photo No. 6: Right side upstream slope of the dam  
looking left toward the bend.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 7: Left side upstream slope of the dam looking right toward the spillway.  
Note the scarping along the lake edge at the bench.**



**Photo No. 8: Left side upstream slope of the dam looking left along the restaurant.  
Note the segmental block retaining walls.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 9: Right side downstream slope and toe of the dam looking left toward the spillway.**



**Photo No. 10: Right side downstream slope and toe of the dam looking right toward the right abutment.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 11: Left side downstream slope of the dam looking upstream from the toe.**



**Photo No. 12: Left side downstream slope of the dam looking right toward the spillway. Note the area of sparse grass cover.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 13: Left side downstream slope of the dam looking left toward the restaurant.**



**Photo No. 14: Closeup of the rock rubble wall on the left side downstream slope of the dam looking left toward the restaurant.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 15: Dike on Lot 113 looking left.**



**Photo No. 16: Dike on Lot 112 looking right toward the restaurant.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 17: Spillway entrance and crest looking left.**



**Photo No. 18: Downstream face of spillway looking left.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 19: Downstream face of spillway looking upstream.**



**Photo No. 20: Closeup of a typical void between the spillway footing and the grouted riprap apron.**





**Photo No. 21: Right side downstream face of spillway.**



**Photo No. 22: Joint between the spillway and the right side training wall.  
Note the the repaired joint material.**



**Photo No. 23: Left side downstream face of spillway.**



**Photo No. 24: Joint between the spillway and the left side training wall.  
Note the the repaired joint material.**



**Photo No. 25: Right side spillway training wall looking downstream.  
Note the efflorescence and cracking in the wall.**



**Photo No. 26: Left side spillway training wall looking downstream.  
Note the efflorescence and cracking in the wall.**



**Photo No. 27: Closeup of 5-foot long horizontal crack in the downstream end of the right spillway training wall.**



**Photo No. 28: Closeup of horizontal crack in the top of the right training wall extending from the downstream end of the wall to the fence post.**

**Seneca Lake Dam  
2022 Inspection**



**Photo No. 29: Spillway and grouted riprap discharge channel looking upstream.**



**Photo No. 30: Grouted riprap discharge channel looking downstream.**



**Photo No. 31: Downstream riprap apron looking right.  
Note that some riprap was added since the 2020 inspection.**



**Photo No. 32: Looking downstream at the plunge pool and exit channel  
toward the Tomahawk Trail bridge.**



**Photo No. 33: Closeup of the low-level outlet sluice gate.  
Note the deflection cover over the hydraulic operating cylinder.**



**Photo No. 34: Hydraulic operator enclosure for the  
low-level outlet sluice gate.**



## **USE OF REPORT**

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of the Client for the stated purpose(s) and location(s) identified in the Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

## **STANDARD OF CARE**

2. Our findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. Our services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

## **DAM INSPECTION**

4. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.
5. In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, along with data available to the inspection team. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.
6. It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

## **TYPES OF DAM INSPECTIONS PER NJDEP GUIDELINES**

7. Per NJDEP guidelines, a Regular Inspection is a visual inspection of a dam to detect any signs of deterioration in material, developing weaknesses, or unsafe hydraulic or structural behavior. A review of existing hydrologic and hydraulic analyses, stability analyses, and failure/inundation analyses is not part of the scope of a Regular Inspection.
8. Per NJDEP guidelines, a Formal Inspection is a visual inspection and a performance evaluation of a dam. Formal Inspections include a review of records on project design, construction, and performance.

## **SUBSURFACE CONDITIONS**

9. If presented, the generalized soil profile(s) and description, along with the conclusions and recommendations provided in our Report, are based in part on widely-spaced subsurface explorations by GZA and/or others, with a limited number of soil and/or rock samples and groundwater /piezometers data and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.
10. Water level readings have been made in test holes (as described in the Report), monitoring wells and piezometers, at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this





Report. Fluctuations in the groundwater and piezometer levels, however, occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, reservoir and tailwater levels, the presence of subsurface utilities, and/or natural or artificially induced perturbations.

#### **GENERAL**

11. The observations described in this report were made under the conditions stated therein. The conclusions presented were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by the Client.
12. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein available to GZA at the time of the evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.
13. Any GZA hydrologic analysis presented herein is for the rainfall volumes and distributions stated herein. For storm conditions other than those analyzed, the response of the site's spillway, impoundment, and drainage network has not been evaluated.
14. Observations were made of the site and of structures on the site as indicated within the report. Where access to portions of the structure or site, or to structures on the site was unavailable or limited, GZA renders no opinion as to the condition of that portion of the site or structure. In particular, it is noted that water levels in the impoundment and elsewhere and/or flow over the spillway may have limited GZA's ability to make observations of underwater portions of the structure. Excessive vegetation, when present, also inhibits observations.
15. In reviewing this Report, it should be realized that the reported condition of the dam is based on observations of field conditions during the course of this study along with data made available to GZA. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued inspection and care can there be any chance that unsafe conditions be detected.

#### **COMPLIANCE WITH CODES AND REGULATIONS**

16. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.
17. This scope of work does not include an assessment of the need for fences, gates, no-trespassing signs, boat/swimmer barriers, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

#### **COST ESTIMATES**

18. Unless otherwise stated, our cost estimates are for comparative, or general planning purposes. These estimates may involve approximate quantity evaluations and may not be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over the labor and material costs required to plan and execute the anticipated work, our estimates were made using our experience and readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

#### **ADDITIONAL SERVICES**

19. It is recommended that GZA be retained to provide services during any future: site observations, explorations, evaluations, design, implementation activities, construction and/or implementation of remedial measures recommended in this Report. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.