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Via Electronic Mail

November 7, 2022

Mr. Joshua Fontaine
U.S. Environmental Protection Agency, New England Region
Five Post Office Square
Suite 100
Boston, MA 02109

Re: GE-Pittsfield/Housatonic River Site
Rest of River (GECD850)
Monitoring and Maintenance Plan for Columbia Mill Dam

Dear Mr. Fontaine:

Under the Revised Final Resource Conservation and Recovery Act Permit issued by EPA to GE on December 16, 2020 and the *Final Revised Rest of River Statement of Work* (Final Revised SOW), submitted to and approved by EPA in September 2021, GE is required to prepare and submit monitoring and maintenance plans for the non-GE-owned dams on the Housatonic Rest of River in Massachusetts. Enclosed is a Monitoring and Maintenance Plan for Columbia Mill Dam. As provided in Section 4.5.3 of the Final Revised SOW, given that Columbia Mill Dam is required to be removed as part of the Rest of River Remedial Action, the Monitoring and Maintenance Plan for this dam is more limited than the similar plans for other dams on the Rest of River. It describes the inspection, monitoring, and maintenance activities that GE proposes to conduct at this dam during the interim period prior to its removal in an effort to prevent dam failure during that period.

Please let me know if you have any questions about the enclosed Monitoring and Maintenance Plan.

Very truly yours,

Kevin G. Mooney
Senior Project Manager – Environmental Remediation

Enclosure

Cc: (via electronic mail)
Dean Tagliaferro, EPA
Tim Conway, EPA
John Kilborn, EPA

SEMS Doc ID 668966

Anni Loughlin, EPA
Christopher Ferry, ASRC Primus
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Town Administrator, Lee
Town Manager, Great Barrington
Town Administrator, Stockbridge
Town Administrator, Sheffield
Andrew Silfer, GE
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Jonathan Andrews and Chris Tsinidis, GZA
James Bieke, Sidley Austin
Public Information Repository at David M. Hunt Library in Falls Village, CT
GE Internal Repository

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MONITORING AND MAINTENANCE PLAN FOR COLUMBIA MILL DAM – MA 00260

Lee, MA

November 2022

PREPARED FOR:
General Electric Company
Pittsfield, Massachusetts

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1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This document constitutes a Monitoring and Maintenance (M&M) Plan for the Columbia Mill Dam (MA00260, referred to herein as the Dam), which is owned by the by Lenox Development, LLC (Lenox Development) and is located on the Housatonic River in Lee, Massachusetts (**Figure 1**). Under the Revised Final Resource Conservation and Recovery Act (RCRA) Permit issued by the United States Environmental Protection Agency (EPA) to GE on December 16, 2020 (Revised EPA Permit), the Dam is required to be removed by the General Electric Company as part of the Housatonic Rest of River Remedial Action. The removal date for the Dam is unknown at this time, but may occur in about ten years or so from the present date. In the meantime, this M&M Plan was prepared by GZA GeoEnvironmental, Inc. (GZA) on behalf of GE. In accordance with Sections II.B.2.j.(1)(a) and (2)(b) of the Revised EPA Permit and Section 4.5.3 of GE's Final Revised Rest of River Statement of Work (Final Revised SOW), submitted by GE and approved by EPA in September 2021, this M&M Plan describes the inspection, monitoring, and maintenance activities that GE will undertake at the Dam during the interim period prior to the Dam's removal.

This M&M Plan was prepared without review of dam information available from Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety (ODS) and relies heavily on information from a February 28, 2008 Phase II Inspection/Evaluation Report on the Dam prepared by Tighe & Bond (2008 Phase II Report) and observations made during a visual inspection performed by GZA on August 17, 2022.

1.2 PURPOSE

The purpose of this M&M Plan is to describe the monitoring and maintenance activities that GE will conduct at the Dam in an effort to prevent the Dam from failing and releasing the sediments containing polychlorinated biphenyls (PCBs) in the Columbia Mill impoundment behind the Dam prior to the Dam's removal under the Revised EPA Permit.

Definitions of commonly used terms associated with dams and/or used in this M&M Plan are provided in **Attachment A**.

1.3 DESCRIPTION OF THE COLUMBIA MILL DAM

1.3.1 Dam Location

Town: Lee

County: Berkshire

The Dam is located on the Housatonic River just east of Interstate 20, about two miles north of the intersection of the Massachusetts Turnpike and Route 102, in Lee, Massachusetts. The left (south) abutment of the Dam is part of an existing mill complex (the former Schweitzer – Mauduit International Mill at 149 – 63 Columbia Street). To access the left (south) abutment, one follows Route 20 on Main Street heading north, takes a right onto Columbia Street, and then follows Columbia Street for one mile until the entrance to the Columbia Mill Complex and parking lot is reached on the left. To access the right (north) abutment, one continues north on Columbia Street past the Columbia Mill Complex, takes a left onto Golden Hill Road, turns south into the Golden Hill lot, and follows an existing access road located on the right abutment. Golden Hill Road crosses the Housatonic River approximately 0.5 miles downstream of the Dam over an existing concrete bridge.

The Columbia Mill Dam location is shown on **Figure 1** and on the United States Geological Survey (USGS) Stockbridge, MA topographic map. The approximate coordinates are -73.24744 degrees longitude and 42.31750 degrees latitude.

1.3.2 Owner/Caretaker

The owner of the Columbia Mill Dam is Lenox Development, LLC. The current Caretaker on Lenox Development's behalf is:

Thom Clapper
Lenox Development, LLC
1101 Mill Street
Niagara, WI 54151
Daytime Phone: 732-221-1196
Cell Phone: 413-841-9804

1.3.3 Description of the Dam and Appurtenances

Columbia Mill Dam is a run-of-the-river dam which impounds and raises the main branch of the Housatonic River. The original purpose for the Dam was to provide power to the former Columbia Mill. It is GZA's understanding that the only present function of the Dam is to impound existing sediments that are impacted by PCBs. A site sketch of the Dam is provided as **Figure 2**.

The Dam spillway is a 116-foot-long rock filled timber crib structure with a concrete (gunite) facing. The width of the structure varies from approximately three feet at the crest to a maximum of about 33.5 feet at the base. The spillway crest consists of concrete with sloping upstream and downstream faces. The gunite facing is reportedly three to eight inches thick. There is a two-foot-thick downstream concrete wall with weepholes and there is assumed to be an upstream concrete cutoff wall. Riprap is visible downstream of the toe of the Dam.

A reported 20-inch diameter wastewater treatment plant effluent pipe is located on the crest near the left spillway abutment. There is no known fire intake in the impoundment.

The Dam has a maximum structural height (base to crest) of approximately 25 feet and impounds a maximum storage capacity of 100 acre-feet. The Dam includes an approximately 50-foot-long earth embankment at the right (west) abutment with a masonry, concrete faced training wall at the upstream face and a densely vegetated slope on the downstream side.

The left (east) abutment concrete wall abuts a sluiceway, which is a three-foot-wide gated concrete channel with an invert approximately three feet below the crest of Dam. The left side of the sluiceway is the exterior wall of one of the buildings making up the Columbia Mill complex. A grated platform at the left abutment extends over the sluiceway gate control. The platform is accessible from within the Mill. The sluiceway discharges water from the impoundment directly into the downstream river channel. The sluice gate may provide a certain amount of control over the water level in the upstream impoundment; however the sluiceway invert is approximately three feet below the crest of the Dam, so it can only draw down the impoundment a maximum of about three feet, depending on river flow. As such, the amount of control over water levels provided by the sluice gate is limited, and the response time of the impoundment could be very slow, dependent on river inflow. During flood flows, the sluice gate at the left spillway abutment may be opened to help reduce the rise of the impoundment behind the Dam.

The sluiceway slide gate is operated independently by a hand wheel on the floor of the left abutment platform. Raising the gate provides more sluiceway flow, and lowering the gate provides less flow or results in closing the gate. The gate has a rising stem, so gate position (opening) can be quantified by measuring the stem rise.

A trash rack and presumably inoperable outlet are located to the left of the sluiceway. The trash rack and presumably inoperable outlet feed water to an internal sluiceway through the Mill. The internal mill sluiceway discharges through the mill wall and back into the river about 10 to 20 feet downstream of the Dam.

The Dam is operated on a run-of-the-river basis and, the reservoir is normally at or above the spillway weir crest normal pool level. In a typical year, there is considerable variation in river flow, as measured at a U.S. Geological Survey (USGS) gaging station in Great Barrington (No. 01197500), located approximately 18 miles downstream of the Dam. River flow can range from less than 150 cubic feet per second (cfs) in the middle of summer to 3,000 to 7,000 cfs during the spring runoff, depending on how much snow has fallen during the winter months and how heavy the spring rains are. A new Housatonic gaging station in Lenoxdale (No. 01197145) was installed by USGS in September 2022 approximately 2.1 miles upstream of the Dam.

There were no previous engineering hydrologic and hydraulic (H&H) evaluations of the Dam available for review. The regulatory Spillway Design Flood (SDF) for an Intermediate-sized, Significant hazard dam such as Columbia Mill Dam is a 100-year return interval event. Based on FEMA's Flood Insurance Rate Map (FIRM), the 100-year flood elevation upstream of the Dam is El. 916 feet NGVD29, which, depending on vertical datum, could be approximately eight feet above the spillway crest and three feet above the riverbanks. The 2008 Phase II Report indicates that the mill complex is flooded during a 100-year event and that the spillway capacity is approximately 4,300 cubic feet per second (cfs), which is 38 percent of the 11,200 cfs one-half Probable Maximum Flood (½ PMF). A 2008 Dam Removal Study indicates that, based on observation of erosion, debris, and disturbed vegetation, "overtopping of the dam likely occurs on a regular basis and that the spillway is therefore hydraulically inadequate."[1]

Current, historical, and predicted Housatonic River flows at the above-referenced USGS Great Barrington gage No. 01197500 are available online.[2] This gage measures flow from a drainage area of 282 square miles. By multiplying the flow measured at the gage by the ratio of the dam drainage area to the gage drainage area (e.g. flow x 0.62), the inflow into the Columbia Mill Dam impoundment may be estimated.

1.3.4 Dam Construction History

Based on the 2008 Phase II Report, the Columbia Mill Dam, including the approach apron, upstream and downstream slopes, and discharge apron, were constructed in 1901. A void developed under the downstream slope at the left side of the Dam in 1936, reportedly due to ballast stones migrating out of the Dam under the discharge apron. To repair this condition, the discharge apron was shortened, a downstream concrete cut off wall founded on ledge was installed, and the void under the downstream slope was filled with new stone ballast. In 1951, wood planking was removed from the entire structure, the upstream approach apron was eliminated, and an upstream concrete cutoff wall was reportedly installed. Concrete (gunite) reinforced with wire mesh was applied on the sloped upstream and downstream spillway faces to replace the wood planks. A base of stone ballast covered with gravel was placed below the gunite. Large boulder riprap protection was placed along the full length of the downstream spillway toe in 1984. This riprap was intended to filter and prevent any additional

[1] See *Removal of the Columbia Mill Dam, Lee Massachusetts*, prepared for the Massachusetts Riverways Program, Department of Fish and Game, by Stantec Consulting (June 2008).

[2] https://water.weather.gov/ahps2/hydrograph.php?gage=GTBM3&wfo=aly

ballast from migrating out through the deteriorated toe cutoff wall and from under the concrete slope. Voids were also filled with concrete as part of the 1984 repairs.

Based on the 2008 Phase II Report, emergency repairs were performed in 2007 after personnel from the Columbia Mill observed a large vortex in the Housatonic River on the upstream right side of the Columbia Mill Dam spillway. In addition to the reported vortex, water was observed discharging from various locations along the downstream toe of the Dam (about 1,400 to 2,100 gallons per minute or gpm) which potentially caused erosion to the Dam's foundation. The Massachusetts DCR ODS issued a Certificate of Non-compliance and a Dam Safety Order for immediate investigations and emergency repairs to prevent further damage to the Dam and protect public safety. The 2007 repairs included filling cracks and voids on the upstream (right) and downstream (left) sides of the Dam with grout. On the upstream side, the repairs included pumping approximately 27 cubic yards of grout into the Dam where voids were observed. On the downstream side, a void was found on the left side of the Dam, and the void was filled with approximately 35 cubic yards of high slump concrete. The vertical concrete cutoff wall was excavated near the failures, and the wall was reported to appear intact with no observable cracks. The emergency 2007 repairs were intended to make the structure safe for the short term, until more permanent solutions were implemented.

1.3.5 Drainage Area

The drainage area for Columbia Mill Dam is approximately 184 square miles, and encompasses the Berkshire communities of Lee, Lenox, Pittsfield, Dalton, Windsor, and Hinsdale. The drainage area includes large areas of agricultural and residential development, wooded mountainous terrain, and several small urban areas.

1.3.6 Reservoir Storage Volume

The following information is from the 2008 Phase II Report.

	Elevation (unknown datum)	**Storage Volume (acre-feet)**
Normal Pool	908.0 feet	90
Maximum Pool	Unknown	100
Spillway Design Flood (SDF) Pool	916 feet	110

1.3.7 General Elevations (unknown datum)

Feature	Approx. Elev. (feet)[3]
A. Top of Dam Embankment	913.0
B. Spillway Design Flood Pool	916.0
C. Normal Pool	908.0
D. Primary Spillway Crest	908.0
E. Low Level Outlet Invert	approx. 905 (sluiceway at left abutment)
F. Streambed at Toe of the Dam	883.0

[3] The 2008 Phase II Report does not include elevation sources and vertical datum.

1.3.8 Dam Size and Hazard Classification

Columbia Mill Dam has a height of approximately 25 feet and a maximum storage capacity of 100 acre-feet. Refer to **Attachment A** for definitions of height of dam and storage. Therefore, in accordance with the classification procedures of the Massachusetts Department of Conservation and Recreation (MassDCR) Office of Dam Safety (ODS), under the Massachusetts Dam Safety Regulations (302 CMR 10.00), the Dam is an **Intermediate** size structure based on maximum storage between 50 and 1,000 acre-feet.

In accordance with MassDCR classification procedures, under the Massachusetts Dam Safety Regulations, Columbia Mill Dam is classified as a dam with **Significant Hazard** potential.

1.4 RECENT INSPECTIONS

GZA understands that the Dam was previously inspected in December 2006 and found to be in Poor condition, and that, after the emergency repairs in 2007, it was inspected again in the fall of 2007 and again found to be in Poor condition, as described in the 2008 Phase II Report. The Dam was inspected again on February 27, 2017; however, GZA does not have a copy of the report.

The most recent inspection of the Dam was a visual inspection performed by GZA at GE's request on August 17, 2022. A summary of that inspection is provided as **Attachment B**. That report contains a list of the defects or other unusual conditions found at the Dam during the inspection and GZA's recommended monitoring, maintenance, and minor repair activities. As noted in Section 3.1 of this Plan, GE intends to complete the recommended minor repairs in 2023.

1.5 CURRENT GENERAL ELECTRIC PERSONNEL AND THEIR RESPONSIBILITIES

In accordance with the Revised EPA Permit and the Final Revised SOW, and as provided in this M&M Plan, GE will conduct monitoring and maintenance activities at the Dam. GE's representative is:

Kevin Mooney
General Electric Company
Global Operations – Environment, Health & Safety
1 Plastics Avenue
Pittsfield, MA 01201
Daytime Phone: 413-553-6610 (Direct Office Number)
Cell Phone: 413-441-4619

In addition, GE has retained a Professional Engineer experienced in dam engineering and safety to prepare this M&M Plan, conduct inspections, and review other dam issues on an as-needed basis. The current GE consulting dam safety engineer is:

Jonathan D. Andrews, P.E.
GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, Massachusetts 02062
Phone: (781) 278-5808
Cell: (781) 983-2881

In the event that any of the preceding personnel changes, GE will advise EPA of those changes.

2.0 INSPECTIONS

This section describes the inspections that GE will conduct at the Dam. These inspections will include routine quarterly and annual inspections, inspections after large storm events, and other special inspections.

2.1 ROUTINE INSPECTIONS

Routine visual inspections will include quarterly and annual inspections and will be conducted by GE.

2.1.1 Quarterly Observations

Observations of the Dam will be made and recorded by GE on a quarterly basis. The quarterly observations, including any exceptional or unusual conditions, will be recorded on the observation checklist provided in **Attachment C** (except when the quarterly inspection is replaced by the annual inspection described below). The quarterly observation checklist contains details for specific dam components and maintenance actions performed over the prior month. If significant changes in the condition of the Dam are noticed, a dam safety engineer will be contacted.

During each quarterly inspection, the inspector will pay particularly close attention to any vortices, cracks, and the "splash" area at the downstream toe of the primary spillway in the main river channel. Careful attention will also be paid to the presence of displaced rock fill from the dam interior, as well as the depth and extent of visible scour holes at the toe of the Dam. Evidence of seepage, cracking, and gunite facing displacement will be noted and documented with photos and measurements.

The quarterly inspections may also include ice-out inspections – defined as inspections after ice that has been present for a significant period in the river has disappeared due to thawing or breakup. During these inspections, particular attention will be paid to the spillway, including observations for potential damage to the concrete of the spillway and training walls, as well as debris that may reduce spillway or sluiceway flow capacity. The results of this inspection will be recorded on the quarterly observation checklist.

2.1.2 Annual Inspections

Annual inspections will be conducted by GE's dam safety engineer to evaluate how the Dam performed throughout the year and to determine the Dam's condition. Annual inspections will evaluate whether the Dam has changed from its condition noted in the previous year. Detailed photographic documentation will be prepared to provide a permanent record of conditions, including observed changes. Maintenance and repair items will be identified for correction. The annual inspection will be performed, if practicable, in place of the third quarterly inspection during a low-flow period in the river.

At least once every five years, prior to GE's annual inspection, the Columbia Mill impoundment will be drawn down, if feasible, to expose the downstream face of the primary spillway and the boulder-lined downstream splash area at the toe of the Dam and allow observation of potential scour areas at the downstream spillway toe. This will not require a total drawdown of the impoundment, but rather opening of the sluice gate in a manner such that no flow passes over the spillway crest. For such a drawdown, a description will be submitted to EPA and notifications will be made to the Lee Conservation Commission and to the contact persons at the downstream Willow Mill and Glendale Dams.

Prior to the annual inspection, the inspector will review the checklist from the previous annual inspection, as well as the checklists from the intervening quarterly and any post-storm and ice-out observations, the August 2022

Visual Inspection Report (**Attachment B**), records of any regulatory or other inspections performed by the Dam owner, and any maintenance records since the last annual inspection.

During each annual inspection, the operation of the active gates and valves will be assessed, if feasible, by operating the gate, in coordination with the Dam owner or operator, through the full range or partial range, depending on river flow conditions. During the inspection, the inspecting personnel will carry and complete the visual inspection checklist contained in **Attachment D**. This checklist has been customized for Columbia Mill Dam. An inspection sketch will be used to note the location of concerns identified during the inspection.

During the annual inspection, as during the quarterly inspections, the inspector will pay particularly close attention to any vortices, cracks, and the "splash" area at the downstream toe of the primary spillway in the main river channel. Careful attention will also be paid to the presence of displaced rock fill from the dam interior, as well as the depth and extent of scour holes at the toe of the Dam; and evidence of seepage, cracking, and gunite facing displacement will be noted and documented with photos and measurements. Inspection of the toe may require a personal flotation device, safety line, or other measures deemed necessary for proper health and safety procedures. Similar precautions, as well as fall protection, will be used if the crest of the primary spillway is accessed.

During each annual inspection, the dam safety engineer will evaluate the need for maintenance or repair activities and will provide recommendations regarding those matters to GE. GE will submit a report on each annual inspection within 60 days of completion of the inspection.

2.2 POST-STORM OBSERVATIONS

Observations of the Dam will also be made by the GE after high-flow events. For this purpose, a high-flow event is defined as a flow event with a measured peak river flow of 3,650 cubic feet per second (cfs) at the USGS Great Barrington stream gauge, which corresponds to the "Action Stage" of seven feet above gage streambed, as determined by the Advanced Hydrologic Prediction Service (AHPS). The post-storm observations will be made as soon as flood water conditions have subsided, and conditions allow safe access to the Dam and will include the same activities and use the same inspection form described above for a quarterly inspection.

2.3 POST-EARTHQUAKE INSPECTIONS

In addition to the foregoing inspections, in the event that there is an earthquake with reported damage in Berkshire County, GE will arrange for a dam safety engineer to conduct a thorough inspection of Columbia Mill Dam to assess whether any damage has occurred.

3.0 MAINTENANCE AND REPAIRS

This section describes the maintenance and repair activities that GE will perform at Columbia Mill Dam. Maintenance actions performed will be documented, and the documentation will be made available to the dam safety engineer as part of the facility documents available for each annual inspection. Documentation of the maintenance will include relevant dates, photographs and notes regarding the pre-maintenance condition, identification of who took the maintenance action, a description of the maintenance action, and relevant drawings, cut sheets, specifications, etc.

3.1 INITIAL REPAIR ACTIVITIES

As noted above, a visual inspection of the dam was performed by GE on August 17, 2022, and report on that inspection is provided as **Attachment B**. Section 3.4 of that report contains recommendations for the following minor repairs at the Dam:

1. Fill vortex near left side gate platform;
2. Repair the crack in the downstream face of the spillway on the left side; and
3. Repair the separation of the concrete joint at the weir crest.

GE intends to complete these repairs in 2023.

3.2 ROUTINE ANNUAL MAINTENANCE

Routine maintenance will be performed at the Dam by GE, as described below:

Debris Removal: Debris in the river occasionally becomes lodged on the crest of the spillway. In particular, large logs or tree trunks can snag on the crest or hang over the crest onto the downstream streambed. In most cases, this debris will be dislodged during subsequent high flows; however, in some cases the debris is persistent. When debris accumulation appears to impede the hydraulic capacity of the spillway, sluiceway, or gate, it will be removed.

Vegetation Removal: Vegetation is mostly concentrated on the right embankment, as the left side consists of the mill building. During the August 17, 2022 inspection, significant vegetative growth was observed on the right embankment. As part of routine maintenance, the vegetation in this area will be cut, and woody vegetation removed within 20 feet of the Dam. The access road on the right embankment will also be periodically cleared of vegetation to allow for use in an emergency, to perform repairs, or to monitor the Dam.

3.3 OTHER MAINTENANCE OR REPAIRS

Apart from the above-described initial repairs and regular maintenance, GE will perform other maintenance and repair activities where necessary in response to observations during the inspections (or other observations, if any). The need for other maintenance or repairs will be determined in consultation with a dam safety engineer. These maintenance or repair activities would include the following as warranted

3.3.1 Embankments

Repair of Sparse Vegetation and Erosion – In the event that areas of missing or distressed grass cover or local erosion are identified on the embankment slopes, those areas will be seeded, as necessary.

Rodent Damage Control – Rodents, such as groundhogs, muskrats, and beavers, are naturally attracted to the habitats created by dams and reservoirs and can endanger the structural integrity and proper performance of the embankments. If rodent burrow holes are observed, the rodents will be removed if practicable and the burrow holes will be repaired. Where the damage consists of shallow holes scattered across the embankment, tamping of earth into the rodent holes is generally sufficient repair. Large burrows on an embankment will be filled using the following procedure: (a) Placement of a piece of metal stove or vent pipe vertically over the entrance to the den with a tight seal between the pipe and the den; (b) preparation of a mixture consisting of approximately 90 percent earth, 10 percent cement, and water added to produce a thin slurry; (c) pouring the slurry mixture into the hole; and (d) once the hole is filled, removal of the pipe and tamping additional dry earth into the entrance.

Seepage Damage Control – The downstream toe of the embankment slope will be checked for systematically for seeps during the quarterly and annual inspections described in Section 2. If seeps become evident, a dam safety engineer will be contacted to determine the most appropriate monitoring and repair for an observed seep. If evidence of seepage is observed, the seep location(s) will be marked in the field with pin flags or flagged stakes and the location(s) will be measured as part of the inspections. The seepage will then be evaluated by a dam safety engineer for repairs.

3.3.2 Spillway and Sluiceway Outlet Structure

Concrete Maintenance – Where observations indicate damage to or deterioration of concrete or gunite surfaces, the damaged or deteriorated areas will be monitored and repaired as necessary. Specifically, if cracks or deterioration identified in the concrete training walls and/or the upstream and downstream spillway faces appear to be worsening, GE will have a dam safety engineer evaluate the need for repair, and repairs will be performed where warranted.

3.3.3 Other

Security Item Repair – Where observations indicate a need for repair of the left spillway abutment platform grates or rails, such repairs will be made. All gates and locks will be maintained to function properly in case quick access is required.

Other Repairs– In the event that the inspections indicate the need for other repairs not identified above, those repairs will be made if the condition identified is deemed to be a dam safety issue.

3.4 HANDLING, MANAGEMENT, AND DISPOSITION OF SEDIMENTS AND SOILS

In the event that dam maintenance or repair activities or other response activities at Columbia Mill Dam prior to its removal should involve the handling, management, and/or disposition of Housatonic River sediments in the Columbia Mill impoundment or otherwise adjacent to the Dam, GE will, after consultation with the Dam owner, take steps to ensure that those materials are properly handled, managed, and disposed of. If sediment analytical testing indicates the presence of PCB concentrations that do not allow unrestricted use, GE will develop and submit to EPA a plan that includes the following, as required by the Revised EPA Permit:

a. An estimate of the volume of sediment/soil to be managed and disposed of;
b. Information regarding the testing and classification of the sediment/soil;
c. Requirements for staging of the sediment/soil, covering of that material, and the length of time that the material will be stockpiled;

d. A job safety plan, including requirements for personal protective equipment and equipment decontamination, consistent with sediment/soil classification; and

e. A contractor work plan outlining the means and methods of removal, the disposal location(s), and site rehabilitation, if any.

In general, any removed sediments containing PCBs at levels exceeding those that would allow unrestricted use will be sent off-site for disposal. In such a case, the materials will be characterized for PCBs and other hazardous constituents as necessary to determine the appropriate management and off-site transport procedures and an appropriate permitted off-site disposal facility. Materials that are determined to contain PCBs at concentrations at or above 50 parts per million (ppm), which are regulated under the Toxic Substances Control Act (TSCA), will be managed as such, and transported for disposal to an authorized off-site TSCA disposal facility. Materials (if any) that are found to constitute characteristic hazardous waste under RCRA will be handled as such and transported for disposal to an authorized hazardous waste disposal facility. Materials that contain PCB concentrations less than 50 ppm and do not constitute RCRA hazardous waste will be transported for disposal to an authorized solid waste disposal facility.

4.0 EMERGENCY RESPONSE

As required by Section II.B.2.j.(2)(c) of the Revised EPA Permit, if there is a catastrophic failure and/or a material breach of the Dam (or any component of it) that results in a release of PCBs over the Dam that is materially greater than the PCB transport over that Dam under the normal range of flow conditions, GE will, within 30 days of notification by EPA of such failure or breach, submit a response plan to EPA for EPA approval. That plan will: (a) propose repairs to the Dam; and (b) propose measures to characterize and respond to the PCBs released by such failure and/or breach if necessary to maintain the Performance Standards for, or to maintain the effectiveness of, the Rest of River Remedial Action as set forth in the Revised EPA Permit. That plan will also include a proposed schedule to implement the required response actions. Following receipt of EPA's approval of the plan and schedule, GE will implement the additional response actions in accordance with EPA's approval, including the approved schedule.

5.0 RECORD-KEEPING AND REPORTING

GE will maintain electronic files containing records and checklists on all quarterly, annual, post-storm, and other inspections, as well as electronic records of all maintenance and repair work conducted at the Dam. As noted in Section 2, records of maintenance actions performed will be prepared and made available to the dam safety engineer as part of the documents available for the annual inspection.

The observation checklists for the quarterly inspections of the Dam will be provided to EPA upon request. Reports on the annual inspections of the Dam, including the annual inspection checklists and any recommendations for maintenance or further inspection activities, will be submitted to EPA within 60 days after each annual inspection.

6.0 SCHEDULE

The schedule of monitoring and maintenance activities to be performed by GE at the Columbia Mill Dam is summarized in the following table.

Inspection and Maintenance Summary

Inspection	Frequency
Routine	Quarterly and annually
Post-storm	After high-flow events (3,650 cfs at Division Street gage)
Post-earthquake	After an earthquake with reported damage in Berkshire County

Monitoring	Frequency
Headwater	Quarterly and annually
Concrete and masonry	Quarterly and annually
Vortices	Quarterly and annually

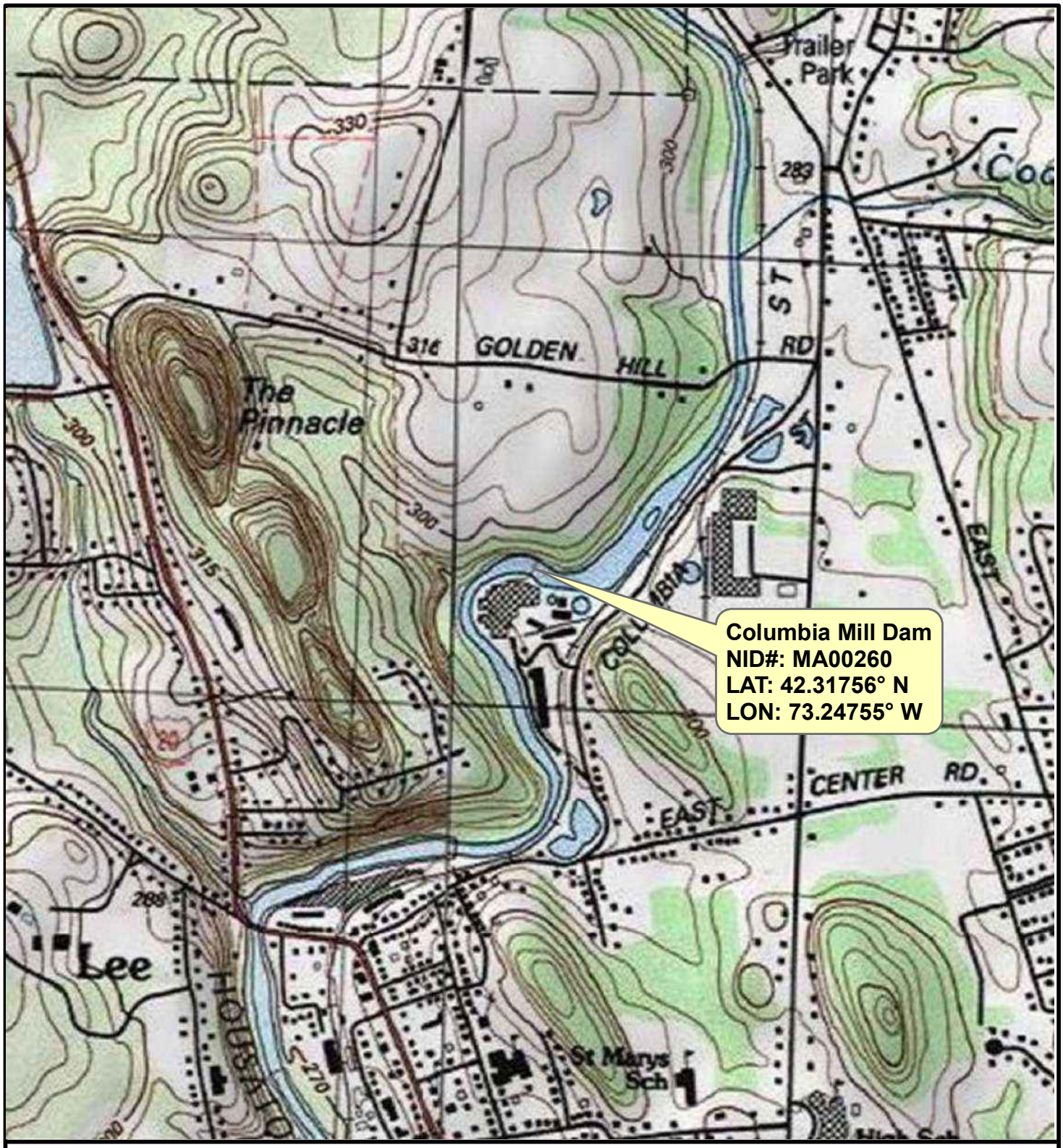
Maintenance Type	Frequency
Grass mowing	Semi-annual or whenever grass reaches maximum height of 12 inches
Other brush/woody vegetation removal	Annual
Spillway and sluiceway cleaning	If flow is impaired
Gate testing/maintenance, if feasible	Annual
Repair of sparse vegetation & erosion	As needed
Rodent damage control	As needed
Seepage damage control	As needed
Concrete maintenance, including crack repairs and vortex filling	As needed
Handling, management & disposal of sediment with PCB concentrations that do not allow unrestricted use	As needed
Security item maintenance	As needed
Access road maintenance	As needed

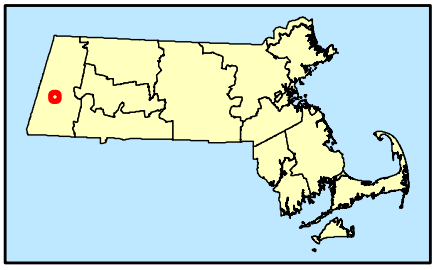
7.0 REFERENCES

Tighe & Bond, Inc., 2008. *Columbia Mill Dam Phase II Inspection/Evaluation Report*. Prepared for Schweitzer – Mauduit International, Inc. February, 2008.

Stantec Consulting, 2008. *Removal of the Columbia Mill Dam, Lee, Massachusetts – Site Reconnaissance and Cost Estimates*. Prepared for Massachusetts Riverways Program, Department of Fish and Game. June 2008.

FIGURES





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SCALE IN FEET

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PROJ. MGR.: CJT
DESIGNED BY: CJT
REVIEWED BY: JDA
OPERATOR: CJT

DATE: 9/26/2022

LOCUS PLAN

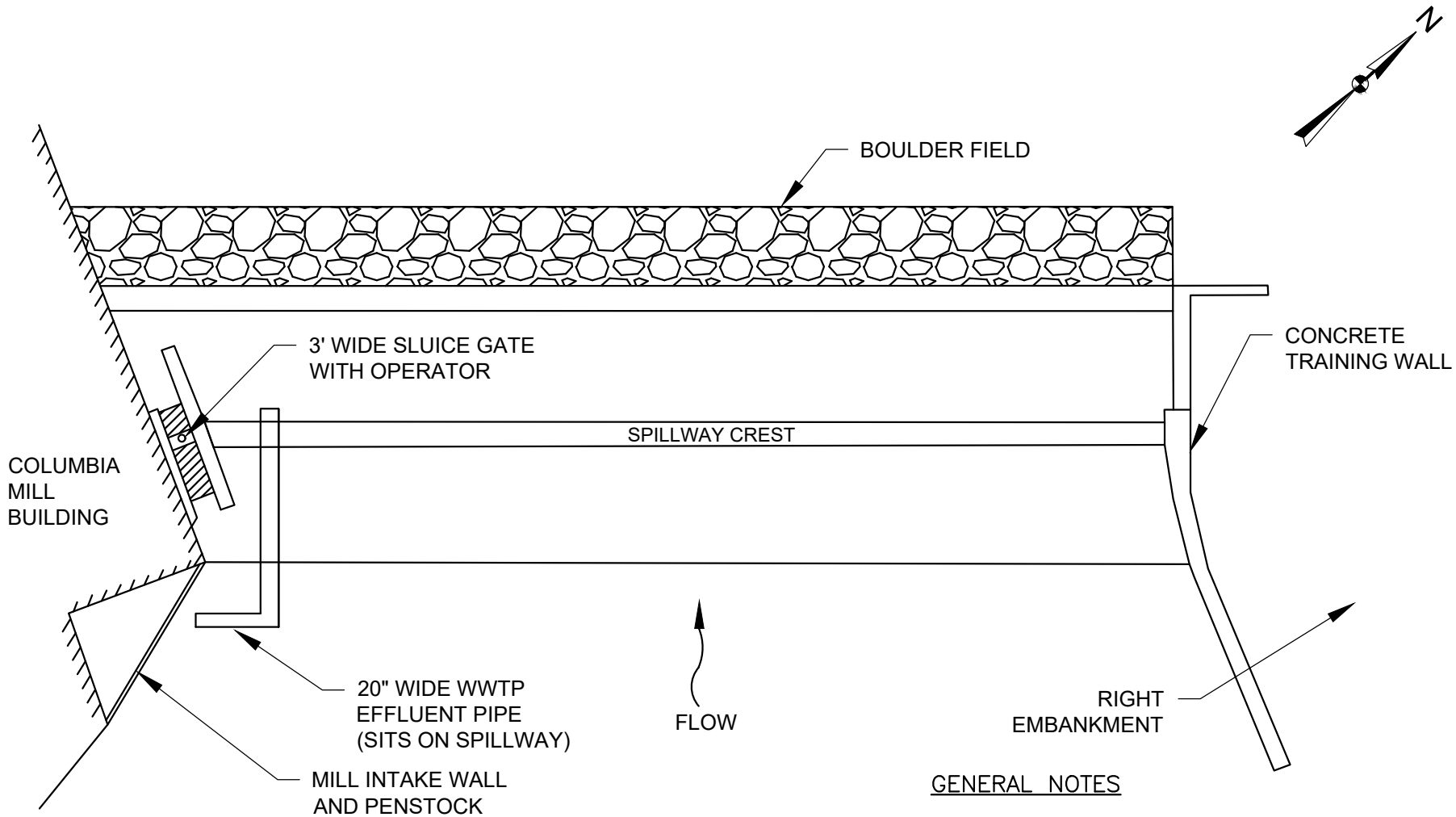
JOB NO. 01.019896.70

COLUMBIA MILL DAM
LEE, MASSACHUSETTS

FIGURE NO. 1

© 2022 - GZA GeoEnvironmental, Inc., J:\19,000-20,999\19896\19896-50.LAG Inspections for Rising+Woods\Inspections\Columbia Mill\Figures\Figure 1 - Locus Map.mxd, 9/26/2022, 2:25:33 PM, Rex.Gamble

© 2016 – GZ- GeoEnvironmental, Inc. GZ--J:\19,000–20,999\19896\19896–50.L-G Inspections for Rising+Woods\Inspections\Columbia Mill\Figures\C-D\Columbia Mill Dam Site Sketch.dwg [Site Sketch] September 27, 202



GENERAL NOTES

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COLUMBIA MILL DAM
LEE, MASSACHUSETTS

SITE SKETCH

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
GENERAL ELECTRIC COMPANY

PROJ MGR: CJT	REVIEWED BY: JDA	CHECKED BY: JDA	FIGURE
DESIGNED BY: CJT	DRAWN BY: CJT	SCALE: NTS	2
DATE: 9/22/2022	PROJECT NO. 01.0019896.70	REVISION NO. 0	

ATTACHMENT A – CONDITION DESCRIPTIONS AND DAM TERMINOLOGY

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions, refer to 302 CMR 10.00 or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA. Please note that should discrepancies between definitions exist, those definitions included within 302 CMR 10.00 govern for dams located within the Commonwealth of Massachusetts.

Orientation

Upstream – The side of the dam that borders the impoundment.

Downstream – The high side of the dam, the side opposite the upstream side.

Right – The area to the right when looking in the downstream direction.

Left – The area to the left when looking in the downstream direction.

Dam Components

Dam – Any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – The fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – The top of the dam, usually containing a road or path across the dam.

Abutment – That part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Structures, either in dams or separate therefrom, including but not be limited to, spillways; reservoirs and their rims; low-level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – A structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

Size Classification

(as listed in Massachusetts Dam Safety Regulations, 302 CMR 10.00)

Large – Structure with a height greater than 40 feet or a storage capacity greater than 1,000 acre-feet.

Intermediate – Structure with a height between 15 and 40 feet or a storage capacity of 50 to 1,000 acre-feet.

Small – Structure with a height between 6 and 15 feet and a storage capacity of 15 to 50 acre-feet.

Non-Jurisdictional – Structure less than 6 feet in height or having a storage capacity of less than 15 acre-feet.

Hazard Classification

(as listed in Massachusetts Dam Safety Regulations, 302 CMR 10.00)

High Hazard (Class I) – Dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).

Significant Hazard (Class II) – Dams located where failure may cause loss of life and damage to home(s), industrial or commercial facilities, secondary highway(s) or railroad(s), or cause the interruption of the use or service of relatively important facilities.

Low Hazard (Class III) – Dams located where failure may cause minimal property damage to others. Loss of life is not expected.

General

Acre-foot – A unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

AHPS – Advanced Hydrologic Prediction Service – a website showing Housatonic River flows and river stage at United States Geological Survey Gage No. 01197500 at Division Street in Great Barrington.

Dam safety engineer – A Professional Engineer experienced in dam safety and registered in Massachusetts.

EAP – Emergency Action Plan – A predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.

Height of dam (structural height) – The vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the lowest point on the crest of the dam.

Hydraulic height – The height to which water rises behind a dam and the difference between the lowest point in the original streambed at the axis of the dam and the maximum controllable water surface.

Maximum storage capacity – The volume of water contained in the impoundment at maximum water storage elevation.

Maximum water storage elevation – The maximum elevation of water surface which can be contained by the dam without overtopping the embankment section.

Normal pool – The elevation of the impoundment during normal operating conditions.

Normal storage capacity – The volume of water contained in the impoundment at normal water storage elevation.

M&M Plan – Monitoring and Maintenance Plan.

Spillway Design Flood (SDF) – The flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Condition Rating

Unsafe – Major structural*, operational, and maintenance deficiencies exist under normal operating conditions.

Poor – Significant structural*, operation and maintenance deficiencies are clearly recognized for normal loading conditions.

Fair – Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters.

Satisfactory – Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.

Good – No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF.

* Structural deficiencies include but are not limited to the following:

- Excessive uncontrolled seepage (e.g., upwelling of water, evidence of fines movement, flowing water, erosion, etc.).
- Missing riprap with resulting erosion of slope.

- Sinkholes, particularly behind retaining walls and above outlet pipes, possibly indicating loss of soil due to piping, rather than animal burrows.
- Excessive vegetation and tree growth, particularly if it obscures features of the dam and the dam cannot be fully inspected.
- Deterioration of concrete structures (e.g., exposed rebar, tilted walls, large cracks with or without seepage, excessive spalling, etc.).
- Inoperable outlets (gates and valves that have not been operated for many years or are broken).

ATTACHMENT B – AUGUST 2022 VISUAL INSPECTION

Known for excellence. Built on trust.

August 2022 Visual Inspection Report

MA00260 Columbia Mill Dam
Lee, Massachusetts

Prepared For:
General Electric Company
Global Operations – Environment, Health & Safety
1 Plastics Avenue
Pittsfield, MA 01201

Prepared by:
GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, Massachusetts 02062

Inspection Date: August 17, 2022
Report Date: October 28, 2022
GZA File No. 01.0019896.70

PREFACE

The assessment of the general condition of the dam reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report unless reported otherwise.

In reviewing this report, it should be realized that the reported condition of the dam was based on observations of field conditions at the time of inspection, along with data available to the inspection team.

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 reported 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.

TABLE OF CONTENTS

1.0 INTRODUCTION

The General Electric Company (GE) retained GZA GeoEnvironmental, Inc. (GZA) to perform a visual inspection and develop a report of conditions for the Columbia Mill Dam (the Dam) along the Housatonic River in Lee, Berkshire County, Massachusetts. That inspection was performed on August 17, 2022, and this report describes the observations made and recommendations for follow-up actions. This report is subject to the Limitations in **Appendix A.** This report was prepared without review of dam information available from Massachusetts Department of Conservation and Recreation Office of Dam Safety (DCR ODS) and is not intended to constitute a Phase 1 Inspection/Evaluation of the Dam under the Massachusetts Dam Safety Regulations.

The Dam is located on the Housatonic River in Lee Massachusetts. Its location is shown on **Figures 1 and 2**, and a site sketch is provided as **Figure 3**. The Dam is owned by Lenox Development, LLC. The original purpose for the Dam was to provide power to the former Columbia Mill, but its only known current function is to impound existing sediments that are impacted by polychlorinated biphenyls (PCBs). Under the Massachusetts Dam Safety Regulations (302 CMR 10.00), the Dam is an Intermediate size structure based on maximum storage between 50 and 1,000 acre-feet and is classified as a dam with Significant Hazard potential.

The Dam will be removed as part of the Housatonic Rest of River Remedial Action, as required by a Revised Resource Conservation and Recovery Act Permit issued to GE by the United States Environmental Protection Agency (EPA) on December 16. 2020 (Revised RCRA Permit). The removal date for Columbia Mill Dam is unknown at this time, but may occur in about ten years or so from the present date. In the meantime, under the Revised RCRA Permit, GE is required to monitor and maintain the Dam to help assure that it remains in place and does not fail prior to its removal. To meet that requirement, in accordance with the Revised RCRA Permit, GE has developed a Monitoring and Maintenance Plan for Columbia Mill Dam, to which this report is an attachment. That plan includes a detailed description of the Dam, its history, its elevation, and other pertinent features.

To provide the reader with a better understanding of this report, definitions of commonly used terms associated with dams are provided in **Appendix D**. Many of these terms may be included in this report. The terms are presented under common categories associated with dams which include: (1) orientation; (2) dam components; (3) size classification; (4) hazard classification; and (5) miscellaneous.

2.0 FINDINGS

2.1 VISUAL INSPECTION AND OBSERVATIONS

Columbia Mill Dam was visually inspected on August 17, 2022 by Jonathan Andrews, P.E., and Leslie Decristofaro, of GZA. Thomas Czelusniak of HDR, Inc. (representing EPA) and Thom Clapper of Lenox Development, LLC were also present during the inspection.

At the time of the August 2022 inspection, the weather was mostly clear and the temperature approximately 75°F. River flow hindered observations of some dam components. Photographs to document the current Dam conditions were taken during the inspection and are included in **Appendix B**, with the locations of the photographs shown on **Figure 4**. The level of the impoundment at the time of inspection was about two inches above the spillway crest, corresponding to approximate elevation 908.2 feet (unknown datum used in 2008 Phase II Report). Underwater areas were not inspected during this inspection. A copy of the inspection checklist is provided in **Appendix C**. The observations from this visual inspection are discussed in the following sections.

2.1.1 Dam

Embankment Abutments

The embankment right abutment contact appeared to be in fair condition. The right embankment is heavily overgrown with vegetation and was difficult to observe.

Upstream Slope

The upstream slope was obscured by heavy vegetation. Riprap protection was observed at one location.

Top of Embankment

The top of embankment was heavily vegetated and difficult to observe.

Downstream Slope

The downstream slope of the right side embankment includes a dry stone masonry wall. The area is heavily overgrown with large trees and woody brush which obscured observation.

Drains

There were no drains observed at the time of inspection.

Instrumentation

GZA is not aware of any instrumentation on this Dam.

Access Roads and Gates

The right-side embankment has an unpaved access road that leads to Golden Hill Road. The access road is relatively steep near the Dam, with a granular surface. The side banks on either side of the access road are steep, unprotected, and show signs of erosion.

2.1.2 Appurtenant Structures

Primary Spillway

Observation of and access to the spillway were limited by flow. The spillway consists of a boulder-filled, gunite-faced, ogee spillway. The spillway appeared to be in poor condition. There is an approximate one-inch-wide diagonal crack on the left downstream face of the spillway. It was unclear whether water was escaping through the crack, as flow was present over the spillway during the inspection. The right downstream training wall has several cracks, staining, and scarping; however, the cracks did not appear wet or exhibit flow. The left training wall, which separates the spillway from the external sluiceway, also has small cracks and staining. In addition, deteriorated concrete was observed at the top and bottom of the joint between the spillway and both the right and left training walls. There was separation observed at the concrete joint along the weir crest. There were several large logs lodged on the spillway crest, as well as on the upstream and downstream faces of the spillway. The logs did not appear to be impeding flow. The upstream and downstream left training wall (exterior Mill wall) had deteriorated concrete with spalling and exposed steel reinforcement.

A one-inch± diameter vortex was observed upstream of the Dam beneath the gate platform. Small debris was introduced near the vortex base and observed entering the dam structure through the upstream apron. No void in the apron was observed; however, a separation between the left training wall and spillway was observed where not obscured by debris and flow. The vortex was located approximately upstream of the diagonal crack on the left downstream face (see description above).

Sluiceways

The external sluiceway at the left spillway abutment appeared to be generally clear of debris, with minimal debris upstream of the slide gate and one six-inch log on the downstream side. There appeared to be minimal leakage beneath the gate. The sluice gate is reportedly operable; however, GZA did not observe operation during the inspection.

The internal sluiceway feeds into the Mill building to the left of the external sluiceway. The slide gate was reported as non-operational. The gate appears to consist of a steel plate with chain hoist to adjust position. Debris was observed upstream of the slide gate. The approach could not be observed and the slide gate position could not be determined. There was significant flow (100 gallons per minute or more) through the internal Mill sluiceway which exits the sluiceway about 10 to 20 feet downstream of the Dam. It is not known whether the internal sluiceway flow is from a partially open gate or from gate leakage. The sluiceway channel was observed to extend further downstream of the Mill wall exit. Flow in the internal sluiceway channel appeared to extend downstream of the Mill wall exit.

2.1.3 Downstream Area

The downstream area is the Housatonic River. There is a Mill building on the left side of the river. The Mill foundation walls have deteriorated concrete and exposed rebar in some areas. In addition, there several possible small leaks discharging through the foundation walls and between the internal sluiceway channel and the downstream river channel. Clear seepage was observed emanating from the left downstream bank. It was not apparent if the seepage source was the internal sluiceway, recent rainfall, or another source.

2.1.4 Reservoir Area

The upstream area is the Housatonic River.

2.2 OPERATION AND MAINTENANCE PROCEDURES

There appear to be no operations or maintenance performed at this Dam and no current owner operation or maintenance procedures. In general, the dam functions without significant operation. Operational procedures can include adjustment of the external sluiceway gate to help control reservoir elevation or attempt a limited reservoir drawdown. As noted in Section 1 and required by the Revised RCRA Permit, GE has developed a Monitoring and Maintenance Plan for the Dam, to which this report is an attachment. That Plan describes the monitoring and maintenance activities that GE will undertake at the Dam during the interim period prior to the Dam's removal.

2.3 EMERGENCY WARNING SYSTEM

There is no physical early warning system at the Dam. The 2008 Phase II Report indicates that an Emergency Action Plan (EAP) was developed for the Dam in 1999. GZA did not have access to the EAP during the inspection.

2.4 HYDROLOGIC/HYDRAULIC DATA

Hydrologic and hydraulic (H&H) analyses were not included in the scope of GZA's visual inspection. Under the Massachusetts Dam Safety Regulations, the spillway design flood (SDF) for this Intermediate-size, Significant Hazard dam is the 100-year storm. Review of the 2008 Phase II Report indicates that H&H analyses had not been performed for the Dam; however, pool elevations and storage volume for the SDF were presented in the Phase II Report and are included in the Monitoring and Maintenance Plan. The Phase II Report also indicates the following:

- The Town's Flood Insurance Study notes that the spillway capacity prior to overtopping the right abutment is 4,300 cubic feet per second (cfs) or 38 percent of the 11,200 cfs one-half probable maximum flood (½ PMF).

- The Town of Lee flood mapping also indicates that the Mill complex area will be flooded during the 100-year storm event, thus indicating that the river will overtop its banks and that the Dam would become an insignificant structure in the stream channel during that event.

A 2008 Dam Removal Study indicates that, based on observation of erosion, debris, and disturbed vegetation, "overtopping of the dam likely occurs on a regular basis and that the spillway is therefore hydraulically inadequate." See *Removal of the Columbia Mill Dam, Lee Massachusetts*, prepared for the Massachusetts Riverways Program, Department of Fish and Game, by Stantec Consulting (June 2008).

2.5 STRUCTURAL STABILITY

Embankment, structural, and seepage stability analyses were not included in the scope of GZA's visual inspection. No records of structural and seepage stability analyses were made available for GZA review. During our visual inspection, observations were obscured by heavy vegetation and river flow. However, indications of embankment and non-embankment structural instability were not observed except for the spillway crest joint separation, downstream face diagonal crack, and exposed rebar and spalling of the left training wall (Mill foundation wall), as noted in Section 2.1.2. In addition, there was no observed indication of structural instability

due to seepage of non-embankment structures except for the vortex observed upstream of the spillway as noted in Section 2.1.2. The recently observed vortex may potentially be related to indications of structural instability as the 2007 stability repairs were precipitated by observation of an upstream vortex.

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 ASSESSMENTS

During the August 17, 2022 visual inspection, the Dam was found to have the following defects or unusual conditions of note:

1. A one-inch± vortex upstream of the spillway on the left side;
2. A large diagonal crack on the left side of the downstream face of the spillway;
3. Several cracks, staining, and scarping on the right downstream training wall;
4. Small cracks and staining on the left training wall of the spillway and the right wall of the external sluiceway;
5. Exposed rebar and concrete spalls on the downstream Mill foundation wall;
6. Separation of concrete joint at weir crest;
7. Deteriorating concrete at top and bottom of spillway joint with right and left training wall;
8. Logs and branches lodged on upstream and downstream portions of spillway, including logs and debris lodged on the structure for the 20-inch diameter wastewater treatment plant effluent pipe on the left side;
9. Significant vegetation growth on the right embankment, with large trees and woody vegetation on and within 20 feet of the Dam; and
10. Leaks through base of Mill foundation wall between internal sluiceway and downstream channel, the likely water source of which is the internal sluiceway.

3.2 STUDIES AND ANALYSES

While GZA understands that the Dam will be removed under the Revised RCRA Permit, GZA recommends that, in the meantime, a licensed professional engineer develop the following studies and analyses for Columbia Mill Dam:

1. Obtain and review all available information on the Dam from the Massachusetts Office of Dam Safety.
2. Assess the stability implications of the vortex at the left upstream side of the spillway if not repaired.

3.3 RECURRENT MAINTENANCE AND MONITORING RECOMMENDATIONS

GZA recommends the following recurrent maintenance and monitoring activities that do not require engineering design:

1. Clear inappropriate vegetative growth and debris on the upstream and downstream slopes of the Dam and abutment contacts. Re-inspect the right embankment and right training wall after vegetation removal. Establish grass cover on the right embankment.
2. Remove debris from the spillway approach, crest, and downstream face if impeding flow.
3. Monitor the condition of the crack in the downstream face of the spillway on the left side until repaired.
4. Monitor the condition of the vortex on the left side upstream of the spillway until repaired.

5. Monitor cracks on the right downstream training wall.
6. Monitor cracks on the left training wall of the spillway/right wall of the external sluiceway.
7. Monitor the exposed rebar and concrete spalls on the downstream Mill foundation walls.
8. Monitor the separation of the concrete joint at the weir crest until repaired.
9. Monitor the deteriorated concrete at the spillway joint with right and left training walls unless and until repaired.
10. Monitor leaks through base of the Mill foundation wall between internal sluiceway and downstream channel.
11. Exercise and maintain sluiceway gate annually if feasible.
12. Fill animal burrows in the right embankment if observed.

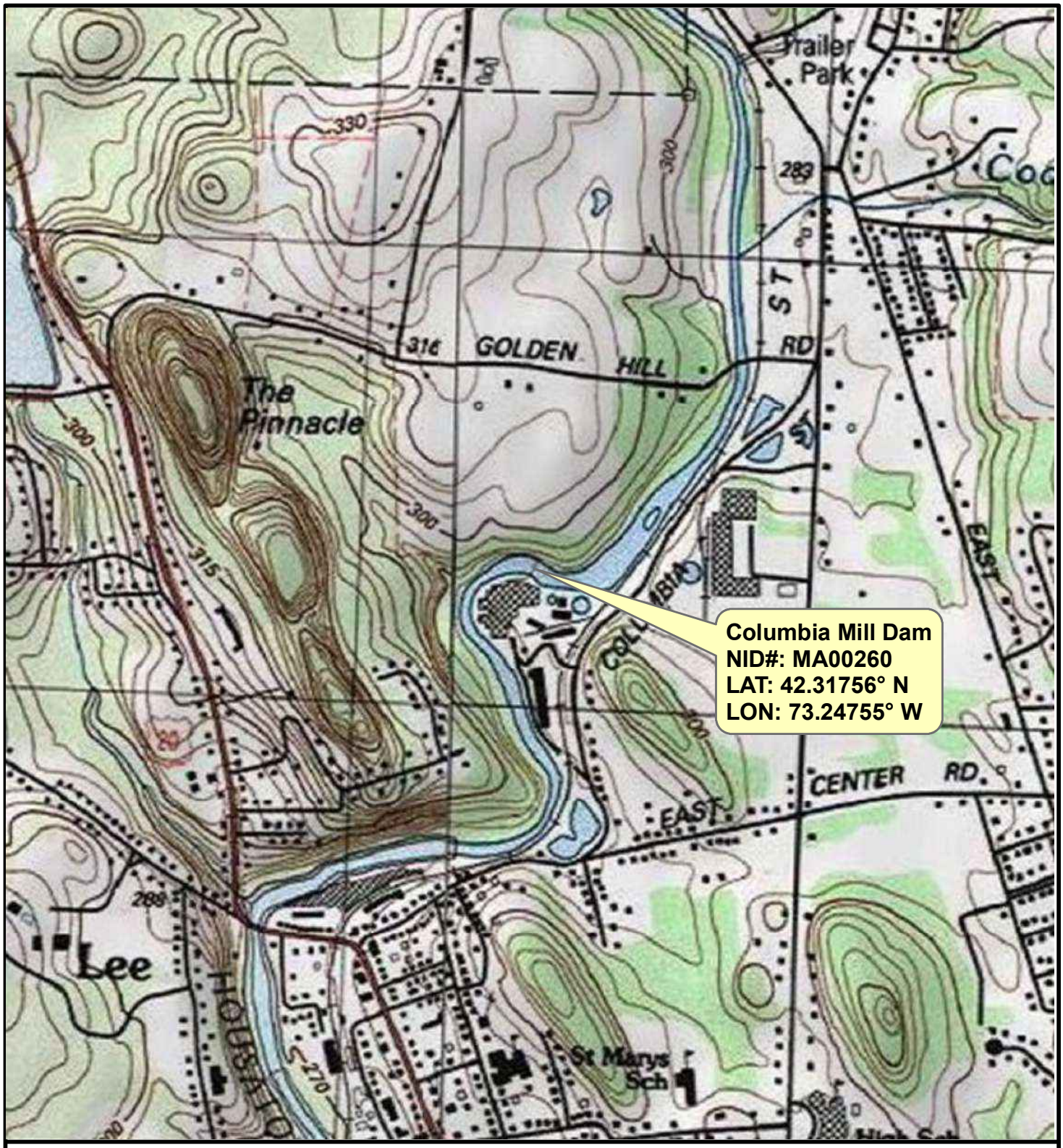
3.4 REPAIR RECOMMENDATIONS

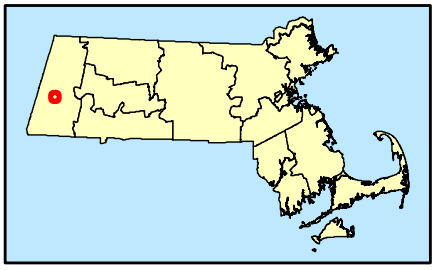
GZA recommends the following minor repairs which may improve the overall condition of the Dam but would not alter the current design of the Dam. These recommendations may require design by a professional engineer and construction contractor experienced in dam construction.

1. Fill vortex near left side gate platform.
2. Repair the crack in the downstream face of the spillway on the left side.
3. Repair the separation of the concrete joint at the weir crest.

In addition, while GZA understands that the Dam will be removed, GZA recommends that, in the meantime, the need for additional interim remedial repairs be evaluated following review of available dam information from the Office of Dam Safety, including results of any evaluations of hydrology and hydraulics, seepage, and/or stability.

FIGURES





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OPERATOR: CJT

DATE: 9/26/2022

LOCUS PLAN

JOB NO. 01.019896.70

COLUMBIA MILL DAM
LEE, MASSACHUSETTS

FIGURE NO. 1

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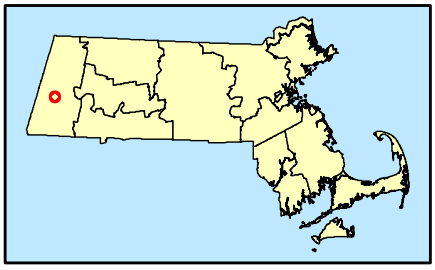

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REVIEWED BY: JDA
OPERATOR: RSG

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AERIAL MAP

COLUMBIA MILL DAM
LEE, MASSACHUSETTS

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FIGURE NO.
2

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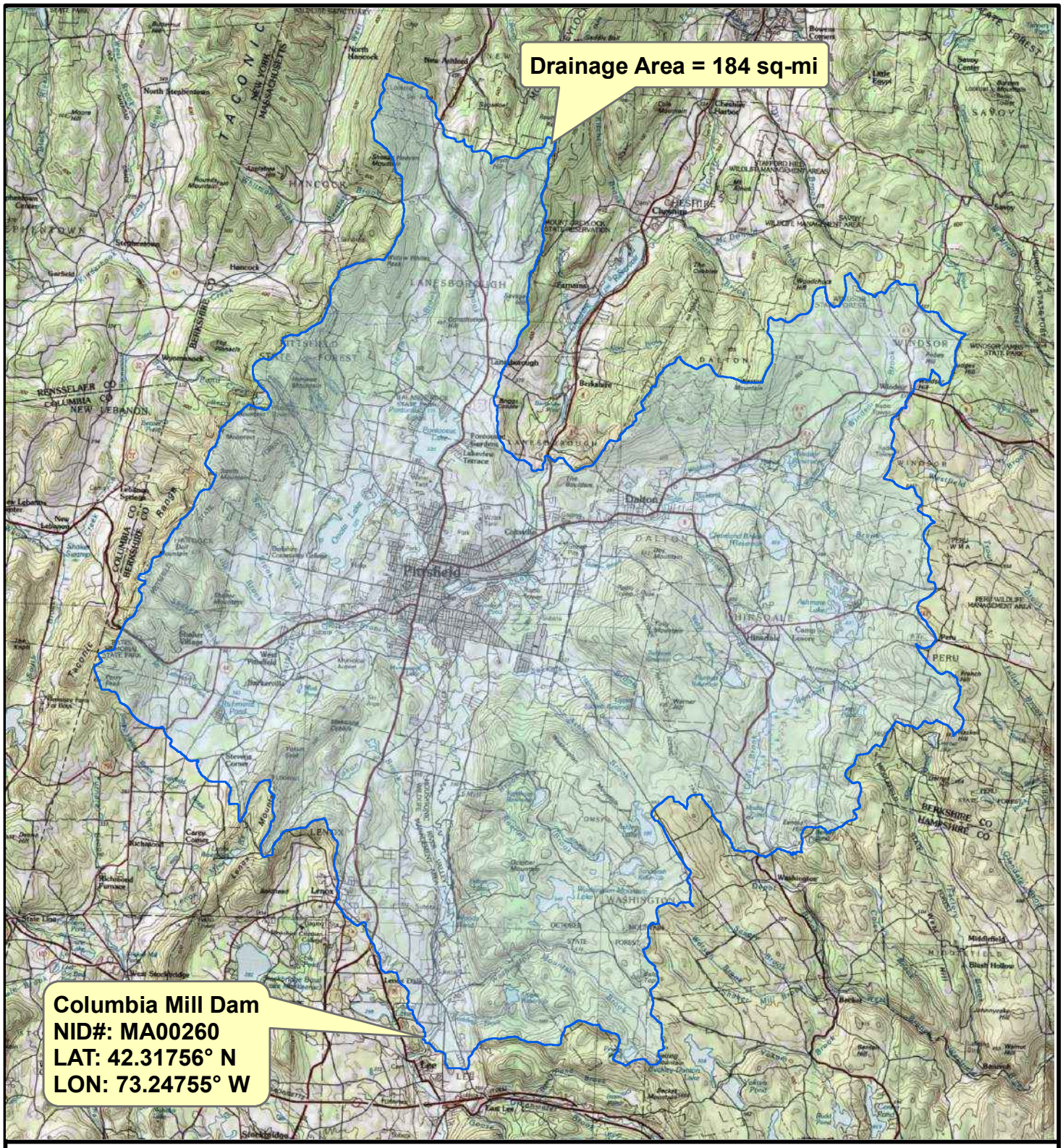

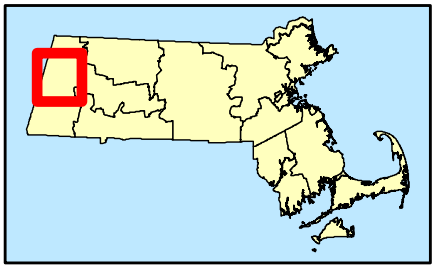

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DRAINAGE AREA MAP

COLUMBIA MILL DAM
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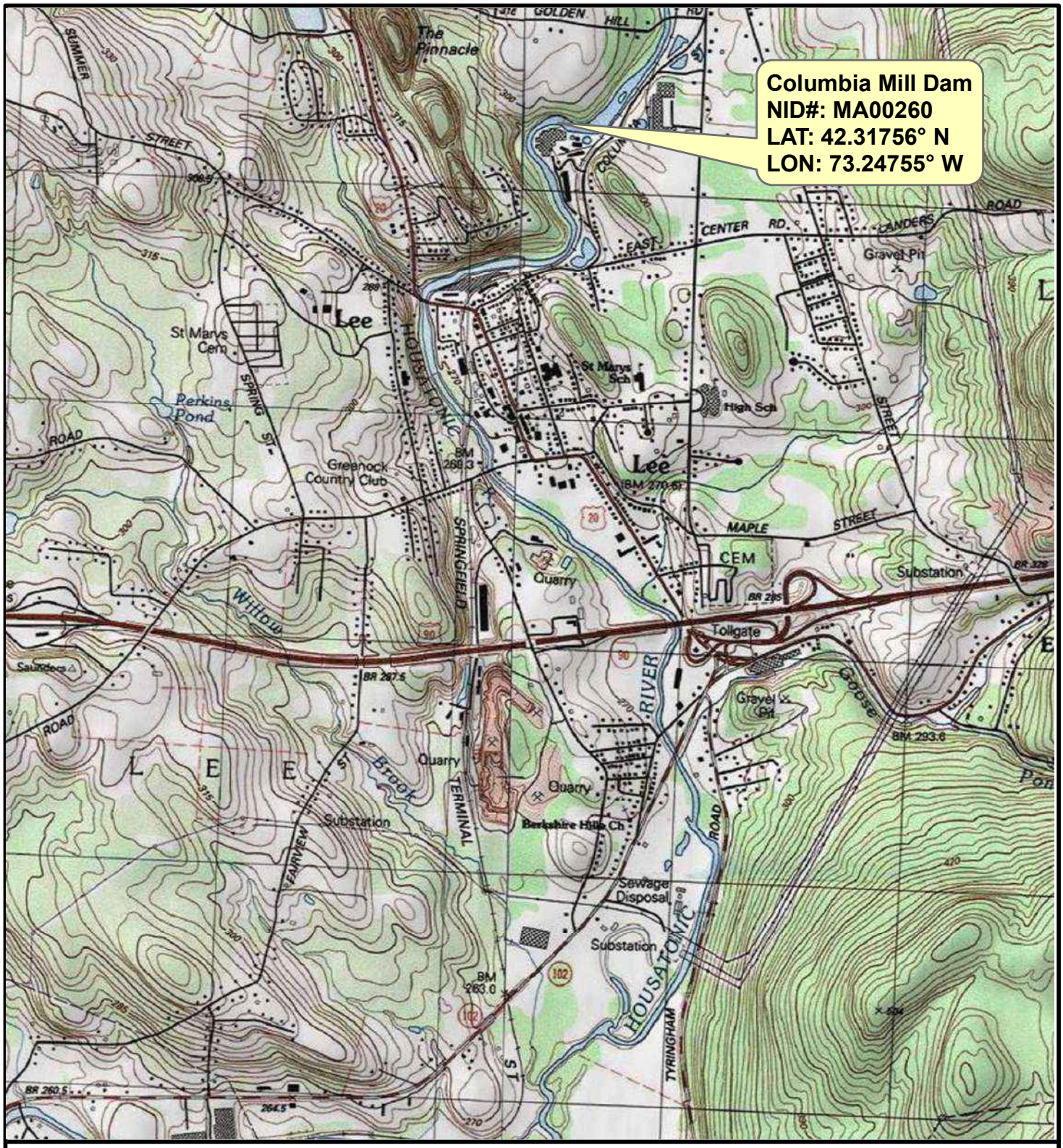
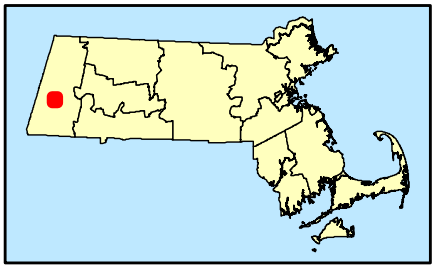
FIGURE NO.
3

© 2022 - GZA GeoEnvironmental, Inc., J:\19,000-20,999\19896\19896-50.LAG Inspections for Rising+Woods\Inspections\Columbia Mill\Figures\Figure 3 - Drainage Map.mxd, 9/26/2022, 2:25:58 PM, Rex.Gamble





SOURCE : THIS MAP CONTAINS THE ESRI ARCGIS ONLINE USA TOPOGRAPHIC MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCIMS SERVICES AND UPDATED AS NEEDED. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.

Data Supplied by : MASS GIS esri

0 2,000 4,000

SCALE IN FEET

N W E S

PROJ. MGR.: CJT
DESIGNED BY: CJT
REVIEWED BY: JDA
OPERATOR: RSG

DATE: 9/26/2022

DOWNSTREAM AREA

COLUMBIA MILL DAM
LEE, MASSACHUSETTS

JOB NO.
01.019896.70

FIGURE NO.
4

© 2022 - GZA GeoEnvironmental, Inc., J:\19,000-20,999\19896\19896-50.LAG Inspections for Rising+Woods\Inspections\Columbia Mill\Figures\Figure 4 - Downstream Area.mxd, 9/26/2022, 2:26:37 PM, Rex.Gamble

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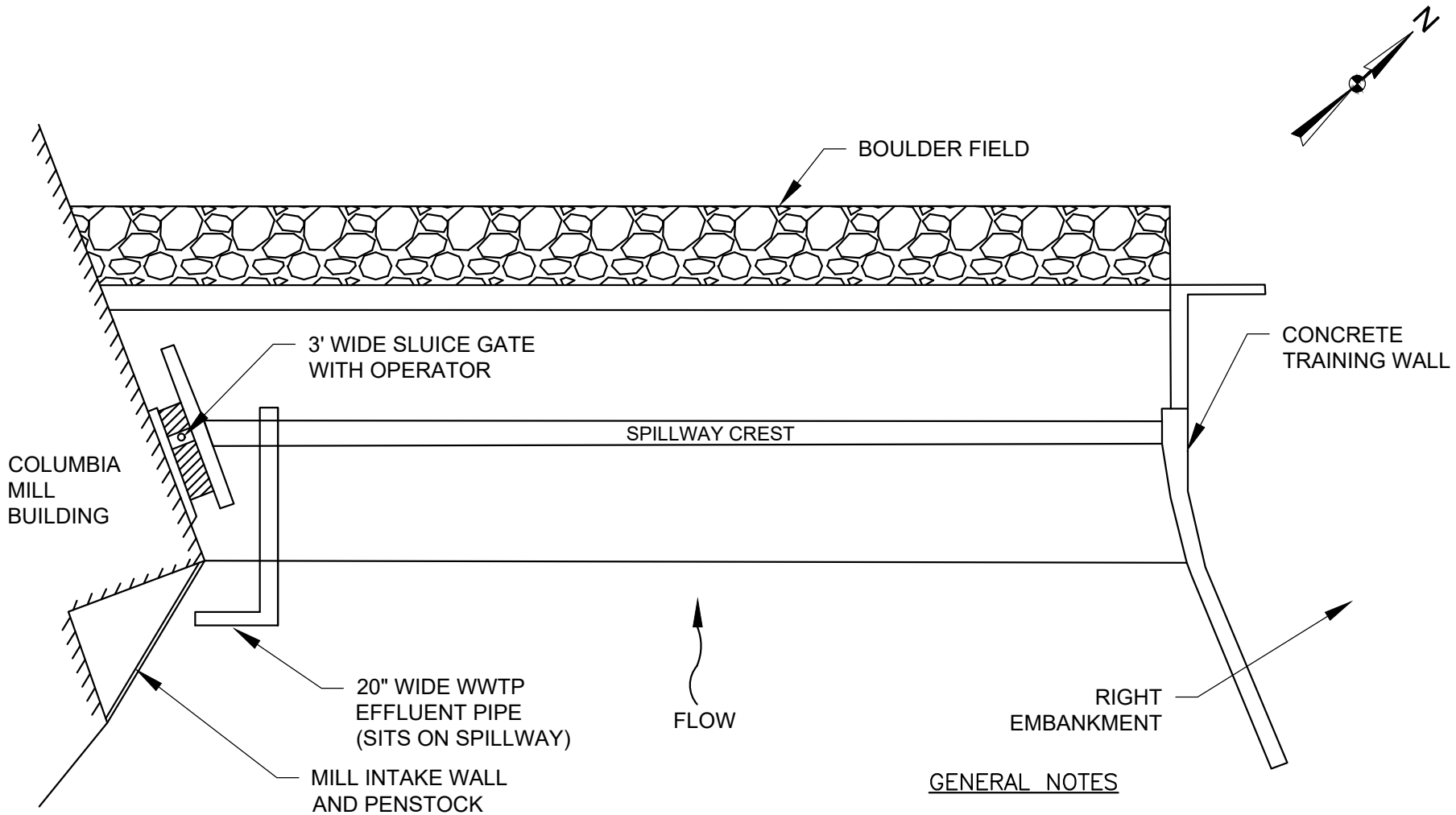

GENERAL NOTES

1. B-SE M-P DEVELOPED FROM - DR- ING ENTITLED, "PL- OF D- , FIGURE 6," PREP-RED BY TIGHE - D BOND, ORIGIN-L SC-LE 1"=20', - D D-TED J- U-RY 2006.

FIGURE IS NOT TO SCALE

NO.	ISSUE/DESCRIPTION	BY	D-TE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

COLUMBIA MILL DAM
LEE, MASSACHUSETTS

SITE SKETCH

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
GENERAL ELECTRIC COMPANY

PROJ MGR: CJT	REVIEWED BY: JDA	CHECKED BY: JDA	FIGURE
DESIGNED BY: CJT	DRAWN BY: CJT	SCALE: NTS	5
DATE: 9/22/2022	PROJECT NO. 01.0019896.70	REVISION NO. 0	

© 2016 – GZA GeoEnvironmental, Inc. GZA–J:\19,000–20,999\19896\19896–50.LAG Inspections for Rising+Woods\Inspections\Columbia Mill\Figures\CAD\Columbia Mill Dam Site Sketch.dwg [Photo Location] September 27,

LEGEND:

(#) PICTURE No. AND VIEW DIRECTION

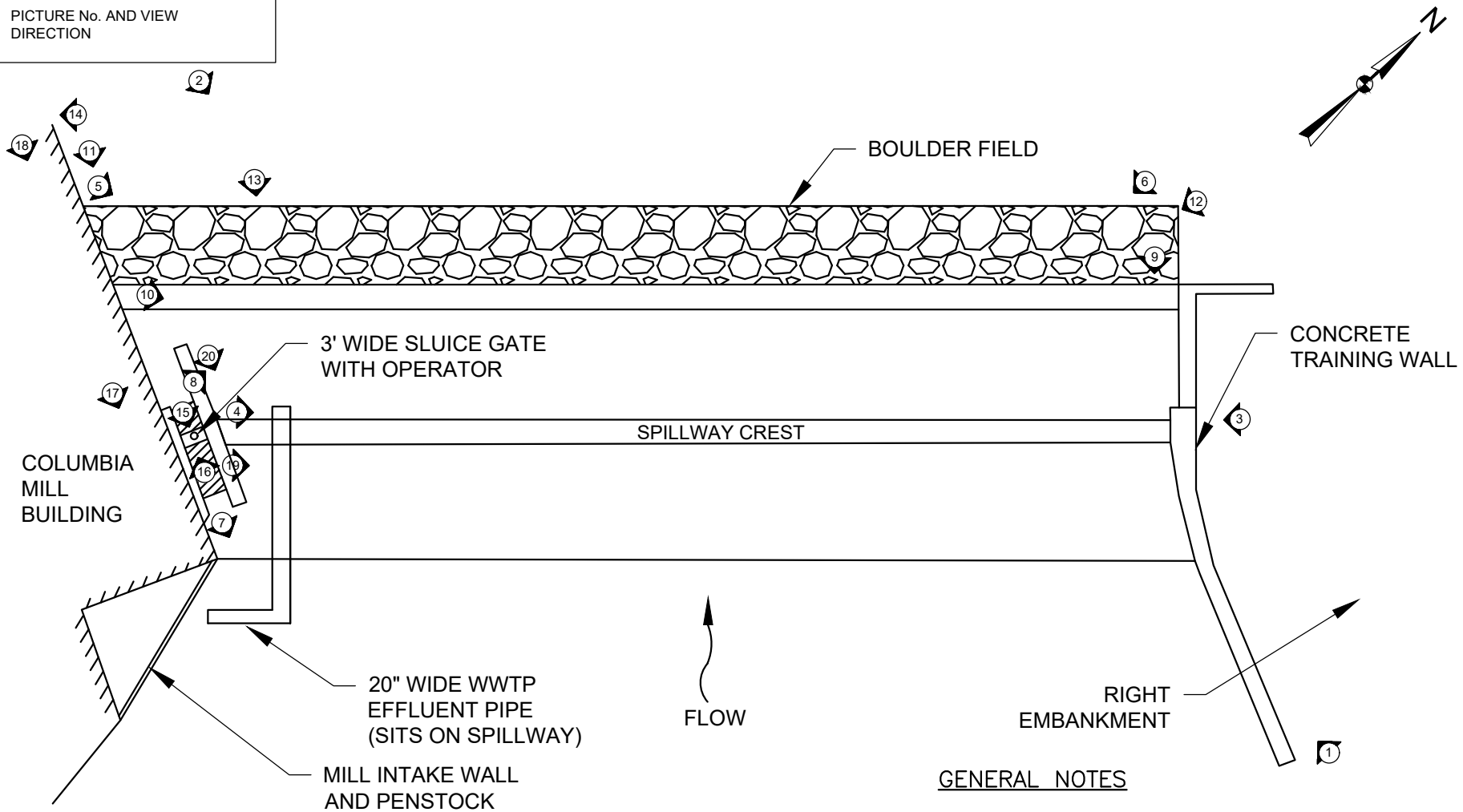

FIGURE IS NOT TO SCALE

GENERAL NOTES

1. BASE MAP DEVELOPED FROM A DRAWING ENTITLED, "PLAN OF DAM, FIGURE 6," PREPARED BY TIGHE AND BOND, ORIGINAL SCALE 1"=20', AND DATED JANUARY 2006.
2. LOCATION OF PHOTO DIRECTION POINTS SHOWN ON THIS FIGURE ARE APPROXIMATE AND NOT EXACT.

NO.	ISSUE/DESCRIPTION	BY	DATE

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COLUMBIA MILL DAM
LEE, MASSACHUSETTS

SITE SKETCH WITH PHOTO LOCATION

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
GENERAL ELECTRIC COMPANY

PROJ MGR: CJT	REVIEWED BY: JDA	CHECKED BY: JDA	FIGURE
DESIGNED BY: CJT	DRAWN BY: CJT	SCALE: NTS	6
DATE: 9/22/2022	PROJECT NO. 01.0019896.70	REVISION NO. 0	

APPENDIX A – LIMITATIONS

DAM ENGINEERING REPORT LIMITATIONS

Use of Report

1. GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of the General Electric Company, (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.

General

4. 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.
5. 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.
6. 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.
7. 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.
8. 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

9. 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.
10. This scope of work does not include an assessment of the need for fences, gates, no trespassing signs, swimming or boating 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.

Additional Services

11. 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.

APPENDIX B – PHOTOGRAPHS

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No.	**Date:**
1	8/17/2022

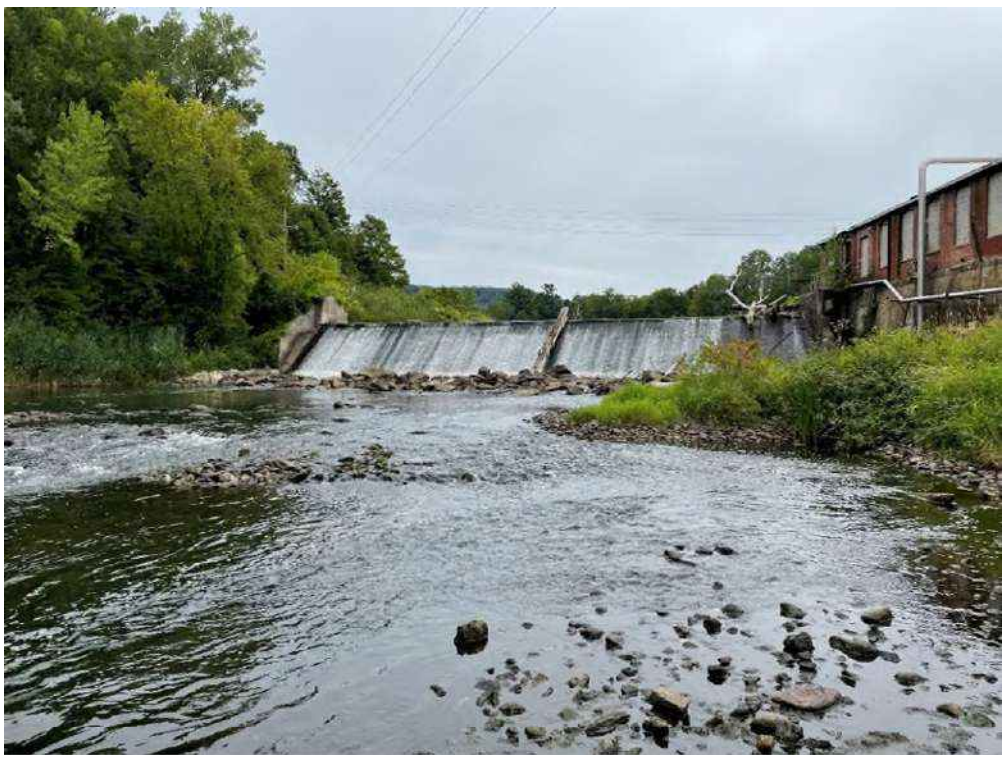
Direction Photo Taken:
From right upstream pond shoreline, looking left and downstream.

Description:
Overview of dam from upstream. Dam is obscured by vegetation. Mill complex in background.

Photo No.	**Date:**
2	8/17/2022

Direction Photo Taken:
From left downstream bank, looking upstream.

Description:
Overview of dam from downstream.



Photographic Log

Client Name: General Electric Company	Site Location: Columbia Mill Dam (MA00260) Lee, MA	Project No. 01.0019896.50

Photo No. 3	Date: 8/17/2022

Direction Photo Taken:
From right abutment, looking left.

Description:
Overview of crest.

Photo No. 4	Date: 8/17/2022

Direction Photo Taken:
From left abutment, looking right.

Description:
Overview of crest.
Note logs and on crest and downstream face; debris on crest; reported wastewater treatment plant effluent pipe on crest; and vegetation obscuring right embankment (beyond training wall on right side of dam/far side of photo)

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No.	**Date:**
5	8/17/2022

Direction Photo Taken:
From left bank downstream, looking right.

Description:
Overview of spillway and downstream riprap field. Note: Right embankment downstream masonry wall obscured by vegetation (photo background)

Photo No.	**Date:**
6	8/17/2022

Direction Photo Taken:
From right downstream bank looking left.

Description:
Overview of spillway and downstream riprap field. Mill structure in photo background.

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No.	**Date:**
7	8/17/2022

Direction Photo Taken:
From left end of spillway looking upstream.

Description:
Overview of impoundment.
Note: Logs and debris on spillway crest debris in foreground.

Photo No.	**Date:**
8	8/17/2022

Direction Photo Taken:
From left end of spillway looking downstream.

Description:
Overview of downstream channel.

Client Name: General Electric Company	Site Location: Columbia Mill Dam (MA00260) Lee, MA	Project No. 01.0019896.50

Photo No.	Date:
9	8/17/2022

Direction Photo Taken:
From right base of spillway looking upstream.

Description:
Right spillway training wall.

Photo No.	Date:
10	8/17/2022

Direction Photo Taken:
From left downstream bank looking right.

Description:
Right spillway training wall.
Note: Cracks on wall and vegetation obscuring right embankment downstream masonry wall.

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No. 11	**Date:** 8/17/2022

Direction Photo Taken:
From left base of spillway looking upstream.

Description:
From photo left to photo right: Left portion of spillway, sluiceway outlet structure, and exterior wall of mill building.
Note: Diagonal crack on downstream face of spillway.

Photo No. 12	**Date:** 8/17/2022

Direction Photo Taken:
From right downstream bank looking left.

Description:
Left spillway training wall / sluiceway wall, outlet structure, and mill building.

Note concrete degradation on mill building foundation with exposed reinforcing steel.

Photographic Log

Client Name: General Electric Company	Site Location: Columbia Mill Dam (MA00260) Lee, MA	Project No. 01.0019896.50

Photo No.	Date:
13	8/17/2022

Direction Photo Taken:
From left base of spillway looking upstream.

Description:
Large diagonal crack in spillway face, large debris on spillway crest.

Photo No.	Date:
14	8/17/2022

Direction Photo Taken:
From left downstream bank, looking left.

Description:
Internal mill sluiceway outlet through exterior mill building wall.

Note deteriorated mill concrete wall with exposed steel reinforcing and leakage at base of wall (upstream of outlet/photo right).

Photographic Log

Client Name: General Electric Company	Site Location: Columbia Mill Dam (MA00260) Lee, MA	Project No. 01.0019896.50

Photo No.	Date:
15	8/17/2022

Direction Photo Taken:
From left, looking upstream.

Description:
Sluiceway slide gate.

Photo No.	Date:
16	8/17/2022

Direction Photo Taken:
From left.

Description:
Sluiceway slide gate operator looking down.

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No.	**Date:**
17	8/17/2022

Direction Photo Taken:
Inside mill building, looking upstream.

Description:
Internal mill sluiceway inoperable gate.
Note debris buildup.

Photo No.	**Date:**
18	8/17/2022

Inside building, looking upstream.

Description:
Internal mill sluiceway from inside mill. Outlet to downstream channel can be seen on left.

Photographic Log

Client Name: General Electric Company	**Site Location:** Columbia Mill Dam (MA00260) Lee, MA	**Project No.** 01.0019896.50

Photo No.	**Date:**
19	8/17/2022

Direction Photo Taken:
Down

Description:
Small 1-inch± diameter vortex adjacent to left upstream training wall/sluiceway wall, circled in red.

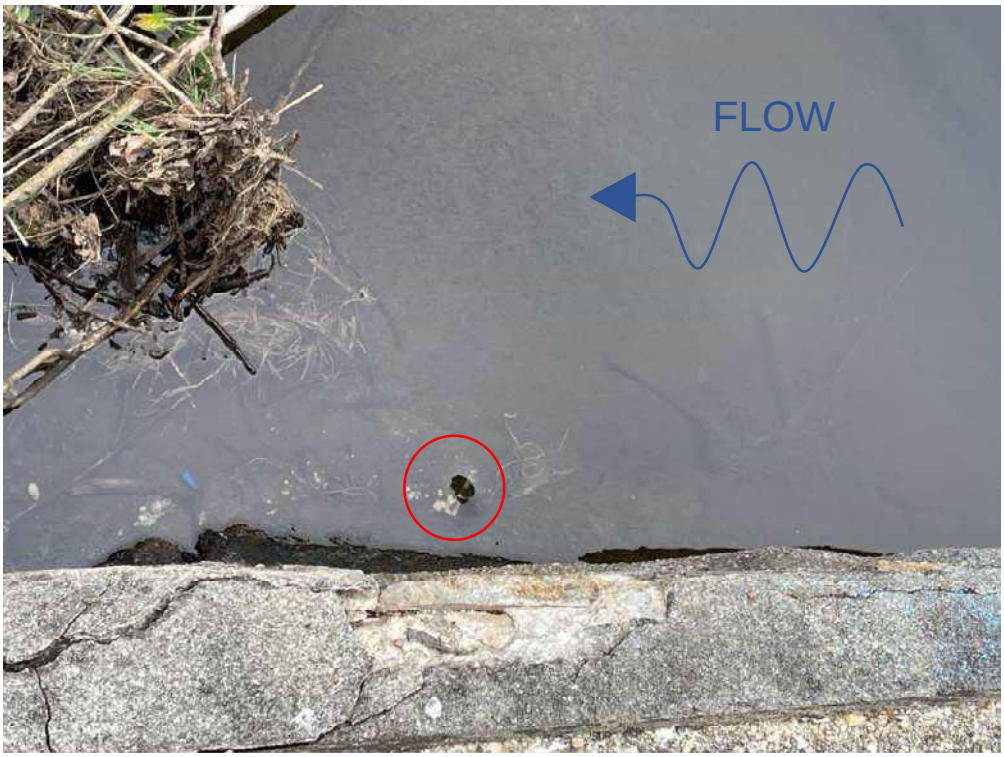


Photo No.	**Date:**
20	8/17/2022

Direction Photo Taken:
From left edge of spillway, looking upstream.

Description:
Vortex area looking upstream. Vortex circled in red.

Note log, debris and reported wastewater treatment plant effluent pipe on spillway crest.

APPENDIX C – INSPECTION CHECKLIST

DAM INSP C I C KLIS (

		I.D. No.: C	MA00260 C
Name of Dam:	ol mbia Mill Dam		
Loca ion:	L , Ma ach C To n, S a C (		
O n r:	Lenox Dev velopment, LL C	Riv r C/ S r Cam:	Housatonic River C
Ma D R la ification Da a:	In media (Siz	Significan Hazard	
PHYSI AL DA TA:	imb r crib, bo ld f fill d, concr -fac d Ty of Dam	25 f C o Primary S l ay r C H igh of Dam	90 acr -f C Normal Po l S or ag a aci y
ELEVATIONS:	908 f (Cn k. Da C m r 2008 Pha II R Cor) Normal Po l	2-inch ov r cr ; El. 908.2 Pool a in C c ion	

Name of Individ l a in C c ion	Ti l /Po i ion	Organiza ion
Jona han D. An dr , P.E.	A ocia Princi al	GZA GeoEnvironmental, Inc
L li O ri faro, E.I.T.	Engin I	GZA Geo Environmental, Inc C
Thom la C r	R r n a iv	Lenox, Dev velopment, LL C
Thoma l niak	R media in Sy ms Manag r	HDR, Inc C

DATE OF INS PE CTION: C A g 17, 2022

WEATHER: C loudy C TEMPERATURE: C 75°F C

Thi i c rify ha h abov dam ha b in C c d and h foll ing ar h r Cl of hi in C c ion.

SIGN ATURE OF INS PE TOR

Name of Dam: Columbia Mill Dam   I.D. No.: MA00260   Inspection Date: August 17, 2022

DAM / PRIMARY SPILLWAY
1 of 2

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	MAINTAIN	REPAIR
				CHECK (X) ACTION NEEDED		
UPSTREAM FACE	1	Surface Conditions	Generally obscured by flow and impoundment.			
	2	Condition of Joints	Generally obscured by flow/impoundment.			
	3	Unusual Movement	None observed, Generally obscured by flow/impoundment.			
	4	Abutment-Dam Contacts	Left abutment consists of existing mill, right side consists of earthen embankment. Right side is overgrown with vegetation which obscured view.			
	5	Vortices (if any)	Small vortex near left side gate platform.			X[A]
	6	Debris	Logs lodged on crest and upstream face, [illegible]	X		
DOWNSTREAM FACE	7	Surface Conditions	1-inch ± wide diagonal crack on left side of downstream spillway face.			X[B]
	8	Condition of Joints	Generally obscured by flow; Deteriorated concrete at training wall joints both sides.	X		
	9	Unusual Movement	Generally obscured by flow; Diagonal crack in left side.			X[B]
	10	Abutment-Dam Contacts	Left abutment consists of existing mill, right side consists of earthen embankment. Right side is overgrown with vegetation which obscured view.			
	11	Drains	None			
	12	Leakage	Flow over spillway obscured view of possible leakage on the downstream face.			
	13	Debris	Large log lodged on downstream face of spillway near center of dam. Smaller logs lodged at toe of downstream face.	X		
CREST	14	Surface Conditions	Generally obscured by flow. Logs lodged on crest, and on left side near effluent pipe.	X		
	15	Horizontal Alignment	Appears to be in adequate alignment.			
	16	Vertical Alignment	Appears to be in adequate alignment.			
	17	Condition of Joints	Separation at concrete joint at weir crest and at training walls both sides.			X
	18	Unusual Movement	Separation at weir crest joint and at spillway/training wall joints on both sides.			X[C]
	19	General	Observation obscured by flow & impoundment.			

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

A. Items 5 and 24 involve the same repair.
B. Items 7, 9, and 25 involve the same repair.
C. Items 17 and 18 involve the same repair.

Name of Dam: Columbia Mill Dam | I.D. No.: MA00260 | Inspection Date: August 17, 2022

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	MAINTAIN	REPAIR
			CONCRETE DAM / PRIMARY SPILLWAY 2 of 2		**CHECK (✓) ACTION NEEDED**	
UPSTREAM	20	Slides, Sloughs, Scarp	None observed.			
	21	Erosion	None observed.			
	22	Vegetation condition	Significant vegetation growth on right side, obscuring view.		X	
	23	Debris	Logs lodged on upstream face of spillway and on the structure for the 20-inch diameter wastewater treatment plant effluent pipe on the left side. Did not appear to be significantly impeding flow.	X		
	24	Seepage	A small < 1 inch diameter vortex was observed in the reservoir next to the left upstream spillway training wall. Debris was rearranged to determine the source of the vortex, and flow path was observed with available materials. It is possible that water enters the structure through a crack or separation at the joint between the upstream face and the training wall. The exit point is unknown.			X[A]
DOWNSTREAM	25	Training walls	One large vertical crack on downstream portion of right training wall; smaller cracks, staining, scarping on downstream portion of right training wall; small cracks and staining on left training wall separating spillway from sluiceway.	X		X[B]
	26	Riprap Condition (e.g. displacement)	Appeared in-place.			
	27	Unusual Movement	None observed.			
	28	Discharge Area	Downstream boulder field mostly clear with a few large branches and small debris.	X		
	29	Downstream Area	Housatonic River.			
	30	Sinkholes, Scour Holes, etc.	None observed.			
	31	Foundation Seepage	None observed.			
	32	Exterior Mill Wall and Internal Sluiceway Discharge	Small leaks at base of Mill foundation wall; source is likely internal Mill sluiceway. Spalled concrete and exposed rebar on exterior Mill wall.	X		

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

A. Items 5 and 24 involve Chamber Stair.
B. Items 7, 9, and 25 involve Chamber Stair.

Name of Dam: Columbia Mill Dam | I.D. No.: MA00260 | Inspection Date: August 17, 2022

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK (✓) ACTION NEEDED: MONITOR	MAINTAIN	REPAIR
SLUICEGATE & CONTROL	33	Intake Area	Some debris upstream of external gate; significant debris upstream and around internal gate.	X		
	34	Stoplog Grooves	External stoplog grooves appeared in adequate condition; internal stop log grooves not observed.			
	35	Gate U/S Face	External: Appeared in adequate condition; Internal sluiceway not observed due to debris.			
	36	Gate D/S Face	External: Appeared in adequate condition; Internal sluiceway not observed due to debris.			
	37	Gate Stem	Hand crank for external slide gate; chain hoist on internal slide gate.			
	38	Gate Operator	Did not operate gates. External sluiceway gate is operable, internal gate is inoperable.			
	39	Gate Leakage	Minor leakage through exterior gate, Significant flow (est 100 gpm+) in internal sluiceway. Unknown if source is leakage or partially-open gate.	X		
	40	Other	Internal sluiceway approach not observed due to mill configuration.			
SLUICEWAY & DISCHARGE AREA	41	U/S Concrete Condition	Visible aggregate due to scour and spalling on upstream portion of intake channel.	X		
	42	D/S Concrete Condition	Minor spalls and cracking on wall between spillway and external sluiceway; Mill wall (wall between internal sluiceway and river) had significant spalls and exposed rebar with leakage at base of wall.	X		
	43	Seepage	None other than leakage through mill foundation wall (internal sluiceway wall).	X		
	44	Discharge Area	External sluiceway discharge area appeared clear; internal sluiceway discharge through Mill wall and likely at another location downstream of dam.			
	45	Debris	6-inch log on downstream side. Did not appear it would impede flow.	X		

SLUICEWAY & CONTROL WORKS
1 of 1

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

Name of Dam: C olumbia Mill Dam C I.D. No.: MA00260 C Inspection Date: C August 17, 2022

AR CA C D C INSP	RI C MBANKM N C 1 of 1			HE CK ( ) C A CTION C NEEDED C		
	ITEM NO.	ONDITION C	OBSERVATIONS C	MONITOR	MAINTAIN C	REPAIR C
UPS R CAM SL C P C	46	Surface onditions C	Heavy vegetation obscured observation.			
	47	Surface Protection C	Riprap observed in one location. Other locations not observed.			
	48	Unusual Movement C	Heavy vegetation obscured observation.			
	49	Abutment-Dam ontacts C	Heavy vegetation obscured observation. C			
	50	Vegetation	Heavy vegetation obscured observation of dam condition.		X	
D C NS CR CAM SL C W P C	51	Surface onditions C	Heavy vegetation obscured observation.			
	52	Masonry Wall ondition C	Heavy vegetation obscured observation.			
	53	Unusual Movement C	Heavy vegetation obscured observation.			
	54	Abutment-Dam ontacts C	Heavy vegetation obscured observation.			
	55	Drains C	Heavy vegetation obscured observation.			
	56	Leakage C	Heavy vegetation obscured observation. C			
	57	Vegetation C	Heavy vegetation obscured observation of dam condition.		X	
R CS C	58	Surface onditions C	Heavy vegetation obscured observation.			
	59	Horizontal Alignment C	Heavy vegetation obscured observation.			
	60	Vertical Alignment C	Heavy vegetation obscured observation.			
	61	Unusual Movement C	Heavy vegetation obscured observation. C			
	62	Vegetation C	Heavy vegetation obscured observation of dam condition.		X	

ADDITIONAL OMMENTS: REFER TO ITEM NO. IF APPLI ABLE C

Name of Dam: C olumbia Mill Dam C I.D. No.: MA00260 C Inspection Date: C August 17, 2022

AR CA C INSP D C	D C NS CR CAM AR CA AND MIS C. W 1 of 1			HE CK ( ) C A CTION C NEEDED C		
	ITEM NO.	ONDITION C	OBSERVATIONS C	MONITOR	MAINTAIN C	REPAIR C
D C NS CR CAM AR CA C W	63	Abutment Seepage C	None observed but obscured by flow, downstream leakage & rock movement observed, ca 2007.	X C		
	64	Training Walls C	One large vertical crack on downstream portion of right training wall; smaller cracks, staining, scarping on downstream portion of right training wall; small cracks and staining on left training wall separating spillway from outlet channel.	X		
	65	Slide, Slough, Scarp C	None observed; vegetation and flow hindered observation			
	66	Drainage System C	Discharges to Housatonic River, no toe drain installed			
	67	Downstream Hazard Description	Wooded on right bank; mill building complex on left bank; residential, commercial, and Rt 20/W enter St within 1 mile downstream.			
MIS C LLAN C S C U	68	Impoundment Banks C	Steep and vegetated.			
	69	Access Roads C	Access road to dam on right side.			
	70	Signage C	None observed.			
	71	Fences / Railing C	Gate operator platform and railings to appeared in adequate condition.			
	72	Security / Access C	No security fencing at the dam. C	X C		

ADDITIONAL OMMENTS: REFER TO ITEM NO. IF APPLI ABLE C

APPENDIX D – DEFINITIONS

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to 302 CMR10.00 Dam Safety, or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA. Please note should discrepancies between definitions exist, those definitions included within 302 CMR 10.00 govern for dams regulated by the Commonwealth of Massachusetts.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate therefrom, including but not be limited to, spillways; reservoirs and their rims; low-level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

Size Classification
(as listed in Commonwealth of Massachusetts, 302 CMR 10.00 Dam Safety)

Large – structure with a height greater than 40 feet or a storage capacity greater than 1,000 acre-feet.

Intermediate – structure with a height between 15 and 40 feet or a storage capacity of 50 to 1,000 acre-feet.

Small – structure with a height between 6 and 15 feet and a storage capacity of 15 to 50 acre-feet.

Non-Jurisdictional – structure less than 6 feet in height or having a storage capacity of less than 15 acre-feet.

Hazard Classification
(as listed in Commonwealth of Massachusetts, 302 CMR 10.00 *Dam Safety*)

High Hazard (Class I) – Shall mean dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).

Significant Hazard (Class II) – Shall mean dams located where failure may cause loss of life and damage to home(s), industrial or commercial facilities, secondary highway(s) or railroad(s), or cause the interruption of the use or service of relatively important facilities.

Low Hazard (Class III) – Dams located where failure may cause minimal property damage to others. Loss of life is not expected.

General

EAP – Emergency Action Plan – Shall mean a predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

Height of Dam (Structural Height) – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the lowest point on the crest of the dam.

Hydraulic Height – means the height to which water rises behind a dam and the difference between the lowest point in the original streambed at the axis of the dam and the maximum controllable water surface.

Maximum Water Storage Elevation – means the maximum elevation of water surface which can be contained by the dam without overtopping the embankment section.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Maximum Storage Capacity – The volume of water contained in the impoundment at maximum water storage elevation.

Normal Storage Capacity – The volume of water contained in the impoundment at normal water storage elevation.

Condition Rating

Unsafe – Major structural*, operational, and maintenance deficiencies exist under normal operating conditions.

Poor – Significant structural*, operation and maintenance deficiencies are clearly recognized for normal loading conditions.

Fair – Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters.

Satisfactory – Minor operational and maintenance issues. Infrequent hydrologic events could result in deficiencies.

Good – No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF.

* Structural deficiencies include but are not limited to the following:

- Excessive uncontrolled seepage (e.g., upwelling of water, evidence of fines movement, flowing water, erosion, etc.).
- Missing riprap with resulting erosion of slope.
- Sinkholes, particularly behind retaining walls and above outlet pipes, possibly indicating loss of soil due to piping, rather than animal burrows.
- Excessive vegetation and tree growth, particularly if it obscures features of the dam and the dam cannot be fully inspected.
- Deterioration of concrete structures (e.g., exposed rebar, tilted walls, large cracks with or without seepage, excessive spalling, etc.).
- Inoperable outlets (gates and valves that have not been operated for many years or are broken).

ATTACHMENT C – QUARTERLY OBSERVATION CHECKLIST

COLUMBIA MILL DAM
Lee, Massachusetts

Quarterly Observation Checklist

Make thorough observations of the dam and appurtenant structures once per quarter. If condition cannot be observed due to flow or other factors, please note.

Date:_____ Weather Conditions:_____

Inspector(s):_____

No.	Condition	Observations
1.	Impoundment Water Level (approximate inches of flow over the dam - note unexplained changes)	
2.	Flow in River (fast, normal, slow - note unexplained flow or flow below minimum requirements)	
3.	Leakage Through Spillway Facing or Mill Wall (note new or increased leakage and describe location)	
4.	Concrete/Masonry Condition (presence of cracks (dry or wet), spalling, exposed rebar, joint separation, tilting)	
a.	Primary Spillway (include changes in large diagonal crack on left side of downstream face, if still present)	
b.	Sluiceway Outlet Structure	
c.	Left Training Wall	
d.	Right Training Wall	
e.	Exterior Mill Wall and Internal Sluiceway Discharge	
5.	Water Controls (exercise sluiceway gate or note the last known date of movement for gate)	
a.	Sluiceway Gate	
6.	General Dam Conditions	
a.	Right Embankment	
b.	Vortices observed	
7.	Toe of Dam (note seepage or displaced riprap in splash zone)	
8.	Debris & Vegetation (note location, type, amount)	
a.	Spillway Debris (note if impeding flow)	

Recommended Maintenance/Repair Actions:_____

_____

Other Notes:_____

*Copy form as needed

ATTACHMENT D – ANNUAL OBSERVATION CHECKLIST

ANNUAL DAM INSPECTION CHECKLIST

		I.D. No.:	MA00260
Name of Dam:	Columbia Mill Dam		
Location:	Lee, Massachusetts Town State		
Owner:	Lenox Development, LLC	River / Stream:	Housatonic River
MassDCR Classification Data:	Intermediate Size		Significant Hazard

PHYSICAL DATA:	timber crib, boulder-filled concrete-aided type of Dam	25 feet to Primary Spillway Crest Height of Dam	90 acre-feet Normal Pool Storage Capacity
ELEVATIONS:	908 ft (unk. Datum per 2008 Phase II Report) Normal Pool	 Pool at Inspection	

Names of Individuals at Inspection	Title/Position	Organization

DATE OF INSPECTION:

WEATHER:

TEMPERATURE:

This is to certify that the above dam has been inspected and the following are the results of this inspection.

SIGNATURE OF INSPECTOR

Name o Dam: f Columbia Mill Dam f I.D. No.: MA00260 f Inspection Date: f

AR fA f IN f D f	ON R f DAM / RIMARY fILLWAY 1 o 2			CHECK ( ) f ACTION f NEEDED f		
	I EM NO.	CONDITION f	OB SERVATIONS	MONITOR	MAINTAIN f	REPAIR f
U f R fAMf FA	1	Surface Conditions				
	2	Condition o Joints				
	3	Unusual Movement				
	4	Abutment-Dam Contacts				
	5	Vortices (i any)				
	6	Debris f				
DOWN R fAM FA f	7	Surface Conditions				
	8	Condition o Joints				
	9	Unusual Movement				
	10	Abutment-Dam Contacts f				
	11	Drains				
	12	Leakage				
	13	Debris f				
R f	14	Surface Conditions				
	15	Horizontal Alignment				
	16	Vertical Alignment				
	17	Condition o Joints				
	18	Unusual Movement				
	19	Genera				

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE f

Name o Dam: f Columbia Mill Dam f I.D. No.: MA00260 f Inspection Date: f

AR A f D f IN	ON R f DAM / f RIMARY ILLWAY 2 o 2 f			CHECK ( ) f ACTION NEEDED		
	I EM NO.	CONDITION f	OBSERVATIONS f	MONITOR f	MAIN fAIN	REPAIR f
U f R AM HANN L	20	Slide, Slough, Scarp				
	21	Erosion				
	22	Vegetation Condition				
	23	Debris f				
	24	Seepage f				
DOWN R AMf HANN L f	25	Training walls				
	26	Riprap Condition (e.g. displacement)				
	27	Unusual Movement				
	28	Discharge Area				
	29	Downstream Area				
	30	Sinkholes, Scour Holes, etc.				
	31	Foundation Seepage				
	32	Exterior Mi Wa and Interna Sluiceway Discharge				

ADDI IONAL COMMEN fS: REFER O I EM NO. IF APPLICABLE

Name o Dam: f Columbia Mill Dam f I.D. No.: MA00260 f Inspection Date: f

AR fA f IN f D f	LUI f WAY OU L f WORK S 1 o 1			CHECK ( ) f ACTION f NEEDED f		
	I EM NO.	CONDITION f	OB SERVATIONS	MONITOR	MAIN fAIN	REPAIR f
LUI f GA & ON ROL f	33	Intake Area				
	34	Stoplog Grooves				
	35	Gate U/S Face				
	36	Gate D/S Face				
	37	Gate Stem f				
	38	Gate Operator				
	39	Gate Leakage f				
	40	Other f				
LUI f WAY OU L f RU f UR f	41	U/S Concrete Condition				
	42	D/S Concrete Condition f				
	43	Seepage				
	44	Discharge Area f				
	45	Debris f				

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

Name o Dam: f Columbia Mill Dam f I.D. No.: MA00260 f Inspection Date: f

AREA IN f	ITEM NO.	CONDITION f	OBSERVATIONS	CHECK ( ) f ACTION f NEEDED f MONITOR	MAINTAIN f	REPAIR f
RIGHT MBANKMENT f 1 o 1						
U f RfAM f LOP	46	Surface Conditions				
	47	Surface Protection				
	48	Unusual Movement				
	49	Abutment-Dam Contacts				
	50	Vegetation				
DOWN RfAM f LOP f	51	Surface Conditions				
	52	Masonry Wall Condition				
	53	Unusual Movement				
	54	Abutment-Dam Contacts				
	55	Drains				
	56	Leakage f				
	57	Vegetation f				
R f	58	Surface Conditions				
	59	Horizontal Alignment				
	60	Vertical Alignment				
	61	Unusual Movement				
	62	Vegetation f				

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE f

Name o Dam: f Columbia Mill Dam f I.D. No.: MA00260 f Inspection Date: f

AR fA f IN f D f	DOWNf R fAM AR fA AND MI f . 1 o 1			CHECK ( ) f ACTION f NEEDED f		
	I EM NO.	CONDITION f	OBSERVATIONS	MONITOR	MAINTAIN f	REPAIR f
DOWNf R fAM AR fA f	63	Abutment Seepage				
	64	Training Walls f				
	65	Slide, Slough, Scarp				
	66	Drainage System				
	67	Downstream Hazard Description				
MI f LLAN fOUf	68	Impoundment Banks				
	69	Access Roads				
	70	Signage				
	71	Fences / Railing				
	72	Security / Access f				

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE f

GZA GeoEnvironmental, Inc.