

SCOPE OF WORK

Greenwood Lake Dam Repairs

Greenwood Lake State Park
West Milford Township, Passaic County, NJ

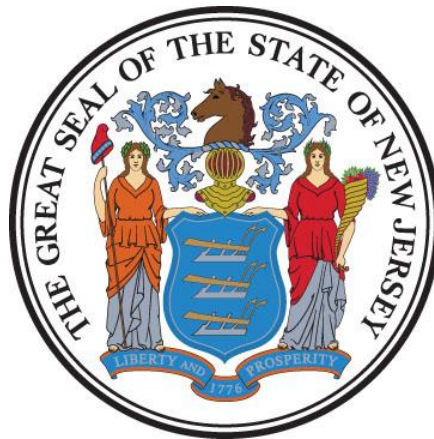
Project No. P1389-00

STATE OF NEW JERSEY

Honorable Mikie Sherrill, Governor
Honorable Dr. Dale G. Caldwell, Lt. Governor

DEPARTMENT OF THE TREASURY

Aaron Binder, State Treasurer



DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

Thomas A. Edenbaum, Director

Date: May 26, 2026

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I. OBJECTIVE

The objective of this project is to rehabilitate the low-level outlet system and all appurtenant operating components at Greenwood Lake Dam in accordance with the New Jersey Dam Safety Standards (N.J.A.C. 7:20). Included in the rehabilitation is the replacement of two sluice gates. The stop logs, fish screens, trash racks, and the control room entry door will be inspected and repaired or replaced as necessary. The Greenwood Lake Dam is located in Greenwood Lake State Park in West Milford Township in Passaic County.

II. CONSULTANT QUALIFICATIONS

A. CONSULTANT & SUB-CONSULTANT PRE-QUALIFICATIONS

The Consultant shall be a firm pre-qualified with the Division of Property Management & Construction (DPMC) in the following discipline(s):

- **P021 Dam/Levee Design**

The Consultant shall also have in-house capabilities or Sub-Consultants pre-qualified with DPMC in:

- **P025 Estimating/ Cost Analysis**
- **P037 Asbestos Design**
- **P038 Asbestos Safety Control Monitoring**
- **P065 Lead Paint Evaluation**

As well as, **any and all** other Architectural, Engineering and Specialty Disciplines necessary to complete the project as described in this Scope of Work (SOW).

III. PROJECT BUDGET

A. CONSTRUCTION COST ESTIMATE (CCE)

The initial Construction Cost Estimate (CCE) for this project is \$500,000.

The Consultant shall review this Scope of Work and provide a narrative evaluation and analysis of the accuracy of the proposed project CCE in its technical proposal based on its professional experience and opinion.

B. CURRENT WORKING ESTIMATE (CWE)

The Current Working Estimate (CWE) for this project is \$762,500.

The CWE includes the construction cost estimate and all consulting, permitting and administrative fees.

The CWE is the client agency's financial budget based on this project Scope of Work and shall not be exceeded during the design and construction phases of the project unless DPMC approves the change after notification from the consultant during the design process and in a revised CWE deliverable.

C. CONSULTANT'S FEES

The construction cost estimate for this project *shall not* be used as a basis for the Consultant's design and construction administration fees. The Consultant's fees shall be based on the information contained in this Scope of Work document and the observations made and/or the additional information received during the pre-proposal meeting.

IV. PROJECT SCHEDULE

A. SCOPE OF WORK DESIGN & CONSTRUCTION SCHEDULE

The following schedule identifies the estimated design and construction phases for this project and the estimated durations. The Consultant's proposed design and construction schedule shall be in Gantt chart format and calendar day durations with start and finish dates for each task.

<u>PROJECT PHASE</u>	<u>ESTIMATED DURATION (Calendar Days)</u>
1. Site Access Approvals & Schedule Design Kick-off Meeting	14
2. Design Development Phase	42
• <i>Project Team & DPMC Plan/Code Unit Review & Comment</i>	14
3. Final Design Phase	42
• <i>Project Team & DPMC Plan/Code Unit Review & Approval</i>	14
4. Final Design Re-Submission to Address Comments	7 (See Note)
• <i>Project Team & DPMC Plan/Code Unit Review & Approval</i>	14

5. Permit Application Phase	7
• <i>Issue Plan Release</i>	
6. Bid Phase	42
7. Award Phase	28
8. Construction Phase	120
9. Project Close Out Phase	30

Note: The Final Design Phase is considered complete upon the release of Construction Documents by the DPMC Code Group and/or the Department of Community Affairs (DCA).

B. CONSULTANT’S PROPOSED DESIGN & CONSTRUCTION SCHEDULE

The Consultant shall submit a project design and construction schedule with its technical proposal that is similar in format and detail to the schedule depicted in **Exhibit ‘A.’** The schedule developed by the Consultant shall reflect its recommended project phases, phase activities, and activity durations.

A written narrative shall also be included with the technical proposal explaining the schedule submitted and the reasons why and how it can be completed in the time frame proposed by the Consultant.

This schedule and narrative will be reviewed by the Consultant Selection Committee as part of the evaluation process and will be assigned a score commensurate with clarity and comprehensiveness of the submission.

PROJECT NAME: Greenwood Lake Dam Repairs
PROJECT LOCATION: Greenwood Lake State Park, West Milford Township, Passaic County
PROJECT NO: P1389-00
DATE: May 26, 2026

V. PROJECT SITE LOCATION & TEAM MEMBER

A. PROJECT SITE ADDRESS

The location of the project site is:

Greenwood Lake Dam
Greenwood Lake State Park
NJ Dam Number: 22-20
West Milford, Township, Passaic County

GPS Coordinates: 41.161766° N, -74.335504° W

See **Exhibit 'B'** for the project site location map.

B. PROJECT TEAM MEMBER DIRECTORY

The following are the names, addresses, and phone numbers of the Project Team members.

1. DPMC Representative

Name: Troylene Ladner, Project Manager
Address: Division of Property Management & Construction
20 West State Street, 3rd Floor
Trenton, NJ 08608-1206
Phone No: (609) 292-5953
E-Mail: Troylene.Ladner@treas.nj.gov

2. Department of Environmental Protection

Name: William C. White, Construction Mgmt. Specialist 2
Address: Department of Environmental Protection
275 Freehold-Englishtown Road
Englishtown, NJ 07726
Phone No: (609) 802-5886
E-Mail: William.White@dep.nj.gov

VI. PROJECT DEFINITION

A. BACKGROUND

Greenwood Lake is 1,920-acres and is located on the New Jersey and New York border. The Greenwood Lake Dam was constructed between 1927-1928 and is situated on the Hudson River Basin within the State of New Jersey, County of Passaic in West Milford. The lake is an important recreational resource that is dependent upon a stable water level and supplies water flow to the nearby Wanaque River and Monksville and Wanaque Reservoirs, as well as supplying water to nearby residents and businesses (See **Exhibit ‘B’** Project Location Map).

The yearly inspection results of the Greenwood Lake Dam can be found in the latest report which included a visual inspection and checklist. (See **Exhibit ‘C’** 2025 Regular Inspection Report for Greenwood Lake Dam). Recommendations are presented in the report for immediate repair and improvements in accordance with New Jersey Dam Safety Standards (N.J.A.C. 7:20).

The Greenwood Lake Dam and equipment belongs to the State of New Jersey and is the responsibility of the NJ Department of Environmental Protection and the State Park Service. The site is maintained and operated by the NJDEP State Parks, Forests and Historic Sites.

B. FUNCTIONAL DESCRIPTION OF THE SITE

Greenwood Lake Dam is 18 feet high and 270 feet in length. The dam is classified as a Class I (High Hazard) Dam (See **Exhibit ‘B’** Project Site). The dam structure is earth fill with grouted riprap, concrete paving and cellular concrete block overtopping protection. Further information about the structure and conditions can be found in the included Inspection Report. The included report is to be used as a guide only in development of the design for this project (See **Exhibit ‘C’** 2025 Inspection Report).

After review of the latest Inspection Report, NJDEP Dam Safety recommends the full rehabilitation of the low-level outlet system at Greenwood Lake Dam, in accordance with the New Jersey Dam Safety Standards (N.J.A.C. 7:20). This includes the replacement of the existing two 42-inches x 60-inches sluice gates and all appurtenant operating components (see **Exhibit ‘C’** 2025 Regular Inspection Report for Greenwood Lake Dam-Photos). The gates are aged and have reached the end of their useful life. Prior investigations indicate replacement parts for the gate and components are not available. To restore full functionality of the system, inspection and design is necessary for the repairs and/or replacement of the stop log, fish screens, and trash rack. Additionally, the latest inspection shows the access door leading from the gatehouse over the trash screens is not operating and has reached the end of its useful life. The design will include the necessary repairs to the gatehouse structure for the access door leading from the gatehouse to the platform over the trash screens.

VII. CONSULTANT DESIGN RESPONSIBILITIES

A. DAM REHABILITATION DESIGN REQUIREMENTS

1. Design Criteria

The Consultant shall review the Inspection Report included as a guide to develop a rehabilitation design to bring the Greenwood Lake Dam into compliance with Dam Safety Standards (N.J.A.C. 7:20). The Consultant shall provide the final design that will include, but not be limited to:

- Rehabilitation of the low-level outlet system at Greenwood Lake Dam in accordance with the New Jersey Dam Safety Standards (N.J.A.C. 7:20).
- Replacement of the two existing sluice gates (42-inches x 60-inches) and all appurtenant operating components.
- Restoration of full functionality of the system by performing a detailed inspection and provide the design necessary to repair/replace the stop log, fish screens and trash racks and components.
- An inspection and design shall be provided for the repair and/or replacement of the access door leading from the gatehouse structure to the platform over the trash screens.

The design documents shall include the preparation of plans, specifications, and design calculations for the rehabilitation of the low-level outlet system in accordance with all applicable local, state and federal laws sufficient to obtain a Dam Repair Permit from the NJDEP Bureau of Dam Safety (N.J.A.C. 7:20). The plans must be of sufficient detail to allow for construction of the project.

B. HAZARDOUS BUILDING MATERIALS

Consultant shall survey the building and related components and, if deemed necessary, collect samples of materials that will be impacted by the construction/demolition activities and analyze them for the presence of hazardous materials including:

1. Asbestos in accordance with N.J.A.C. 5:23-8, Asbestos Hazard Abatement Sub-code.
2. Lead in accordance with N.J.A.C. 5:17, Lead Hazard Evaluation and Abatement Code.
3. PCB's in accordance with 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions. Consultant shall engage a firm certified in the testing and analysis of materials containing PCB's.

4. Mold.

Consultant shall document the procedure, process and findings and prepare a “Hazardous Materials Survey Report” identifying building components impacted by construction activities requiring hazardous materials abatement. Consultant shall provide three copies of the “Hazardous Materials Survey Report” to the Project Manager.

Consultant shall estimate the cost of hazardous materials sample collection, testing, analysis and preparation of the Hazardous Materials Survey Report and include that amount in the fee proposal line item entitled “**Hazardous Materials Testing and Report Allowance,**” refer to paragraph XII.B.

Based on the Hazardous Materials Survey Report, Consultant shall provide construction documents for abatement of the hazardous materials impacted by the work in accordance with the applicable code, sub-code and Federal regulations.

Consultant shall estimate the cost to prepare construction documents for hazardous materials abatement and include that amount in the fee proposal line item entitled “**Hazardous Materials Abatement Design Allowance,**” refer to paragraph XII.C.

Consultant shall estimate the cost to provide “Construction Monitoring and Administration Services” for hazardous materials abatement activities and include that amount in the fee proposal line item entitled “**Hazardous Materials Construction Administration Allowance,**” refer to paragraph XII.D.

There shall be no “mark-up” of sub-consultant or subcontractor fees if sub-consultants or subcontractors are engaged to perform any of the work defined in paragraph VII.B “**Hazardous Building Materials.**” All costs associated with managing, coordinating, observing and administering sub-consultants and subcontractors performing hazardous materials sampling, testing, analysis, report preparation, hazardous materials construction administration services shall be included in the consultant’s lump sum fee proposal.

C. DESIGN MEETINGS & PRESENTATIONS

1. Design Meetings

Conduct the appropriate number of review meetings with the Project Team members during each design phase of the project so they may determine if the project meets their requirements, question any aspect of the contract deliverables, and make changes where appropriate. The Consultant shall describe the philosophy and process used in the development of the design criteria and the various alternatives considered to meet the project objectives. Selected studies, sketches, cost estimates, schedules, and other relevant information shall be presented to support the design solutions proposed. Special considerations shall also be addressed such as: contractor

site access limitations, utility shutdowns and switchover coordination, phased construction and schedule requirements, security restrictions, available swing space, material and equipment delivery dates, etc.

It shall also be the responsibility of the Consultant to arrange and require all critical Sub-Consultants to be in attendance at the design review meetings.

Record the minutes of each design meeting and distribute within three (3) calendar days to all attendees and those persons specified to be on the distribution list by the Project Manager.

2. Design Presentations

The minimum number of design presentations required for each phase of this project is identified below for reference:

Design Development Phase: One (1) oral presentation at phase completion.

Final Design Phase: One (1) oral presentation at phase completion.

D. EXISTING DOCUMENTATION

Copies of the following documents will be provided to each Consulting firm at the pre-proposal meeting to assist in the bidding process.

- P0800-00 Greenwood Lake Sluice Gate Rehabilitation, Buck, Seifert & Joist Incorporated
- DBC P0234: Rehabilitation of Greenwood Lake Dam, June 1993 Record Drawings Storch Engineers
- Sluice Gate Rehabilitation repairs to Greenwood Lake Dam, June 1993 Record Drawings Storch Engineers

Review these documents and any additional information that may be provided at a later date such as reports, studies, surveys, equipment manuals, as-built drawings, etc. The State does not attest to the accuracy of the information provided and accepts no responsibility for the consequences of errors by the use of any information and material contained in the documentation provided. It shall be the responsibility of the Consultant to verify the contents and assume full responsibility for any determination or conclusion drawn from the material used. If the information provided is insufficient, the Consultant shall take the appropriate actions necessary to obtain the additional information required.

All original documentation shall be returned to the provider at the completion of the project.

VIII. PERMITS & APPROVALS

A. NJ UNIFORM CONSTRUCTION CODE PERMIT

The project construction documents must comply with the latest adopted edition of the NJ Uniform Construction Code (NJUCC).

The latest NJUCC Adopted Codes and Standards can be found at:
<https://www.nj.gov/dca/codes/codreg/ucc.shtml>

The Consultant shall complete the NJUCC permit application and all applicable technical sub-code sections with all technical site data required. The Agent section of the application and certification section of the building sub-code section shall be signed. These documents shall be forwarded to the DPMC Project Manager.

The following information should be provided for the permit application and technical sections to be submitted:

Ownership in Fee:

Department of Environmental Protection
501 East State Street
Trenton, 08625

Proposed work site:

Greenwood Lake Dam
Greenwood Lake State Park

Work site location:

Greenwood Lake Dam
NJ Dam Number: 22-20
Greenwood Lake State Park
West Milford Township, Passaic County

Block 3802	Lot 1,2
Block 3803	Lot 1,2

The county MUST be listed in the address.

The Consultant may obtain copies of all NJUCC permit applications at the following website:

<https://www.nj.gov/dca/codes/resources/constructionpermitforms.shtml>

All other required project permits shall be obtained and paid for by the Consultant in accordance with the procedures described in Paragraph VIII.B.

1. Prior Approval Certification Letters

The issuance of a construction permit for this project may be contingent upon acquiring various “prior approvals” as defined by N.J.A.C. 5:23-1.4. It is the Consultant’s responsibility to determine which prior approvals, if any, are required. The Consultant shall submit a general certification letter to the DPMC Plan & Code Review Unit Manager during the Permit Phase of this project that certifies all required prior approvals have been obtained.

In addition to the general certification letter discussed above, the following specific prior approval certification letters, where applicable, shall be submitted by the Consultant to the DPMC Plan & Code Review Unit Manager: Soil Erosion & Sediment Control; Water & Sewer Treatment Works Approval; Coastal Areas Facilities Review; Compliance of Underground Storage Tank Systems with N.J.A.C. 7:14B; Pinelands Commission; Highlands Council; Well Construction and Maintenance; Sealing of Abandoned Wells with N.J.A.C. 7:9D; Certification that all utilities have been disconnected from structures to be demolished; Board of Health Approval for Potable Water Wells; Health Department Approval for Septic Systems; and Notification to Adjoining Property Owners with N.J.A.C. 5:23-2.17(c). It shall be noted that in accordance with N.J.A.C. 5:23-2.15(a)5, a permit cannot be issued until the letter(s) of certification is received.

2. Multi-building or Multi-site Permits

A project that involves many buildings and/or sites requires that a separate permit shall be issued for each building or site. The Consultant must determine the construction cost estimate for *each* building and/or site location and submit that amount where indicated on the permit application.

3. Special Inspections

In accordance with the requirements of the NJUCC N.J.A.C. 5:23-2.20(b), Bulletin 03-5 and Chapter 17 of the International Building Code, the Consultant shall be responsible for the coordination of all special inspections during the construction phase of the project.

Bulletin 03-5 can be found at:

https://www.nj.gov/dca/codes/publications/pdf_bulletins/b_03_5.pdf

a. Definition

Special inspections are defined as an independent verification by a certified special inspector for **Class I buildings and smoke control systems in any class building**. The special inspector is to be independent from the contractor and responsible to the Consultant so that there is no possible conflict of interest.

Special inspectors shall be certified in accordance with the requirements in the NJUCC.

b. Responsibilities

The Consultant shall submit with the permit application, a list of special inspections and the agencies or special inspectors that will be responsible to carry out the inspections required for the project. The list shall be a separate document, on letter head, signed and sealed.

B. OTHER REGULATORY AGENCY PERMITS, CERTIFICATES AND APPROVALS

The Consultant shall identify and obtain all other State Regulatory Agency permits, certificates, and approvals that will govern and affect the work described in this Scope of Work. An itemized list of these permits, certificates, and approvals shall be included with the Consultant's Technical Proposal and the total amount of the application fees should be entered in the Fee Proposal line item entitled, **"Permit Fee Allowance."**

The Consultant may refer to the DPMC "Procedures for Architects and Engineers Manual," Paragraph **"9. REGULATORY AGENCY APPROVALS"** which presents a compendium of State permits, certificates, and approvals that may be required for this project.

The Consultant shall determine the appropriate phase of the project to submit the permit application(s) in order to meet the approved project milestone dates.

Where reference to an established industry standard is made, it shall be understood to mean the most recent edition of the standard unless otherwise noted. If an industry standard is found to be revoked, or should the standard have undergone substantial change or revision from the time that the Scope of Work was developed, the Consultant shall comply with the most recent edition of the standard.

C. STATE INSURANCE APPROVAL

The Consultant shall respond in writing to the FM Global Insurance Underwriter plan review comments through the DPMC Plan & Code Review Unit Manager as applicable. The Consultant shall review all the comments and modify the documents while adhering to the project's SOW requirements, State code requirements, schedule, budget, and Consultant fee.

D. PUBLIC EMPLOYEES OCCUPATIONAL SAFETY & HEALTH PROGRAM

A paragraph shall be included in the design documents, if applicable to this project that states: The Contractor shall comply with all the requirements stipulated in the Public Employees Occupational Safety & Health Program (PEOSHA) document, paragraph 12:100-13.5 entitled “Air quality during renovation and remodeling”. The Contractor shall submit a plan demonstrating the measures to be utilized to confine the dust, debris, and air contaminants in the renovation or construction area of the project site to the Project Team prior to the start of construction.

The link to the document can be found on the Public Employees Occupational Safety and Health (PEOSH) website and the document found on the following link:

<https://www.nj.gov/health/workplacehealthandsafety/documents/peosh/iaqstd.pdf>

IX. BIDDING AND CONTRACT AWARD RESPONSIBILITIES

The Bidding and Contract Award Phase commences with receipt of the required permits, UCC plan release and verification that funding is in place for construction. The Consultant shall refer to the DPMC “Procedures for Architects and Engineers Manual”, Paragraph “17. BIDDING AND CONTRACT AWARD” for all requirements for this phase available at <https://www.nj.gov/treasury/dpmc/Assets/Files/ProceduresforArchitectsandEngineers.pdf>.

X. CONSTRUCTION ADMINISTRATION RESPONSIBILITIES

The A/E and their sub-consultants shall, unless otherwise specified in the project specific Scope of Work, provide site administration during the construction of the project. The services required of such site administration shall include, but shall not be limited to, attend and chair the pre-construction meeting, conduct weekly field observations, attend and chair regularly scheduled bi-weekly job meetings, review/approve shop drawings, submittals, and respond to RFI’s.

The Consultant shall refer to the DPMC “Procedures for Architects and Engineers Manual”, Paragraph “18. CONSTRUCTION PHASE” for all construction administration requirements available at <https://www.nj.gov/treasury/dpmc/Assets/Files/ProceduresforArchitectsandEngineers.pdf>.

XI. PROJECT CLOSE-OUT PHASE

The DPMC Project Manager has the full responsibility for the planning, scheduling, and execution of project close-out activities. The A/E is responsible to cooperate with the DPMC Project Manager in the planning, scheduling, and execution of project close-out activities. The Consultant shall refer to the DPMC “Procedures for Architects and Engineers Manual”, Paragraph “19. PROJECT CLOSE-OUT PHASE” for all requirements available at <https://www.nj.gov/treasury/dpmc/Assets/Files/ProceduresforArchitectsandEngineers.pdf>.

XII. ALLOWANCES

A. PERMIT FEE ALLOWANCE

The Consultant shall obtain and pay for all of the project permits in accordance with the guidelines identified below.

1. Permits

The Consultant shall determine the various permits, certificates, and approvals required to complete this project.

2. Permit Costs

The Consultant shall estimate the application fee costs for all of the required project permits, certificates, and approvals (excluding the NJUCC permit) and include that amount in its fee proposal line item entitled “**Permit Fee Allowance.**” A breakdown of each permit and application fee shall be attached to the fee proposal for reference.

NOTE: The NJUCC permit is excluded since it will be paid for by the State.

3. Applications

The Consultant shall complete and submit all permit applications to the appropriate permitting authorities and the costs shall be paid from the Consultant’s permit fee allowance. A copy of the application(s) and the original permit(s) obtained by the Consultant shall be given to the DPMC Project Manager for distribution during construction.

4. Consultant Fee

The Consultant shall determine what is required to complete and submit the permit applications, obtain supporting documentation, attend meetings, etc., and include the total cost in the base bid of its fee proposal.

Any funds remaining in the permit allowance will be returned to the State at the close of the project.

B. HAZARDOUS MATERIALS TESTING AND REPORT ALLOWANCE

The Consultant shall estimate the costs to complete the hazardous materials survey, sample collection, testing and analysis and preparation of a “Hazardous Materials Survey Report” noted in paragraph **VII.B** and enter that amount on the fee proposal line item entitled “**Hazardous Materials Testing and Report Allowance**,” Consultant shall attach a detailed cost breakdown sheet for use by DPMC during the proposal review and potential fee negotiations. The cost breakdown sheet shall include, but not be limited to, the following information:

- Description of tasks and estimated cost for the following:
 - Sample collection;
 - Sample testing; and,
 - Preparation of a Hazardous Materials Survey Report.

Any funds remaining in the Hazardous Materials Testing and Report Allowance will be returned to the State at the close of the project.

C. HAZARDOUS MATERIALS ABATEMENT DESIGN ALLOWANCE

The Consultant shall estimate the costs to prepare construction documents for hazardous materials abatement noted in paragraph **VII.B** and enter that amount on the fee proposal line item entitled “**Hazardous Materials Abatement Design Allowance**.” Consultant shall attach a detailed cost breakdown sheet for use by DPMC during the proposal review and potential fee negotiations. The cost breakdown sheet shall include a description of the tasks to be performed and the estimated cost of each task.

Any funds remaining in the Hazardous Materials Abatement Design Allowance will be returned to the State at the close of the project.

D. HAZARDOUS MATERIALS CONSTRUCTION ADMINISTRATION ALLOWANCE

The Consultant shall estimate the cost to provide Construction Monitoring and Administration Services for hazardous materials abatement as noted in paragraph **VII.B** and enter that amount on the fee proposal line item entitled “**Hazardous Materials Construction Administration Allowance**.” Consultant shall attach a detailed cost breakdown sheet for use by DPMC during the proposal review and potential fee negotiations. The cost breakdown sheet shall include a description of the tasks to be performed and the estimated cost of each task.

Any funds remaining in the Hazardous Materials Construction Administration Allowance will be returned to the State at the close of the project.

PROJECT NAME: Greenwood Lake Dam Repairs
PROJECT LOCATION: Greenwood Lake State Park, West Milford Township, Passaic County
PROJECT NO: P1389-00
DATE: May 26, 2026

XIII. SOW SIGNATURE APPROVAL SHEET

This Scope of Work shall not be considered a valid document unless all signatures appear in each designated area below.

The client agency approval signature on this page indicates that they have reviewed the design criteria and construction schedule described in this project Scope of Work (including the subsequent contract deliverables and exhibits) and verifies that the work will not conflict with the existing or future construction activities of other projects at the site.

SOW PREPARED BY: Alison F. Gottlieb 5/26/2026
ALISON F. GOTTLIEB, PROJECT MANAGER DATE
DPMC PROJECT PLANNING & INITIATION

SOW APPROVED BY: James Wright 5/26/2026
JAMES WRIGHT, MANAGER DATE
DPMC PROJECT PLANNING & INITIATION

SOW APPROVED BY: William C. White 5/26/26
WILLIAM C. WHITE PROJECT MANAGER DATE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOW APPROVED BY: Troylene Ladner 06-16-2026
TROYLENE LADNER, PROJECT MANAGER DATE
DPMC PROJECT MANAGEMENT GROUP

SOW APPROVED BY: Jeanette M. Barnard 6.15.26
JEANETTE M. BARNARD, DEPUTY DIRECTOR DATE
DIV PROPERTY MGT & CONSTRUCTION

XIV. CONTRACT DELIVERABLES

The following are checklists listing the Contract Deliverables that are required at the completion of each phase of this project. The Consultant shall refer to the DPMC publication entitled “Procedures for Architects and Engineers,” 3.0 Edition, dated September 2022 available at <https://www.nj.gov/treasury/dPMC/Assets/Files/ProceduresforArchitectsandEngineers.pdf> for a detailed description of the deliverables required for each submission item listed. References to the applicable paragraphs of the “Procedures for Architects and Engineers” are provided.

Note that the Deliverables Checklist may include submission items that are “S.O.W. Specific Requirements.” These requirements will be defined in the project specific scope of work and included on the deliverables checklist.

This project includes the following phases with the deliverables noted as “Required by S.O.W” on the Deliverables Checklist:

DESIGN DEVELOPMENT PHASE;

FINAL DESIGN PHASE;

PERMIT APPLICATION PHASE;

BIDDING AND CONTRACT AWARD;

CONSTRUCTION PHASE; and

PROJECT CLOSE-OUT PHASE

XV. EXHIBITS

- A. SAMPLE PROJECT SCHEDULE FORMAT**
- B. PROJECT SITE LOCATION MAP**
- C. 2025 REGULAR INSPECTION REPORT for GREENWOOD LAKE DAM**

END OF SCOPE OF WORK

Deliverables Checklist Design Development Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
14.4.1.	A/E Statement of Site Visit						
14.4.2.	Narrative Description of Project						
14.4.3.	Building Code Information Questionnaire						
14.4.4.	Space Analysis						
14.4.5.	Special Features						
14.4.6.	Catalog Cuts						
14.4.7.	Site Evaluation						
14.4.8.	Subsurface Investigation						
14.4.9.	Surveys						
14.4.10.	Arts Inclusion						
14.4.11.	Design Rendering						
14.4.12.	Regulatory Approvals						
14.4.13.	Utility Availability						
14.4.14.	Drawings (6 Sets)						
14.4.15.	Specifications (6 Sets)						
14.4.16.	Current Working Estimate/Cost Analysis in CSI Format						
14.4.17.	Project Schedule						
14.4.18.	Formal Presentation						
14.4.19.	Plan Review/Scope of Work Compliance Statement						
14.4.20.	Design development Phase Deliverables Checklist						
S.O.W. Reference	S.O.W. Specific Requirements						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

Consultant Signature

Date

Deliverables Checklist Final Design Phase

A/E Name: _____

A/E Manual Reference	Submission Item	Required by S.O.W.		Previously Submitted		Enclosed	
		Yes	No	Yes	No	Yes	No
15.4.1.	A/E Statement of Site Visit						
15.4.2.	Narrative Description of Project						
15.4.3.	Building Code Information Questionnaire						
15.4.4.	Space Analysis						
15.4.5.	Special Features						
15.4.6.	Catalog Cuts						
15.4.7.	Site Evaluation						
15.4.8.	Subsurface Investigation						
15.4.9.	Surveys						
15.4.10.	Arts Inclusion						
15.4.11.	Design Rendering						
15.4.12.	Regulatory Approvals						
15.4.13.	Utility Availability						
15.4.14.	Drawings (6 Sets)						
15.4.15.	Specifications (6 Sets)						
15.4.16.	Current Working Estimate/Cost Analysis in CSI Format						
15.4.17.	Project Schedule						
15.4.18.	Formal Presentation						
15.4.19.	Plan Review/Scope of Work Compliance Statement						
15.4.20.	Final Design Phase Deliverables Checklist						
S.O.W. Reference	S.O.W. Specific Requirements						

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

Consultant Signature

Date

A/E Name: _____

[illegible]

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC Project Manager the status of all the deliverables required by the project specific Scope of Work.

Consultant Signature

Date _____

A/E Name: _____

[illegible]

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

Consultant Signature

Date

A/E Name: _____

[illegible]

This checklist shall be completed by the Design Consultant and included as the cover sheet of this submission to document to the DPMC the status of all the deliverables required by the project specific Scope of Work.

Consultant Signature

Date _____

[illegible]

Date _____

February 7, 1997
Rev.: January 29, 2002

Responsible Group Code Table

The codes below are used in the schedule field "GRP" that identifies the group responsible for the activity. The table consists of groups in the Division of Property Management & Construction (DPMC), as well as groups outside of the DPMC that have responsibility for specific activities on a project that could delay the project if not completed in the time specified. For reporting purposes, the groups within the DPMC have been defined to the supervisory level of management (i.e., third level of management, the level below the Associate Director) to identify the "functional group" responsible for the activity.

<u>CODE</u>	<u>DESCRIPTION</u>	<u>REPORTS TO ASSOCIATE DIRECTOR OF:</u>
CM	Contract Management Group	Contract Management
CA	Client Agency	N/A
CSP	Consultant Selection and Prequalification Group	Technical Services
A/E	Architect/Engineer	N/A
PR	Plan Review Group	Technical Services
CP	Construction Procurement	Planning & Administration
CON	Construction Contractor	N/A
FM	Financial Management Group	Planning & Administration
OEU	Office of Energy and Utility Management	N/A
PD	Project Development Group	Planning & Administration

EXHIBIT 'A'

Activity ID	Description	Repn	Weeks
<PROJ>			
Design			
CV3001	Schedule/Conduct Predesign/Project Kick-Off Mtg.	CM	
CV3020	Prepare Program Phase Submittal	AE	
CV3021	Distribute Program Submittal for Review	CM	
CV3027	Prepare & Submit Project Cost Analysis (DPMC-38)	CM	
CV3022	Review & Approve Program Submittal	CA	
CV3023	Review & Approve Program Submittal	PR	
CV3024	Review & Approve Program Submittal	CM	
CV3025	Consolidate & Return Program Submittal Comments	CM	
CV3030	Prepare Schematic Phase Submittal	AE	
CV3031	Distribute Schematic Submittal for Review	CM	
CV3037	Prepare & Submit Project Cost Analysis (DPMC-38)	CM	
CV3032	Review & Approve Schematic Submittal	CA	
CV3033	Review & Approve Schematic Submittal	PR	
CV3034	Review & Approve Schematic Submittal	CM	
CV3035	Consolidate & Return Schematic Submittal Comment	CM	
CV3040	Prepare Design Development Phase Submittal	AE	
CV3041	Distribute D. D. Submittal for Review	CM	
CV3047	Prepare & Submit Project Cost Analysis (DPMC-38)	CM	
CV3042	Review & Approve Design Development Submittal	CA	
CV3043	Review & Approve Design Development Submittal	PR	
CV3044	Review & Approve Design Development Submittal	CM	
CV3045	Consolidate & Return D.D. Submittal Comments	CM	
CV3050	Prepare Final Design Phase Submittal	AE	
CV3051	Distribute Final Design Submittal for Review	CM	
CV3052	Review & Approve Final Design Submittal	CA	
CV3053	Review & Approve Final Design Submittal	PR	
CV3054	Review Final Design Submittal for Constructability	OCS	

NOTE:

Refer to section "TV Project Schedule" of the Scope of Work for contract phase durations.

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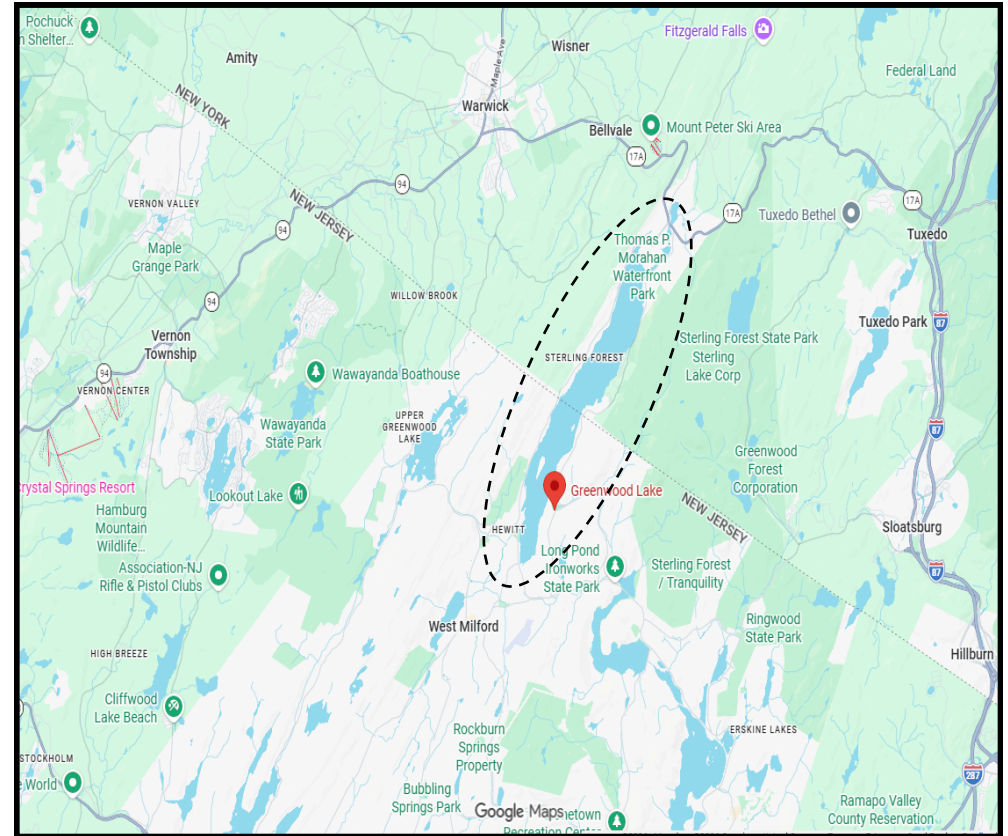
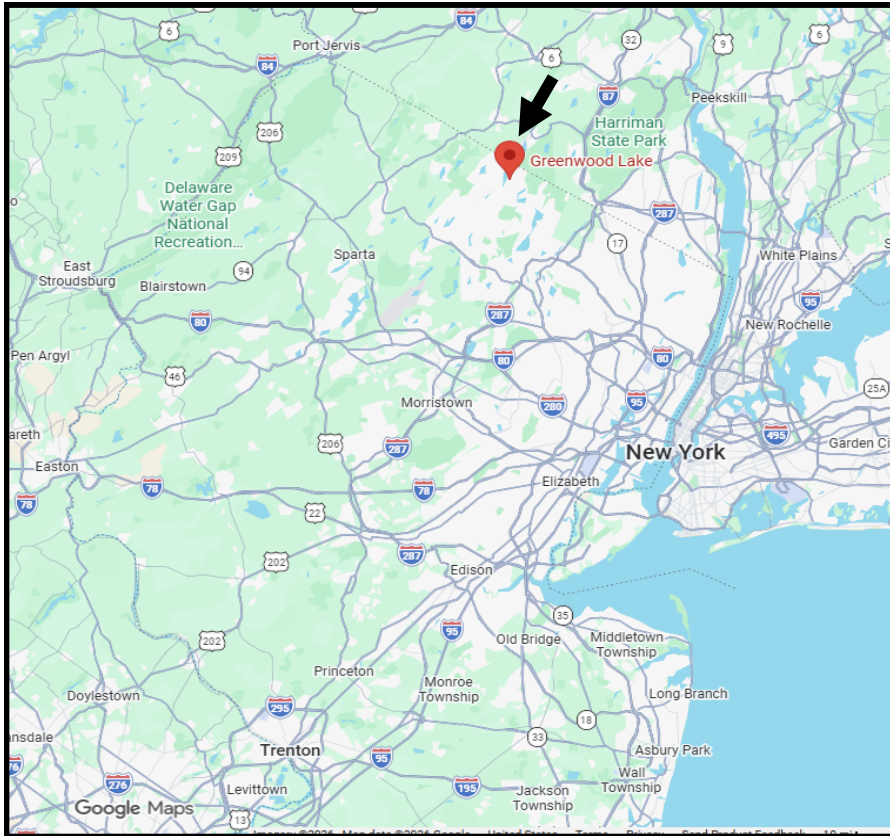
DBCA - TEST

Sheet 1 of 3

Bureau of Design & Construction Services

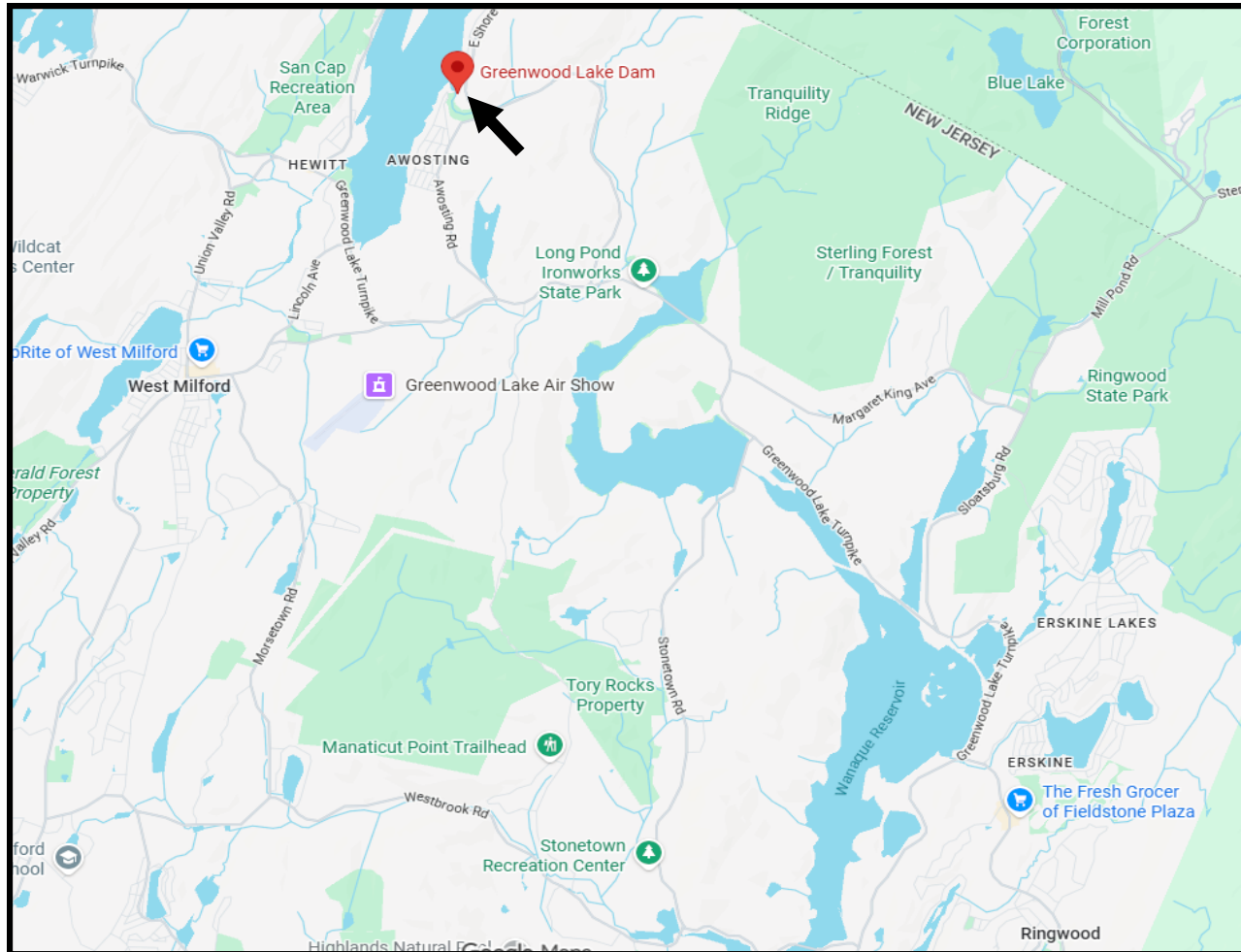
EXHIBIT 'A'

Greenwood Lake Dam



Project Site Location Map
Greenwood Lake State Park
EXHIBIT 'B'

Greenwood Lake Dam



Project Location Map
Greenwood Lake State Park
EXHIBIT 'B'

Greenwood Lake Dam



Project Site
Greenwood Lake State Park
EXHIBIT 'B'



Known for excellence.
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2025 REGULAR INSPECTION REPORT

for

GREENWOOD LAKE DAM

(NJDEP File No. 22-20)

West Milford Township, Passaic County, New Jersey

in compliance with the
**STATE OF NEW JERSEY
DAM SAFETY PROGRAM**

Owner

**State of New Jersey
Department of Environmental Protection
State Parks, Forests and Historic Sites
501 East State Street
Trenton, NJ 08625**

Prepared by:

GZA GeoEnvironmental, Inc.

55 Lane Road, Suite 407 | Fairfield, NJ 07004
973.774.3300

www.gza.com

EXHIBIT 'C'

Table of Contents

Visual Inspection Results & NJDEP Checklist

Photographs

Dam Engineering Report Limitations

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

NJ INSPECTION YEAR: 2025

TYPE OF INSPECTION:	Regular
Dam Name:	Greenwood Lake Dam
Dam File Number:	22-20
Location:	West Milford Township, Passaic County, NJ
Owner:	NJDEP State Parks, Forests and Historic Sites
Operator:	NJDEP State Parks, Forests and Historic Sites
Date of Inspection:	September 24, 2025

Reservoir Information:

Normal Reservoir Elevation (ft.)	619.0 (See notes below.)
Reservoir Elevation at time of Inspection (ft.)	618.35± (See notes below.)

Notes: The Normal Reservoir Elevation 619.0 is based on the Record Drawings entitled, "Greenwood Lake Dam Rehabilitation," prepared by Converse Consultants East, dated May 2000. The elevation datum is not referenced on the drawings. Based on the USGS gauge 01383000, the spillway crest is at a gauge height of 10 feet. The USGS website showed a gauge height of 9.35 during the inspection, corresponding to an elevation of approximately 618.35.

Weather Conditions (including recent rainfall)

Low 50s, clear. Last rainfall was on September 23, 2025.

INSPECTION PERSONNEL

New Jersey Licensed Professional Engineer(s):

Name	Affiliation	Area of Expertise
Jess Bergmann, P.E.	GZA GeoEnvironmental, Inc.	Dam Engineering
Anthony Calzaretta, P.E.	GZA GeoEnvironmental, Inc.	Dam Engineering

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

Name	Affiliation	Area of Expertise
None		

New Jersey State Representative(s):

Name	Affiliation	Area of Expertise
Sarah Hatala, PE	NJDEP Bureau of Dam Safety	Dam Safety
James Perry, P.E.	NJDEP Bureau of Dam Safety	Dam Safety
Olivier Duverneau	NJDEP Bureau of Dam Safety	Dam Safety

Dam Owner Representative(s):

Name	Affiliation	Area of Expertise
Donna Aramini	Wawayanda State Park	Maintenance Supervisor
Jesse Bongiardino	Wawayanda State Park	Maintenance

Others:

Name	Affiliation	Area of Expertise
None		

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

GENERAL INFORMATION

Name of Dam:	Greenwood Lake Dam		
Federal I.D. Number:	NJ-00187	NJ Dam Number:	22-20
River Basin:	Hudson River		
Town:	West Milford Township	County:	Passaic
Block:	3802 3803	Lot:	1, 2 1, 2
Nearest Downstream City or Town:	Hewitt		
Stream Name:	Wanaque River		
Tributary of:	Hudson River		
Latitude:	41°09'42.3"	Longitude:	74°19'59.3"
Type of Dam:	Earthfill with grouted riprap, concrete paving and cellular concrete block overtopping protection.		
Purpose of Dam:	Recreation		
Hazard Category:	Class I (High Hazard)	Drainage Area (sq.miles)	27.1
Height (ft):	18	Length (ft):	270
Normal Surface (ac):	1,947	Normal Capacity (af):	37,630
Maximum Capacity (af):	43,713	Spillway Capacity (cfs):	3,250 (not including overtopping protection)

Note: Portions of General Information are based on previous inspection reports, the report entitled "Greenwood Lake Dam, Dam Breach Analysis," prepared by Schnabel Engineering North, LLC, dated December 2005 and updated hydrologic and hydraulic analyses conducted by GZA in 2020.

HISTORY

Date Constructed:	1927-1928	Date(s) Reconstructed:	1997 (Sluice Gates) 1999 (Overtopping protection, concrete repair, stabilization of discharge channel)
Designed by:	Morris Canal & Banking Co.	Reconstruction Designed by:	Converse Consultants East
Constructed by:	Unknown	Reconstructed by:	Unknown
Owner:	NJDEP State Parks, Forests and Historic Sites		
Owner's Address:	State of New Jersey Department of Environmental Protection State Parks, Forests and Historic Sites 501 East State Street Trenton, NJ 08625		
Owner / Operator present during inspection:	Yes	☒	No ☐

PREVIOUS INSPECTION

Date of Last Inspection:	<u>Oct. 10, 2024</u>	Date of Last Regular Inspection:	<u>Sept 21, 2023</u>
Date of Last Phase I Inspection:	<u>August 1979</u>	Date of Last Formal Inspection:	<u>Oct. 10, 2024</u>

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

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

Date of Approved Plan:	December 2005. Text updates by Civil Dynamics in October 2014.
Date of Plan Revision:	November 1, 2021
Is the notification flowchart complete and current?	Contact information needs to be checked and updated. Specifically, Wawayanda State Park is now responsible for the dam, so the Operator information needs to be updated.
Is inundation mapping or a description included?	Yes, inundation mapping dated 2005 was prepared by Schnabel Engineering on USGS base maps. Updated inundation mapping for the 0.5 PMP event should be prepared based on the results of the 2020 study (see Downstream Hazard Classification below). The USGS base maps should also be updated to current aerial imagery as part of this work.
Are emergency materials and equipment identified?	Yes
When was the plan last tested?	Not tested.

DOWNSTREAM HAZARD CLASSIFICATIONS

Present Hazard Classification:	Class I (High Hazard)
Changes in downstream Land Use and Habitation:	No change was observed or apparent based on a review of historical aerial images.
Is the present classification appropriate?	Yes, based on an updated hydrologic and hydraulic analyses conducted by GZA. See GZA's June 8, 2020 letter. The 2020 study was approved based on the Bureau's memorandum dated October 25, 2021.

OPERATION AND MAINTENANCE

Date of Operation and Maintenance Plan:	None
Are instructions adequate?	N/A
Do operating personnel follow instructions?	N/A
What are the operating personnel capabilities?	N/A

EXAMINATION OF EMBANKMENT DAMS AND DIKES

DESCRIPTION OF STRUCTURE

Embankment Material:	Earthfill with overtopping protection consisting of grouted riprap, concrete paving and cellular concrete block mats with soil anchors (based on Record Drawings for Greenwood Lake Dam Rehabilitation dated May 2000).
Cutoff Type:	Unknown
Impervious Core:	Unknown

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

Internal Drainage system:	2-inch diameter PVC drain pipe discharges just below the concrete paving at the surge tank. 4-inch diameter PVC drain pipe discharges at the toe from beneath the cellular concrete blocks about 27.5 feet right of the surge tank. According to the 2000 Record Drawings, the 4-inch diameter drain pipe is an extension of an original toe drain pipe beneath the concrete paving.
Movement (Horizontal and Vertical Alignment):	No signs of movement were observed or apparent.
Junctions with Abutments or Embankments:	The right side of dam abuts earth and the left side abuts rock outcrop at the contact with the spillway. Both the earth and rock abutments appeared stable. No significant erosion was observed.
Miscellaneous:	None

CREST

Description:	The dam crest is protected by concrete paving and grass-covered cellular concrete block mats. Construction joints in concrete paving sections were sealed with elastomeric sealant.
Vertical Alignment:	Appeared relatively level.
Horizontal Alignment:	Straight with a varied crest width.
Condition of Material:	Concrete paving appeared intact with minor surface weathering and minor surface cracks in a few locations. The second row of concrete paving (in the upstream to downstream direction) from the right abutment appeared the most weathered. No significant cracks or spalls were observed in the concrete. Elastomeric sealant between paving sections has lost elasticity and was missing and/or failed in numerous locations. This condition was observed during previous inspections over the last several years. The concrete has gradually continued to weather and the elastomeric sealant has continued to deteriorate, but no significant change was observed during his inspection. Cellular concrete block mats were covered by grass and were not visible, but no irregularities were visually apparent.
Surface Cracks:	None observed.
Settlement:	Minor settlement of concrete paving was observed in some areas, but no significant change was apparent from previous inspections. See Unusual Conditions below.
Unusual Conditions:	According to the 2000 Record Drawings, the cellular concrete block mats are reportedly cable-tied. However, one of the cellular blocks was exposed during the 2023 inspection and no cable ties were observed. Minor weedy vegetation was growing within the joints of the concrete paving. Grass growing on the cellular concrete block section of the crest appeared generally well maintained.

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

Measurements of joint separation and settlement of the concrete paving were obtained on the crest near the contact with the downstream slope, about 35 feet downstream of the downstream gatehouse footbridge wall (See Photo 2). The 2021 inspection was the first time these measurements were taken, and are summarized below:

Inspection Year	Separation width of the joint between the third and fourth paving row to the right of the corner of the concrete training wall (inches)	Settlement depth of the crest paving at the contact with the concrete toe wall along the top of the downstream slope (inches)	Separation width of the joint immediately downstream of the concrete toe wall (inches)
2021	$\frac{7}{8}$	$1\frac{3}{8}$	$1\frac{1}{16}$
2022	1	$1\frac{3}{8}$	$1\frac{1}{16}$
2023	1	$1\frac{3}{8}$	$1\frac{1}{16}$
2024	1	$2\frac{1}{2}$ *	$1\frac{1}{4}$
2025	$1\frac{1}{16}$ to $1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{1}{4}$

*Settlement reading taken during the 2024 inspection was likely incorrectly documented.

UPSTREAM SLOPE

Description:	The upstream slope is protected by grouted riprap along the lake edge and concrete paving. Construction joints in concrete paving sections were sealed with elastomeric sealant.
Slope Estimate (H:V):	Varies from about 4:1 (grouted riprap) to 8.5:1 (concrete paving).
Trees, Undesirable Growth or Debris, Animal Burrows:	Minor weedy vegetation was observed growing in the grouted riprap and in the joints of the concrete paving.
Sloughing, Subsidence or Depressions:	During previous inspections, minor depressions were observed in the grass near the right abutment (near the electric pole) at the contact with the downstream edge of the grouted riprap. The grouted riprap was also previously observed to be locally undermined in the same location. The undermining was probed to a depth of about 1 foot during the 2020 inspection. The depressions and undermining were visually observed during the subsequent inspections but were difficult to measure due to overgrown conditions. During this inspection, the depression was measured to be approximately 0.7 feet deep. The area was overgrown, but no significant problems were apparent.
Slope Protection:	Protected by grouted riprap transitioning to concrete paving at top of slope. Grouted riprap was about 10 to 15 feet wide (upstream to downstream) along the slope.
Condition of Materials:	Similar to previous inspections, the grouted riprap was broken up at the lake edge and some movement of loose riprap down the slope was observed, but the condition had not resulted in erosion of the slope. The grout did not appear to penetrate the full depth of the riprap resulting in voids within the grouted riprap near the upstream edge. Some minor cracks were observed in the

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

grout and the grout was broken up in a few areas along the top of slope. One larger longitudinal crack was also observed in the grout near the top of slope extending throughout the length of the slope. This crack was observed during previous inspections but was first measured during the 2021 inspection. Cracking of the grouted riprap appeared similar to the 2023 inspection when it was last measured.

Crack measurements are summarized below.

Inspection Year	Approximate Crack Width (in)
2021	$\frac{1}{8}$
2022	$\frac{1}{4}$
2023	$\frac{1}{4}$
2024	Not Measured
2025	$\frac{1}{4}$

An area of displaced grouted riprap was observed along the upstream end of the right side training wall. The area was triangular and measured to be approximately 2.5 feet by 3 feet, with a maximum depth of about 1 foot.

In general, concrete paving appeared intact and in good condition. A crack with minor spalling was observed in one concrete paving section near the right side at the contact with the grouted riprap. This crack was observed during previous inspections and no significant change was apparent since previous inspections. Construction joints in concrete paving sections were sealed with elastomeric sealant. Similar to previous inspections, the elastomeric sealant has continued to deteriorate. Minor settlement of the concrete paving was observed along the left side at the contact with the spillway training wall.

Surface Cracks or Movement at Toe: Toe was submerged. Unable to observe.

Unusual Conditions: Four core holes were observed in the concrete paving. The core holes were filled with concrete. Maximum settlement of concrete in the core holes was measured to be about 1 inch during this inspection.

DOWNSTREAM SLOPE

Slope Estimate (H:V): 2.5:1

Trees, Undesirable Growth or Debris, Animal Burrows: Minor weedy and woody vegetation were growing in between the concrete paving sections. The grass growing on the cellular concrete block section of slope appeared generally well maintained. Minor woody vegetation was observed locally adjacent to the surge tank and the tank was covered in mature poison ivy vines. Several trees and weedy/woody vegetation were growing in the grouted riprap at the bottom of the slope along the downstream channel.

One small, shallow depression was observed during the 2023 inspection in the cellular concrete block section of slope near the downstream edge of the surge tank to the right of the concrete paving sections. The depression was likely the start of an

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

animal burrow. The depression was not observed during this inspection.

Sloughing, Subsidence or Depressions: Some settlement was observed between the concrete paving sections at the top left side of the slope adjacent to the concrete wing wall. This condition has been observed during previous inspections since 2008. There are 6 locations along the wall where measurements have been obtained since 2010 to monitor the settlement of the paving sections relative to the top of the wing wall (see attached table). The measurements collected during this inspection were compared to the 2024 measurements, which showed differences up to ¼ inch, which is not considered significant. The six locations should be permanently marked to allow accurate repetition of measurements.

The first and second row of paving sections from the concrete wing wall were observed to be uneven with a maximum of about 1½ inches of vertical differential measured between the top of the paving sections, which is about ¼ inch more than the 2023 and 2024 measurements. However, this difference is not judged to be significant.

The paving sections were irregular around the upstream side of the surge tank. Based on a review of available photographs, this condition appeared similar to the previous inspections since 2010. A gap was observed at the upstream right corner of the surge tank at the contact with the paving sections. The difference in the gap width between 2018 and 2025 is a maximum of about 1/8 inch, which is not judged to be significant. Gap measurements are summarized below:

Year	Approx. Width (in.)
2018	13 inches deep; 1 1/8 inches wide
2019	Not measured.
2020	Similar to 2018.
2021	Not measured.
2022	1 1/8 inches wide (gap between paving sections) 1/2 inch wide (gap between paving section and surge tank)
2023	Similar to 2022.
2024	Similar to 2022.
2025	1 1/4 inches wide (gap between paving sections) 1/2 inch wide (gap between paving section and surge tank)

Three small subsidence holes were previously observed in the cellular concrete block mats. One subsidence hole was observed mid-slope immediately right of the surge tank. In 2017, this subsidence was measured at about 16 inches deep. The subsidence was not measured during the 2018 inspection because a snake was in the hole. The

SUMMARY OF MEASUREMENTS SETTLEMENT OF DOWNSTREAM SLOPE PAVING SECTIONS ALONG WING WALL GREENWOOD LAKE DAM

SUMMARY OF SETTLEMENT OF CONCRETE PAVING SECTIONS ALONG LEFT DOWNSTREAM SLOPE WALL
GREENWOOD LAKE DAM

Location Along Wall		Summary of Measurements														
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
		Measured Height of Wall from Bottom of Chamfer to Base (inches)														
1	5 feet upstream toward footbridge	10 1/2	10 3/4	10 5/8	10 5/8	10 3/4	11	11	11	11 1/4	11 1/4	11 1/4	11 1/4	11 1/4	11 1/4	11 1/4
2	Top of Slope	18 3/4	19	19	18 3/8	18 3/4	18 3/4	18 3/4	18 3/4	19	19	19	19	19	19 1/4	19 1/4
3	5 feet downslope from top of slope	16 1/8	16	16 1/4	16 1/4	16 3/8	16 1/2	16 1/2	16 1/2	16 3/4	16 3/4	17	17	17 1/4	17 1/2	17 1/2
4	10 feet downslope from top of slope	10 3/4	8	8 3/16	8 1/4	8 1/2	8 1/2	8 5/8	8 5/8	8 3/4	8 3/4	9	9	9 1/2	9 1/2	9 1/2
5	15 feet downslope from top of slope	4 3/4	4 3/4	4 5/8	4 3/4	5	5	5 1/8	5 1/8	5 3/8	5 3/8	5 7/16	5 7/16	5 7/16	5 9/16	5 9/16
6	20 feet downslope from top of slope	3 1/2	3 3/4	3 1/2	3 1/2	3 3/4	3 3/4	3 7/8	3 7/8	4 1/8	4 1/8	4 3/8	4 3/8	4 3/4	4 1/2	4 1/2

Notes:

- Settlement condition was noted in 2008 Formal Inspection Report, but no measurements were taken.
- No Regular Inspection of dam conducted in 2009.
- In 2010, measurements were taken from the caulk line near the bottom of the wall, but this was not an accurate way to measure and the method was changed in 2011.
- 2011 measurement at Location 4 is likely erroneous.
- Measurements are approximate as the monitoring locations are approximate. Measurements are taken perpendicular to the wall.

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

subsidence was probed to a maximum depth of about 12 inches during the 2019 inspection, and about 18 inches during the 2020, 2021 and 2022 inspections. The subsidence was measured to be about 9 inches in diameter during the 2021 and 2022 inspections. During the 2023 inspection, the subsidence was probed to a depth of about 16 inches and measured to be about 9 inches in diameter. The cellular concrete blocks were exposed in the hole. During the 2024 inspection and this inspection, the subsidences were not observed and were likely filled in.

In 2017, two additional subsidences were observed at the bottom of the cellular concrete block slope and measured a maximum depth of about 9 inches. During the 2018 inspection, only one of the subsidence holes was located at the downstream toe at the contact with the grouted riprap. During the 2019 and 2020 inspections, both subsidences were observed and probed to a maximum depth of about 12 inches. Neither subsidence hole could be located during the 2021 through 2024 inspections. The subsidences also were not observed during this inspection.

Surface Cracks or Movement at Toe: None observed. The toe of slope was parallel to the downstream channel.

Slope Protection: Protected by concrete paving and grass-covered cable-tied cellular concrete block mats transitioning to grouted riprap along the downstream toe. The grouted riprap ties into bedrock outcrop at the contact with the concrete paving section of the slope.

Condition of Materials: The concrete paving sections appeared intact and stable. No new significant cracks or spalls were observed in the concrete paving. The construction joints in concrete paving sections were sealed with elastomeric sealant which was cracked and failing and/or missing in some locations. This condition has been observed during previous inspections and the elastomeric sealant has continued to deteriorate.

The cellular concrete block mats appeared stable with well-established vegetative cover. A few exposed blocks were observed near the downstream toe of the slope during this inspection.

The grouted riprap along the toe appeared intact and stable. Some minor cracks and breakage of the grouted riprap were observed mainly along the channel edge. A minor void was observed in the grouted riprap at the contact with the downstream right abutment. Also, similar to previous inspections, a loss of grouted riprap was observed at the contact with the concrete paving in a localized area immediately downstream of the surge tank. Depths from previous and this inspection are summarized in the table below:

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

Inspection Year	Probe depth (in.)
2019	9
2020	11
2021	11
2022	10.5
2023	10.5
2024	12
2025	11

The hole may have been filled in with debris which could impact the measurement. Also see Unusual Conditions below regarding observation of the cellular concrete block.

The grouted riprap was also sounded during this inspection. The left side of the grouted riprap (near the concrete wall) appeared hollow when sounded, which may indicate voids.

Similar to previous inspections, minor rutting was observed along the bottom of the cellular concrete block slope near the contact with the grouted riprap. Rutting was likely due to mowing equipment.

The conditions along the downstream slope appeared similar to the conditions observed during the previous inspections and no significant change was observed.

Seepage: During previous inspections, some standing water was observed along the toe of the downstream slope, but this area was adjacent to the exit channel and relatively low-lying, so the water was possibly overflow from the exit channel. However, the water could potentially be seepage from the dam and/or abutment. This condition has not been observed since the 2020 inspection, likely due to flow conditions in the channel.

External Drainage System (Ditches, Trenches, Blanket):

None observed.

Condition Around Outlet Structure:

Not applicable.

Unusual Conditions:

During the 2023 inspection, one of the cellular concrete blocks was uncovered and exposed to the right of the surge tank for observation/measurements as part of an overtopping evaluation study on the dam. No stone base was visible below the block and no cable ties were observed. Additionally, a minor void and root were observed beneath the block. The excavated soil was then placed back over the block filling the subsidence noted earlier.

An abandoned surge tank was located mid-slope on the concrete paving. The tank was a component of the abandoned third outlet from the dam. During the 2015 and 2016 inspections, wetness and efflorescence were observed on a localized area of

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

concrete paving at the contact with the downstream left corner of the surge tank. The source of the wetness was not apparent but could have been from the surge tank or saturated conditions around the tank. This condition has not been observed since the 2016 inspection but staining of the concrete was observed at this location during this inspection and previous inspections.

A 2-inch diameter PVC drain pipe discharges just below the concrete paving at the surge tank. This drain pipe was not located in recent previous inspections, but the outlet was located during this inspection. Some minor weedy vegetation was observed growing around the pipe and some soil was observed within the pipe. The pipe was dry during this inspection.

A 4-inch diameter PVC drain pipe discharges at the toe from beneath the cellular concrete blocks about 27.5 feet right of the surge tank. The pipe appeared dry during previous inspections. The pipe was likely covered by leafy debris and could not be located during this inspection or the past few recent previous inspections. According to the 2000 Record Drawings, the 4-inch diameter drain pipe is an extension of an original toe drain pipe beneath the concrete paving. The configuration of the drain pipe is unknown.

ABUTMENTS AND TOE AREA

Erosion at Contact: Localized area of minor erosion was observed near the bottom of the downstream slope at the contact with the right abutment. This condition was observed during previous inspections and no significant change was observed during this inspection, but vegetation made it difficult to observe.

No other areas of significant erosion were observed at the right abutment or downstream toe area. The left abutment ties into rock and no significant erosion was observed.

Seepage or Wet Area Along Contact: As discussed above, some standing water was observed along the toe of the downstream slope during previous inspections. While this water was possibly overflow from the exit channel, the water could potentially be seepage from the dam and/or abutment. This condition has not been observed since the 2020 inspection, likely due to flow conditions in the channel.

Signs of Movement: None observed or apparent, but the downstream toe was overgrown along the channel and the left abutment could not be closely observed due to flow conditions.

Depressions, Sinkholes: None observed.

Unusual Conditions: None observed.

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SEEPAGE AND TOE DRAIN / RELIEF WELL FLOW SUMMATION

Location	Estimated Flow:	Color (Turbidity)
2-inch diameter PVC drain	Appeared dry.	N/A
4-inch diameter PVC drain	Unknown. Unable to locate drain.	Unknown

EXAMINATION OF SPILLWAYS AND OUTLET WORKS

TYPES AND DESCRIPTION OF SPILLWAYS

Primary:	90-foot long reinforced concrete ogee weir to the left of gatehouse and 30-foot long reinforced concrete ogee weir to the right of gatehouse.
Secondary (auxiliary):	None
Emergency:	Dam embankment is protected for overtopping.
Other:	None

ENTRANCE CHANNEL

Description:	Both spillways are open to the impoundment. The approach channel to both spillways is shallow.
Vegetation (trees, bushes, etc.):	None observed.
Debris:	None observed.
Channel Side-Slope Stability:	A concrete training wall and the gatehouse wall line the entrance channel to the 30-foot long spillway. The left side entrance channel to the 90-foot long spillway is lined by the gatehouse wall and a concrete training wall at the left abutment. The walls appeared stable. The low level outlet entrance consists of submerged stone masonry training walls which were not visible.
Slope Protection/Erosion:	Based on previous inspections when the reservoir was lowered, the entrance channels to both spillways consist of gravel and some larger stone transitioning to concrete approach aprons. The entrance channels were submerged during this inspection and could not be observed. Observations from a previous inspection are summarized below: The upstream concrete approach apron of the 30-foot long spillway weir was observed during the 2021 inspection when the reservoir level was lower. The apron appeared intact where visible, and no significant cracks or spalls were observed. There are seven construction joints along the upstream concrete approach apron of the 90-foot long spillway weir. The upstream apron was observed during the 2021 inspection when the reservoir level was lower and the apron appeared intact with no significant cracks or spalls.
Unusual Conditions:	None observed.

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SPILLWAY WEIRS

Description: 90-foot long reinforced concrete ogee weir located to the left of gatehouse. The weir was constructed in three monolith sections.

30-foot long reinforced concrete ogee weir to the right of gatehouse. The weir is divided into three 10-foot long sections separated by two concrete piers supporting the footbridge to the gatehouse.

Condition of Material: The crest and downstream face of the 30-foot long concrete spillway were observed from the dam crest and downstream slope during this inspection. The concrete appeared intact and no signs of significant problems were apparent. Some minor cracks were observed in the concrete piers at the 30-foot long spillway. Cracking and spalling of the left concrete pier wall was observed at the contact with the footbridge. Conditions appeared similar to previous inspections. The upstream face of the weir was submerged and could not be observed during this inspection. The upstream face was observed during the 2021 inspection and appeared intact with no significant cracks or spalls observed.

The downstream face of the 90-foot long concrete spillway weir was observed during this inspection due to the lower lake level and appeared intact with some minor cracks observed. Similar to previous inspections, four minor horizontal cracks were observed on the downstream face of the left monolith at the contact with the rock abutment and wetness was observed at three of the four cracks. The cracks are likely lifts joints concrete from the original concrete placement. The cracks were observed during this inspection and the lowest crack appeared slightly moist, but the other cracks appeared dry. Three horizontal cracks with efflorescence were also observed immediately right of the vertical joint between the left and center monolith. An additional crack with efflorescence was observed near the bottom of the vertical joint between the right and center monolith.

The upstream face of the weir was mostly submerged and could not be observed during this inspection.

The crest of the 90-foot long concrete spillway weir was also closely observed during this inspection due to the lower lake level. Specifically, the crest was walked. A longitudinal crack was observed along the upstream edge of the crest that extended from the center of the right monolith to the gatehouse. An additional crack was also observed near the keyway joint between the left and center monolith in the upstream edge of the crest.

In general, conditions appeared similar to previous inspections when the 90-foot long spillway weir was able to be walked and closely observed.

Signs of Movement: No signs of movement were apparent.

Joints: The 90-foot long spillway has two keyway construction joints on the crest, both 18 inches wide and 12 inches deep. The joints were closely observed during this inspection. During the 2017, 2021 and this inspection, the left keyway joint was observed to be intact with no significant erosion. During the 2011 and 2012 inspections, the right keyway joint was found to be eroded to a depth of 4 inches. During the 2014, 2016 and 2021 inspections, the right keyway joint was found to be eroded to a depth of 5 inches. The eroded depth of the right keyway joint was measured to be about 5 inches during this inspection. The eroded depth of the right keyway joint was not measured during

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

the 2017 and 2024 inspections.

There are two vertical construction joints between the three monoliths on the downstream face of the 90-foot long spillway weir. There are horizontal construction joints along the lower portion of the right and center monoliths and along the upper portion of the left monolith.

During the 2017 inspection, the horizontal construction joint on the downstream face of the 90-foot weir in the left monolith was observed to be wet. Wetness was also observed in the horizontal joint of the right monolith at the contact with the right vertical joint. During the recent inspections, including this inspection, these horizontal joints were difficult to observe due to flow or wet conditions.

Minor spalling and weathering were observed in the right vertical construction joint. During the 2021 inspection, no wetness or leakage were observed in the joints. During this inspection, minor spalling and weathering were observed in the right vertical construction joint. One minor spall was approximately 9 feet above the downstream apron and was measured to be about 3 inches by 5 inches in area and about 2.5 inches deep.

The joints of the 30-foot long spillway weir were observed from the downstream slope and crest of the dam and appeared intact. Some previous patching of the pier walls near the contact with the spillway crest appeared intact but patching has continued to weather.

Unusual Conditions: Similar to previous inspections, minor seepage was observed at the contact of the downstream face of the 90-foot long spillway weir with the rock at the left abutment. The source of seepage was not determined.

During previous inspections, a minor gap was observed at the contact of the downstream face of the 90-foot long spillway weir with the rock at the left abutment. The gap was last measured during the 2019 inspection and was about 4 feet long with a maximum depth of about 10 inches at one location. During this inspection, the gap was measured to be about 4 feet long and 6 inches deep. Standing water was observed at this location but no seepage flow was apparent.

During previous inspections, wetness and minor abutment flow were observed from the rock at the left abutment above normal pool elevation, likely from runoff or groundwater. The rock appeared moist during this inspection, possibly from recent rainfall.

Based on observed flow conditions over the 90-foot long spillway weir during previous inspections, the leftmost monolith weir crest appeared slightly lower in elevation since more flow was observed over this section. This condition was not visible during this inspection due to the lack of flow over the spillway.

Similar to previous inspections, a wooden dock was still lodged on the left rock abutment at the contact with the downstream face of the spillway. The dock should be removed.

SPILLWAY WALLS

Description: Reinforced concrete walls. There is an upstream concrete training wall along the entrance to the 30-foot long spillway weir on the right side at the contact with the grouted riprap and concrete paving section of the dam. Downstream of the 30-foot long spillway, there are concrete wing walls along the downstream concrete apron. There is also a short

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

	concrete training wall at the contact with the left end of the 90-foot long spillway weir and the left rock abutment. The gatehouse sidewalls are discussed under Appurtenant Structures.
Condition of Material:	Various cracks and spalls were observed in the upstream training wall and downstream wing walls for the 30-foot long spillway weir. Based on observations, the cracks did not appear to warrant immediate attention. The concrete patching on the walls has continued to deteriorate and additional loss of patching material has continued. Specifically, the patching on the downstream right wing wall was delaminating. Two spalls were observed at the bottom of the downstream wing wall left of the 30-foot long spillway weir and below the gatehouse. These are not new conditions, and no significant change was apparent since previous inspections. While not judged to be currently critical, major work will be required to repair the concrete. The left training wall of the 90-foot long spillway was observed during this inspection. Based on observations during this inspection, the wall appeared intact and stable with some minor pattern cracking and weathering. A small void was observed through the wall upstream of and level with the spillway crest and was measured to be about 24 inches deep. The void almost extended through the full thickness of the wall, which was measured to be about 28 inches thick. This condition has been noted during prior inspections and no significant change was apparent.
Signs of Movement:	No signs of movement of the walls were apparent. Walls appeared stable.
Joints:	Joints in the walls appeared to have been covered with mortar and appeared intact. A gap was observed in a construction joint at the base of the upstream right training wall about ten feet upstream of the 30-foot long spillway weir. The gap was measured at about 4 inches deep during the 2021 inspection, which was similar to prior measurements taken. The gap was visible this inspection but could not be measured. No joints were visible in the left training wall. The contact between the wall and the 90-foot long spillway appeared intact. The downstream portion of the wall abuts rock. The contact between the wall and rock was slightly weathered but appeared intact.
Drains:	None observed.
Unusual Conditions:	None observed.

DOWNSTREAM APRON

Description:	The lower apron consists of a concrete slab at the toe of the spillways. A higher concrete slab apron also exists immediately below the right (30-foot long) spillway. The abandoned third outlet pipe is under the raised apron. According to the 2000 Record Drawings, a grouted riprap apron extends about 20 to 25 feet downstream of the concrete apron and transitions to the downstream channel.
Condition of Material:	During this inspection, the concrete aprons appeared intact and stable and no significant problems were visually apparent. No significant cracks or spalls were observed in the concrete and minor weathering and spalling of the concrete were observed in the 90-foot long spillway apron. Conditions generally appeared similar to past inspections.

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- Signs of Movement:** No signs of movement were apparent during this inspection. The downstream edge of the lower apron was probed and no undermining of the apron was apparent.
- Unusual Conditions:** According to the 2000 Record Drawings, a fishing hole, about 18 feet by 20 feet in area and about 5.5 feet deep, was constructed within the grouted riprap apron just downstream of the low level outlets.

DOWNSTREAM CHANNEL (Same for both spillways and low level outlet)

- Vegetation (Trees, Bushes):** Some minor weedy and woody vegetation and some small trees were growing within the rocks on both sides of the channel. The channel banks were wooded. As previously noted, the right side of the channel along the downstream toe of the dam was overgrown with trees and vegetation.
- Debris:** Two large fallen trees and wood debris were observed on the steep left channel bank near the spillway. A few fallen trees were also observed across the channel several hundred feet downstream of the dam, but the trees were not blocking the flow. These conditions were observed during previous inspections.
- Channel Side-Slope Stability:** Appeared stable.
- Erosion:** Previous inspection reports noted that a 5-foot deep scour hole was observed in the channel at the toe of the spillway apron immediately downstream of the low level outlets. As noted above in the Downstream Apron section, this is a constructed fishing hole within the grouted riprap apron.
- Unusual Conditions:** A short dry-laid stone wall was observed on the left side of the exit channel downstream of the spillway apron.

LOW LEVEL OUTLET

- Description:** Two 42-inch by 60-inch sluice gates are located below the gatehouse (middle and left side). The third sluice gate (42-inch by 42-inch) on the right side was reportedly permanently sealed with concrete. The gates are manually operated.
- Condition:** The middle low level outlet sluice gate was partially open during this inspection. However, according to a discussion with Ringwood State Park personnel (previous operator) during the 2023 inspection, the middle outlet stem was starting to experience operating problems. Specifically, the stem was slipping during operation.
- The left gate has not been operational since the 2020 inspection (see below for further details).
- Ferraro Construction Corp. (Ferraro) conducted an investigation and performed maintenance to the sluice gates in September 2012. Both gate structures were cleaned and it was determined that the actuators were worn and the gate seats were deteriorated which was causing leakage. Ferraro indicated that replacement parts for the sluice gates were not available and recommended replacement of the gates during a planned drawdown of the lake. Additionally, new wooden stop logs were manufactured.
- During the 2020 inspection, difficulties were encountered while attempting to close the left gate and the gate was not able to be fully closed.

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During the 2021 inspection, J. Fletcher Creamer (JFC) was on-site investigating the left sluice gate. JFC reported that the existing sluice gate frame anchors and the stem, hardware and pedestal appeared to be heavily corroded and deteriorated. Additionally, the existing thrust nut which fastens the stem to the sluice gate was missing. Subsequently, JFC provided recommendations for repairs/modifications to bring the left sluice gate back into service. Specifically, JFC recommended installing angle iron plates to reinforce the sluice gate frame and replacement of the sluice gate stem, hardware and pedestal.

The recommended repairs were not completed and the left gate has remained in the raised position (about 6 inches) since the 2020 inspection. As observed from the discharge chute, stop logs were installed upstream of the gate. Minor leakage from the stop logs was observed.

Trash Rack: Steel trash racks are bolted to the upstream face of the concrete structure below the gatehouse. Fish screens were located on each outlet between the trash racks and the gates. In Summer 2017, Ferraro removed the fish screens, but the fish screens could not be reinstalled because the side tracks were significantly damaged. The fish screens are in need of replacement.

Leakage	
Location	Estimated Flow
Middle gate – Leakage unknown since gate was partially open during this inspection and the 2022, 2024 and 2024 inspections. Leakage observed during 2021 inspection appeared to be flowing from the top of the sluice gate.	Approx. 3 to 5 gpm during 2021 inspection.
Left gate – Leakage unknown as the gate was partially open with stop logs installed upstream of gate.	Minor leakage through stop logs upstream of gate observed during this inspection.
Unusual Conditions:	See above.
Was the Low Level Outlet operated during the inspection?	No
Were there difficulties operating the Low Level Outlet?	Not applicable.
When was the Low Level Outlet last operated and did this conform with the Operation and Maintenance procedures?	The Owner representative reported that they have not been operating the gates for the reasons discussed above. The left gate was last operated in 2020. The middle gate was partially opened, but it is unknown when the middle gate was last fully opened and closed. An O&M Manual does not exist for this dam.
Miscellaneous:	Wooden stop logs are available for use in the low level outlets to isolate the gates. The Owner representative previously stated that the stop logs leak and are not suitable for isolating the gates. Stop logs were installed upstream of the left gate and minor leakage was observed through the stop logs based on observations during this inspection.

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EXAMINATION OF OTHER FEATURES

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

Item	Location	Condition
A Sutron Constant flow bubbler and datalogger was installed to replace the previous reservoir level system provided by USGS. The replacement occurred after the 2023 inspection. The gage station is known as "USGS 01383000 Greenwood Lake at Awosting NJ."	The datalogger is located inside the gatehouse.	Appeared to be in working condition. The USGS stream gage showed the reservoir at gage height 9.35 feet. The spillway crest is at gage height 10.00 feet.

RESERVOIR

Slopes:	Large reservoir, slopes not inspected.
Sedimentation:	Unknown
Unusual Conditions Which Affect the Dam:	None observed or reported.
Unusual Conditions:	None observed or reported.

APPURTENANT STRUCTURES

Item	Location	Condition
Gatehouse	In between two spillways.	Gatehouse structure appeared to be in poor condition. Similar to previous inspections, vertical and horizontal cracks and spalls were observed in the gatehouse walls. Specifically, vertical and horizontal cracks were observed in the right concrete exterior sidewall of the gatehouse immediately upstream of the 30-foot long spillway weir. These conditions were noted during previous inspections and no significant change was apparent. Additionally, during this inspection a horizontal crack was observed just below the normal reservoir level in the left concrete sidewall of the gatehouse upstream of the 90-foot long spillway weir. A void was also observed in the left sidewall of the gatehouse immediately upstream of the spillway crest. The void was about 9 inches wide and probed to about 13 inches deep. This condition has been noted during previous inspections, and measurements were similar to the last time it was measured during the 2021 inspection. Multiple spalls were observed on the downstream corners of the gatehouse sidewalls. Rolled roofing material appeared to be deteriorated. The floor of the gatehouse was dry during this inspection, but the 2022 inspection noted wetness on the floor, likely due to leakage through the roof. Vegetation growing on the roof was observed growing into the gatehouse interior. The upstream side door window panes were replaced after the 2022 inspection. The door was difficult to open during this inspection.

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

Gatehouse (continued)	In between two spillways.	Owner's representative previously reported that there was no electricity in the gatehouse and there have been problems with vandalism. While the low level outlets were closed during the 2021 inspection, the downstream low level outlet discharge chutes below the gatehouse were inspected. In the middle sluice gate outlet chute, multiple cracks with weeping were observed in both the left and right sidewalls and a spall about 8 feet above the floor was observed on the left sidewall. The leakage was not significant and appeared to be clear. In the left sluice gate outlet chute, a horizontal crack with leakage was observed on the right sidewall and various cracks with efflorescence were observed on the left sidewall. The left sluice gate outlet chute was observed during the 2022 inspection and the report noted that conditions appeared similar to the 2021 inspection. During this inspection, the left outlet chute was inspected. Several cracks and spalls were observed in the outlet chute, but conditions generally appeared similar to prior inspections. The middle outlet chute could not be inspected due to flow conditions. In general, these are not new conditions and no significant change was apparent from the past inspections.
Gatehouse Footbridge	Directly above 30-foot long spillway connecting dam crest and gatehouse.	Concrete footbridge appeared intact with some cracks and spalls. Delamination of the surface of the concrete has continued to worsen.
Surge Tank	Structure is located on the downstream slope at the end of a 5-foot diameter penstock.	Abandoned. As per the Phase I Inspection, an additional 12,000-foot long penstock historically supplied a downstream manufacturing facility. The penstock at the dam was reportedly sealed. There were various thin cracks with efflorescence observed throughout the tank walls. Large vines on the surge tank should be removed.

**GREENWOOD 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

Due to an evaluation of existing overtopping protection system concluding that the system is inadequate to safely pass the SDS.

☐ UNSATISFACTORY

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

CONCLUSION (continued)

NOTE: The recommendations presented below are similar to those presented in the 2019 and 2024 Formal Inspection Reports as well as the 2020, 2021, 2022 and 2023 Regular Inspection Reports.

GZA recommends the following repairs/improvements be made immediately:

1. Wawayanda State Park staff should continue to become familiar with the dam operations since they are currently responsible for the dam.
2. Repair or replace both the left and middle low level outlet sluice gates.
3. Repair concrete paving sections and reseal the joints, including resealing the joints around the surge tank. Possibly core through concrete to determine if voids exist under sections that have settled.
4. Repair the void in the concrete training wall at the left abutment.
5. Repair the void in the left gatehouse sidewall at the contact with the 90-foot long spillway crest.
6. Remove vegetation growing in between concrete paving sections.
7. Remove trees and vegetation growing in grouted riprap at bottom of downstream slope.
8. Remove vines from the surge tank.
9. Repair area of missing grouted riprap at the contact with the concrete paving section below the surge tank.
10. Locate and uncover the discharge end of the 4-inch diameter PVC toe drain pipe. Repair as necessary.
11. Continue to clear vegetation and debris from around the discharge end of the 2-inch diameter PVC toe drain pipe.
12. Repair undermining of the grouted riprap upstream slope at the contact with the grass near the utility pole at the right abutment.
13. Repair small subsidence holes within the cellular concrete mats on the downstream slope, as necessary.
14. Remove wooden dock lodged on the left rock abutment at the contact with the downstream face of the spillway.

The following long term improvements should also be undertaken:

1. Rehabilitate the dam to safely pass the Spillway Design Storm (SDS). As discussed in GZA's June 2, 2025 letter titled "Evaluation of Overtopping Protection and Spillway Stability", the existing overtopping protection system, including both the ACBs and concrete slabs, were found to be inadequate to safely pass the 0.5 PMP. Additionally, the 90-foot long spillway was found to have inadequate stability against sliding failure. It is recommended that the existing concrete slab and ACB overtopping protection systems be replaced with a new overtopping protection system designed to safely pass the 0.5 PMP. Additional investigation of the 90-foot long spillway was also recommended, as discussed below under studies. The rehabilitation design should also include:
 - Improving the stability of spillways, pending the results of additional investigations.
 - Repairs to the gatehouse.
 - Significant concrete repairs.
 - All other immediate recommendations stated above that have not been addressed.

The following studies are recommended:

- | | |
|-------------------------------------|---------------------------------------|
| ☐ | Hydrologic and Hydraulic analysis |
| ☒ | Stability analysis: <u>See below.</u> |
| ☐ | Failure/Inundation analysis |
| ☒ | Other: <u>See below.</u> |
| ☐ | None |

1. Conduct a drilling program to investigate the apron thickness and foundation depth of the 90-foot long spillway, and to evaluate the condition of the bedrock foundation. The findings of this investigation should then be used to supplement and refine the existing stability evaluation. If the 90-foot long spillway section is found to have inadequate stability factors of safety, the 30-foot long spillway should also be evaluated.
2. Continue monitoring/measuring settlement in concrete paving sections along the crest near the transition with the downstream slope and along the right concrete wing wall of the 30-foot long spillway and continue visually monitoring concrete paving sections around the surge tank

GREENWOOD LAKE DAM VISUAL INSPECTION CHECKLIST

- on an annual basis. The locations where measurements are taken should be permanently marked so measurements can be replicated more accurately.
3. The 2011 inspection report recommended monitoring potential seepage in the left spillway (90-foot) at the contact with bedrock foundation, but the condition does not appear to warrant establishing a regular monitoring program beyond visual observations during the annual inspections.
 4. Continue monitoring the concrete paving section adjacent to the surge tank for wetness.

Have the recommendations above included those from the Phase I Inspection Report or previous Regular or Formal Inspection Reports? If not, indicate why. **Yes, but additional recommendations are included based on the results of GZA's 2025 "Evaluation of Overtopping Protection and Spillway Stability."**

EMERGENCY ACTION PLAN (This section must be completed for all Class I & II dams)

Date of Approved Plan: **December 2005. Text updates by Civil Dynamics in October 2014.**

Date of Last Plan Revision: **November 1, 2021**

Is the notification flowchart complete and current? **Contact information needs to be checked and updated. Specifically, Wawayanda State Park is now responsible for the dam, so the Operator information needs to be updated.**

(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? **Yes, inundation mapping dated 2005 was prepared by Schnabel Engineering on USGS base maps. Updated inundation mapping for the 0.5 PMP event should be prepared based on the results of the 2020 study. The USGS base maps should also be updated to current aerial imagery as part of this work.**

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:

Sign *Jessica Bergmann* Date 2/4/2026
Jessica Bergmann, P.E.



New Jersey Professional Engineer License Number: **24GE04842200**

SEAL

GZA Principal in responsible charge of the inspection:

Sign *David M. Leone* Date 2/4/2026
David M. Leone, P.E.

Massachusetts Professional Engineer License Number: **45877**

**Greenwood Lake Dam
2025 Regular Inspection**



Aerial view of Greenwood Lake Dam.

**Greenwood Lake Dam
2025 Regular Inspection**



Photo No. 1: Concrete paving sections of the dam crest looking downstream.

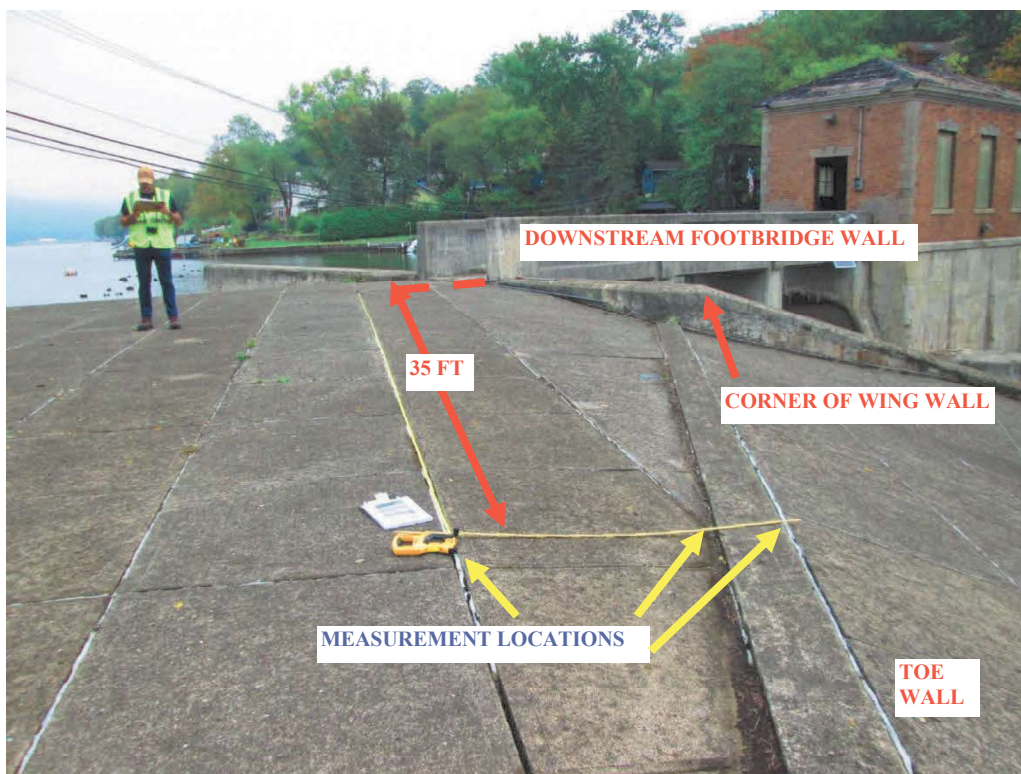


Photo No. 2: Closeup of concrete paving sections of the dam crest at the contact with the downstream slope. Note the separation of the joints and the deteriorated joint sealant between paving sections.

EXHIBIT 'C'

**Greenwood Lake Dam
2025 Regular Inspection**



Photo No. 3: Cellular concrete block mats (covered by grass) and concrete paving sections of the dam crest looking upstream.



**Photo No. 4: Concrete paving sections on the upstream slope of dam looking left.
Note the crack in one of the concrete sections.**



**Photo No. 5: Grouted riprap on the upstream slope of dam looking right.
Note the area of minor depressions and undermining of the grouted
riprap at the contact with the grass near the right abutment.**



**Photo No. 6: Closeup of grouted riprap upstream slope looking left.
Note the various cracks throughout the grout.**



Photo No. 7: Closeup of voids and loss of grout within grouted riprap on the upstream slope of dam along the lake edge.



Photo No. 8: Area of displaced grouted riprap along the right side spillway training wall.

**Greenwood Lake Dam
2025 Regular Inspection**



**Photo No. 9: Cellular concrete block mats (covered by grass)
on the right side downstream slope of dam looking downstream.**



**Photo No. 10: Cellular concrete block mats (covered by grass)
on the downstream slope of dam looking right.**



Photo No. 11: Closeup of rutting within exposed cellular concrete blocks on downstream slope to the right of the surge tank.



Photo No. 12: Concrete paving along the upper downstream slope above the surge tank looking left.



**Photo No. 13: Concrete paving on the downstream slope at the contact with the upstream face of the surge tank looking downstream.
Note the vines growing on the surge tank.**

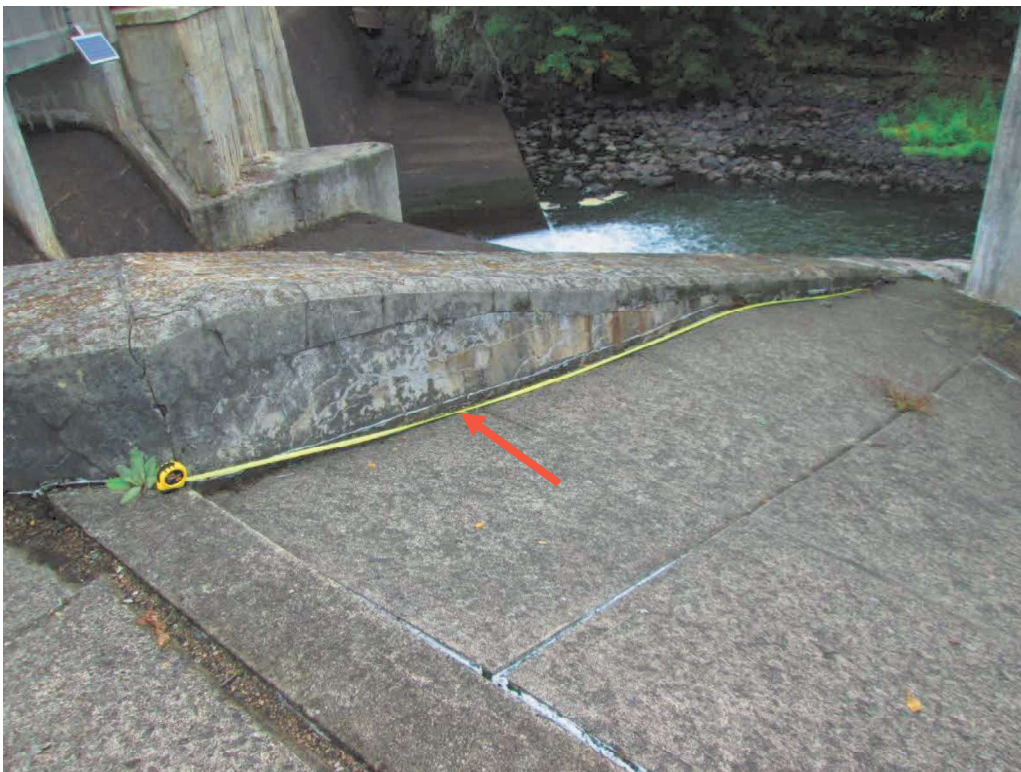


Photo No. 14: Concrete paving on the downstream slope at the contact with the downstream wing wall. Note the settlement of the paving sections along the wall.



Photo No. 15: Concrete paving along the lower downstream slope below the surge tank looking left.



Photo No. 16: Closeup of concrete paving at the contact with the downstream and left sides of the surge tank. Note the efflorescence on the surge tank wall where wetness has been observed in the past. Also note the void in the grouted riprap at the contact with the paving.

**Greenwood Lake Dam
2025 Regular Inspection**



**Photo No. 17: Grouted riprap along the lower downstream slope and toe of dam immediately downstream of the concrete paving looking left and upstream.
Note the undermining at the downstream end of the grouted riprap.**



**Photo No. 18: Lower downstream slope and toe of dam looking right.
Note the trees and vegetation growing in the grouted riprap along the toe.**

**Greenwood Lake Dam
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Photo No. 19: Entrance channel to the 30-foot long spillway weir looking downstream.



Photo No. 20: Upstream right training wall along the entrance to the 30-foot long spillway weir. Note the location of the gap at a construction joint.

EXHIBIT 'C'

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Photo No. 21: Crest and downstream face of the 30-foot long spillway weir looking upstream.



Photo No. 22: Downstream face and apron of the 30-foot long spillway weir looking upstream. Note the cracks and spalls in the previous repair material in the downstream right wing wall.

EXHIBIT 'C'

**Greenwood Lake Dam
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Photo No. 23: Downstream right wing wall at the 30-foot long spillway weir looking downstream.



Photo No. 24: Downstream left wing wall and right gatehouse sidewall at the 30-foot long spillway weir looking left. Note the cracks and spalls in the gatehouse walls.

EXHIBIT 'C'

**Greenwood Lake Dam
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Photo No. 25: Entrance channel of the 90-foot long spillway weir looking left.



**Photo No. 26: Crest of the 90-foot long spillway weir looking right.
Note the right keyway joint. Also note the longitudinal crack along the upstream
edge of the crest.**

EXHIBIT 'C'

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Photo No. 27: Closeup of the eroded right keyway joint in the 90-foot long spillway weir.



**Photo No. 28: Crest of the 90-foot long spillway weir looking left.
Note the left keyway joint.**

**Greenwood Lake Dam
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Photo No. 29: Downstream face and apron of the 90-foot long spillway weir looking left.



Photo No. 30: Downstream face and apron of the 90-foot long spillway weir looking right.



**Photo No. 31: Right construction joint in the 90-foot long spillway weir.
Note the minor spall at the construction joint.**



**Photo No. 32: Left construction joint in the 90-foot long spillway weir.
Note the efflorescence at horizontal cracks which are likely concrete lift joints.**



Photo No. 33: Contact of the downstream face of the 90-foot long spillway weir with rock at the left abutment. Note the horizontal cracks/lift joints in the downstream face of the weir. Note the dock lodged on the rock abutment.



Photo No. 34: Closeup of the gap at the contact of the downstream face of the 90-foot long spillway weir with rock at the left abutment.

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Photo No. 35: Left training wall at the contact with the 90-foot long spillway crest and left abutment. Note the location of the small void in the training wall.



Photo No. 36: Closeup of the small void (24 inches deep) in the left training wall of the 90-foot long spillway weir.



Photo No. 37: Left sidewall of the gatehouse at the contact with 90-foot long spillway weir. Note the horizontal crack and void in the wall.



Photo No. 38: Closeup of the horizontal crack and void in the left sidewall of the gatehouse at the 90-foot long spillway weir.

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Photo No. 39: Closeup of the upstream portion of the left sidewall of the gatehouse at the 90-foot long spillway weir. Note the various fine cracks in the wall.



Photo No. 40: Closeup of the upstream portion of the left sidewall of the gatehouse at the 30-foot long spillway weir. Note the various minor cracks in the wall.

**Greenwood Lake Dam
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Photo No. 41: Gatehouse and low level outlet entrance.



**Photo No. 42: Interior of gatehouse and the hand crank operators
for the sluice gates.**

EXHIBIT 'C'



Photo No. 43: Downstream side of the gatehouse and low level outlets.



Photo No. 44: Downstream side of left low level outlet sluice gate and discharge chute. Note that the gate was partially open. Note the cracks with minor weeping in the discharge chute.

EXHIBIT 'C'

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**Photo No. 45: Closeup of stop logs upstream of left low level outlet sluice gate.
Note the minor leakage through the stop logs.**



**Photo No. 46: Downstream channel from the 90-foot long spillway crest.
Note the approximate location of the downstream scour hole.**



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.