**Andrew T. Silfer**
Leader, Pittsfield/Housatonic River

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Global Operations – Environment, Health & Safety
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December 11, 2017

Mr. Dean Tagliaferro
EPA Project Coordinator
U.S. Environmental Protection Agency
c/o Avatar Environmental
10 Lyman Street, Suite 2
Pittsfield, MA 01201

***Re: GE-Pittsfield/Housatonic River Site***
***Rest of River (GECD850)***
***Operation, Monitoring, and Maintenance Plans for Woods Pond Dam and Rising Pond Dam***

Dear Mr. Tagliaferro:

Section II.H.20 of the Modified RCRA Permit issued by the U.S. Environmental Protection Agency (EPA) to the General Electric Company (GE) on October 24, 2016 requires GE to submit a Dam Operation, Inspection, Monitoring, and Maintenance Plan. EPA's Revised Notice of Uncontested and Severable Permit Conditions, dated January 9, 2017, and GE's *Rest of River Initial Statement of Work*, submitted on May 12, 2017 and approved by EPA on July 10, 2017, provide that the non-stayed components of that requirement are the plans for Woods Pond and Rising Pond Dams. In accordance with that requirement, enclosed for EPA's review and approval are the Operation, Monitoring, and Maintenance (OM&M) Plans for Woods Pond Dam and Rising Pond Dam, prepared for GE by GZA GeoEnvironmental, Inc.. These documents present GE's plans to comply with Sections II.B.2.j.(1)(a) and (2)(a) of the Modified Permit insofar as those requirements apply to Woods Pond and Rising Pond Dams. They include, in appendices, updated Emergency Action Plans for these dams.

Please let me know if you have any questions or would like to discuss the enclosed OM&M Plans.

Very truly yours,

Andrew T. Silfer
GE Project Coordinator

Enclosures

cc:

Tim Conway, EPA (via electronic mail)
John Kilborn, EPA (via electronic mail)
Christopher Ferry, ASRC Primus (via electronic mail)
Scott Campbell, Avatar (2 hard copy sets + 1 set via electronic mail)
Michael Gorski, MassDEP (via electronic mail)
Christine LeBel, MassDEP (via electronic mail)
Eva Tor, MassDEP (cover letter by electronic mail)
John Ziegler, MassDEP (via electronic mail)
Mark Tisa, MassDFG (via electronic mail)
Traci Iott, CT DEEP (1 hard copy set and 1 set via electronic copy)
Susan Peterson, CT DEEP (via electronic mail)
Rod McLaren, GE (via electronic mail)
Kevin Mooney, GE (via electronic mail)
James Nuss and Adam Ayers, Arcadis (via electronic mail)
Michael Werth, Anchor QEA (via electronic mail)
James Bieke, Sidley Austin (1 hard copy set and 1 set by electronic mail)
Public Information Repository at David M. Hunt Library in Falls Village, CT (1 hard copy set)
GE Internal Repositories (1 hard copy set)

Proactive by Design


# OPERATION, MONITORING, AND MAINTENANCE PLAN RISING POND DAM – MA 00250

## Great Barrington, MA

December 8, 2017
File No.: 01.0019896.50

**PREPARED FOR:**
General Electric Company
Pittsfield, Massachusetts

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# 1.0 INTRODUCTION AND BACKGROUND

## 1.1 INTRODUCTION

This Operation, Monitoring, and Maintenance (OM&M) Plan for Rising Pond Dam, which has been prepared for the General Electric Company (GE) by GZA GeoEnvironmental, Inc. (GZA), describes the operation, inspection, and maintenance procedures that GE will implement for Rising Pond Dam, which is located on the Housatonic River in Great Barrington, Massachusetts, and which is owned and operated by GE (**Figure 1**).

This OM&M Plan is submitted pursuant to Section II.H.20 of the Modified Permit issued by the United States Environmental Protection Agency (EPA) in October 2016 under the Resource Conservation and Recovery Act (RCRA) for the Rest of River portion of the GE-Pittsfield/Housatonic River Site and Section 3.6 of the *Rest of River Initial Statement of Work*, submitted by GE on May 12, 2017 and conditionally approved by EPA on July 10, 2017. It presents GE's plan to comply with Sections II.B.2.j.(1)(a) and (2)(a) of the Modified Permit insofar as those requirements apply to Rising Pond Dam. Section II.B.2.j.(1)(a) requires GE to minimize the releases of polychlorinated biphenyls (PCBs) from that impoundment by "ensuring inspection, monitoring, and maintenance" of the dam and impoundment. Section II.B.2.j.(2)(a) similarly requires GE to "operate, inspect, monitor, and maintain" Rising Pond Dam. It specifies that such activities "shall include, (i) maintaining the integrity of the dam to contain contaminated sediments and (ii) conducting materials handling and off-site disposal and engineering controls related to dam maintenance, repair, upgrades, and enhancement activities (including, but not limited to, addressing sedimentation in sluiceways, conveyances, and other channels that transport water over, through or around the dam); and (iii) . . . all other related activities."

The procedures described herein have been developed in consideration of those requirements, as well as the guidance provided in in the Federal Emergency Management Agency (FEMA) publication entitled *Dam Safety: An Owner's Guidance Manual* (FEMA, 1987).

## 1.2 PURPOSE

The purpose of this OM&M Plan is to describe GE's proposed OM&M program for Rising Pond Dam. The overall objective of that program is to minimize releases of PCBs in sediments and surface water in Rising Pond that could be prevented by appropriate inspection, monitoring, and maintenance activities for the dam.

The responsibility for maintaining a safe dam rests with the dam owner. The Massachusetts Dam Safety Regulations state in 302 CMR 10.13 that "the owner shall be responsible and liable for damage to property of others or injury to persons, including but not limited to loss of life, resulting from the operation, failure of or misoperation of a dam."

Definitions of commonly used terms associated with dams are provided in **Appendix A**. This plan also contains visual inspection checklists for the quarterly and biennial inspections discussed in Section 3. An Emergency Action Plan (EAP) addressing emergency dam safety conditions is provided in **Appendix B**.

## 1.3 DESCRIPTION OF THE RISING POND DAM

### 1.3.1 Dam Location

Town: Great Barrington

County: Berkshire

The left (north) abutment of Rising Pond Dam is on Route 183 (at 285 Park Street, the Hazen Paper Mill). To access the right (south) abutment from Route 183, one turns west onto Division Street, continues for 0.9 mile and proceeds north on Van Deusenville Road for about 1.1 miles to a railroad access gate on the right. A 0.3-mile path, capable of passing vehicular traffic, leads eastward from the railroad access gate to the right side of the dam. The railroad owner will be contacted to arrange access across the tracks.

The Rising Pond Dam location is shown on **Figure 1** and on the USGS Great Barrington, MA-NY topographic map. The approximate coordinates are -73.3577 degrees longitude and 42.2424 degrees latitude.

1.3.2 Description of the Dam and Appurtenances

Rising Pond Dam is a run-of-the-river structure located on the Housatonic River in the Housatonic or Risingdale section of Great Barrington, Massachusetts.

The Rising Pond Dam consists of left and right earth embankments, with a central spillway and outlet works to the left of the spillway. The spillway is a concrete-faced timber crib structure with steel crest plates. The spillway is ogee-shaped with upstream and downstream concrete aprons. Energy dissipators are located on the downstream apron. The spillway is approximately 127 feet wide and 28 feet high, with a varying crest elevation from approximately 716.7 feet NGVD[1] on the left side to 716.1 feet on the right side, and an average crest elevation of about 716.4 feet NGVD. Spillway training walls are a combination of concrete, mortared stone masonry, and steel sheetpile.

The low-level outlet is located directly to the left of the spillway. The low-level outlet works consist of a mortared stone masonry forebay with steel trash racks, a concrete-walled gate chamber with sluice gate and a 14-foot-diameter steel penstock that extends approximately 110 feet downstream to a 150-foot long open channel reinforced concrete tailrace that discharges to the Housatonic River. The invert of the penstock is reported to be at elevation 699 feet NGVD. Gate chamber drainage was formerly provided by a 12-inch-diameter well drain with an outlet at the left downstream training wall. Well drain flow was controlled by a valve located in a covered pit between the gate chamber and left training wall. The gate chamber drain is no longer needed as the low-level outlet drains by gravity through the penstock and tailrace. A fire-protection pumphouse that supports the Rising Mill and is unrelated to the operation of the dam is located on the left embankment crest to the left of the forebay.

A wide embankment/fill area is present on the left side of the spillway and outlet structures. The upstream slopes are steep and have some riprap protection near the low-level outlet. The downstream slope is poorly defined and consists of the mill.

The right earthen embankment is approximately 38 feet high, with upstream and downstream slopes of approximately 2 horizontal to 1 vertical (2H:1V). Slope protection at the waterline consists of a combination of steel sheetpiles and riprap. A shed for instrumentation leads has been installed at the crest near the right spillway training wall.

The shores of Rising Pond are generally wooded. Route 183 extends parallel to the east bank of the impoundment/river. An abandoned railroad bridge abutment and center pier are located immediately upstream of the dam. The western railroad bridge pier was formerly integral with the right embankment. The immediate downstream area includes the mill and wooded river banks. A United States Geological Survey (USGS) gaging station (No. 01197500) is located near the Division Street bridge approximately 1 mile downstream of the dam.

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[1] NGVD denotes National Geodetic Vertical Datum

### 1.3.3 Dam Construction History

The dam was originally constructed in the 1800s. The embankment was constructed of alluvial sand and gravel excavated from the west river bank. Original upstream slopes ranged from 1.5H:1V to 4H:1V, and downstream slopes ranged from 1H:1V to 1.5H:1V. The original embankment height was about 17 feet. The spillway and railroad bridge abutment were reportedly constructed on rock-filled timber cribbing over grouted cobbles in timber cribbing laid on the original river bottom. The original spillway was about 17 feet high and was faced with wooden planks laid at a 1H:1V slope.

In 1934, the embankments and spillway were reportedly raised by about 10.5 feet to 27.5 feet high and spillway flashboards were added. Rockfilled timber cribbing was placed above the original structure and new wooden facing was placed on the spillway.

In 1953, the dam spillway was reportedly raised to elevation 716.5 feet NGVD to its current height of approximately 28 feet. The stone masonry outlet channel training walls were replaced with a headgate and 14 foot-diameter steel penstock. The downstream timber plank spillway facing was demolished and replaced with a concrete slab. The spillway crest was rebuilt with a concrete slab faced with a steel plate. The upstream timber plank facing was covered with sand and gravel fill overlain by a new concrete apron slab and an upstream concrete wall was added.

Between 1991 and 1993, the dam was significantly rehabilitated. The rehabilitation generally included: installation of an steel sheetpile cutoff wall upstream of the timber crib spillway; removal of the upstream timber plank spillway facing; filling of voids in the timber cribbing with peastone and sandy gravel; flowable fill placement in voids below the spillway crest and upstream slab; installation of tiedowns and passive H-pile shear keys in the downstream apron; replacement of deteriorated areas of spillway training wall concrete; repointing of the forebay walls and floor; replacement of trashracks; construction of a concrete tailrace outlet channel and plugging of the former penstock where it entered the mill; placement of riprap slope armor; and raising of the embankments to elevation 727.0 feet NGVD. In addition, piezometers and observation wells were installed in and below the embankment and spillway. In 2002, the forebay walls and right downstream training wall were repaired, and riprap was placed and reworked at the upstream slope and downstream toe of the right embankment.

By the early 2000s, the 14-foot sluice gate stem had become inoperable due to a broken gate stem. A replacement slide gate was installed in 2005. In 2010, new steel plate covers, fencing, bollards, and ladders were installed for the gate platform and well drain platform.

In 2011 through 2013, the dam underwent a number of rehabilitation actions. These included the installation of new sheetpiles along the upstream edge of the right embankment crest. The new sheetpiles overlapped the existing crest sheetpiles and extended the line of sheeting approximately 60 feet westward (right). In addition, the right embankment was regraded, including levelling the crest to a uniform elevation 728.0 feet NGVD, and the right training wall at the top of the embankment was extended upward by 2 feet to accommodate the crest levelling.

Further, as part of the 2011 through 2013 activities, a row of sheetpiles was installed at the downstream end of the spillway apron and a new 2-foot thick reinforced concrete downstream spillway apron was constructed. The timber cribbing and rubble fill underneath the apron slab was filled with un-reinforced, high-slump concrete. Concrete energy dissipaters were constructed on the downstream apron. The downstream portion of the right training wall was refaced and raised by up to two feet. Voids under the downstream portion of the right training wall were filled with diver-placed grout bags and a two-phase program of cementitious soil grouting was performed within the right embankment adjacent to the training wall.

#### 1.3.4 Drainage Area

The drainage area for Rising Pond Dam is approximately 279 square miles, and encompasses a large portion of western Massachusetts along the New York border. The drainage area includes large areas of agricultural and residential development, wooded mountainous terrain, and several small urban areas.

#### 1.3.5 Reservoir Storage Volume

Reservoir storage volume data presented below are based on previous analyses, as well as data presented in a 1979 U.S. Army Corps of Engineers Phase I Inspection Report. They are:

| | Elevation (feet, NGVD) | Storage Volume (acre-feet) |
|---|---|---|
| Normal Pool | 716.4 | 195 |
| Maximum Pool | 726.2 | 710 |
| Spillway Design Flood (SDF) Pool | 724.4 | ±600 |

#### 1.3.6 General Elevations

| Feature | Approx. Elev. (feet NGVD)[2] |
|---|---|
| A. Top of Dam Embankment | 728 (right side) / 727 (left side) |
| B. Spillway Design Flood Pool | 724.4 |
| C. Normal Pool | 716.4 (average spillway crest el.) |
| D. Spillway Crest | 716.1 to 716.7 |
| E. Low Level Outlet Invert | 699 ± |
| F. Streambed at Toe of the Dam | 688 ± |

#### 1.3.7 Dam Size and Hazard Classification

Rising Pond Dam has a height of dam of approximately 40 feet and a maximum storage capacity of 710 acre-feet. Refer to **Appendix 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 in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Rising Pond 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, Rising Pond Dam is classified as a dam with **Significant Hazard** potential.

[2] Refer to the June 2017 Phase 1 Inspection/Evaluation Report (GZA, 2017) for elevation sources

1.3.8 Most Recent Inspection

The most recent visual engineering inspection of Rising Pond Dam was conducted by GZA in December 2016 and is described in GZA's June 2017 *Rising Pond Dam Phase I Inspection/Evaluation Report* (GZA, 2017). Based on the results of that inspection, Rising Pond Dam was found to be in Satisfactory Condition and in compliance with the MassDCR's Dam Safety Regulations.

1.4 CURRENT KEY PERSONNEL AND THEIR RESPONSIBILITIES

GE is the owner of the Rising Pond Dam and is responsible for overseeing the operations and maintenance of the dam. The current Caretaker on GE's behalf is:

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

The current Alternate Caretaker on GE's behalf is:

Matthew Calacone
General Electric Company
Global Operations – Environment, Health & Safety
159 Plastics Avenue
Pittsfield, MA 01201
Daytime Phone: 413-553-6614 (Direct Office Number)
Cell Phone: 413-822-0082

GE contracts with consultants to assist in maintaining and inspecting the dam, including inspections following flooding or storm events as needed. Currently, Tetra Tech is responsible for these activities.

In addition, GE has retained a Professional Engineer experienced in dam engineering to conduct Phase 1 Inspections/Evaluations biennially and to review other dam issues on an as-needed basis. The current dam engineering consultant is:

Jonathan D. Andrews, P.E.
GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, Massachusetts 02062
Phone: (781) 278-5808
Cell: (781) 983-2881
Fax: (781) 278-5701

In the event that the Caretaker, Alternate Caretaker, or dam engineering consultant changes, GE will advise EPA of those changes.

## 2.0 OPERATIONS

This section describes the operation of Rising Pond Dam under normal and flood conditions. It also discusses the potential for dewatered conditions for dam maintenance.

### 2.1 RIVER FLOW INFORMATION

Previous engineering hydrologic and hydraulic (H&H) evaluations[3] have indicated that the Rising Pond Dam is able to safely pass the regulatory 100-year Spillway Design Flood (SDF) criteria[4] with adequate freeboard, as well as passing the 500-year flood criteria without overtopping of the earthen embankment sections. These evaluations conservatively did not include hydraulic capacity of the outlet works (i.e. assumed the penstock slide gate is closed). A summary of the previous H&H evaluations is presented in the following table.

| Flood Return Period | Estimated Peak Flow at Dam (cfs) | Estimated Peak Water Surface Elevation at Dam (ft NGVD) |
|---|---|---|
| 100-Year | 11,220 cfs | 724.4 |
| 500-Year | 15,130 cfs | 726.2 |

Note: Analysis conservatively assumes no gate operations (i.e. penstock gate remains closed)

Current, historical, and predicted Housatonic River flows at the USGS Great Barrington gage No. 01197500 located about 1 mile downstream of the dam can be found at the Advanced Hydrologic Prediction Service (AHPS) website at http://water.weather.gov/ahps2/hydrograph.php?wfo=aly&gage=gtbm3. The AHPS-predicted flows can be compared to the estimated peak flows in the table above to plan flood operations and responses.

### 2.2 NORMAL OPERATIONS

No operator action is required for normal dam operations. The uncontrolled run-of-the river overflow spillway conveys flow downstream.

### 2.3 FLOOD OPERATION

No operator action is required for river flow corresponding to a 100-year to 500-year return period flood event. As a routine matter, as discussed in Section 4, GE will keep the spillway approach and discharge areas clear of debris that could hinder flow during such an event. For operational flexibility, GE will also keep the trash racks clear of debris that could also hinder flow. Floods on the order of a 500-year return period flood event may result in minor overtopping of the concrete forebay gate operator platform. The top of the gate operator platform is at elevation 725.75 to 725.85 feet NGVD and the estimated 500-year return period impoundment elevation is 726 feet NGVD. When a 500-year storm event is forecast, GE will place sandbags placed on top of and adjacent to the forebay to help mitigate potential overflows and impound the reservoir.

Actions during an actual or potential emergency are set forth in the Rising Pond Dam Emergency Action Plan (EAP), provided in **Appendix B**.

[3] Refer to the July 2012 Phase II Engineering Evaluation (GZA, 2012) for additional detail.

[4] Spillway Design Flood (SDF) criteria for an Intermediate sized, Significant Hazard Classification existing dam as specified in the Massachusetts Dam Safety Regulations (302 CMR 10.14(6)).

## 2.4 DEWATERED OPERATIONS

In the event that GE proposes to lower the water level in Rising Pond and dewater the spillway in order to perform maintenance or repairs, GE will develop a separate proposal and submit it to EPA for review and approval. That proposal will include a description of the proposed dewatering, as well as the monitoring and/or other actions that GE will undertake to monitor and control the potential releases of PCBs in that situation.

## 3.0 INSPECTIONS

This section describes GE's proposed routine inspection/observation program. These inspections will include regular quarterly inspections, biennial engineering inspections, inspections after large storm events, and other special inspections. The Rising Pond Dam Emergency Action Plan (**Appendix B**), will be followed during emergency conditions.

### 3.1 ROUTINE QUARTERLY INSPECTIONS

Quarterly inspections will be conducted by the Caretaker or by contracted personnel. A checklist for quarterly observations is included in **Appendix C**.

#### 3.1.1 General Observations

The checklist from the previous quarter, as well as the checklists from any post-storm and ice-out observations from that quarter and the report on the most recent biennial engineering inspection, will be reviewed by the inspector prior to the quarterly inspection. During each quarterly inspection, the inspector will inspect the left side earthen embankment; the intake and diversion channel structures, penstock, and gate controls; the spillway; the spillway training walls; the right earthen embankment; and, the historical, intermittently observed spring at the toe of the right embankment. The inspector will note the impoundment and tailwater water levels, unusual conditions (whirlpools in the reservoir, etc.), debris on the crest, indicators of potential movement (i.e. cracks, sloughing of embankment, sinkholes, etc.), seepage, or any other unusual items that can be observed. Grout bag depths will be measured on a yearly basis during low flow conditions. During the quarterly inspections, close observation of the embankment condition, including the toe of the downstream slope, is particularly important. Careful attention will be paid to signs of erosion, scouring, sloughing, and seepage in the embankment. The inspector will also take photographs from the locations and directions shown in **Appendix C**. If a change from the previous inspection is observed, that issue will be investigated and recorded.

The observations during the quarterly inspection will be recorded on the quarterly checklist in **Appendix C**. If significant changes in the condition of the dam are noticed, a Professional Engineer experienced in dam engineering will be contacted to review the condition of the dam.

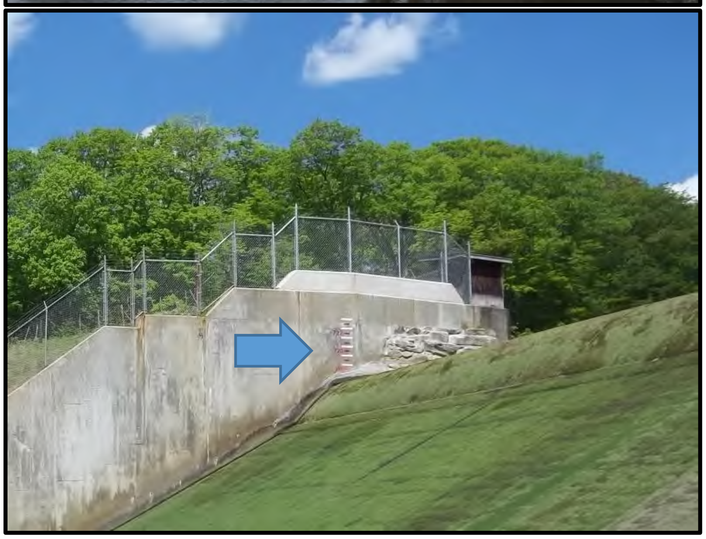
#### 3.1.2 Water Levels

During each quarterly inspection, observations of water levels will be made for the reservoir, tailwater, observation wells, and piezometers. All water levels will be recorded as part of the inspection report. Data collection sheets are included in **Appendix C**. If significant changes in water surface elevations are seen (up or down), these will be noted in the report. If the cause of the change is unknown, a Professional Engineer experienced in dam engineering will be contacted to review the observations.

Water levels at the dam and water levels/pressures at instruments will be measured using manual or electronic equipment. The following paragraphs explain the procedures for water level observations.

a. Impoundment Water Surface Elevation:

Staff gauges have been painted onto the training walls at several locations as shown in the photographs below.



*Photos 1 and 2: Reservoir (headwater) measuring point on left and right training walls.*

*Photo 3: Tailwater measuring point on right training wall.*

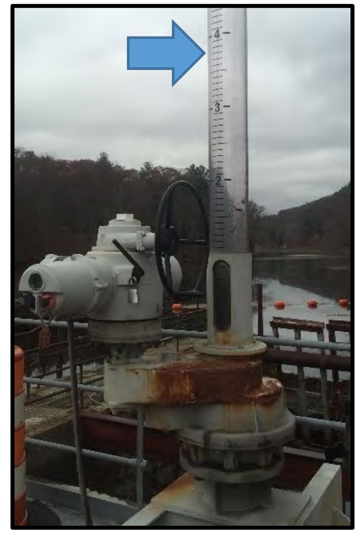


*Photo 4: Gate position measuring point.*

In addition to the reservoir and tailwater levels, the slide gate position will be recorded. The measurement is made on the plastic tube above the gate and reflects the location of the gate stem within the tube.

b. Observation Well Readings:

During GE's quarterly inspections, water levels will be measured within observation wells GZ-2, GZ-5, and GZ-7. The locations of these observation wells are shown on Figure 1 in **Appendix C**. Water levels within the instruments will be measured manually using a water level indicator. The depth to water will be noted and referenced to ground surface elevation. A data sheet to record observation well measurements is included in **Appendix C**.

c. Vibrating Wire Piezometer Readings:

Two methods are required for reading vibrating wire piezometers at Rising Pond Dam, as described below. The majority of the instruments are contained within the instrumentation shed, and th d

e others are installed within well casings.

*Method for reading vibrating wire piezometers within instrumentation shed using a Geokon GK-403 Readout Box:*

1. Plug the two leads into the connectors below the first dial inside the terminal box. Connect the GK-403 Readout Box to the lead using the provided connector with alligator clips. Connect green to green, red to red, etc.

2. Turn the GK-403 readout selector to Channel "B".

3. Turn the dial in the terminal box to "1". Record the reading from the GK-403 in the table in **Appendix C** for Piezometer Number P-1B (Dial Selection "1").

4. Cycle through all selections in the first dial, then repeat the process for the other two dials.

Note that dial selections 23 and 24 have been moved to the bottom dial and have replaced dial selections 35 and 36.

*Method for reading vibrating wire piezometers within well casing (GZ-2 and GZ-5):*

1. Connect the GK-403 Readout Box to the bare wire in the casing using the provided connector with alligator clips. Connect green to green, red to red, etc.

2. Turn the GK-403 readout selector to Channel “B”.

3. Record the number on the GK-403 in the table in **Appendix C**.

## 3.2 BIENNIAL ENGINEERING PHASE 1 INSPECTION/EVALUATIONS

The Massachusetts Dam Safety Regulations (302 CMR 10.00) require that a qualified Professional Engineer licensed in Massachusetts with experience in dam safety engineering perform an inspection of the dam once every five years. However, GE will arrange for such a dam safety inspection by such a licensed Professional Engineer, referred to as a Phase 1 inspection, on a biennial basis – i.e., every two years. The checklist used for such a Phase 1 visual inspection is included as **Appendix D**. The purpose of this independent visual dam safety inspection is to verify and supplement the results of the quarterly inspections. The inspecting engineer will be provided with the results of the quarterly inspections prior to the field visit, along with any additional inspection information or observations collected by GE. The engineer’s inspection will be conducted in accordance with the MassDCR ODS requirements for a Phase 1 Inspection/Evaluation.

The final Phase 1 Inspection/Evaluation Report generated by the two-year inspection will follow the standard MassDCR Phase I format and will be submitted to the MassDCR ODS and EPA. The reports will also be kept on file for review during subsequent quarterly inspections. Note that, should the dam be determined to be in “Poor” or “Unsafe” condition, the MassDCR ODS may require follow-up inspections of the dam every three or six months.

## 3.3 POST-STORM OBSERVATIONS

Observations of the dam will be made after hi.gh-flow events. For this purpose, a high-flow event is defined as a flow event with river flow of 3,650 cubic feet per second (cfs) or greater at the USGS gage on the Housatonic River downstream of Rising Pond near the Division Street Bridge, which corresponds to the “Action Stage” of seven feet above gage streambed, as determined by the National Weather Service. 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 in Section 3.1 for a quarterly inspection. When appropriate based on timing, a post-storm inspection may replace the quarterly inspection for the quarter in which the high-flow event occurs.

In addition, some limited dam observations will be made during major storms that are expected to result in flows over 3,650 cfs at the Division Street Bridge gage, provided that safe access is available. These observations will be conducted to ensure that no significant damage is occurring to the dam as a result of the storm.

## 3.4 ICE-OUT OBSERVATIONS

Ice-out observations will be made in the spring and, if possible, will be combined with the spring quarterly inspection. During these inspections, particular attention will be paid to the spillway. Particular care will be taken to look for damage to the concrete of the spillway, training walls, and forebay, as well as debris that may reduce spillway, penstock, or diversion channel flow capacity. The results of this inspection will be recorded on the quarterly inspection checklist.

## 3.5 PENSTOCK INSPECTIONS

Inspection of the penstock will be conducted every four years by a Professional Engineer experienced in dam safety. This inspection may be combined with the engineering Phase 1 visual inspection for the year involved. Penstock inspection requires individuals with confined-space entry training and equipment. During the inspection, the interior of the penstock will be visually inspected for debris, pipe deformations, joint offset/condition, bottom condition based on manual probing, sluice gate seating and leakage, apparent water-tightness of the pipe, or other unusual conditions within the pipe. The results of this inspection will be included in the engineering Phase 1 Inspection/Evaluation Report covering the subject two-year period.

# 4.0 MAINTENANCE AND REPAIRS

This section describes the maintenance and repair activities that GE will perform at Rising Pond Dam. Routine maintenance, including the clearing debris and maintaining the embankment, aids in reducing future repair costs and helps provide for safe operation of the dam and appurtenant structures.

## 4.1 ROUTINE ANNUAL MAINTENANCE

Some maintenance activities will be regularly performed each year, generally on an annual basis (or more frequently as needed). These activities include the following:

Vegetative Cutting – GE will cut the vegetative cover on the embankments at least annually to prevent the growth of trees or brush on the embankments and to allow the embankments to be easily inspected. Woody or intrusive vegetation also will be removed from the riprap areas on an annual basis.

Spillway and Low-Level Outlet Works Cleaning – GE will maintain the spillway and forebay approach areas, the trash rack, diversion channel, and the downstream spillway apron structure area clear of debris to provide full hydraulic capacity. GE will remove debris annually, and more frequently as necessary if the free flow of water is being impacted. In addition, GE will remove debris, if present, when a major storm (as defined in Section 3.3) is forecast.

Gate System Maintenance – GE will test the gate operator system annually to ensure that it is properly functioning. The electrical system will be maintained free of moisture and dirt, and wiring will be checked for corrosion or build-up of mineral deposits. Any necessary repairs will be completed immediately, and records of the repairs will be kept. In addition, GE will annually exercise the gate to ensure that it is properly functioning. Gate testing will be conducted under periods of low flow and be conducted in stages to reduce the impact of reservoir discharges. During the operation, the operator, stem, and stem guides will be checked for smooth operation, alignment, and excessive wear; and the parts will be lubricated if necessary. Any peculiar noises or erratic movements detected during operation will be investigated and addressed.

## 4.2 OTHER MAINTENANCE OR REPAIRS

Apart from the above-described regular maintenance, other maintenance and repair activities will be routinely performed as needed in response to observations during the inspections (or other observations, if any). These activities include the following:

### 4.2.1 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 repaired, re-graded, and loamed and seeded as necessary.

Tree Removal – In instances where tree removal is necessary, the primary and secondary root system will be removed, and the resulting holes properly filled with compacted sand and gravel. Tree stumps greater than 6 inches will be removed and backfilled with suitable compacted fill using procedures outlined in FEMA 534. Tree removal will be performed under direction of a registered Professional Engineer familiar with and experienced in dam safety.

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.

Slope Traffic Damage Control – Pedestrian and wildlife traffic on the embankment slopes can cause ruts which allow water to collect, causing saturation and softening of the embankment. Mowing equipment can also cause "mower scars" by cutting into slopes and vegetative cover. Any ruts or mower scars that develop will be repaired as soon as noticed.

Seepage Damage Control – GE will check along the downstream toe of embankment slopes systematically for seeps during the quarterly inspections, preferably in times of high reservoir levels. If seeps become evident in the dam, a Professional Engineer will be contacted to determine the most appropriate monitoring and repair for an observed seep.

Riprap Damage Control – GE will maintain the riprap as needed by periodically adding riprap to areas where it has become displaced by ice, clogged with debris or eroded material, or otherwise disturbed.

#### 4.2.2 Spillway, Intake Structure, and Diversion Channel Outlet Structure

Sediment Removal – Where observations of conveyances indicate build-up of excess sediment within the conveyances that may interfere with the flow of water, that excess sediment will be removed. Handling, management, and disposition of removed sediments and soils are described in Section 4.3.

Weephole Clearing – GE will keep the weepholes along the downstream spillway face clear of debris, as needed, to preclude the buildup of hydrostatic pressures beneath the slab surface.

Concrete and Masonry Maintenance – Where observations indicate damage to or deterioration of concrete and/or masonry surfaces, the damaged or deteriorated areas will be repaired, typically during summer months when pond levels and reservoir outflows are seasonally low. Specifically, GE will:

- Inspect the interface joint between the upstream spillway slab and the steel sheetpile cutoff wall during the quarterly inspections, as allowed by impoundment level.
- Grout and fill any cracks in the concrete training walls, trash rack supports, and/or upstream and downstream spillway faces that develop or open with time, as soon as they become evident.
- Replace and repoint loosened blocks or mortar joints in the training walls.

Metal Component Maintenance – Periodic maintenance will be performed as needed on all exposed metal where submerged or exposed to air. GE will ensure the integrity of all contact surfaces between concrete and metal and, where necessary, re-grout those surfaces to preclude the build-up of water in the interface. Periodically, the metal crest plates and trash racks may require sandblasting and applications of corrosion inhibitors to preclude the build-up of rust.

Spillway Toe Riprap Maintenance – GE will maintain riprap downstream of spillway apron as needed and keep the spillway toe area clear of debris. GE will periodically add riprap (with similar size stones) where it has been loosened or washed out, such that full heavy riprap cover is maintained over the entire channel bottom.

#### 4.2.3 Other

Instrumentation Monitoring/Repair – During the quarterly inspections, as described in Section 3.1.2, GE will obtain readings from the staff gauges, observation wells, and piezometers. Where these instruments have been damaged or are not working, they will be repaired.

Security Item Repair – Where observations indicate a need for repair of the chain link fence, fence fabric, Lexan panels, locks, chains, warning buoys, and/or platform fencing/bollards, such repairs will be made.

Access Road Maintenance – GE will maintain the access road clear of debris and remove growth and accumulated brush as it develops so that the road is clear for vehicles or equipment that must access the various appurtenances of the dam for emergency repairs or access. All gates and locks will be maintained to function properly in the event that quick access is required.

Other Repairs or Dam Upgrades – In the event that the inspections indicate the need for other repairs or dam upgrades not identified above, those repairs or upgrades will be made.

#### 4.2.4 Timing

Except as noted within the specific sections above, maintenance-level repairs will be completed within 60 days of observance. For repairs that require a longer period of time, GE will submit a schedule and plan to EPA.

### 4.3 HANDLING, MANAGEMENT, AND DISPOSITION OF SEDIMENTS AND SOILS

In the event that dam maintenance or repair activities or other response activities relating to Rising Pond Dam involve the handling, management, and/or disposition of sediments in Rising Pond or of soils adjacent to the dam, GE will take steps to ensure that those materials are properly handled, managed, and disposed of.

In general, any sediments/soils removed during such activities 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.

In the event that GE should wish to re-use some of all of the removed materials on-site, it will provide a specific proposal to EPA for approval, describing the sediments/soils proposed for re-use, the chemical and physical characteristics of those materials, the volume of those materials, the locations and depths for the proposed re-use, and other relevant information.

## 5.0 EMERGENCY RESPONSE

For the purposes of this OM&M Plan, an emergency is defined as a failure or other condition at Rising Pond Dam that results in an impending or actual sudden, uncontrolled release of water. Response procedures that will be followed in the event of such an emergency are presented in the EAP in **Appendix B**.

## 6.0 TRAINING

Personnel who are responsible for quarterly inspections (Caretaker, Alternate Caretaker, and contracted personnel) will be familiar with this OM&M Plan and will be formally trained prior to beginning their duties and at regular intervals. This training will be conducted biennially in conjunction with the biennial engineering inspections.

Personnel who are responsible for routine maintenance and repair items will be familiar with this OM&M Plan and review the procedures outlined above prior to beginning work. A copy of this OM&M Plan will be kept in an easily accessible area.

Biennial engineering inspections and large repairs will be conducted/designed by a Professional Engineer experienced in dam safety engineering.

# 7.0 RECORD-KEEPING AND REPORTING

## 7.1 RECORD-KEEPING

GE will maintain a file containing records and checklists on all quarterly, biennial, post-storm, ice-out, and penstock inspections. GE will also maintain records of all maintenance and repair work conducted at Rising Pond Dam and annual updates to the EAP.

## 7.2 REPORTING

The annual updates to the EAP will be provided to the distribution listed in the EAP, including EPA and the MassDCR ODS. GE will submit the biennial engineering Phase I Inspection/Evaluation Reports to EPA and ODS. Further reporting to EPA will be on an as-needed basis, but will include any of the other proposals to EPA described in this OM&M Plan (if necessary), as well as documentation of proposed major repairs.

## 8.0 SCHEDULE

The schedule of activities described in this OM&M Plan is summarized in the following table and will commence upon EPA's approval of this plan.

**Inspection and Maintenance Summary**

| Inspection | Frequency |
|---|---|
| Routine | Quarterly |
| Phase 1 Inspection/Evaluations | Biennial (every 2 years) |
| Ice Out | Annual (in conjunction with a quarterly inspection) |
| Post-Storm | After storm events (possibly in conjunction with a quarterly inspection, depending on timing); limited observations during storms |
| Penstock | Once every 4 years (in conjunction with a biennial engineering inspection) |

| Monitoring | Frequency |
|---|---|
| Headwater and Tailwater | Quarterly |
| Groundwater Levels | Quarterly |
| Grout Bag Depths | Annual (in conjunction with quarterly inspections) |
| Concrete and Masonry | Quarterly |
| Metal Components | Quarterly |

| Maintenance Type | Frequency |
|---|---|
| Vegetative Cutting | Annual |
| Spillway and Outlet Works Cleaning | At least annual and as needed, plus ahead of forecast high flows if needed |
| Gate Testing/Maintenance | Annual |
| Repair of Sparse Vegetation & Erosion | As needed |
| Tree Removal | As needed |
| Rodent Damage Control | As needed |
| Slope Traffic Damage Control | As needed |
| Seepage Damage Control | As needed |
| Riprap Damage Control | As needed |
| Sediment Removal from Conveyances | As needed |
| Weephole Cleaning | As needed |
| Concrete and Masonry Maintenance | As needed |
| Metal Component Maintenance | As needed |
| Spillway Toe Riprap Maintenance | As needed |
| Instrument Maintenance | As needed |
| Security Item Maintenance | As needed |
| Access Road Maintenance | As needed |
| Other | As needed |

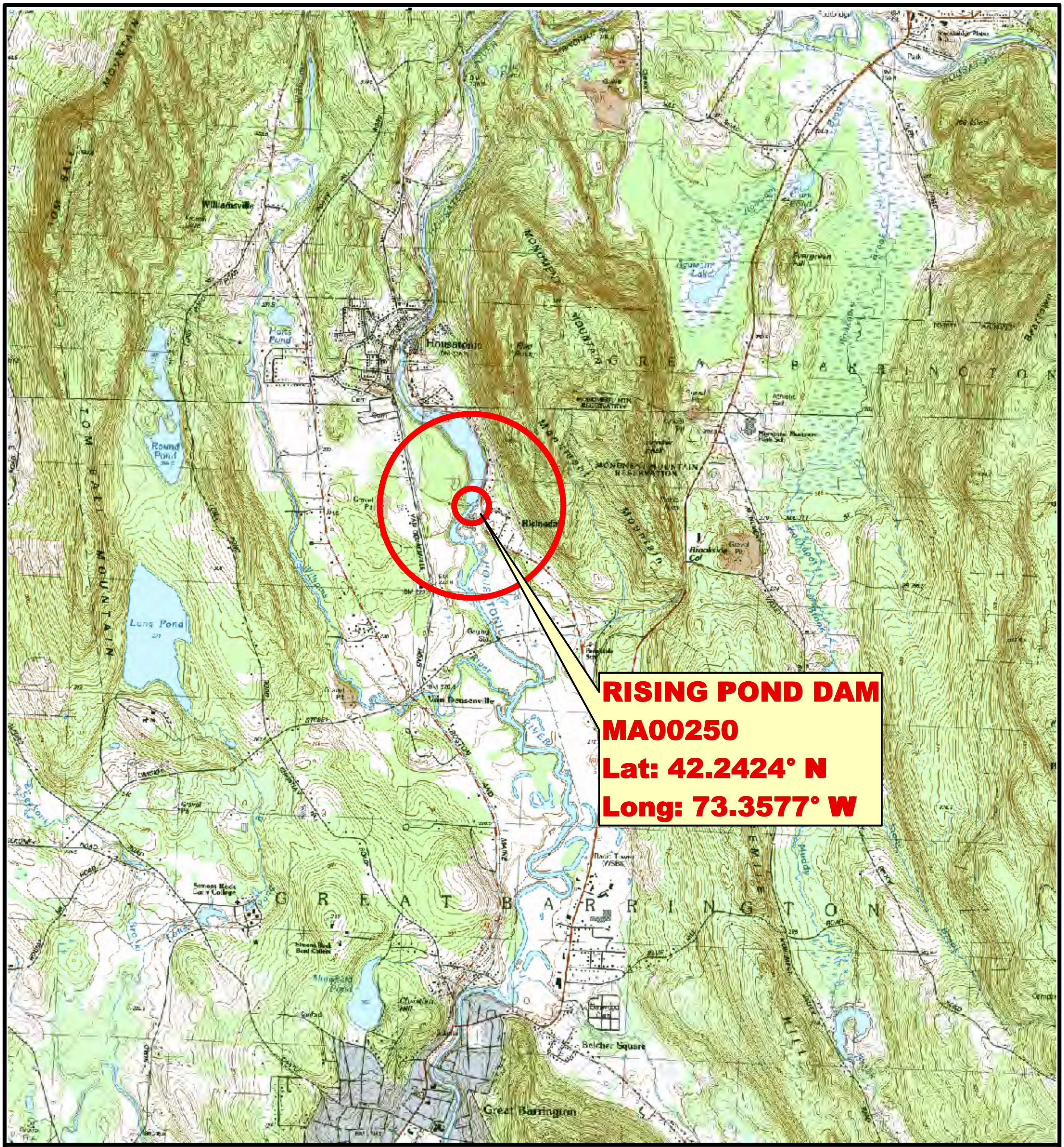
## 9.0 REFERENCES

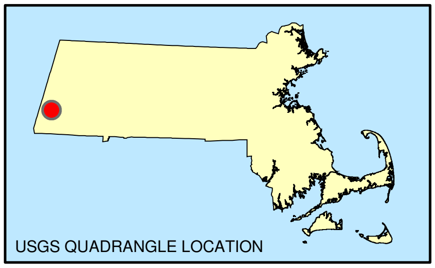
Federal Emergency Management Agency (FEMA), 1987. *Dam Safety: An Owner's Guidance Manual.* FEMA No. 145. July 1987.

GZA GeoEnvironmental Inc., 2012. *Rising Pond Dam Phase II Engineering Evaluation*. Prepared for General Electric Company. July 13, 2012.

GZA GeoEnvironmental Inc., 2017. *Rising Pond Dam Phase I Inspection/Evaluation Report*. Prepared for General Electric Company. June 2017.

# FIGURES

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GREAT BARRINGTON TOPOGRAPHIC QUAD SHOWN.

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Data Supplied by : MASS GIS

N W E S

| | | |
|---|---|---|
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| | RISING POND DAM, MA00250<br>GREAT BARRINGTON, MASSACHUSETTS | FIGURE NO.<br>**1** |

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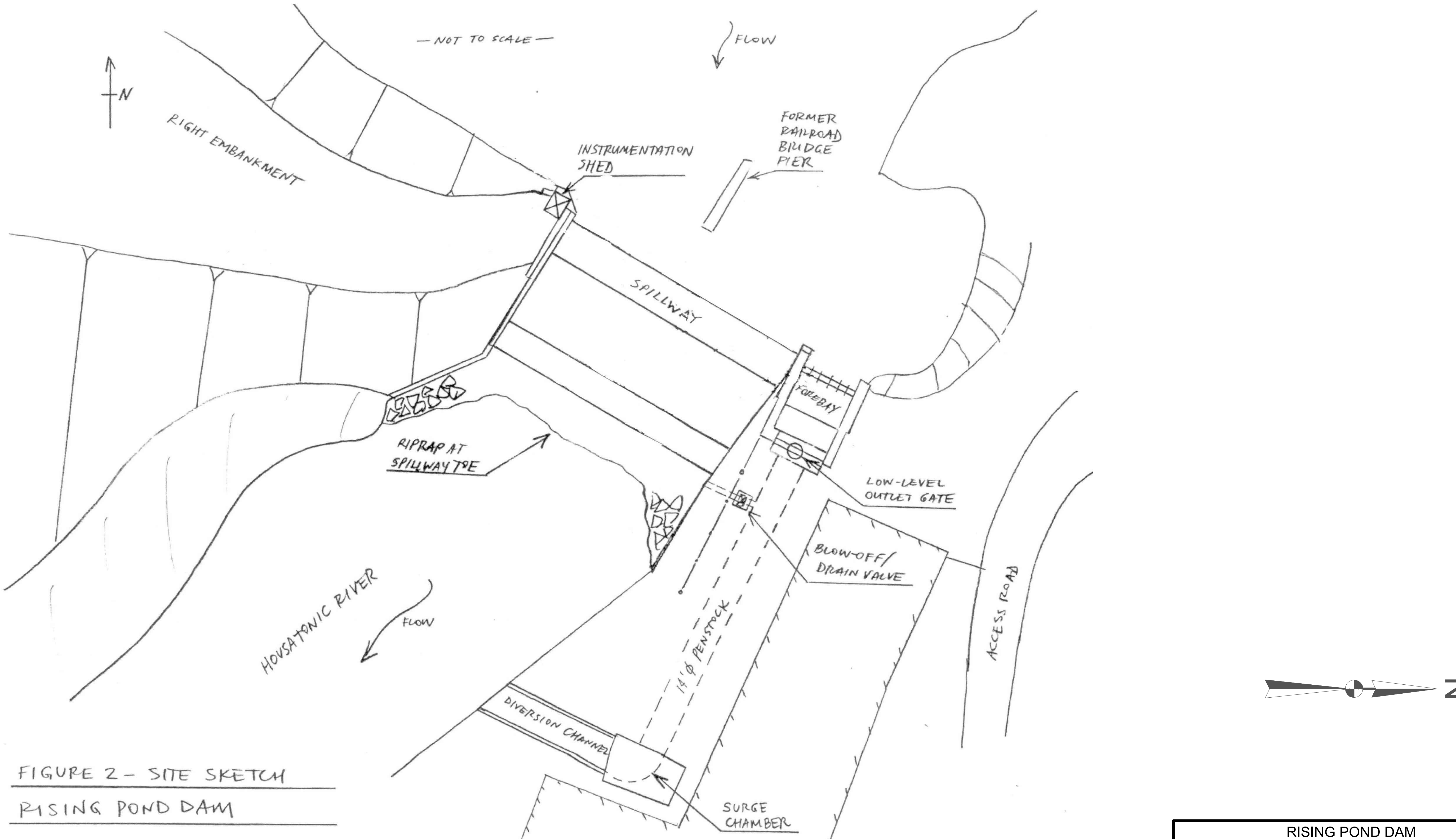


FIGURE 2 – SITE SKETCH

RISING POND DAM

RISING POND DAM
OPERATIONS AND MAINTENANCE MANUAL

GREAT BARRINGTON, MASSACHUSETTS

SITE SKETCH

| | |
|---|---|
| PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists 249 VANDERBILT AVENUE NORWOOD, MA 02062 781-278-3700 | PREPARED FOR: GENERAL ELECTRIC COMPANY |

| | | | |
|---|---|---|---|
| PROJ MGR: JDA | REVIEWED BY: ABB | CHECKED BY: JDA | FIGURE |
| DESIGNED BY: LAG | DRAWN BY: LAG | SCALE: NTS | 2 |
| DATE: NOV 2017 | PROJECT NO. 19896.50 | REVISION NO. | SHEET NO. 1-0-1 |

# APPENDIX 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**

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.

OM&M – Operation, Monitoring, and Maintenance.

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

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.

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

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.

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 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).

**APPENDIX B – EMERGENCY ACTION PLAN**

# EMERGENCY ACTION PLAN

## Rising Pond Dam

**GREAT BARRINGTON, MASSACHUSETTS**
**NID # MA 00250**

***PREPARED FOR:***
**GENERAL ELECTRIC COMPANY**

***PREPARED BY*:**
**GZA GEOENVIRONMENTAL, INC.**
**Norwood, Massachusetts**
**GZA File No.01.0019896.50**

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## TABLE OF CONTENTS (CON'T)

## TABLE OF CONTENTS (CON'T)

**TABLES**



**FIGURES**



**APPENDICES**



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# 1.0 NOTIFICATION FLOWCHART

## 1.1 INTRODUCTION

This Emergency Action Plan (EAP) for the Rising Pond Dam addresses the General Electric Company, and the Towns of Great Barrington and Sheffield, Massachusetts roles and responsibilities for potential and actual emergency conditions at the dam. Emergency situations are herein defined as conditions which have or could potentially lead to a sudden, uncontrolled release of water. **Figure 1 - Notification Flowchart** summarizes the key operational, governmental, and public safety personnel to be notified in the event of an emergency condition at the Rising Pond Dam. The objective of the flowchart provided herein is to outline clear, concise, and concurrent notifications. The organization of the flowchart is based on GZA GeoEnvironmental Inc.'s (GZA's) review of existing communication networks and discussions with the Towns of Great Barrington and Sheffield, and Commonwealth of Massachusetts personnel.

## 1.2 LIMITATIONS

The **Figure 1 - Notification Flowchart** should be considered a "top-down" system for initial notifications. Other means and avenues of communication between and among key local and state emergency personnel that may develop may not be specifically depicted in the referenced flow chart as an emergency progresses. Also, as the emergency condition intensifies, normal telephone lines and some two-way radio frequencies may be overloaded or otherwise unavailable.

The Notification Flowchart is to be used as a guide during an emergency condition. For clarity and brevity, not all possible emergency phone numbers have been shown. However, additional names and notification information of persons are provided in the Contact Lists in **Tables 1 through 5**. Each notification "cell" on the flowchart may have its own subset of emergency numbers and procedures. **This EAP does not suggest that General Electric Company personnel take over the established responsibilities of other governmental and institutional elements (such as the police, fire and emergency management departments in the downstream communities) to enact their own emergency preparedness plans and to evacuate people.** However, the flowchart and outlined duties and responsibilities described herein provide a means for initial notification. It is assumed that state public safety entities and local police departments in potentially affected downstream communities will activate their own specific procedures for evacuation, sheltering, and mobilization of resources, once the initial warning is provided.

The Notification Flowchart relies heavily on the use of the Town of Great Barrington dispatch/call center.

Massachusetts State Police Barracks B-1/Lee Dispatch is the local State Police dispatch center located at 215 Laurel Street (Route 20) in Lee, MA.

The Town of Great Barrington Emergency Dispatch Center is the dispatch center for the town and is located at 465 Main Street in Great Barrington, MA.

The Berkshire County Sheriff's Communication Center is the dispatch center for the Town of Sheffield and is located at 467 Cheshire Road in Pittsfield, MA.

All dispatch centers are staffed 24 hours a day, 7 days a week and are responsible for contacting the Emergency Management, Police, and Fire Departments, the Department of Public Works (DPW) contact and the specified government official for their respective towns. The Towns of Great Barrington and Sheffield are responsible for providing warning messages to their own residents.

## 1.3 SUPPLEMENTAL EMERGENCY CONTACT LISTS

**Tables 1 through 5** provide detailed Alert Lists which provide names, position, title, telephone number, etc. for the following entities:

| | |
|---|---|
| Table 1 | General Electric Company Contact List |
| Table 2 | Town of Great Barrington Community Alert List |
| Table 3 | Town of Sheffield Community Alert List |
| Table 4 | State Agency Alert List |
| Table 5 | Major Utilities List |

These lists are considered to be a supplement to the information provided on Figure 1 - Notification Flowchart. The telephone numbers provided are often listed numbers. Some numbers are serviced 24 hours or have a call forwarding capability. However, as the emergency condition intensifies, all listed telephone lines may be in use with incoming calls and thus be unavailable.

Table 5 lists major utilities within the potential downstream impact area and includes telephone numbers for the applicable utility companies. The table has been provided for general reference purposes and is not intended to be an all-inclusive list. Primary responsibility for notifying key utilities, rail lines, etc. will rest with the individual community public safety agencies.

# 2.0 STATEMENT OF PURPOSE AND SCOPE

## 2.1 STATEMENT OF PURPOSE

The Emergency Action Plan (EAP) defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the Rising Pond Dam in time to take mitigative action and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam.

**This EAP is a management document intended to be read, understood, annually tested, and updated before an emergency condition occurs.** It is designed to outline the activities of the Town of Great Barrington and other local and state emergency management officials within the framework of existing, in-place emergency management systems. It provides the planning basis for emergency detection, evaluation and classification; notification; evacuation; security, termination and follow-up; and preparedness. This EAP is subject to the limitations set forth in Appendix G.

## 2.2 SCOPE

The EAP sets forth basic procedures, duties, and responsibilities to be implemented by the Town of Great Barrington and the General Electric Company (owner and operator of the dam) and other key operational and public safety personnel in the event of an emergency condition at the Rising Pond Dam.

An “emergency”, for the purposes of this EAP, is defined as an impending or actual sudden uncontrolled release of water caused by a failure of the dam.

The major focus of the EAP is the description of the area of inundation resulting from a hypothetical dam break flood, and the development of a detailed notification plan that describes responsibilities to warn key operational personnel, local public safety agencies, state law enforcement, and emergency management agencies in the path of an anticipated dam break flood wave. The EAP also provides preparedness steps.

**It should be noted that the overall contents of this EAP, including recommendations describing organization and duties, are not intended for the General Electric Company personnel to take over the responsibilities of the state and other local governmental entities.** Rather, the EAP has been developed to be integrated within the framework of existing emergency preparedness plans. During the development of this EAP, GZA has coordinated with the Towns of Great Barrington and Sheffield, and other emergency preparedness personnel. The following public agencies will be directly involved in the event of the activation of this EAP:

- Town of Great Barrington
- Town of Sheffield

- Massachusetts State Police
- Massachusetts Emergency Management Agency (MEMA)
- Department of Conservation and Recreation (DCR) Office of Dam Safety
- United States Army Corps of Engineers

This Updated EAP was prepared to conform with new DCR requirements that the EAP format be consistent with the "Federal Guidelines for Dam Safety: *Emergency Action Planning for Dam Owners* (FEMA 64)," dated July 2013. The scope and format of this EAP generally conforms to the FEMA guidelines. In addition, the technical engineering aspects of the dam break flood routing analysis conforms to the Federal Energy Regulatory Commission (FERC) requirements outlined in their "Engineering Guidelines for the Evaluation of Hydropower Projects", issued October, 1993 and updated in October 2007 Dam break analyses are included in **Appendix A** and the inundation maps are discussed in Section 7.0 and located in **Appendix E**.

# 3.0 PROJECT DESCRIPTION

## 3.1 LOCATION

The Rising Pond Dam is located in the Town of Great Barrington, in Berkshire County, Massachusetts. The left abutment of Rising Pond Dam is on Route 183 (at 285 Park Street, the Hazen Paper Mill).

The dam is at the longitude and latitude coordinates:

Longitude: -73.35796° Latitude: 42.2424°

## 3.2 OWNER\OPERATOR

The Rising Pond Dam is owned, operated, and maintained by the General Electric Company.

| Dam Owner/Caretaker | |
|---|---|
| Name<br>Mailing Address<br>Town | General Electric Corporate Environmental Programs<br>159 Plastics Avenue<br>Pittsfield, MA 01201 |
| Daytime Phone | 413-553-6610 (Caretaker Direct Office Number)<br>413-553-6603 (General Office Number) |
| Emergency Phone | 413-441-4619 (Caretaker Cell Phone) |

## 3.3 PURPOSE OF THE DAM

The dam was likely constructed in the 1800s. The original purpose of the dam was likely to divert water into the adjacent mill complex to power machinery. The right embankment of the dam was previously used as a railroad embankment/bridge abutment. Currently, the dam impounds water for recreational and environmental purposes.

## 3.4 DESCRIPTION OF THE DAM AND APPURTENANCES

The engineering data presented below is based on available information in previous reports provided by the Owner.

Rising Pond Dam is a run of the river structure located on the Housatonic River in the Housatonic or Risingdale section of Great Barrington, Massachusetts.

The dam was originally constructed in the 1800s. The embankment was constructed of alluvial sand and gravel excavated from the west river bank. Original upstream slopes ranged from 1.5H:1V to 4H:1V, and downstream slopes ranged from 1H:1V to 1.5H:1V. The original embankment height was about 17 feet. The spillway and railroad bridge abutment were reportedly constructed on rock-filled timber cribbing over grouted cobbles in timber cribbing laid on the original river bottom. The original spillway was about 17 feet high and was faced with wooden planks laid at a 1H:1V slope.

In 1934, the embankments and spillway were reportedly raised by about 10.5 feet and spillway flashboards were added. Rockfilled timber cribbing was placed above the original structure and new wooden facing was placed on the spillway.

In 1953, the dam was reportedly raised to elevation 716.5 feet (National Geodetic Vertical Datum - NGVD). The stone masonry outlet channel training walls were replaced with a headgate and 14-foot-diameter steel penstock. The downstream timber plank spillway facing was demolished and replaced with a concrete slab. The spillway crest was rebuilt with a concrete slab faced with a steel plate. The upstream timber plank facing was covered with sand and gravel fill covered by a new concrete apron slab and an upstream concrete wall was added.

Between 1991 and 1993, the dam was significantly rehabilitated. The rehabilitation generally included: installation of an upstream steel sheetpile cutoff wall; removal of the upstream timber plank spillway facing; filling of voids in the timber cribbing with peastone and sandy gravel; flowable fill placement in voids below the crest and upstream slab; installation of tiedowns and passive H-pile shear keys in the downstream apron; replacement of deteriorated areas of spillway training wall concrete; repointing of the forebay walls and floor; replacement of trashracks; construction of a concrete tailrace outlet channel and plugging of the former penstock where it entered the mill; placement of riprap slope armor; and raising of the embankments to elevation 727.0 feet (NGVD). In addition, piezometers and observation wells were installed in and below the embankment and spillway. In 2002, the forebay walls and right downstream training wall were repaired, and riprap was placed and reworked at the upstream slope and downstream toe of the right embankment.

The Rising Pond Dam currently consists of left and right earth embankments, with a spillway and outlet works. The spillway consists of a concrete facing with steel crest plate. The spillway is approximately 127 feet wide and 30 feet high, with a crest elevation of approximately 716.6 feet (NGVD). Spillway training walls are a combination of concrete, grouted stone masonry, and steel sheetpile.

The low level outlet is located directly to the left of the spillway. The low-level outlet works consist of a grouted stone masonry forebay with steel trash racks, a concrete-walled gate chamber with sluice gate and a 14-foot-diameter steel penstock that extends approximately 110 feet downstream to a surge chamber. The surge chamber is drained by an open channel reinforced concrete tailrace that discharges to the Housatonic River approximately 150 feet downstream. The invert of the penstock is reported to be elevation 699 feet (NGVD). Gate chamber drainage is provided by a 12-inch-diameter well drain that outlets to the left downstream training wall. Well drain flow is controlled by a valve located in a covered pit between the gate chamber and left training wall. A fire-protection pumphouse is located on the left embankment crest to the left of the forebay.

A wide embankment/fill area is present on the left side of the spillway and outlet structures. The upstream slopes are steep and have some riprap protection near the low level outlet. The downstream slope is poorly defined and consists of the mill.

The right earthen embankment is approximately 38 feet high, with upstream and downstream slopes of approximately 2H:1V. Slope protection at the waterline consists of a combination of steel sheetpiles and riprap. A shed for instrumentation leads is located at the crest near the right spillway training wall.

The shores of the pond are generally wooded. Route 183 extends parallel to the east bank of the impoundment/river. An abandoned railroad bridge abutment and center pier are located immediately upstream of the dam. The western railroad bridge pier was formerly integral with the right embankment. The immediate downstream area includes the mill and wooded river banks. A USGS gaging station is located on the Division Street bridge approximately 1 mile downstream of the dam.

Previous inspection reports indicated that the sluice gate stem was broken and the closure was inoperable. The Owner replaced the sluice gate in 2006.

In 2011 through 2013, the dam underwent a series of repairs and rehabilitations. During this rehabilitation, a row of sheetpiles was construction in front of the spillway apron, then the concrete apron demolished. The rubble underneath the apron surface was filled with unreinforced, high-slump concrete, and a new two-foot thick reinforced concrete apron poured. Concrete energy dissipaters were constructed on the downstream end of the apron, and large riprap dumped in the discharge area to return the channel to preconstruction conditions. In addition, the downstream right training wall was resurfaced and raised by two feet, the embankment was regraded, small riprap placed behind the right training wall, and spillway apron vibrating wire piezometers re-connected. Left side stone masonry was repointed along the spillway, and the blow-off valve closed to the extent possible. Anchors for warning buoys were installed upstream of the spillway.

## 3.5 OPERATIONS AND MAINTENANCE

The dam is operated and maintained by the General Electric Company. The Owner maintains files on the Rising Pond Dam, including inspection reports and results of investigations at their offices. The Owner conducts monthly and quarterly inspections as well as biennial Phase I inspections. The Owner mows grass and removes debris from the spillway regularly, and conducts maintenance activities and minor repairs on an as-needed basis. The gate operated at least annually for lowering the impoundment for apron inspection and maintenance. Each year from spring through fall, warning buoys will be deployed upstream of the spillway.

The operators and controls for the dam are operated by the Owner.

## 3.6 DCR SIZE CLASSIFICATION

Rising Pond Dam has a height of dam of approximately 38 feet and a maximum storage capacity of 710 acre-feet. In accordance with Department of Conservation and Recreation Office of Dam Safety classification, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Rising Pond Dam is an Intermediate size structure.

## 3.7 DCR HAZARD CLASSIFICATION

In accordance with Department of Conservation and Recreation classification procedures, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Rising Pond Dam is classified as a Significant Hazard potential dam.

# 4.0 EMERGENCY DETECTION, EVALUATION, AND CLASSIFICATION

## 4.1 EMERGENCY DETECTION

This section describes the detection of an unusual or emergency event at the dam and provides information to assist the Town in determining the appropriate emergency level for the event.

Unusual or emergency events may be detected by:

- Observations at or near the dam by government personnel (local, state, or Federal), landowners, visitors to the dam, or the public;
- Earthquakes felt or reported in the vicinity of the dam; or
- Forewarning of weather conditions that may cause an unusual event or emergency event at the dam (for example, a severe weather or flash flood forecast).

## 4.2 EMERGENCY EVALUATION

The Incident Commander (Great Barrington Emergency Management Director) is to coordinate with the Caretaker (General Electric Company), Great Barrington DPW and qualified professional dam engineer(s) to evaluate the severity of the observed dam safety issue.

## 4.3 EMERGENCY CLASSIFICATION

After an unusual or emergency event is detected or reported and evaluated, the Incident Commander is responsible for classifying the event into one of the following four conditions.

1. Condition A: Urgent; dam failure appears imminent or has occurred.

   This is an extremely urgent situation when a dam failure is occurring or obviously is about to occur and cannot be prevented. Flash flooding will occur downstream of the dam.

2. Condition B: Potential dam failure situation, rapidly developing.

   This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. Time may be available to employ remedial actions on the order of hours or days.

3. Non-Emergency Condition: Unusual event, slowly developing.

   This situation is not normal (e.g. an increased amount of seepage) but has not yet threatened the operation or structural integrity of the dam. If this situation worsens it could threaten the integrity of the dam.

4. Non-Failure Emergency Condition: No danger of dam failure, only flooding concerns.

   Generally, this situation indicates that there is no sign of pending or imminent dam failure. This Condition is only used when there are flooding concerns caused by high reservoir/river/flow conditions are such that flooding is expected to occur downstream of the dam.

Expanded descriptions of the observed conditions, including guidance on actions, are included in **Table 7** and **Appendix D**. Refer to **Appendix F** for examples of general conditions that could lead to dam failure[1].

[1]Texas Commission on Environmental Quality, "Guidelines for Operation and Maintenance of Dams in Texas," Publication No. GI-357, November 2006.

# 5.0 GENERAL RESPONSIBILITIES UNDER THE EMERGENCY ACTION PLAN

## 5.1 DAM OWNER RESPONSIBILITIES

As owner, the General Electric Company has overall responsibility for care and maintenance of Rising Pond Dam. The following duties and responsibilities are assigned to on-site personnel for the five phases of emergency response. Within the context of the EAP, suggested duties and responsibilities should include the following:

1. Condition A: Failure of the Rising Pond Dam is imminent or has occurred

   Once the Incident Commander has determined that there is no longer any time available to safely attempt corrective measures to prevent failure, the "failure is imminent or has occurred" warning should be issued. Responsibilities of the General Electric Company include:

   - Initiate the notification procedures for Condition A. Refer to Section 5.3 and **Figure 1 – Notification Flowchart**.
   - Continuously update the Incident Commander of the emergency situation.
   - Provide periodic updates to DCR as to condition of affected area, pool level, and discharge through the breach.

2. Condition B: A failure situation at Rising Pond Dam may be developing

   Under this scenario, it is assumed that some time is available for further analyses/decisions to be made before dam failure is considered to be imminent. Dam failure may eventually occur but preplanned actions may avert or mitigate a full dam failure. Responsibilities of the General Electric Company include:

   - Initiate notification procedures for Condition B. Refer to Section 5.3 and **Figure 1 – Notification Flowchart**.
   - Continuously update the Incident Commander of the emergency situation to mobilize staff to the affected area to institute emergency repair procedures (if time and safety considerations permit).
   - Contact dam engineering consultant for repair guidance.
   - Provide periodic situation reports/emergency messages concerning ongoing repair efforts to DCR as outlined in **Figure 1 - Notification Flowchart**. Also provide periodic updates through the Great Barrington Emergency Dispatch Center.

3. Nonemergency, Unusual Event, Slowly Developing Condition

   During an unusual, non-emergency condition, the situation is abnormal but has not yet threatened the integrity of the dam. General Electric Company (Owner) is responsible for monitoring the situation and for providing updates to the Incident Commander. The Owner should seek guidance from a dam engineering consultant and from the DCR, as necessary.

   Note that not all responsibilities of the Owner are listed above. Where duties fall into other specific categories (such as responsibilities for the Town of Great Barrington or responsibilities for termination and follow-up, etc.) these duties have been discussed separately in Sections 5.2, 5.3, 5.4 and 5.5.

4. Non-Failure Emergency Condition

   During a non-failure emergency condition, flooding is expected to occur downstream but there is little danger of dam failure. The General Electric Company is responsible for performing a post-event assessment of Rising Pond Dam to determine if the dam has been damaged.

## 5.2 RESPONSIBILITY FOR NOTIFICATION

It is assumed that an emergency situation at Rising Pond Dam will be identified prior to complete structural failure. Although reaction time prior to complete failure may be limited, it is assumed that notification procedures can be initiated at Great Barrington Dispatch, depending upon the source of initial notification and the condition of the emergency.

Condition A calls for **immediate evacuation** and therefore notification priorities are given to the downstream communities of Great Barrington and Sheffield.

Condition B allows for some evaluation of the condition by the General Electric Company, with the Town of Great Barrington, prior to notification of the downstream community of Sheffield.

The likely mode of initial identification of the emergency condition will be from a passer-by (i.e. Observer – General Public).

If the initial observation of an emergency is made by a General Electric Company Employee, then he or she shall report the situation to the Caretaker and the 911 dispatch center for the Town of Great Barrington. Great Barrington Dispatch's first contact should be Great Barrington Emergency Management which is in turn is responsible for providing notification to the emergency responders in Great Barrington: Police, Fire, and (as needed) Highway Departments. The second set of contacts provides notification to the emergency responders in Sheffield: Emergency Management, Police and Fire Departments. The Town of Great

Barrington Emergency Management shall contact Great Barrington elected officials, Massachusetts State Police, Massachusetts Emergency Management and the Berkshire County Sheriff's Office as needed.

If the initial observation is made by the general public, the observer is expected to call 911 from either a cell phone or landline in the Town of Great Barrington. A cell phone call will be directed to State Police, which will route the call to Great Barrington Dispatch. Great Barrington Dispatch and the following dispatch centers contacted are responsible for carrying out the same notification procedures described above for an emergency that is initially observed by a Town of Great Barrington Employee. Once the communication reaches the local level, direct communication via radio or cell phone may be the quickest way to communicate amongst the local responders. Major announcements; however, will be distributed through the dispatch centers.

If time allows, the General Electric Company is responsible for contacting their Dam Engineering Consultant, and the Department of Conservation and Recreation for advice. The General Electric Company is also responsible for contacting the Housatonic Railroad Company should the entrance to the west side of Rising Pond Dam be blocked by railroad cars

The Incident Commander shall contact MEMA or the Massachusetts State Police (MSP) if he/she deems assistance is or may be needed. Assistance can be requested from and updates can be provided to MEMA through the Web Emergency Operations Center (WebEOC). MEMA has the ability to issue flood watches and warnings to the public through the National Weather Service if appropriate. MEMA also has the ability to transmit warning messages to the public over the Emergency Alert System (EAS).

The Notification Flowchart provided in Section 1.0 summarizes the notification responsibilities listed above; however, individuals listed on the Flowchart may not be available, in which case alternates or designees may be involved in the notification procedures. Alternate contacts and additional phone numbers are listed in the Contact Lists provided in Tables 1 through 6. Initial means of notification will likely be made by telephone landlines or cellular telephones. Additional communication systems are listed in Section 6.6.

Upon notification of an emergency condition, the Towns of Great Barrington and Sheffield are responsible for providing direct warning to their residents via a pre-arranged warning system. A discussion of evacuation responsibilities is included in Section 5.3. The Towns of Great Barrington and Sheffield will coordinate their responses from their EOCs at the Great Barrington Police Station and Sheffield Fire Departments.

Preparation of warning messages should begin as soon as their potential need is apparent, which is likely to be immediately after initial notification. When time is available for their preparation, the initial message should contain pertinent information as to the severity of the problem, expected extent and timing of inundation at key population centers, and general instructions concerning evacuation. However, in some cases, an emergency condition may be declared when failure is imminent with little advance notice or time to compose a specific message intended for broadcast. The example messages below provide a model for the initial announcements in those cases. Subsequent announcements should be scripted so to provide additional data as the situation dictates.

Sample Message for Emergency Condition A – Announcement for Major Failure of Rising Pond Dam

In the event of a Condition A emergency, the Incident Commander or his or her designee has the authority to issue the following message to the emergency responders from the Towns Great Barrington and Sheffield via telephone or local two-way radio.

**Urgent: THE RISING POND DAM IN GREAT BARRINGTON, MA. HAS FAILED.**

Rising Pond Dam, located near Park Street in Great Barrington, Massachusetts, is failing. Water from the dam is expected to cause widespread flooding along Park Street, Route 7, Route 23, and Route 41 in the towns of Great Barrington and Sheffield. The downstream area must be evacuated immediately. Repeat, Rising Pond Dam is failing; evacuate the area along low-lying portions of Housatonic River.

We have activated the emergency action plan for this dam and are currently under emergency Condition A.

The peak of the resultant flood will take approximately 30 to 60 minutes to reach the Division Street Bridge in Great Barrington. Reference the evacuation map in your copy of the Emergency Action Plan.

Stay alert for further announcements. Updated information as to river levels, flood arrival times and evacuation efforts will be provided as soon as they are available.

This is an emergency. This is *identify your name and position.*

Sample Message for Emergency Condition B – Announcement for Rapidly Developing Condition at Rising Pond Dam

In the event of a Condition B emergency, the Incident Commander or his or her designee has the authority to issue the following message to the emergency responders from the Towns of Great Barrington and Sheffield via telephone or local two-way radio.

**Urgent: The Town of Great Barrington has announced that a potential failure situation is developing at Rising Pond Dam in Great Barrington, Massachusetts.**

We have an emergency condition at Rising Pond Dam, located near Park Street in Great Barrington, Massachusetts. We have activated the emergency action plan for this dam and are currently under emergency Condition B.

We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure.

If the dam fails, the peak of the resultant flood will take approximately 30 to 60 minutes to reach the Division Street Bridge in Great Barrington. Please prepare to evacuate the area along low-lying portions of Housatonic River.

Reference the evacuation map in your copy of the Emergency Action Plan.

Standby for periodic updates on the repair efforts at the dam and additional guidance on evacuate. We will advise you when the situation is resolved or if the situation gets worse.

This is *identify your name and position.*

Sample Message for Emergency Services Personnel to Communicate the Status of the Emergency with the Public

In the event of a Condition A emergency, the emergency managers for the Towns of Great Barrington and Sheffield have the authority to issue the following message to the general public through Reverse 911. This message may be modified for a Condition B emergency.

**Urgent:** **This is an emergency message from the *name of community*. Listen carefully. Your life may depend on immediate action.**

Rising Pond Dam, located near Park Street in Great Barrington, Massachusetts, is failing. Repeat. Rising Pond Dam, located near Park Street in Great Barrington, Massachusetts, is failing.

If you are in or near this area, proceed immediately to high ground away from the valley. Do not travel on Route 7, Route 23, Route 41 or return to your home to recover your possessions. You cannot outrun or drive away from the floodwave. Proceed immediately to high ground away from the valley.

This message will be repeated once.

The accurate and timely dissemination of emergency public information is very important to the overall success of an EAP.

## 5.3 RESPONSIBILITY FOR EVACUATION

Warning and evacuation planning are the responsibilities of local authorities who have the statutory obligation (i.e. the Towns of Great Barrington and Sheffield) within their respective communities. The Great Barrington and Sheffield Police Departments will provide security, traffic control for secondary and local roadways and direct evacuees along the major evacuation routes toward upland areas and away from the inundation areas shown on the inundation maps in **Appendix E**. In addition to traffic control, local police/fire department will provide a warning of the emergency by loudspeakers, door to door and Reverse 911. The Great Barrington Fire Department will assist in rescues and evacuations, and the Great Barrington Department of Public Works will assist with road closures and other support. Emergency evacuation routes should also be broadcast simultaneously over local radio, television, cable stations. Additionally, the Towns of Great Barrington and Sheffield may request activation of the EAS through MEMA. The Towns of Great Barrington and Sheffield have limited resources and may request evacuation and/ or traffic control and resident warning assistance from MSP. MSP will provide traffic control along major interstate highways, state highways, and bridges in accordance with the procedures prescribed in the Incident Command System (ICS). In addition, the Berkshire County Sherriff's Office will respond to emergency sites with emergency supply equipment, including shelter trailers and a portable command center.

According to dam break analysis, the inundation areas occur along the Housatonic River. Based on the generally northerly to southerly flow direction within the downstream flood plain zone, the general evacuation direction adjacent to the east and west sides of the flooding should be toward the east and west, respectively, away from the flood plain zone.

## 5.4 RESPONSIBILITY FOR DURATION, SECURITY, TERMINATION AND FOLLOW-UP

The Town of Great Barrington's Incident Commander (Emergency Manager) or his or her designee shall perform on-site monitoring of the situation at the dam and keep local authorities informed of developing conditions at the dam until the emergency has been terminated.

The Town of Great Barrington shall provide security measures to prevent unauthorized entry into the emergency area and establish access control points. Security measures may include warning signage, security tape, staffed outposts, etc. Additional materials may be provided by the Berkshire County Sheriff's Office.

Throughout the duration of an emergency, emergency responders shall update the Unusual Emergency Event Log, which is available in Table 9.

Whenever the EAP has been activated, an emergency level has been declared, all EAP actions have been completed, and the emergency is over, the EAP operations must eventually be terminated and follow-up procedures completed. The Incident Commander is responsible for terminating EAP operations and relaying this decision to all responders. It is then the responsibility of each dispatch center to notify the same group of contacts that were notified during the original event notification process to inform those people that the event has been terminated.

Prior to the termination of an emergency Condition A event that has not caused actual dam failure, the Great Barrington Incident Commander, with the assistance of General Electric Company and its Dam Engineer Consultant, will inspect the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage. The DCR Office of Dam Safety may also participate in the inspection. If it is determined that conditions do not pose a threat to people or property, the Incident Commander may terminate EAP operations as described above. If the severity of a Condition A emergency changes such that there is no longer a threat of imminent failure, the emergency condition shall be reduced to Condition B. If the severity of a Condition B emergency changes such that there is no longer a threat of dam failure, the Incident Commander may terminate EAP operations as described above.

The General Electric Company shall document the emergency event and all actions that were taken. The General Electric Company shall also perform an initial damage assessment and also modify/ update the EAP based upon lessons learned during the emergency situation.

The Towns of Great Barrington and Sheffield should also document their responses and perform initial damage assessments. The results of their evaluations should be documented in written reports for their own files.

## 5.5 EAP COORDINATION RESPONSIBILITY

The General Electric Company is responsible for identifying the EAP Coordinator. The EAP Coordinator is responsible for EAP-related activities, including the following:

- Review and update, as necessary, EAP including notification procedures, contact lists, and responsibilities on at least a yearly basis (per 302 CMR 10.11). Updates should be recorded in Table 11, entitled “EAP Update Log”.
- Conduct staff training and Orientation Seminars of proper procedures for surveillance and emergency repair.
- Conduct a biennial test of the validity of notification procedures and communication systems.
- Review and update available resources information.
- Be prepared to mobilize available on-site resources and obtain Contractors on short notice.

## 5.6 TYPICAL MUTUAL AID POLICE DEPARTMENT FUNCTIONS

Great Barrington is part of a robust mutual aid system with local towns. Should the Incident Commander request assistance, mutual aid communities will respond with manpower and equipment. Other functions include:

- Assist Great Barrington personnel with road closures.
- Support evacuation procedures.
- Provide security in and around the Rising Pond Dam.
- Other typical police functions as requested by Great Barrington.

## 5.7 TYPICAL MEMA FUNCTIONS

If the Emergency Management Director from each city or town deems assistance is or may be needed, he or she may contact MEMA. Typical MEMA functions include the following:

- Dispatch MEMA personnel to coordinate support activities with the local incident commander, when appropriate.
- Activate the State Emergency Operations Center when appropriate.

- Monitor and document potential or actual emergency situations resulting from failure of the Rising Pond Dam.
- Coordinate the delivery of assistance to local governments and State agencies as requested and available.
- Brief the Governor and advise him or her as to necessary actions.
- Assist Governor's Office with emergency and non-emergency public information releases.
- Transmit warning messages over EAS when the State EOC is activated.
- Receive and evaluate Situation Reports from local governments, State agencies, and utility companies.
- Prepare thorough documentation of emergency response activities and development of post-disaster reports on overall emergency operations by State government.
- Contact National Weather Service.

## 5.8 TYPICAL MASSACHUSETTS STATE POLICE FUNCTIONS

If the Incident Commander deems assistance is or may be needed, he or she may also contact MSP. Typical MSP functions include the following if requested by the Incident Commander:

- Provide the key communication lines for rapid and simultaneous notification to local public safety within the affected inundated areas.
- Mobilize, deploy, and organize personnel for crowd and traffic control operations in support of evacuation.
- Provide personnel specifically trained in a wide range of expertise, and specialized equipment, as necessary, to support the public safety response to affected areas
- Issue initial emergency messages and situation updates and relay them via LEAPS to local public safety.
- Report damage and other vital information including road closures, bridge failures, collapsed buildings, and casualty estimates.
- Conduct search and rescue operations.
- Control access to dangerous or impassable sections of State maintained and/or State patrolled roads.
- Provide assistance as requested to local public safety forces primarily for the purposes of search and rescue, route alerting, anti-looting, traffic control, curfew enforcement, and access control.
- Provide emergency transportation for town, state/federal officials, and engineering consultants.
- Provide emergency communications links through mobile units and the State Police communications.
- Provide departmental Situation Reports to MEMA throughout the increased readiness and emergency response phases of a disaster or emergency.
- Prepare thorough documentation and debriefing of State Police emergency response activities.

## 5.9 TYPICAL BERKSHIRE COUNTY SHERIFF FUNCTIONS

If the Incident Commander deems assistance is or may be needed, he or she may also contact the Berkshire County Sheriff. Typical BCS functions include the following:

- Provide specialized equipment to assist in emergency management including light towers with generators, and traffic safety equipment including programmable highway signs and barricades.
- Conduct search and rescue operations and provide equipment for off-road rescue operations.
- Conduct boat-based or underwater search and rescue operations.
- Provide assistance as requested to local public safety forces primarily for the purposes of search and rescue, route alerting, anti-looting, traffic control, curfew enforcement, and access control.
- Provide a mobile communications center/command post, and communications equipment including VHF and multiband radios and handheld GPS units with integrated radios
- Provide departmental Situation Reports to MEMA throughout the increased readiness and emergency response phases of a disaster or emergency.
- Prepare thorough documentation and debriefing of Sheriff’s emergency response activities.

# 6.0 PREPAREDNESS

## 6.1 SURVEILLANCE PROCEDURES

The keys to the successful implementation of the EAP are the means, timeliness and accuracy of identifying potential emergencies. An emergency condition is one in which the occurrence of a significant hazard to life and/or property is possible or certain to occur (COE, 1983)[2]. Conditions justifying declaration of an emergency condition may be imminent (Condition A) or may develop over a longer term (Condition B). However, in either case, such a declaration will likely come from the General Electric Company personnel who are familiar with the operations/maintenance history and existing conditions of the Rising Pond Dam.

Accordingly, GZA presents within this section, suggested recommendations for routine observation and inspections of the dam and appurtenant structures. Early identification of the existence or potential for occurrence of such emergency conditions is essential as a basis for initiating emergency repairs and for issuing appropriate notifications. Refer to Table 8 for key items for which the dam inspector(s) should be on the lookout during dam inspections. Refer to Appendix F for images of these key items.

1. Monthly visual observations should be conducted by General Electric Company. These observations should include a walk along the structure and across the bridge downstream of the dam to check for cracks, movement, seepage, boils and/or other signs of increased leakage or other unusual occurrences at the dam. These observations should be augmented with inspections after every major storm event (exceeding approximately 3 inches of rainfall).

2. A complete visual inspection of the Rising Pond Dam should be made by an engineer registered in the Commonwealth of Massachusetts who has extensive experience in dam inspections, per Massachusetts Dam Safety Regulations 302 CMR 10.10 (2) every 5 years. The inspection reports should document existing conditions, and present recommendations for maintenance and repairs, as necessary. The inspector should use the attached checklist.

At times of high reservoir levels, the frequency of inspection should be increased as appropriate. Anticipated flows in the Housatonic River can be planned for by using the National Weather Service's Advanced Hydrologic Prediction Service (http://water.weather.gov/ahps/), which forecasts the water levels in the channel. Other cases requiring more frequent inspection include:

1. Following a seismic (e.g. earthquake) event, other disturbance, or unusual movement, an immediate and thorough inspection should be undertaken by General Electric

[2] U.S. Army Corps of Engineers, The Hydrologic Engineering Center, "Example Emergency Plan for Blue Marsh Dam and Lake," Research Document No. 19, August 1983.

Company personnel, with follow-up by a Registered Professional Engineer. These inspections should be performed whenever monthly inspectors report unusual movement or there is an earthquake with reported damage in Berkshire County.

2. Increases in the amount of seepage, formation of new seeps or boils, or turbid (muddy) discharge.

Compilation and interpretation of all inspection reports and checklists should be completed by the General Electric Company personnel and kept permanently on file.

## 6.2 RESPONSE DURING PERIODS OF DARKNESS

During normal business hours, response time of General Electric Company personnel to the site of an identified potential emergency condition would be rapid. Actual response time, especially during non-business hours, will be a function of how and by whom the initial emergency condition is discovered and by weather conditions. The Town of Great Barrington Dispatch is available 24 hours a day.

Please refer to the Notification Flowchart and Section 4.00 for special procedures for contacting General Electric Company personnel and local public safety officials.

Emergency power and remote lighting contingencies are available from the Town of Great Barrington. Additional power and remote lighting can be provided by the Berkshire County Sheriff's Office and by local Contractors at the request of the Incident Commander.

## 6.3 ACCESS TO SITE

To access the right abutment from Route 183, one turns west onto Division Street, continues for 0.9 miles and proceeds north on Van Deusenville Road for about 1.1 miles to a railroad access gate on the right. On the east, a 0.3 mile path, capable of passing vehicular traffic, leads to the right side of the dam.

## 6.4 RESPONSE DURING WEEKENDS AND HOLIDAYS

During normal business hours, response time of the General Electric and Town of Great Barrington personnel to the site of an identified potential emergency condition would be rapid. Actual response time, especially during non-business hours, will be a function of how and by whom the initial emergency condition is discovered and communicated. It will also be affected by weather conditions.

Response time could be impacted if the emergency event occurs on a weekends or holiday. The Town of Great Barrington shall attempt to minimize the impact of weekends and holidays through their preparedness measures. Emergency phone numbers listed are for dispatch centers, which are operational 24 hours per day, 7 days per week. Dispatch centers have the ability to contact individuals during weekends and holidays.

## 6.5 RESPONSE DURING PERIODS OF ADVERSE WEATHER

General Electric Company personnel will be placed on a heightened state of readiness in the event of predicted or actual adverse weather conditions. The dam is located on Park Street and can be accessed from each abutment.

## 6.6 ALTERNATIVE SYSTEMS OF COMMUNICATION

In the event of an emergency condition, primary means of notification will be made by telephone landlines or cellular telephones; however, additional/alternative communication systems are listed below. The Contact Lists provided in Tables 1 through 6 contain responder contact information available to GZA at the time that this EAP was prepared. This contact information includes emergency dispatch phone numbers, office phone numbers, cell phone numbers, home phone numbers and radio frequencies, when available.

Should the method of primary communication being used fail, responders should be prepared to utilize alternative communication systems. During an ongoing emergency, many of the communication systems listed below will be vital communication links for use in directing and coordinating emergency operations, issuing alerts and warnings, and instructing the general public.

### 6.6.1 Local Two-Way Radio

The Police, Fire, and Highway Departments in the Towns of Great Barrington and Sheffield communicate through portable radios. Each department communicates via its Emergency Services Dispatch. The following are the Towns departments' radio frequencies:

| Town | Police Department | | Fire Department | | DPW/Highway DEP. | |
|---|---|---|---|---|---|---|
| | **Frequency (MHz)** | **PL Code** | **Frequency (MHz)** | **PL Code** | **Frequency (MHz)** | **PL Code** |
| Great Barrington | 155.775 | 107.2 | 154.310 (dispatch)<br>152.9825 (response)<br><br>154.160 (tactical)<br>158.805 (tactical)<br>153.8825 (tactical) | 107.2 (dispatch)<br>131.8 (response)<br><br>107.2 (tactical)<br>107.2 (tactical)<br>D343 (tactical) | 151.760 | 118.8 |
| Sheffield | 154.950 | 107.2 | 154.310 | 107.2 | 155.955 | 107.2 |

Other radio contact capabilities include contact with Massachusetts Emergency Management Agency (MEMA), which operates on an 800 MHz trunked system, and the mobile communications system available from the Berkshire County Sherriff.

### 6.6.2 Emergency Alert System (EAS)

EAS allows government officials to access local radio and TV stations to communicate with the public in times of impending or actual emergency. To activate the EAS at the state level, a request may be directed to an Originating Primary Relay Station (usually an FM station located near the State capital) by the Governor, State Police, State Emergency Management, or the National Weather Service.

### 6.6.3 Internet Access Capabilities

The Towns of Great Barrington and Sheffield have internet access capabilities and may utilize the MEMA WebEOC portal (https://webeoc.chs.state.ma.us/eoc7/) to report an emergency condition, provide updates to MEMA and request assistance (manpower, materials, equipment, etc.) as needed.

### 6.6.4 Reverse 911

The Towns of Great Barrington and Sheffield utilize Reverse 911 (or equivalent) systems. Reverse 911 (or equivalent) systems would allow Town officials to send out pre-recorded messages to residents by telephone, during an emergency (flood) or a situation that requires public outreach to residents and businesses. Prerecorded messages would be sent out to entire communities or to specific locations depending on the nature of the emergency. In the case of a dam break flood wave, the notification system would be used to notify residents in the potential impact areas.

## 6.7 EMERGENCY SUPPLIES AND INFORMATION

### 6.7.1 Stockpiling Materials and Equipment

A list of emergency supplies is kept on hand within the Town of Great Barrington's Comprehensive Emergency Management Plan, which is available to the local emergency management agency and police department. The General Electric Company has selected an Emergency Response Contractor to respond to an emergency situation at the dam: LB Corporation, whose contact information is provided in Table 6. The Town of Great Barrington DPW and Town of Sheffield DPW should be prepared to respond with additional equipment, material and labor as required.

6.7.2 Coordination of Information

The Glendale Dam is located on the Housatonic River in Stockbridge, Massachusetts approximately 3½ to 4 miles upstream of Rising Pond Dam. The Glendale Dam has the capability to regulate flow via the dam powerhouse. The Glendale Dam is reportedly owned by the Littleville Power Company, Inc., a subsidiary of Enel Green Power, and is operated under a FERC license for electric power generation. The owner/operator can be reached at 978-681-1900[3]

Willow Mill Dam is operated by Onyx Specialty Papers and is located about 10 miles upstream of Rising Pond Dam. The owner/operator can be reached at 413 243-1231.[4]

6.7.3 Other Site-Specific Actions

Under the direction of the Incident Commander, the Town of Great Barrington employees may provide manpower to perform emergency repair activities. If additional manpower is required, the Town of Great Barrington may request the assistance of the National Guard through MEMA. The General Electric Company has an on-call relationship with local contractors who will assist as needed.

[3] Phone number obtained during May 2014 EAP update from the Enel Green Power website at http://www.enelgreenpower.com/en-GB/ena/contacts/contacts_1/

[4] Phone number obtained during May 2014 EAP update from the Onyx Specialty Papers website at http://onyxpapers.com/

## 7.0 INUNDATION MAPS

Note that the inundation maps available in **Appendix E** include a limited number of key landmarks within the impact area and presents estimated flood zones. However, the map does not include all possible structures and facilities that may be impacted due to a dam break of Rising Pond Dam. It is incumbent upon the Towns of Great Barrington and Sheffield to locate key local landmarks and modify the inundation maps, as they deem appropriate.

# Tables

**TABLE 1**

**GENERAL ELECTRIC COMPANY CONTACT LIST**

General Electric Company
159 Plastics Avenue
Pittsfield, MA 01201

| Name | Title | Telephone No. |
|---|---|---|
| Kevin Mooney | GE Facility Manager | (413) 553-6610 office<br>(413) 441-4619 cell |
| Matthew Calacone | GE Alternate Facility Manager | (413) 553-6614 office<br>(413) 822-0082 cell<br>(518) 274-0655 (home) |
| Pittsfield Plant Security | GE Emergency Line | (413) 553-6625 24-hr |

**TABLE 2**

TOWN OF GREAT BARRINGTON COMMUNITY ALERT LIST

| City/Town | Name/Dept. | Position/Title | Address | Telephone No. |
|---|---|---|---|---|
| Great Barrington | **Police Department / Emergency Management** William Walsh, Jr. | Chief | 465 Main Street | 911<br>(413) 528-0306<br>Freq: 155.775 / PL 107.2 |
| | **Fire Department** Charles Burger | Chief | 37 State Road | 911<br>(413) 528-0788<br>Freq: 155.310 / PL 107.2 |
| | **Board of Selectmen** Sean Stanton | Town Manager | 334 Main Street | (413) 528-1619 ext. 2 |
| | **Department of Public Works** Sean VanDeusen | Superintendent | 334 Main Street | (413) 528-0867<br>Freq: 151.760 / PL 118.8 |

**TABLE 3**

TOWN OF SHEFFIELD COMMUNITY ALERT LIST

| City/Town | Name/Dept. | Position/Title | Address | Telephone No. |
|---|---|---|---|---|
| **Sheffield** | **Police Department / Emergency Management**<br>Eric R. Munson, III | Chief / Director | 10 South Main Street<br>(PO Box 186) | 911<br>(413) 229-8522 / -8523<br>Freq: 154.950 / PL 107.2 |
| | **Berkshire County Sheriff's Communication Center** | Desk Officer/ Dispatcher | 467 Cheshire Road<br>(Pittsfield) | 911<br>(413) 442-0512<br>(413) 445-4559 |
| | **Fire Department**<br>Brent Getchall | Chief | 65 Depot Street<br>(PO Box 860) | 911<br>(413) 229-7033<br>Freq: 154.310 / PL 107.2 |
| | **Board of Selectmen**<br>David A. Smith, Jr. | Chairman | 21 Depot Square<br>(PO Box 325) | 413-229-7000 ext. 152 |
| | **Highway Department**<br>Edward Pickert | Highway Superintendent | Pike Road East<br>(PO Box 325) | (413) 229-7030<br>Freq: 155.955 / PL 107.2 |

**TABLE 4**

STATE AGENCY ALERT LIST



| Location | Name/Contact | Address | Telephone No. |
|---|---|---|---|
| Lee, MA | State Police<br>Troop B-1 SP | 215 Laurel Street<br>Route 20<br>Lee, MA 01238 | (413) 243-0600 |
| Northampton, MA | State Police<br>Troop B Headquarters | 555 North King Street<br>Northampton, MA 01060 | (413) 587-5517 |
| Framingham, MA | State Police Communication Center | 470 Worcester Road<br>Framingham, MA 01702-5399 | (508) 820-2121 |
| Framingham, MA | Massachusetts Emergency<br>Management Agency (MEMA)<br>Executive Office | 400 Worcester Road<br>Framingham, MA 01702-5399 | (800) 982-6846<br>(508) 820-2000 (24 hrs) |
| Boston, MA | Department of Conservation<br>and Recreation - Office of Dam<br>Safety | 251 Causeway Street<br>Suite 800<br>Boston, MA 02114-2104 | (617) 626-1410 (Office)<br>(617) 719-1942 (Cell)<br>or<br>(617) 828-1649 (Cell) |
| Agawam, MA | Massachusetts Emergency<br>Management Agency (MEMA)<br>Region 3 | 1002 Suffield Street<br>Agawam, MA 01001 | (413) 750-1400 |
| Springfield, MA | Massachusetts Department of<br>Environmental Protection (MassDEP) | 436 Dwight Street<br>Springfield, MA 01103 | John Ziegler:<br>(413) 755-2228 |
| Hartford, CT | Connecticut Department of Energy and<br>Environmental Protection (CTDEEP) | 79 Elm Street<br>Hartford, CT 06106 | Emergency Response &<br>Spill Prevention<br>(860) 424-3338<br>Additional Emergency Contact:<br>(866) 337-7745 |
| Boston, MA | U.S. Environmental Protection<br>Agency (EPA) | EPA Region 1<br>1 Congress Street<br>Boston, MA 02114 | Pittsfield/Housatonic Office:<br>(413) 236-0969<br>Emergency Reponse Duty Desk:<br>(617) 918-1236 |

Notes:
1. All parties on this list are to be notified for Condition A.
2. MassDEP, CTDEEP, and EPA are to be notified for Condition B as appropriate under the requirements of the Consent Decree for the GE-Pittsfield/Housatonic River Site.

**TABLE 5**

MAJOR UTILITIES LIST

| Name | Telephone No. |
|---|---|
| **<u>Telephone</u>**<br><br>Verizon | <br><br>(800) 870-9999<br>Emergency Repair - Residence: (413) 555-1611<br>Emergency Repair - Business: (413) 555-1515 |
| **<u>Electric</u>**<br><br>National Grid<br>(Western Massachusetts Electric) | <br><br>Emergency: (800) 465-1212 |
| **<u>Gas</u>**<br><br>Berkshire Gas | <br><br>Emergency: (888) 779-8559 |

Note:

This list has been provided for general reference purposes and is not intended to be an all-inclusive list of major utilities within the potential downstream impact area. Primary responsibility for notifying key utilities, rail lines, etc. will rest with the public safety agencies of the individual community.

**TABLE 6**

**GENERAL ELECTRIC EMERGENCY RESPONSE CONTRACTOR LIST**

| | | |
|---|---|---|
| Thomas R. Garrity | LB Corporation | (413) 243-1072 office<br>(413) 441-9317 cell |
| Thomas M. Garrity | LB Corporation | (413) 243-1072 office<br>(413) 441-9318 cell |
| Steve Garrity | LB Corporation | (413) 243-1072 office<br>(413) 441-1412 cell |

**TABLE 7**

GUIDANCE FOR DETERMINING THE EMERGENCY CONDITION

| Event | Situation | Emergency Condition* |
|---|---|---|
| Spillways | Principal spillway blocked with debris and pool is rapidly rising | B |
| | Principal spillway severely blocked with debris or structurally damaged | NE |
| | Principal spillway leaking | NE |
| Flooding | Flood flows are overtopping the dam | A |
| | The reservoir elevation reaches the predetermined evacuation trigger elevation 725.8 NGVD (i.e. 0.5 feet below top of embankment) | A |
| | The reservoir elevation reaches the predetermined notification trigger elevation 725.3 NGVD (i.e. 1.0 foot below top of embankment; Consider rate of rise) | B |
| | National Weather Service issues a flood warning for the area | NE/NF |
| Seepage | Boils observed downstream of dam with cloudy discharge | B |
| | New seepage areas with cloudy discharge or increasing flow rate | B |
| | New seepage areas in or near the dam | NE |
| | Boils observed downstream of dam | NE |
| Sinkholes | Rapidly enlarging sinkhole | A |
| | Observation of new sinkhole in reservoir area or on embankment | B |
| Embankment Cracking | Cracks in the embankment with seepage | B |
| | New cracks in the embankment greater than 1/4-inch wide without seepage | NE |
| Embankment Movement | Sudden or rapidly proceeding slides of the embankment slopes | A |
| | Visual movement/slippage of the embankment slope | NE |
| Instruments | Instrumentation readings beyond predetermined values | NE |
| Earthquake | Earthquake resulting in uncontrolled release of water from the dam | A |
| | Earthquake resulting in visible damage to the dam or appurtenances | B |
| | Measurable earthquake felt or reported on or within 50 miles of the dam | NE |
| Security Threat | Detonated bomb that has resulted in damage to the dam or appurtenances | A |
| | Verified bomb threat that, if carried out, could result in damage to the dam | B |
| Sabotage / Vandalism | Damage to dam or appurtenances that has resulted in uncontrolled water release | A |
| | Damage to dam or appurtenances that has resulted in seepage flow | B |
| | Modification to the dam or appurtenances that could adversely impact the functioning of the dam | NE |
| | Damage to dam or appurtenances with no impacts to the functioning of the dam | NE |

* Emergency Conditions:

A: Urgent; dam failure appears imminent or is in progress

B: Potential dam failure situation, rapidly developing

NE: Non-emergency, unusual event, slowly developing

NF: Non-failure emergency condition, no danger of dam failure, only flooding concerns

Note: This table is based upon the 2007 ASDSO sample EAP format.

**TABLE 8**

EMERGENCY REPAIR GUIDELINES

| Observed Conditions | Potential Effects of the Observed Conditions | Guide for Action | Data to be Reported Situation Report | Remarks |
|---|---|---|---|---|
| 1. CRACKS/DISPLACEMENT in Dam | Not serious, if minor axial cracks in crest. If crack does not extend completely through the dam and no movement or displacement is evident, gradual surficial cracking and/or deterioration of concrete or masonry may not be serious. | Start repairs as soon as possible. Mobilize construction equipment and manpower to perform necessary repairs.<br><br>Contact professional dam engineer to assess condition | Location, width, length, and pattern (horizontal, vertical, or in some intermediate direction). Record pond elevation. | Observe daily until repair work is complete. NOTE: Although cracks can develop anywhere, the most likely location is at transition zones. |
| | Could cause failure, if crack extends completely through the dam or if recent movement or displacement of concrete or masonry is evident | Backfilling or other means of filling the crack will be required after the extent of the crack is determined. | Same as above. **Activate EAP. (Situation B).** | Observe hourly until repair work is completed. |
| | Failure imminent, if cracks extend completely through the dam and water is entering the crack and emerging on the downstream side at an increasing rate or if large sections of concrete or masonry have displaced significantly or fallen off the dam. | Replace and reinforce behind the area of shifted concrete/masonry with large rip rap to form a buttress. Plug the crack on upstream side to the extent possible using stone and gravel (or with other suitable material larger than the crack width) before adding sand or impervious material. After slowing flow, place two layers of geotextile filtration fabric across small cracks and cover with fine grained or impervious soil. This procedure will help prevent the washing out of the finer materials through the crack. The work should be started nearest the water surface on the upstream side. | Location, width, lengths and pattern of crack; also flow rate of downstream exit. **Activate EAP. (Situation A).** | Observe constantly. |

| Observed Conditions | Potential Effects of the Observed Conditions | Guide for Action | Data to be Reported Situation Report | Remarks |
|---|---|---|---|---|
| 2. LEAKAGE (THROUGH CONCRETE OR MASONRY)<br>a. Moist or wet surfaces | This may be due to cracks, deteriorated or porous concrete, open joints or plugged drains. This may not be serious or it could be the start of a serious problem. | Review to see if conditions relating to 1 applies and pursue same remedial actions. | Note the time, size, and location of leakage area and approximate flow rate. | Observe at least once per day until sure that leakage does not change into one of the conditions noted below. |
| b. Concentrated | Not serious.<br>No loss of concrete or unusual movement. Rate of flow not increasing. Flow is clear. | Map location of all leaks, determine path of water if feasible through the use of dye tests. Report to the Consultant Engineer. | Note the time, size and location of leakage area and approximate flow rate. | Monitor quantities and relate to reservoir elevation and other potential influencing conditions. |
| | Could lead to failure.<br>Increase in flow or leakage leading to deterioration, movement, and weakening. | Same as above and:<br>Specifically assess hazards associated with cracks/ displacement above and pursue same remedial actions. Control leakage with drainage system and channel uncontrolled flows. Protect eroded areas with concrete, gunite, rock, or gabions. | Note the time, size, and location of leakage area and approximate flow rate.<br><br>**Activate EAP (Type B)** | Same as above. Monitor condition hourly, until otherwise notified by Consultant Engineer. |
| 3. SEEPAGE<br>a. Wet surface area, located on downstream abutment slope or otherwise normally dry areas downstream of the dam, with very little or no surface water, or very minor seeps. | This may be caused by infiltration of rain water which is not serious, or may be the start of a serious seepage problem, which could be indicated by a quick change to one of the conditions below. | Compare to previously reported conditions under similar weather conditions. Perform complete visual inspection of abutment and downstream area. If situation cannot be fully explained by weather conditions, contact Consultant Engineer. | Note the time, size and location of seepage area, and quantity of surface water; report to dam supervisor. | Observe at least once a day until sure that seepage does not change into one of the conditions noted below. |
| b. Same wet area as above, with moderate seeps of clear or relatively clear water. | Not serious. Clear seep water and rate of flow not increasing. | Measure flow rate, inspect all downstream areas, and report any new seepage locations and conditions. | Note the time, size and location of seepage area, and approximate flow rate. | During flood stages the seepage area must be monitored daily for deteriorating conditions (increase in flow or material discharge). |
| | Could lead to failure.<br>Relatively clear seep water, but rate of flow increases by minutes or hours. | Same as above. | Note the time, size and location of seepage area, and approximate flow rate. **Activate EAP (Situation B)** | Same as above. Monitor condition hourly. |

| Observed Conditions | Potential Effects of the Observed Conditions | Guide for Action | Data to be Reported Situation Report | Remarks |
|---|---|---|---|---|
| c. <u>Boils</u> - Soil particles forming a cone deposited around water discharge point. (Boils can vary from a few inches in diameter spaced to 2 to 3 feet apart to isolated boils several feet in diameter.) | <u>Not serious.</u> Emerging water in developed cone is clear and rate of flow is not increasing. | Check all downstream areas for other boils or seeps. | Note that time, size and location of seepage area, and approximate flow rate or velocity. | Observe at least once a day. |
| d. Piping - (seepage with removal of material through abutments), moderate to active. | <u>Could lead to failure</u>.<br>Emerging water is muddy and rate of flow is increasing. | Temporarily control the seepage by ringing the area with a sandbag dike (see Figures 3 and 4 for schematic on ringing a boil). The dike should be constructed to provide sufficient flow reduction to prevent loss of material at the surface.<br><br>If boils become so large that it is not practical to dike around them, place a coarse, granular blanket over the area, but do not stop the flow of water. | Note that time, size and location of seepage area, and approximate flow rate. **<u>Activate EAP</u>. (Situation B)** | Monitor constantly. |
| | <u>Failure imminent</u>.<br>Emerging water is turbid (muddy), rate of flow increasing, and if there is upstream swirl (whirlpool) caused by water entering at the abutments. | Control seepage on downstream side of embankment as discussed above. Plugging of the upstream entrance of the pipe should be attempted. (See Observed Condition 5 below.) | Note the time, size and location of seepage conditions and approximate size of whirlpool.<br>**<u>Active EAP</u>. (Situation A).** | Observe constantly. |
| 4. SINKHOLES<br>a. Above piping or tunnel in abutment. | Could lead to failure if problem occurs in conjunction with piping (or boils) problem. | If in conjunction with boils problem, place inverted granular blanket material in sinkhole. Check area for other sinkholes or seeps. | Same as above plus description and size of cracks or damage and seepage into conduit.<br>**<u>Activate EAP</u>. (Situation B).** | Observe constantly. |
| b. Above Outlet works conduit. | Could lead to failure if conduit cracks and structural damage results. | Check conduit for cracks or damage and repair as soon as possible. | Same as above plus description and size of cracks or damage and seepage into conduit.<br>**<u>Activate EAP</u>. (Situation B).** | Observe constantly. |

| Observed Conditions | Potential Effects of the Observed Conditions | Guide for Action | Data to be Reported Situation Report | Remarks |
|---|---|---|---|---|
| 5. RESERVOIR WHIRLPOOLS | Usually caused by water flowing through a piping tunnel through the dam or abutment. | Lower the pool. An attempt should be made to plug the entrance with cobbles/boulders or stockpiled materials or anything else that is available. If the large material placed in the hole appears to have reduced the flow, continue adding progressively smaller material. When the flow is sufficiently reduced (Whirlpool disappears) place a granular blanket over the downstream outlet of the piping as noted above for problem, i.e., piping. Inspect abutments, dam, and downstream of dam for seepage areas, sinkholes, boils, etc. | Note the time observed, condition noted, location, and approximate size of whirlpool and the exit area downstream. **Activate EAP**. **(Situation B).** | Observe constantly for changes in the pond or the exit area. |
| 6. SLIDES<br>Upstream slope of abutments | Not serious, if slide does not intersect the crest or extend into the embankment more than 5 feet (measure perpendicular to the slope). | Start repairs as soon as possible. Mobilize town construction equipment and manpower or private contractor to perform necessary repairs. | Note: Location, time first observed, subsidence or building, whether water is emerging from slope, whether any movement can be visually detected and pool elevation. | Observe at least once a day. |
| | Could lead to failure, if slide passes through the crest, and water surface within 10 feet of the slumped crest. | Have labor, materials and equipment standing by as soon as possible. Start repairs as soon as possible. | Report same data as above. **Activate EAP. (Situation B).** | Observe constantly until necessary repairs are completed. |
| | Failure imminent, if: (1) the slide passes through the crest; and, (2) the water surface is at or near (less than 10 feet below) the top of the slumped crest. | Start lowering the reservoir. Use every means possible to armor the crest and to restore to original crest level. | Note: the time first observed location, whether water is emerging from downstream slope, whether any movement can be visually detected. **Activate EAP (Situation A).** | Observe constantly. |

| Observed Conditions | Potential Effects of the Observed Conditions | Guide for Action | Data to be Reported Situation Report | Remarks |
|---|---|---|---|---|
| 7. OVERTOPPING | Could cause failure, if water surface elevation is approaching the top of the dam and there is the potential for erosion of the downstream face or if the water surface elevation is at or above | Increases releases through outlet structures if possible. Increase freeboard by building a sandbag berm, or an earthen berm or parapet wall that is covered with a | Note the time, location and height of overtopping and the length of the crest that is being overtopped. Note the size of the area that is being eroded. **Activate EAP (Situation B)** | Observe constantly. |
| | Failure imminent, if significant erosion is observed on the downstream face of the dam or if a significent decrease in crest width occurs as a result of the erosion. | Construct an auxillary spillway on an abutment. Dig a channel (starting from the bottom at the abutment/ downstream channel contact). Line the channel with filter fabric and dump | Note the time, location and height of overtopping and the length of the crest that is being eroded. **Activate EAP (Situation A)** | Observe constantly. |
| | | If riprap is depleted, sandbags may be placed in the scarp area. Each bag should be filled with sand and tied to prevent loss of material. Placement should be by hand, sling, or other methods that would prevent tearing of the bags. Bags filled with clay and silts may be used only if sand is not readily available and other methods of repair cannot be implemented. | | |

**TABLE 9**
UNUSUAL OR EMERGENCY EVENT LOG
(to be completed during the emergency)

Rising Pond Dam
Great Barrington, Massachusetts

When and how was the event detected? ______________________________________________
________________________________________________________________________________
________________________________________________________________________________

Weather conditions: _______________________________________________________________
________________________________________________________________________________

General description of the emergency situation: ________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Emergency level determination: ______________ Made by: ____________________________

## Actions and Event Progression

| Date | Time | Action/event progression | Taken by |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Report prepared by: ________________________________________ Date: _______________

**TABLE 10**
EAP UPDATE LOG



Rising Pond Dam
Great Barrington, Massachusetts

## EAP Updates

| **Date** | **EAP Update Description** | **Updated by** |
|---|---|---|
| 10/2015 | Reformatted to comply with DCR Regulations and incorporate comments | GZA |
| 12/2017 | Validated protocol and updated responsible parties' information | GZA |
| | | |
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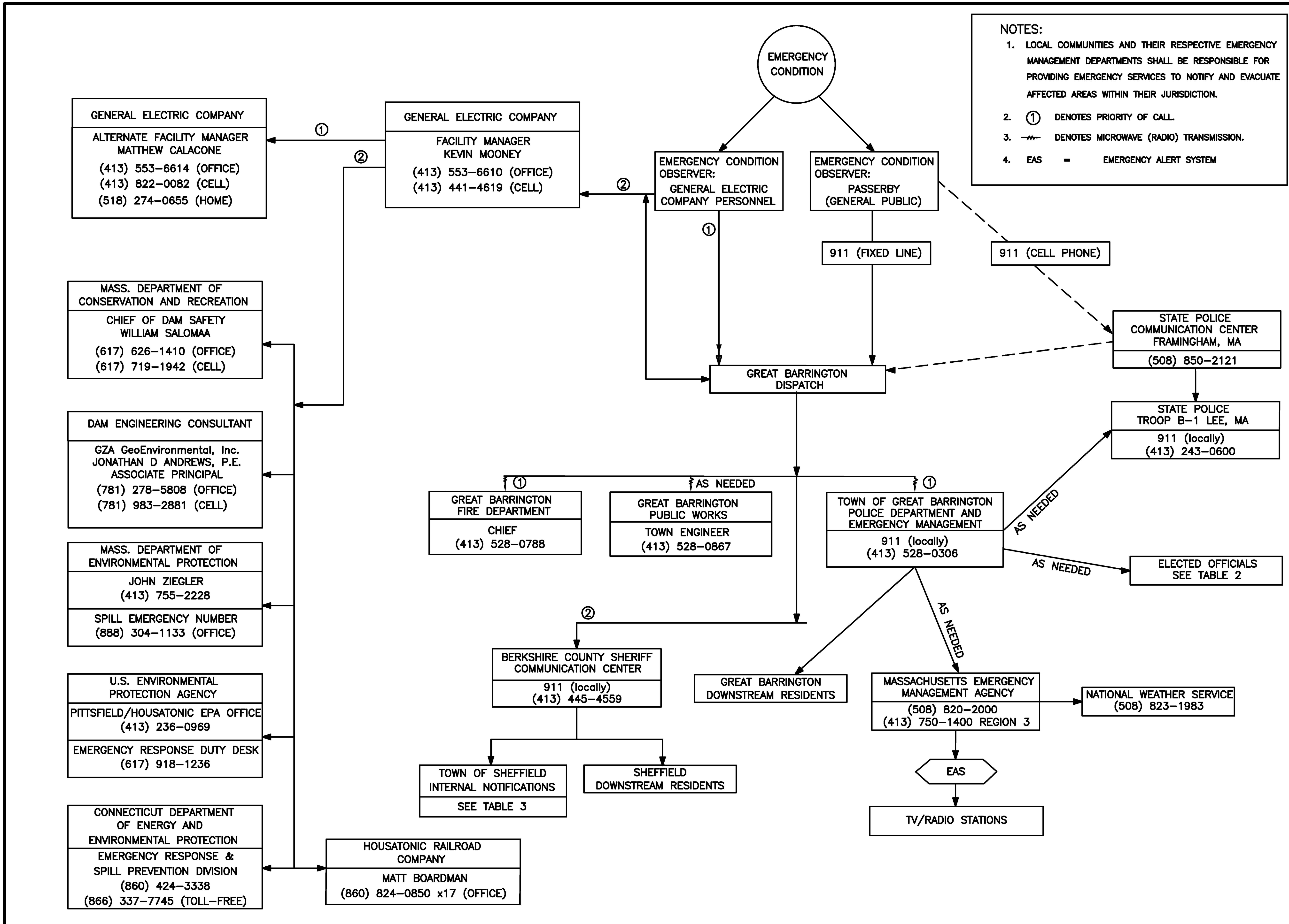
| | | |
| | | |

# Figures




RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA

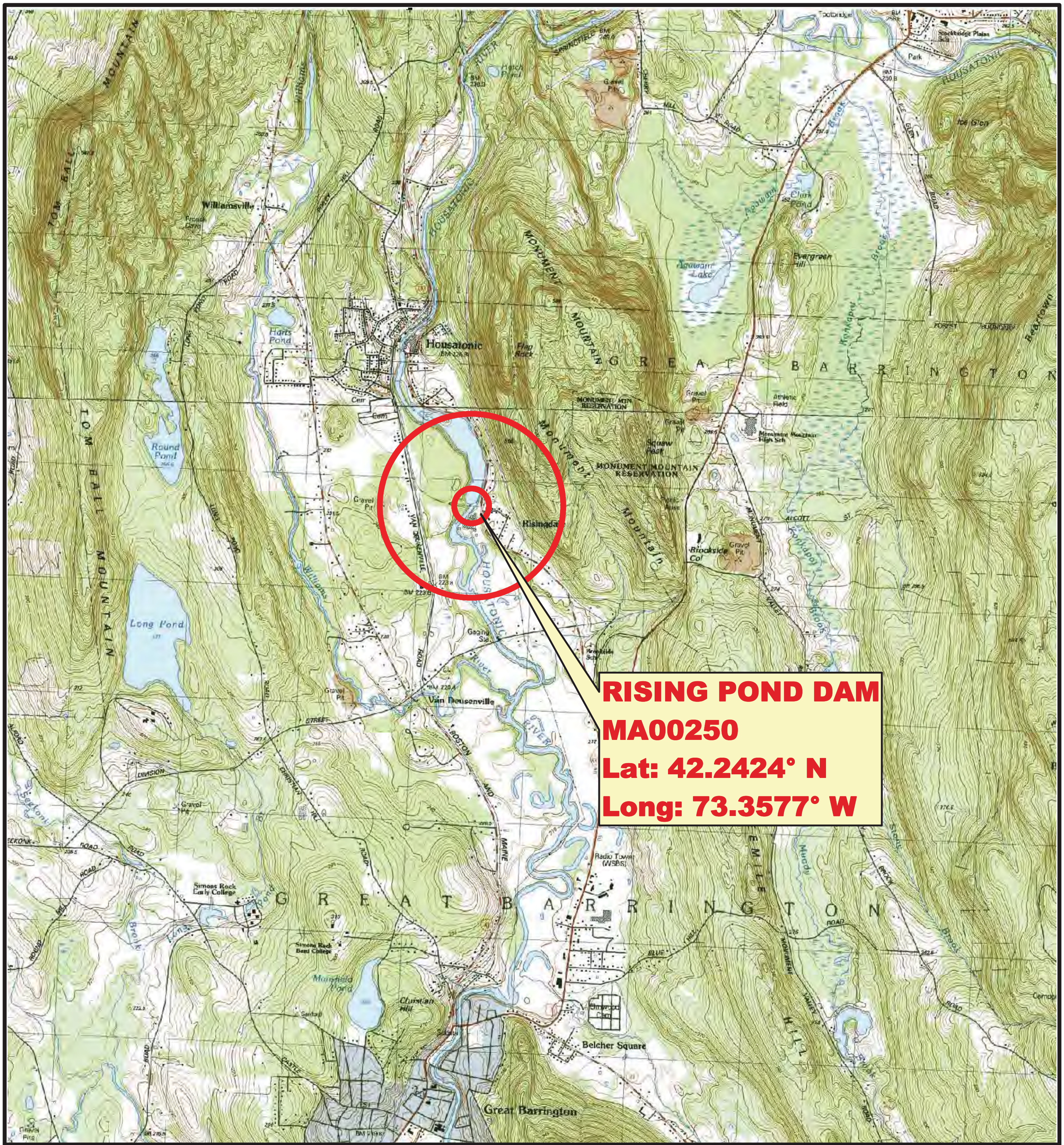
NOTIFICATION FLOWCHART

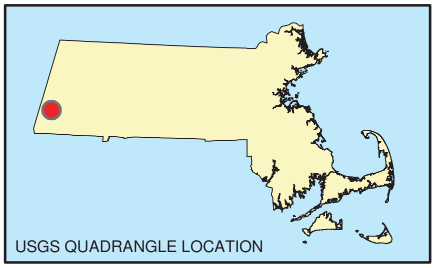
PROJ MGR: JDA
DESIGNED BY: GWH
REVIEWED BY: JDA
OPERATOR: GWH
DATE : DECEMBER 2017

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278-3700
Fax: (781) 278-5701

PROJECT NO. 19896.50

FIGURE NO. 1




SOURCE : SCANNED USGS TOPOGRAPHIC QUADRANGLES SCANNED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS, MASSGIS. DISTRIBUTED JUNE, 2001.

GREAT BARRINGTON TOPOGRAPHIC QUAD SHOWN.

0 2,000 4,000 8,000 12,000 Feet

Data Supplied by :

N W E S

| PROJ. MGR.: JDA<br>DESIGNED BY: LGM<br>REVIEWED BY: ABB<br>OPERATOR: LGM<br><br>DATE: 12-04-2013 | LOCUS PLAN<br><br>RISING POND DAM, MA00250<br>GREAT BARRINGTON, MASSACHUSETTS | JOB NO.<br>01.0019896.30<br><br>FIGURE NO.<br>2 |
|---|---|---|

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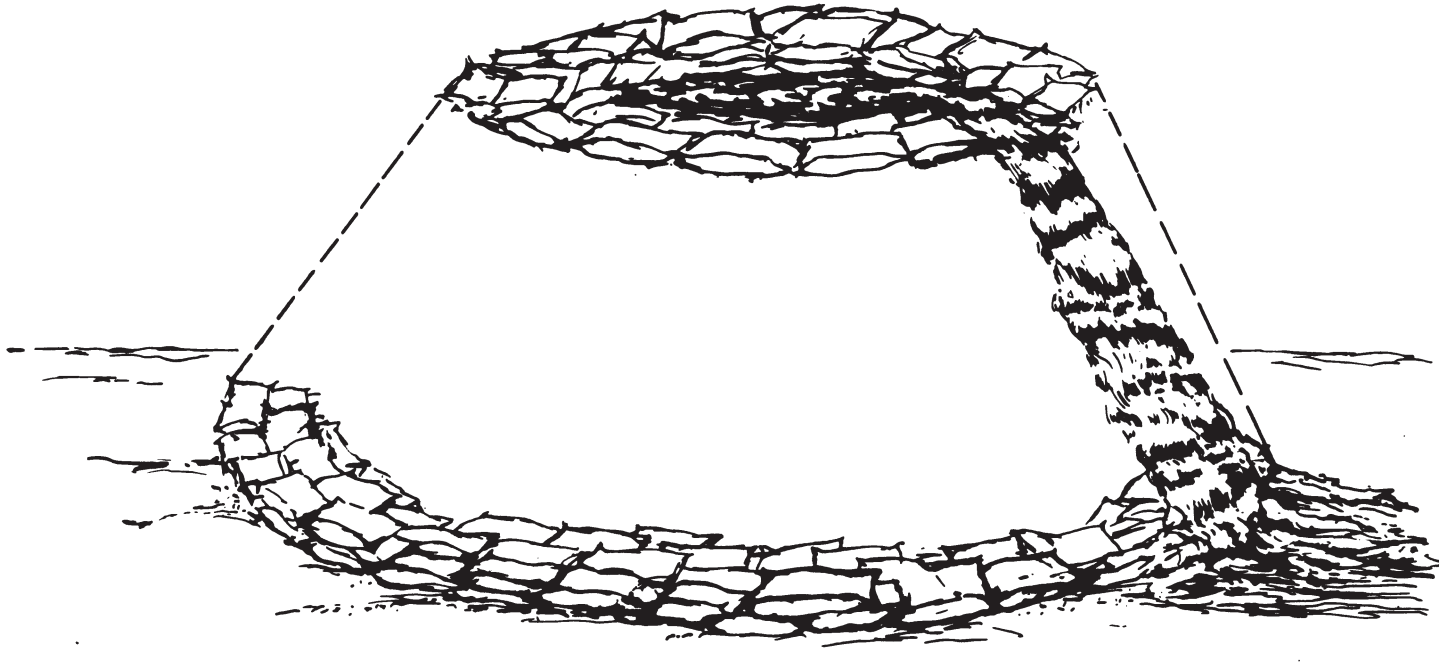


## APPROXIMATE CONSTRUCTION REQUIREMENTS

| BOIL DIA. (ft) | 2 | | | 4 | | | 6 | | | 8 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RING HEIGHT (ft) | 2 | 4 | 6 | 2 | 4 | 6 | 2 | 4 | 6 | 2 | 4 | 6 | 2 | 4 | 6 |
| VOL. SAND REQ. (yd.$^3$) | 1 | 7 | 18 | 2 | 9 | 21 | 3 | 11 | 25 | 3 | 13 | 29 | 4 | 14 | 33 |
| SANDBAGS REQUIRED | 124 | 475 | 1150 | 160 | 600 | 1400 | 197 | 707 | 1600 | 233 | 824 | 1850 | 270 | 921 | 2100 |
| PERSONNEL REQUIRED | 5 | 5 | 5 | 10 | 10 | 10 | 20 | 20 | 20 | 25 | 25 | 25 | 30 | 30 | 30 |
| TIME TO COMPLETE (hrs.) | 1 | 3 | 7 | 1 | 3 | 5 | 2 | 3 | 4 | 2 | 3 | 4 | 2 | 3 | 4 |

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. 3

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

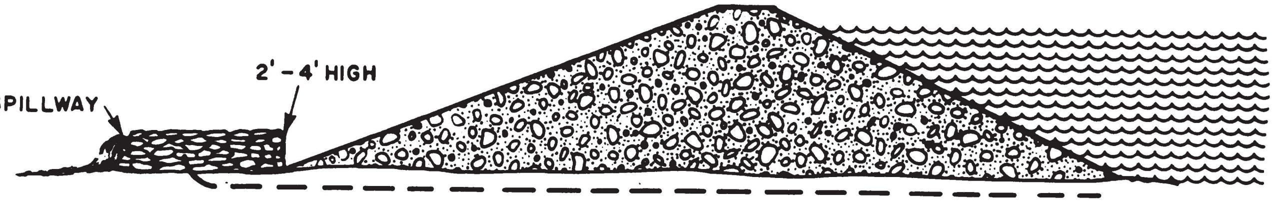
BOIL RING

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM

DATE: DEC 2013

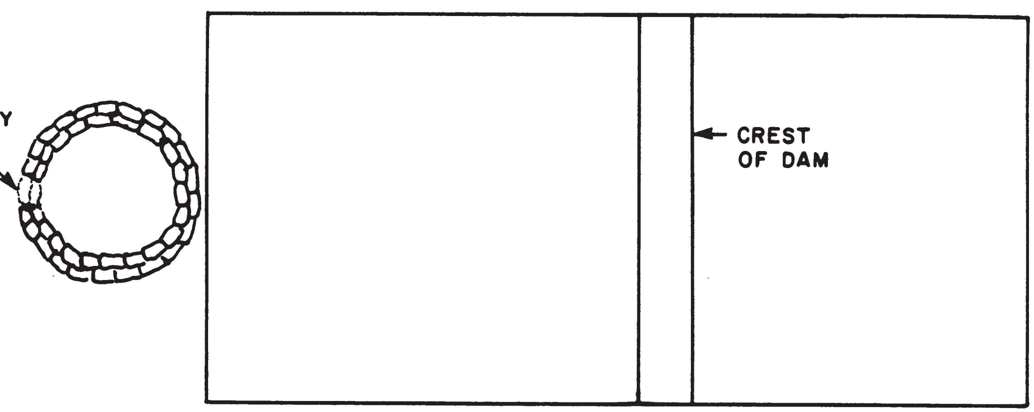
NOT TO SCALE

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278-3700
Fax: (781) 278-5701




## ELEVATION

WALL SHOULD BE BUILT ON FIRM FOUNDATION, WITH WIDTH OF BASE AT LEAST 1 1/2 TIMES THE HEIGHT. BE SURE TO PLACE SACKS ON GROUND CLEAR OF SAND DISCHARGE. TIE INTO DAM IF BOIL IS NEAR TOE.




## PLAN

DO NOT SACK BOIL WHICH DOES NOT PUT OUT MATERIAL. HEIGHT OF SACK LOOP OR RING SHOULD BE ONLY SUFFCIENT TO CREATE ENOUGH HEAD TO SLOW DOWN FLOW THROUGH BOIL SO THAT NO MORE MATERIAL IS DISPLACED AND BOIL RUNS CLEAR. DO NOT TRY TO STOP FULLY, FLOW THROUGH BOIL.

FIGURE NO. 4

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

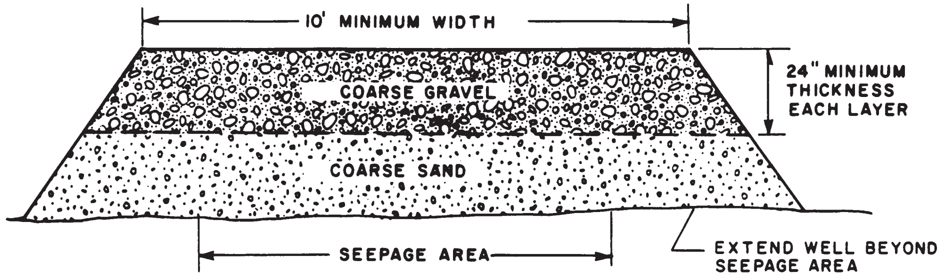
# BOIL RING MAINTENANCE INSTRUCTIONS

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM
DATE: DEC 2013

NOT TO SCALE

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278-3700
Fax: (781) 278-5701

GZA–J:\19,000–20,999\19896\19896–30.JDA\EAP Update – Rising\Rising\Figures\FIG–5.DWG [Layout1] December 24, 2013 – 11:42am laurie.miller




GRANULAR BLANKET

## APPROXIMATE CONSTUCTION REQUIREMENTS

| BLANKET AREA ($ft.^2$) | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 7,000 | 8,000 | 9,000 | 10,000 |
|---|---|---|---|---|---|---|---|---|---|---|
| MATERIAL REQUIRED PER LAYER ($yd.^3$) | 40 | 80 | 120 | 150 | 190 | 225 | 270 | 300 | 330 | 370 |
| NO. TRUCKS & DRIVERS | 3 | 3 | 6 | 6 | 6 | 8 | 10 | 10 | 12 | 12 |
| NO. GRADERS & OPERATORS | 5 | 5 | 10 | 10 | 15 | 15 | 15 | 20 | 20 | 20 |
| TOTAL TIME REQUIRED (hrs) | 4 | 8 | 6 | 8 | 8 | 8 | 8 | 8 | 9 | 10 |

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. 5

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

GRANULAR BLANKET

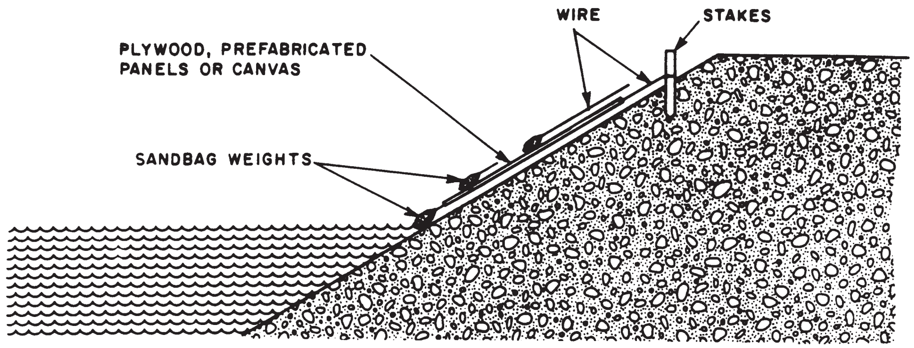
PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM

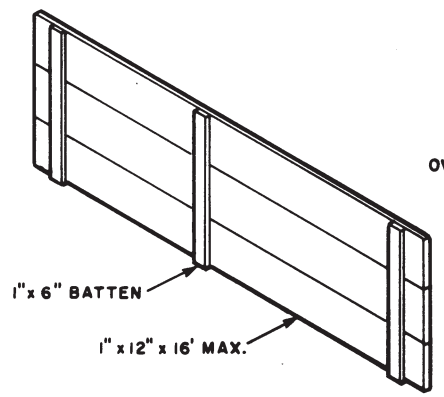
DATE: DEC 2013

NOT TO SCALE

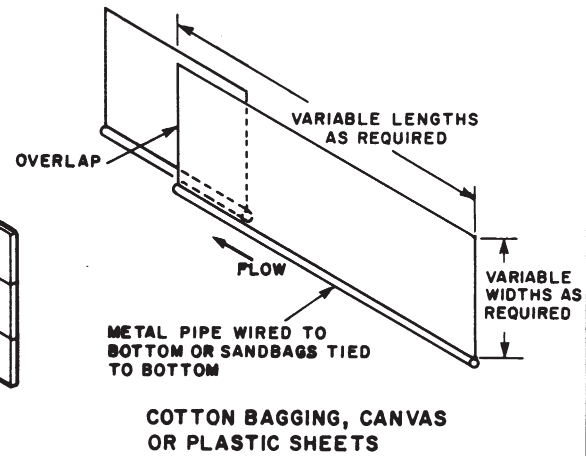
GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
Ph.: (781) 278–3700
Fax: (781) 278–5701

GZA-J:\19,000-20,999\19896\19896-30.JDA\EAP Update – Rising\Rising\Figures\FIG-6.DWG [Layout1] December 24, 2013 – 11:43am laurie.miller




PREFABRICATED PANELS




COTTON BAGGING, CANVAS OR PLASTIC SHEETS

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. 6

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

# TEMPORARY EROSION PROTECTION

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM

DATE: DEC 2013

NOT TO SCALE

GZA GeoEnvironmental, Inc.
249 VANDERBILT AVENUE
NORWOOD, MA 02062
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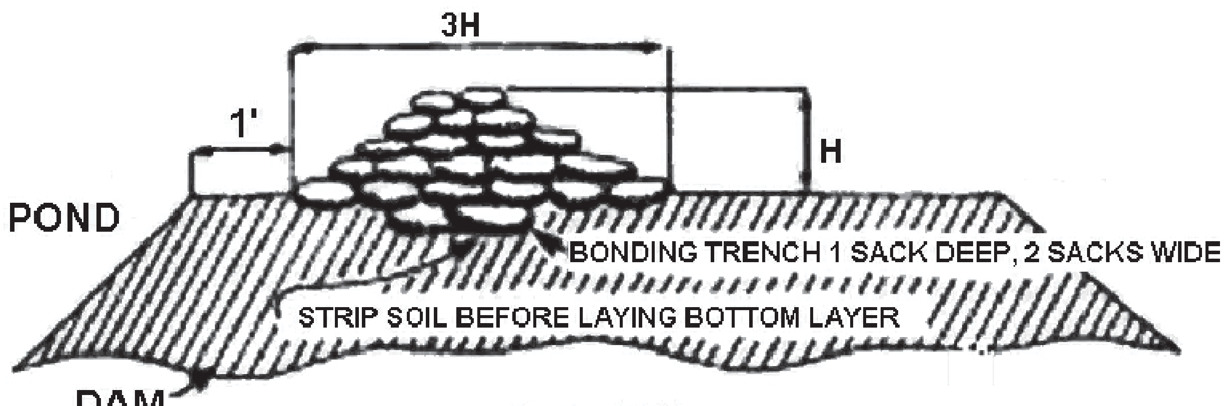
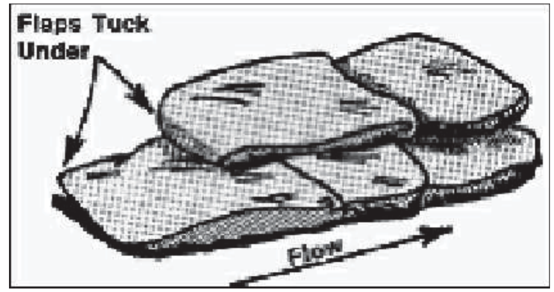



SECTION




| HEIGHT OF BERM | BAGS/100FEET |
|---|---|
| 1 FOOT | 800 |
| 2 FEET | 2000 |
| 3 FEET | 3400 |

Notes:

1) **Sandbag Preparation**
   a. Utilize polypropylene or burlap bags about 14" - 18" wide and 30" -36" deep.
   b. A heavy bodied or sandy soil is most desirable for filling sandbags. On-site soil sources may be utilized, as appropriate.
   c. Bags should be filled between one-third (1/3) to one-half (1/2) of their capacity. This keeps the bag from getting too heavy, and permits the bags to be stacked with a good seal.
   d. Untied sandbags are recommended for most situations. Tied sandbags should be used only for special situations when pre-filling and stockpiling may be required, or for specific purposes such as filling holes, holding objects in position, or to form barriers backed by supportive planks. Tied sandbags are generally easier to handle and stockpile.
2) **Sandbag Placement**
   a. Remove any debris from the area where the bags are to be placed.
   b. Fold the open end of the unfilled portion of the bag to form a triangle. If tied bags are used, flatten or flare the tied end.
   c. Place the partially filled bags lengthwise and parallel to the direction of flow, with the open end facing against the water flow.
   d. Tuck the flaps under, keeping the unfilled portion under the weight of the sack.
   e. Place succeeding bags on top, offsetting by one-half (1/2) filled length of the previous bag, and stamp into place to eliminate voids, and form a tight seal.
   f. Stagger the joint connections when multiple layers are necessary. For unsupported layers over three (3) courses high, use the pyramid placement method.
3) **Pyramid Placement Method**
   The pyramid placement is used to increase the height of sandbag protection.
   a. Place the sandbags to form a pyramid by alternating header courses (bags placed crosswise) and stretcher courses (bags placed lengthwise).
   b. Stamp each bag in place, overlap sacks, maintain staggered joint placement, and tuck in any loose ends.
   c. Use the table on this Figure to estimate the number of bags required

SOURCE: NEW ENGLAND DIVISION ARMY CORPS OF ENGINEERS

FIGURE NO. 7

JOB NO. 19896.30

RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MASSACHUSETTS

SANDBAG BERM CONSTRUCTION

PROJ MGR: JDA
DESIGNED BY: DML
REVIEWED BY: ABB
OPERATOR: LGM

DATE: DEC 2013

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# Appendix A

## Investigation and Analysis of Dambreak Floods

# APPENDIX A

## DAM BREAK ANALYSIS[1]

The objective of this analysis was to determine the resultant flooding depths caused by a breach of the Rising Paper Dam and to estimate the travel time of the flood wave as it progresses downstream. Rising Paper Dam is located on the Housatonic River in Risingdale (Great Barrington), Massachusetts. This analysis was performed using the National Weather Service (NWS) analytical procedure Simplified Dam Break (SMPDBK) Flood Forecasting Model. The dam break scenario consisted of a full breach of the dam while the watershed underwent a storm event equivalent to the 100-year flood.

SMPDBK first computes the peak outflow at the dam based on the reservoir size and the breach geometry. The routine then estimates how the flood wave will diminish as it progresses downstream by utilizing a set of peak flow routing curves that have been developed using a dynamic routing model. Based on this predicted flood wave reduction, the model computes peak flows at specified downstream points and then computes maximum flood depths based on channel geometry, slope, and surface roughness at these downstream locations.

The major limitations of the SMPDBK model is that it estimates maximum water surface elevations in the downstream channel by assuming normal, steady flow at the peak utilizing Manning's equation. The model does not account for the acceleration component of dam break floods which typically have a rapid rise to peak discharge. Thus, backwater effects created by downstream natural channel constrictions, bridge embankments, or dams, cannot be accounted for. In these cases, SMPDBK will predict peak depths upstream of the constriction that may be substantially lower than those actually encountered.

PROGRAM INPUT

Data input to SMPDBK include: (a) reservoir storage, surface area, and discharge, (b) breach description, and (c) downstream valley geometry. Information concerning the reservoir was obtained from the September 1979, New England Division of the Army Corps of Engineers National Dam Inspection Program Phase I Inspection Report for the Rising Paper Dam.

Full breach to the elevation of the toe of the dam was assumed. The initial water elevation was 725 feet, the depth of the water in the spillway under the 100-year flood, and the final breach width was assumed to be three times the breach height. Breach information was gathered from the January 9, 1990, Foresight Land Services "Report Describing the Hydrologic and Hydraulic Setting of Rising Paper Company Dam."

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[1] reprinted from "Design Memorandum, Repairs to Rising Pond Dam, Great Barrington, Massachusetts," GZA GeoEnvironmental, Inc., 1991.

Eleven cross sections were used to describe the downstream valley geometry. These elevation-versus-top width cross sections spanned 9.9 miles downstream from the dam. Top widths within the 100-year floodplain of the river were interpolated from information given by the Federal Emergency Management Agency (FEMA) Flood Insurance Studies for the Towns of Great Barrington (January 19, 1982) and Sheffield (March 16, 1982), Massachusetts. These floodway maps were at a scale of 1 inch equals 400 feet. The surface topography outside of the 100-year floodplain was taken from the United States Geological Survey (USGS) quadrangle maps for Great Barrington, Massachusetts, at a scale of 1 inch equals 2,000 feet. Mannings "n" roughness coefficients ranged from 0.045 in the channel to 0.085 in the overbank areas.

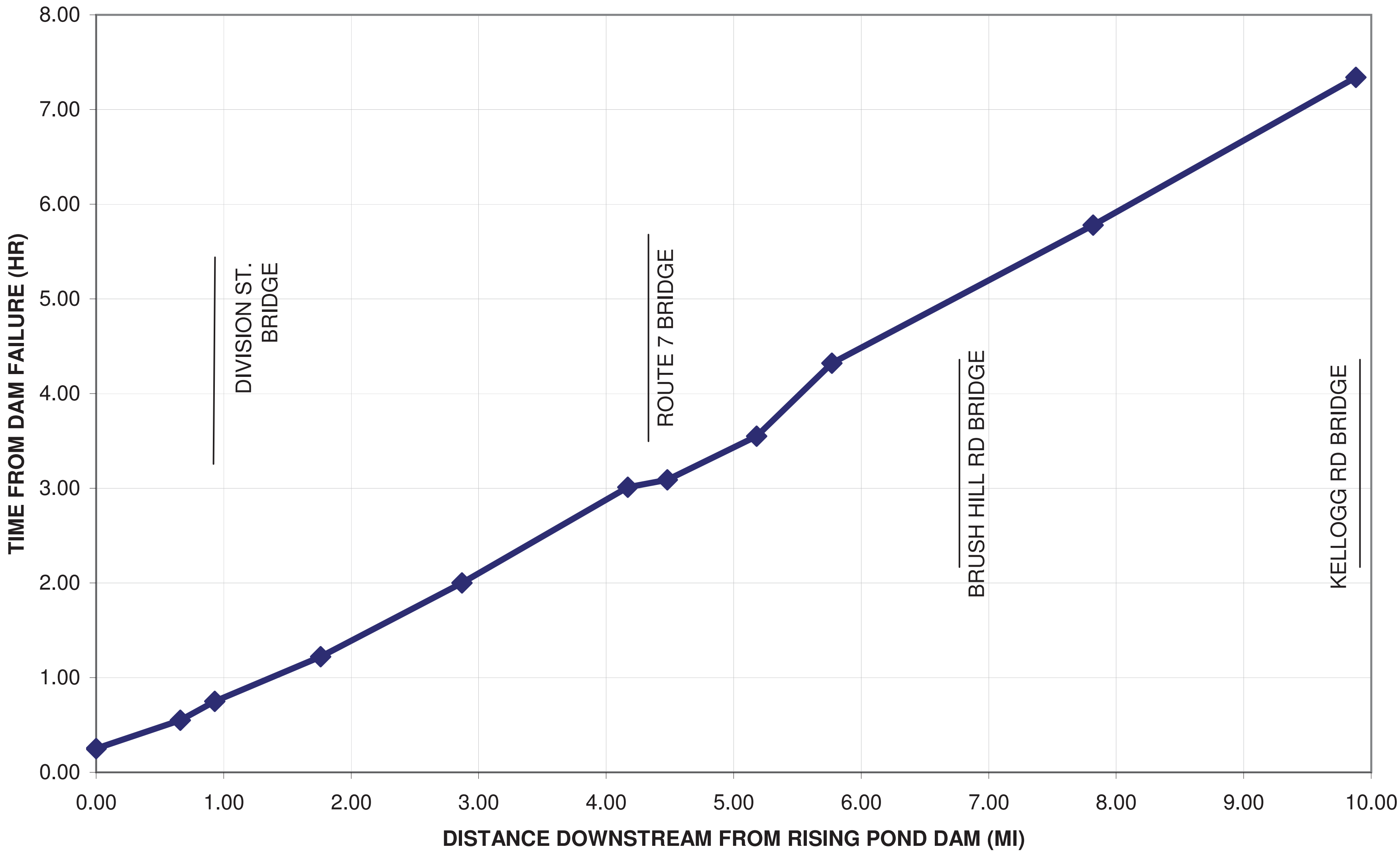
RESULTS

Difficulty in reproducing the magnitude of the initial floodwave at the first cross section (adjacent to the dam) was encountered. The size of the floodwave was dampened by the constrictive geometry of the cross-section and a high mannings "n" roughness coefficient. This initial cross-section was widened slightly to allow the large volume of flow through the cross-section. Mannings "n" was also adjusted from 0.045 to 0.040 in the channel topwidths, and from 0.080 to 0.040 for the first three of six overbank topwidths in the initial cross section. The force of the initial floodwave would remove vegetation such as trees and shrubs along the overbank, and thus reduce Manning's "n" in this area to a value similar to the adjusted figure. These adjustments increased the maximum flow through this cross-section from 15,760 cfs to 53,517 cfs, while the maximum possible discharge through the breach was calculated to be 63,273 cfs.

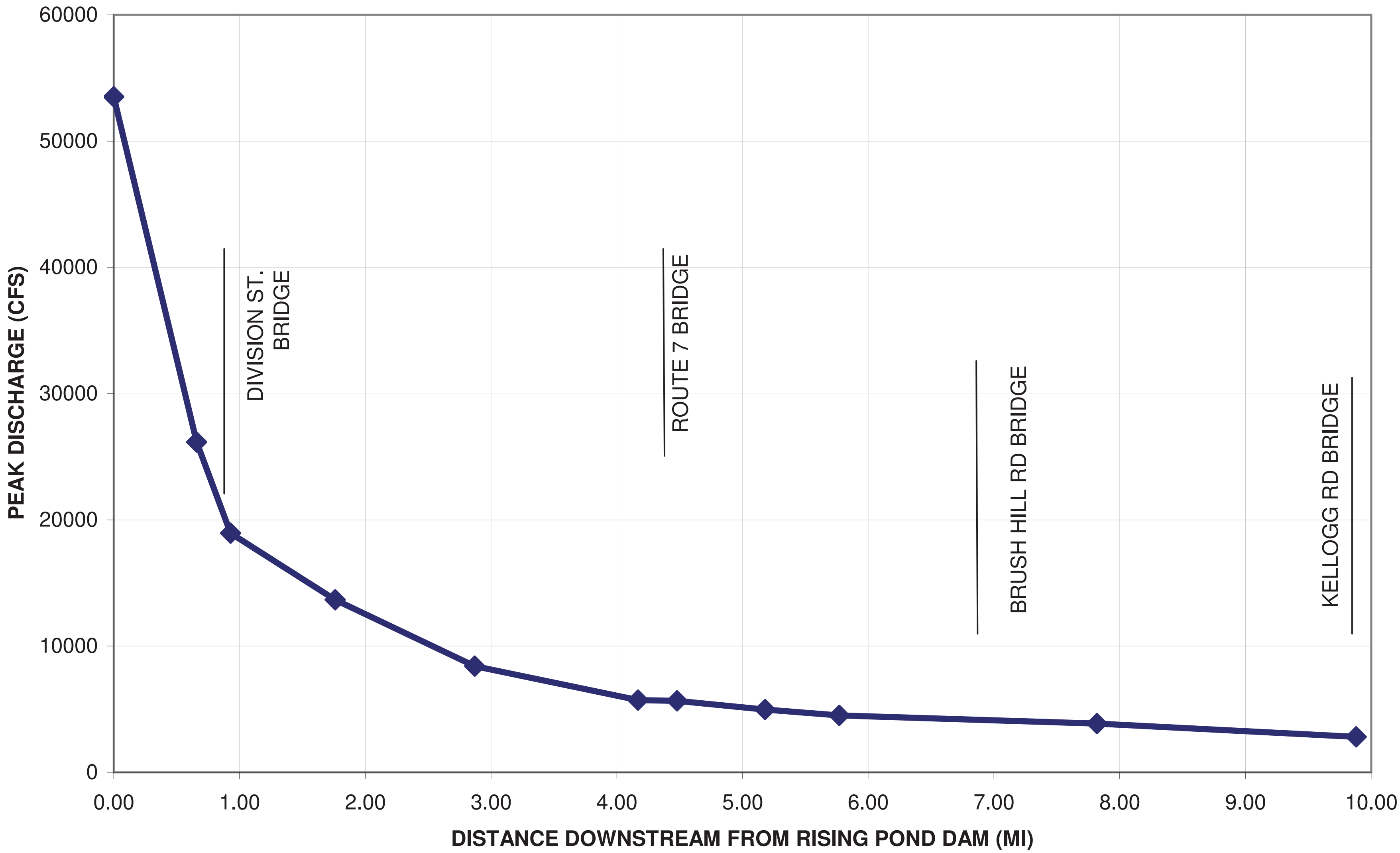
Attenuation of the floodwave within the initial two miles downstream of the dam (covered by the first four cross-sections) occurred. The wide floodplains in this region were responsible for this attenuation. By the fifth cross-section, the maximum discharge had diminished to less than the magnitude of the 100-year flood, 12,000 cfs, and the maximum discharge continued to decrease downstream; therefore, for all cross-sections with a computed maximum discharge of less than the 100-year flood (cross-sections five through eleven), an assumed value of 12,000 cfs was used. The water depth at these cross-sections under the 100-year flood were obtained from the FEMA Flood Insurance Studies.

Under this simulation, the floodwave resulting from a full breach of the Rising Paper Dam while the Housatonic River underwent a discharge equivalent to the 100-year flood would diminish within two miles. The Housatonic River at the Town of Great Barrington, which is located approximately four miles downstream of the dam, would therefore not be influenced by such an event. The maximum floodwave would reach the fourth cross-section in 1.22 hours and increase the discharge in the river at this point from the 100-year design flood of 12,000 cfs to 13,675 cfs. The maximum flood stage arrival time is presented in Figure A-1. A summary of peak discharges in shown in Figure A-2. The flood crest profile is shown in Figure A-3.

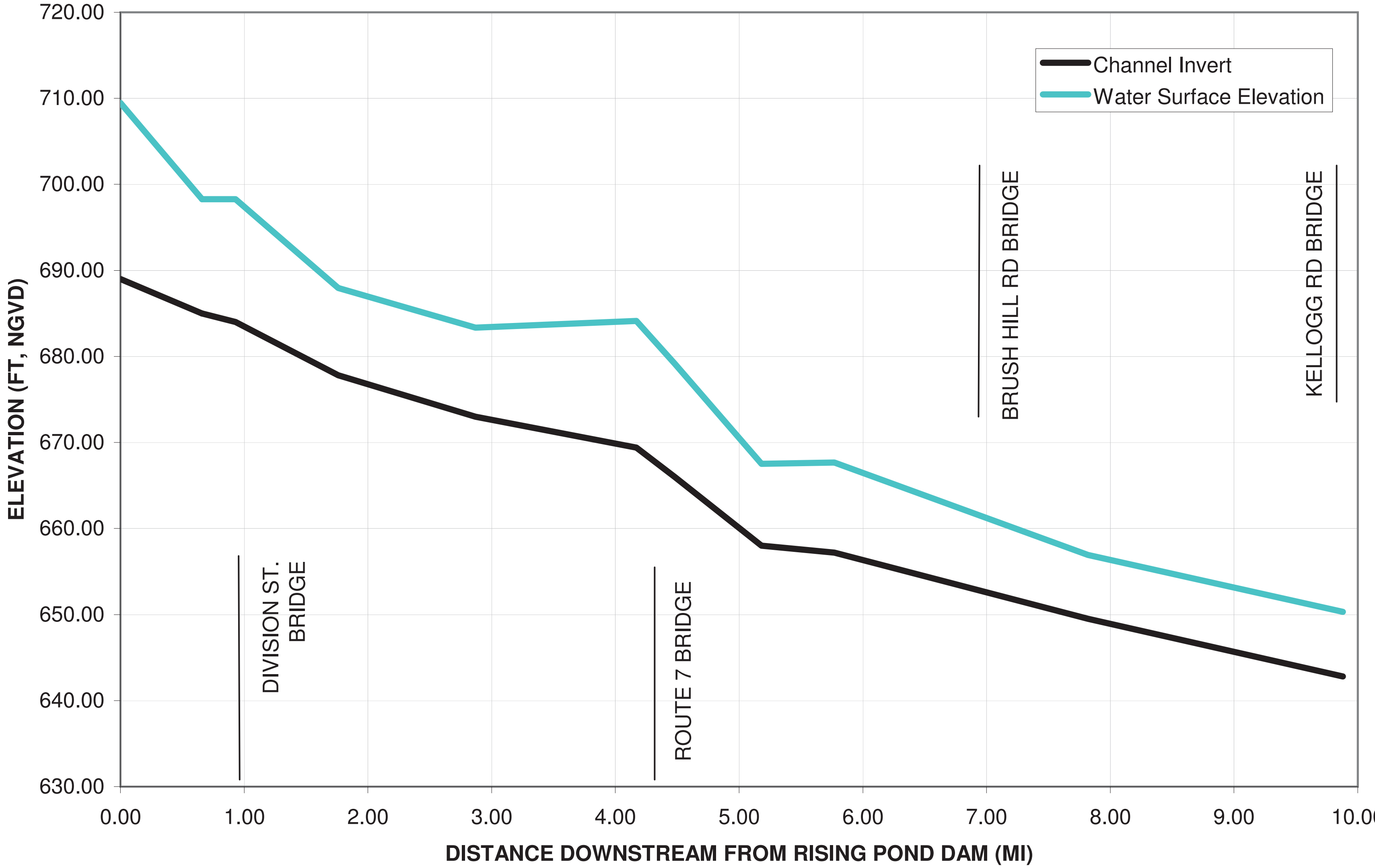
# FIGURE A-1 - MAXIMUM FLOOD STAGE ARRIVAL TIME



## FIGURE A-2 - PEAK DISCHARGE SUMMARY



## FIGURE A-3 - FLOOD CREST PROFILE



# Appendix B

## Plans for Training, Exercising, Updating and Posting the EAP

# APPENDIX B
# PLANS FOR TRAINING, EXERCISING, UPDATING, AND POSTING THE EAP

## TRAINING

Training of the General Electric Company personnel and the Great Barrington and Sheffield personnel involved in the implementation of the EAP shall be conducted to ensure their familiarity with all elements of the plan and their responsibilities under the plan. Qualified staff should be trained in dam safety related problem detection and evaluation and should understand their responsibilities.

Training and testing of the various aspects of the EAP for the Rising Pond Dam described in this Section are necessary to improve operational readiness. In support of that goal, training and initial and subsequent annual EAP testing will:

- Clarify roles and responsibilities
- Improve government interagency cooperation, communication, and coordination
- Improve individual performance
- Reveal plan weaknesses
- Reveal resource gaps

GZA recommends that the initial training take the form of an Orientation Meeting. Later training is recommended to be conducted in a two-step exercise: (a) a Tabletop Exercise followed by (b) a Drill of **Figure 1 - Notification Flowchart** and communications procedures.

The following text provides a suggested outline of instructions and topics to be presented at an Orientation Meeting. The contents generally follow the criteria presented in the "Exercise Design Course - Guide to Emergency Management Exercise", developed by the Federal Emergency Management Agency (FEMA), Emergency Management Institute. FEMA recommends that these training and problem-solving efforts be conducted as soon as the EAP is complete. The shorter Orientation Meeting described below is designed to identify policy issues or problems that should be resolved prior to conducting a functional exercise.

### *Orientation Meeting*

GZA recommends than an EAP Orientation Meeting be held with the pertinent representatives of the General Electric Company and the Towns of Great Barrington and Sheffield to review the updated EAP. At this initial stage, it is recommended that management/operations personnel from the following agencies participate in the Orientation Meeting:

- General Electric Company Dam Caretaker
- Great Barrington Police Department, Fire Department, Emergency Management, and Public Works Department
- Sheffield Police Department, Fire Department, Emergency Management, and Public Works Department

The focus of the Orientation Meeting is on training and familiarization with roles, procedures, responsibilities, and personalities associated with the implementation of the EAP for the Rising Pond Dam. It is intended to be relatively informal and designed to foster a cooperative spirit and elicit constructive discussion by the participants as they examine the contents of the EAP document, understand duties and responsibilities, and then resolve any potential problems. The general purpose is for meeting participants to evaluate plans and procedures and to resolve questions of coordination and assignment of responsibilities in a non-threatening format and under minimum stress.

We recommend that the General Electric Company be responsible for organizing and controlling the meeting.

It is the responsibility of the Moderator (the President or his or her designee) to initiate a sequential "talk-through" discussion of participant roles and to conduct "brain storming" sessions. Each attendee should be encouraged to actively participate in the discussion (possibly in a "round table" format).

The key issues for discussion include, but are not necessarily limited to, the following:

- Familiarization with the overall framework and specific details of **Figure 1 - Notification Flowchart**.
- Familiarization with alternate means of communication.
- Highlight differences between Emergency Condition A (failure imminent), Emergency Condition B (potential hazardous situation developing), Non-Emergency Condition (unusual event, slowly developing) and Non-Failure Emergency Condition (no danger of dam failure, only flooding concerns) and notification procedures for each situation.
- Identification and differentiation of problem conditions at the dam observed during routine surveillance and maintenance.
- The Incident Commander (the Great Barrington Deputy Police Chief) will function as “Incident Commander” as per the Incident Command System (ICS).
- Review of general Emergency Repair Procedures and Guidelines for Rising Pond Dam EAP.
- Review of emergency operation procedures at the Rising Pond Dam.
- Review duties of other key emergency agencies.

<u>EXERCISING</u>

The need to test the EAP through tabletop exercises or field drills should be determined by the Incident Commander identified in the EAP (Great Barrington Police Chief). GE will fully cooperate in any tabletop exercises of field drills determined to be necessary

Should the Incident Commander determine that exercising the EAP is required, the Federal Guidelines for Emergency Action Planning for Dams (FEMA 64) recommends a combination of discussion-based and operations-based exercises. Descriptions of each, from FEMA 64, are shown below.

**Discussion-based exercises** familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. The following are types of discussion-based exercises:

- ***Seminar*** A seminar is an informal discussion designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure). Seminars should include internal discussions as well as coordination with emergency management authorities and other organizations with a role in EAP implementation.
- ***Workshop*** A workshop resembles a seminar but is used to build specific products such as a draft plan or policy. For example, a Training and Exercise Plan Workshop is used to develop a Multi-Year Training and Exercise Plan.
- ***Tabletop Exercise*** A tabletop exercise involves key personnel discussing simulated scenarios in an informal setting. Tabletop exercises can be used to assess plans, policies, and procedures.
- ***Games*** A game is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.

**Operations-based exercises** validate plans, policies, agreements and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. Types of operations-based exercises are:

- ***Drill*** A drill is a coordinated, supervised activity usually employed to test a single operation or function within a single entity, such as testing sirens and warning systems, calling suppliers, checking material on hand, and conducting a call-down drill of those listed on the Notification Flowchart.
- ***Functional Exercise*** A functional exercise examines and/or validates the coordination, command, and control between various multi-agency coordination centers, such as Emergency Operation Centers (EOCs) and Joint Field Offices. A functional exercise does not involve any “boots on the ground” such as first responders or emergency officials responding to an incident in real time.
- ***Full-Scale Exercises*** A full-scale exercise is a multi-agency, multi-jurisdictional, multi-discipline exercise involving functional (e.g., Joint Field Office, EOC, “boots on the ground” response to a simulated event, such as activation of the EOC and role-playing to simulate an actual dam failure). Functional and full-scale exercises are considered comprehensive exercises that provide the necessary verification, training, and practice to improve the EAP and the operational readiness and coordination efforts of all parties responsible for responding to emergencies at a dam. The basic difference between these two exercise types is that a full-scale exercise involves actual field movement and mobilization; in a functional exercise, field activity is simulated.

UPDATING

The Rising Pond Dam EAP must be continually updated to reflect changes in names or titles of project operations, attendants, and other personnel with specific, designated responsibilities for actions in an emergency. At a minimum the EAP should be annually reviewed and updated, as necessary. This may include changes in **Figure 1 - Notification Flowchart**, Contact Lists, the Downstream Residents List or other information critical to providing notification to affected persons, Federal, State, and local agencies. In addition, any changes as a result of debriefing and post-evaluation of the Orientation Meeting, Tabletop Exercise, or Notification Drill should also be incorporated into the updated EAP document. It is recommended that the General Electric Company Caretaker be responsible for updating the EAP.

The District Manager has continuing responsibility to review the adequacy of the Rising PondDam EAP in light of any significant changes in upstream or downstream circumstances which might affect water flows or the location or extent of the areas, persons, or property that might be harmed due to a sudden release of water from Rising Pond Dam. Promptly after becoming aware of necessary changes to keep the EAP workable, the General Electric Company should consult and cooperate with appropriate Federal, State, or local agencies responsible for public safety/emergency management to determine any advisable revision to the EAP.

The General Electric Company should provide all holders of the EAP, copies of all revisions. Revised pages, maps, etc. should be marked, "Revision month/day/year" and revised material should be highlighted.

POSTING OF THE NOTIFICATION FLOWCHART

**Figure 1 - Notification Flowchart** should be posted and a 3-ring bound copy of the completed EAP should be available to each of the entities listed in the flowchart and contact lists.

The following have copies of the EAP:

- General Electric Company
- Town of Great Barrington Emergency Management
- Town of Sheffield Emergency Management
- MEMA
- DCR Office of Dam Safety

# Appendix C

## Site-Specific Concerns

# APPENDIX C
# SITE-SPECIFIC CONCERNS

Each dam and downstream area is unique. Rising Pond Dam is accessible at both abutments, but as a run-of-the-river dam, they are not accessible from each other. The right (west) abutment is accessible via an access road from Van Deusenville Road, over a set of train tracks. The left (east) side is located at a mill building.

Paragraph 123.a of the Consent Decree executed by the General Electric Company and various federal and state agencies, as of October 27, 2000 concerning the GE-Pittsfield/Housatonic River Site has set forth requirements for the maintenance of Rising Pond Dam. Pursuant to the decree, the General Electric Company has included concerned organizations on Figure 1, Flowchart.

# Appendix D

# Emergency Repair

# APPENDIX D
# EMERGENCY REPAIR

## GENERAL

In this section, potential emergency conditions that may affect the function of the Rising Pond Dam are identified and appropriate remedial actions are discussed herein. The intent is to facilitate emergency repair in cases where response time is critical and/or communications are disrupted which may delay the on-site arrival of the General Electric Company's dam safety engineer.

Potential natural phenomena and manmade forces which could affect the stability or function of the Rising Pond Dam include floods, earthquakes, inherent instability, aging and deterioration, accidents and sabotage.

While the cause of the damage is important, the remedial action to be undertaken is mostly dependent on certain characteristic signs of distress which indicate particular types of problems in earthen embankment dams. The following is a general description of conditions and corresponding corrective actions to be undertaken in emergency conditions to mitigate or delay the collapse of the dam. An action guide is presented in the Table 8, entitled "Emergency Repair Guidelines." This table was originally developed by the Army Corps of Engineers and has been modified by GZA to incorporate site-specific conditions at the dam. The Town of Great Barrignton personnel should become familiar with these procedures to reduce response time in the event of an emergency.

The emergency repair procedures outlined in Table 8 are to be supervised by the Town. The following document potential remedial systems:

| | |
|---|---|
| Figure 4 | Boil Ring |
| Figure 5 | Boil Ring Maintenance Instructions |
| Figure 6 | Granular Blanket |
| Figure 7 | Temporary Erosion Protection |
| Figure 8 | Sandbag Berm Construction |

At all times, utmost care should be given to the safety of personnel engaged in the remedial activities. If failure is imminent or cannot be effectively delayed, then remedial activities should cease and all personnel ordered out of the unsafe area by the senior staff at the scene. For observed conditions that are out of the norm, a qualified dam safety engineer (Massachusetts Registered Professional Engineer) should be consulted immediately, to assess the severity of the problem and recommended corrective measures.

## EXCESS SEEPAGE

One of the leading causes of failures of embankment dams is embankment or foundation seepage/piping. Excess seepage leading to embankment failure may be caused by malfunctioning toe drains, presence of vegetative growth and extensive root systems within the embankment, burrowing of small animals, or high reservoir pool levels creating high hydrostatic heads.

Controlled seepage through the toe of an earthen dam embankment is normal. However, rapid or significant increases in flow through the toe may begin to carry out fine soil materials, create sand boils, and produce new seep areas along the downstream face. Normal toe discharge is generally clear. Remedial actions should be taken if toe seepage quantities suddenly increase and become turbid (cloudy or muddy).

Piping is a process in which seepage dislodges and transports soil particles as it daylights on the downstream face of an embankment. An open channel forms at the point of seepage exit and works its way progressively into the embankment as erosion continues. Eventually, a completely open channel is formed through the embankment. Piping may also originate inside an embankment from any internal voids into which water can flow. Abandoned conduits could initiate piping if cracks develop in these structures. Cracks could form as a result of structural deterioration or settlement under static or earthquake loads. Slope failures extending through an embankment's core create another potential source of piping. The soils along the failure plane will be weakened and will likely be more permeable.

Internal erosion is defined as flow seeking and eroding a preferential flow path within or below the dam. This mode of failure is a soil removal process from within the embankment, and, if not corrected, will accelerate over time and ultimately lead to the collapse of the earth embankment structure. Individual “boils” downstream of the embankment dam can be an indicator that this type of failure mechanism is developing.

Individual boils or small areas of seepage can be controlled on a temporary basis by ringing them with sandbags, stone, or other materials. Refer to Figures 4 and 5 for schematics of "ringing a boil" including estimated quantities of required personnel and material.

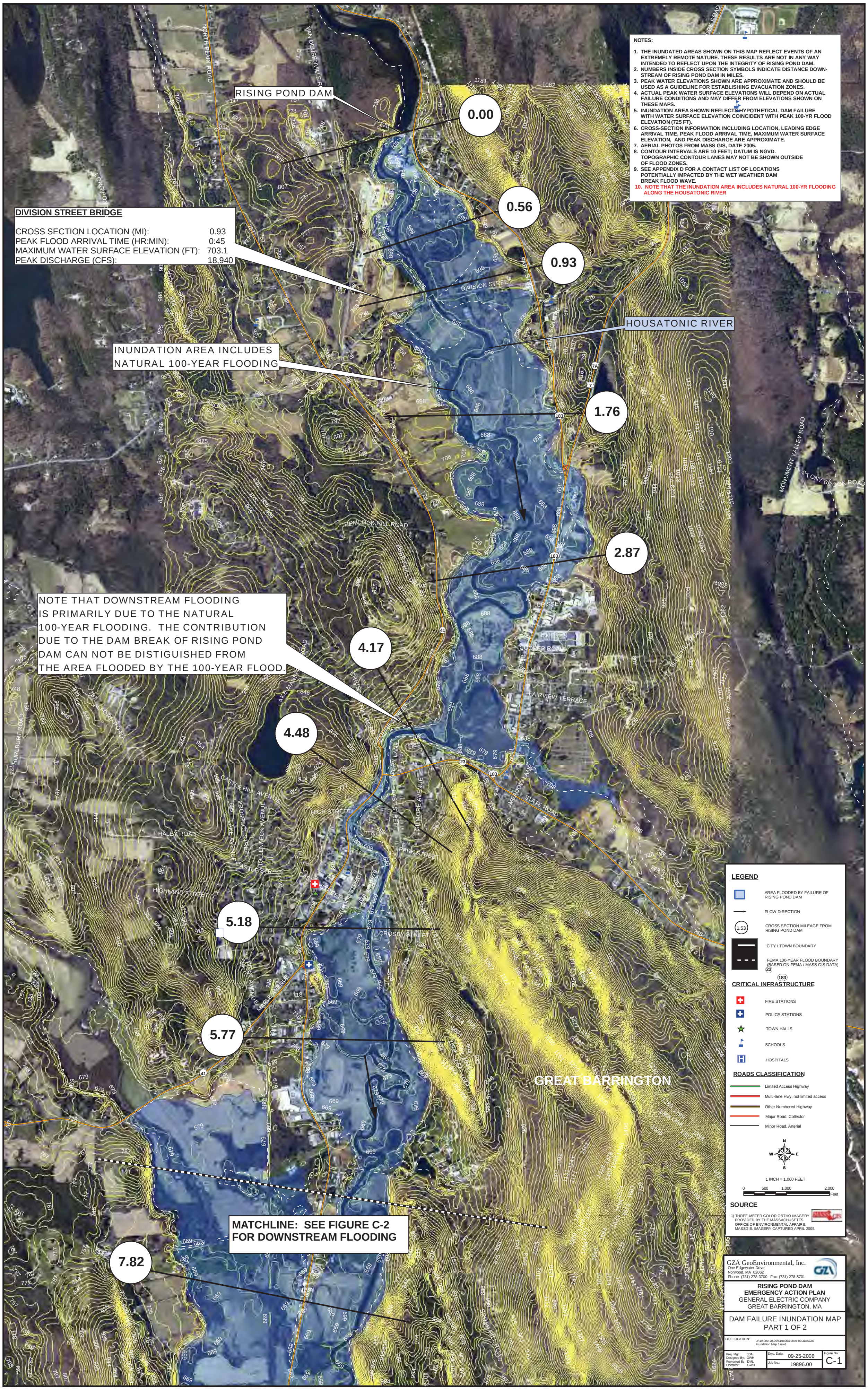
SAND BAGS / OVERTOPPING

Sand bag berms are one of the most common methods for temporarily increasing freeboard to reduce overtopping of a dam during a flood event. Figure 8 provide information on proper methods for constructing sandbag berms. Sandbag berm construction can be highly effective but requires appropriate material and is labor intensive. The maximum effective height should be limited to approximately three feet. (Source: Flood Fighting: How To Use Sandbags, US Army Corps of Engineers) GZA recommends that the Town of Great Barrington either stockpile sandbags at a Town facility or make arrangements with a local supplier to be able to obtain sandbags in the event of an overtopping emergency. Sand to fill the sand bags should be obtained from a local sand and gravel pit.

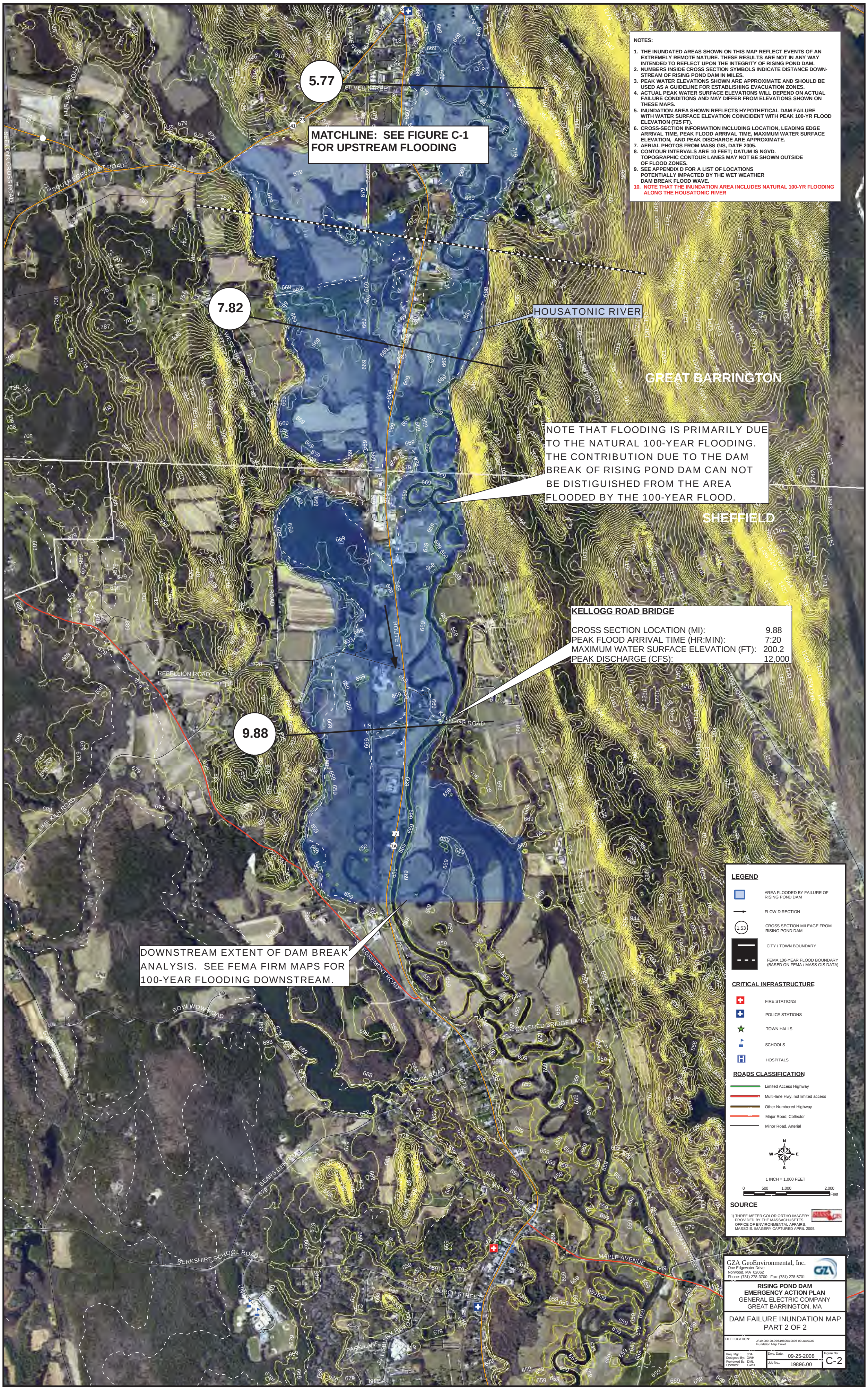
J:\19,000-20,999\19896\19896-30.JDA\EAP Update 2013\Rising\Appendices\Appendix E - Emergency Repair\APPENDIX E.docx

# Appendix E

# Inundation Maps



RISING POND DAM
0.00
0.56
0.93
DIVISION STREET BRIDGE
CROSS SECTION LOCATION (MI): 0.93
PEAK FLOOD ARRIVAL TIME (HR:MIN): 0:45
MAXIMUM WATER SURFACE ELEVATION (FT): 703.1
PEAK DISCHARGE (CFS): 18,940
DIVISION STREET
HOUSATONIC RIVER
INUNDATION AREA INCLUDES NATURAL 100-YEAR FLOODING
1.76
2.87
NOTE THAT DOWNSTREAM FLOODING IS PRIMARILY DUE TO THE NATURAL 100-YEAR FLOODING. THE CONTRIBUTION DUE TO THE DAM BREAK OF RISING POND DAM CAN NOT BE DISTIGUISHED FROM THE AREA FLOODED BY THE 100-YEAR FLOOD.
4.17
4.48
5.18
5.77
GREAT BARRINGTON
MATCHLINE: SEE FIGURE C-2 FOR DOWNSTREAM FLOODING
7.82
NOTES:
1. THE INUNDATED AREAS SHOWN ON THIS MAP REFLECT EVENTS OF AN EXTREMELY REMOTE NATURE. THESE RESULTS ARE NOT IN ANY WAY INTENDED TO REFLECT UPON THE INTEGRITY OF RISING POND DAM.
2. NUMBERS INSIDE CROSS SECTION SYMBOLS INDICATE DISTANCE DOWN-STREAM OF RISING POND DAM IN MILES.
3. PEAK WATER ELEVATIONS SHOWN ARE APPROXIMATE AND SHOULD BE USED AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
4. ACTUAL PEAK WATER SURFACE ELEVATIONS WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM ELEVATIONS SHOWN ON THESE MAPS.
5. INUNDATION AREA SHOWN REFLECTS HYPOTHETICAL DAM FAILURE WITH WATER SURFACE ELEVATION COINCIDENT WITH PEAK 100-YR FLOOD ELEVATION (725 FT).
6. CROSS-SECTION INFORMATION INCLUDING LOCATION, LEADING EDGE ARRIVAL TIME, PEAK FLOOD ARRIVAL TIME, MAXIMUM WATER SURFACE ELEVATION, AND PEAK DISCHARGE ARE APPROXIMATE.
7. AERIAL PHOTOS FROM MASS GIS, DATE 2005.
8. CONTOUR INTERVALS ARE 10 FEET; DATUM IS NGVD. TOPOGRAPHIC CONTOUR LANES MAY NOT BE SHOWN OUTSIDE OF FLOOD ZONES.
9. SEE APPENDIX D FOR A CONTACT LIST OF LOCATIONS POTENTIALLY IMPACTED BY THE WET WEATHER DAM BREAK FLOOD WAVE.
10. NOTE THAT THE INUNDATION AREA INCLUDES NATURAL 100-YR FLOODING ALONG THE HOUSATONIC RIVER
LEGEND
AREA FLOODED BY FAILURE OF RISING POND DAM
FLOW DIRECTION
CROSS SECTION MILEAGE FROM RISING POND DAM
CITY / TOWN BOUNDARY
FEMA 100-YEAR FLOOD BOUNDARY (BASED ON FEMA / MASS GIS DATA)
CRITICAL INFRASTRUCTURE
FIRE STATIONS
POLICE STATIONS
TOWN HALLS
SCHOOLS
HOSPITALS
ROADS CLASSIFICATION
Limited Access Highway
Multi-lane Hwy, not limited access
Other Numbered Highway
Major Road, Collector
Minor Road, Arterial
1 INCH = 1,000 FEET
0 500 1,000 2,000 Feet
SOURCE
1) THREE-METER COLOR ORTHO IMAGERY PROVIDED BY THE MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS, MASSGIS. IMAGERY CAPTURED APRIL 2005.
GZA GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, MA 02062
Phone: (781) 278-3700 Fax: (781) 278-5701
RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA
DAM FAILURE INUNDATION MAP
PART 1 OF 2
FILE LOCATION: J:\19,000-20,999\19896\19896-00.JDA\GIS Inundation Map 1.mxd
Proj. Mgr.: JDA
Designed By: GWH
Reviewed By: DML
Operator: GWH
Dwg. Date: 09-25-2008
Job No.: 19896.00
Figure No.: C-1


NOTES:
1. THE INUNDATED AREAS SHOWN ON THIS MAP REFLECT EVENTS OF AN EXTREMELY REMOTE NATURE. THESE RESULTS ARE NOT IN ANY WAY INTENDED TO REFLECT UPON THE INTEGRITY OF RISING POND DAM.
2. NUMBERS INSIDE CROSS SECTION SYMBOLS INDICATE DISTANCE DOWN-STREAM OF RISING POND DAM IN MILES.
3. PEAK WATER ELEVATIONS SHOWN ARE APPROXIMATE AND SHOULD BE USED AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
4. ACTUAL PEAK WATER SURFACE ELEVATIONS WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM ELEVATIONS SHOWN ON THESE MAPS.
5. INUNDATION AREA SHOWN REFLECTS HYPOTHETICAL DAM FAILURE WITH WATER SURFACE ELEVATION COINCIDENT WITH PEAK 100-YR FLOOD ELEVATION (725 FT).
6. CROSS-SECTION INFORMATION INCLUDING LOCATION, LEADING EDGE ARRIVAL TIME, PEAK FLOOD ARRIVAL TIME, MAXIMUM WATER SURFACE ELEVATION, AND PEAK DISCHARGE ARE APPROXIMATE.
7. AERIAL PHOTOS FROM MASS GIS, DATE 2005.
8. CONTOUR INTERVALS ARE 10 FEET; DATUM IS NGVD. TOPOGRAPHIC CONTOUR LANES MAY NOT BE SHOWN OUTSIDE OF FLOOD ZONES.
9. SEE APPENDIX D FOR A LIST OF LOCATIONS POTENTIALLY IMPACTED BY THE WET WEATHER DAM BREAK FLOOD WAVE.
10. NOTE THAT THE INUNDATION AREA INCLUDES NATURAL 100-YR FLOODING ALONG THE HOUSATONIC RIVER
5.77
MATCHLINE: SEE FIGURE C-1 FOR UPSTREAM FLOODING
7.82
HOUSATONIC RIVER
GREAT BARRINGTON
NOTE THAT FLOODING IS PRIMARILY DUE TO THE NATURAL 100-YEAR FLOODING. THE CONTRIBUTION DUE TO THE DAM BREAK OF RISING POND DAM CAN NOT BE DISTIGUISHED FROM THE AREA FLOODED BY THE 100-YEAR FLOOD.
SHEFFIELD
KELLOGG ROAD BRIDGE
CROSS SECTION LOCATION (MI): 9.88
PEAK FLOOD ARRIVAL TIME (HR:MIN): 7:20
MAXIMUM WATER SURFACE ELEVATION (FT): 200.2
PEAK DISCHARGE (CFS): 12,000
9.88
DOWNSTREAM EXTENT OF DAM BREAK ANALYSIS. SEE FEMA FIRM MAPS FOR 100-YEAR FLOODING DOWNSTREAM.
SOUTH EGREMONT ROAD
ROUTE 7
REBELLION ROAD
KELLOGG ROAD
BOW WOW ROAD
COVERED BRIDGE LANE
BERKSHIRE SCHOOL ROAD
MAPLE AVENUE
LEGEND
AREA FLOODED BY FAILURE OF RISING POND DAM
FLOW DIRECTION
1.53
CROSS SECTION MILEAGE FROM RISING POND DAM
CITY / TOWN BOUNDARY
FEMA 100-YEAR FLOOD BOUNDARY (BASED ON FEMA / MASS GIS DATA)
CRITICAL INFRASTRUCTURE
FIRE STATIONS
POLICE STATIONS
TOWN HALLS
SCHOOLS
HOSPITALS
ROADS CLASSIFICATION
Limited Access Highway
Multi-lane Hwy, not limited access
Other Numbered Highway
Major Road, Collector
Minor Road, Arterial
N
W
E
S
1 INCH = 1,000 FEET
0 500 1,000 2,000 Feet
SOURCE
1) THREE-METER COLOR ORTHO IMAGERY PROVIDED BY THE MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS, MASSGIS. IMAGERY CAPTURED APRIL 2005.
GZA GeoEnvironmental, Inc.
One Edgewater Drive
Norwood, MA 02062
Phone: (781) 278-3700 Fax: (781) 278-5701
RISING POND DAM
EMERGENCY ACTION PLAN
GENERAL ELECTRIC COMPANY
GREAT BARRINGTON, MA
DAM FAILURE INUNDATION MAP
PART 2 OF 2
FILE LOCATION: J:\19,000-20,999\19896\19896-00.JDA\GIS Inundation Map 2.mxd
Proj. Mgr.: JDA
Designed By: GWH
Reviewed By: DML
Operator: GWH
Dwg. Date: 09-25-2008
Job No.: 19896.00
Figure No.: C-2

# Appendix F

# Inspection Guidelines

**Figure 5.1**
**Inspection Guidelines - Upstream Slope**

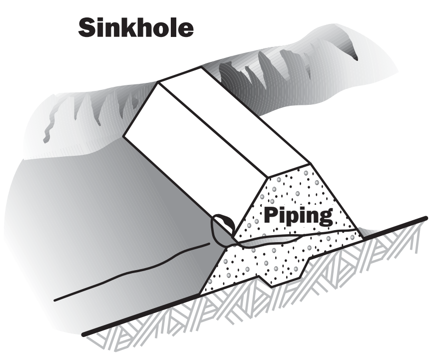



**Figure 5.1a**

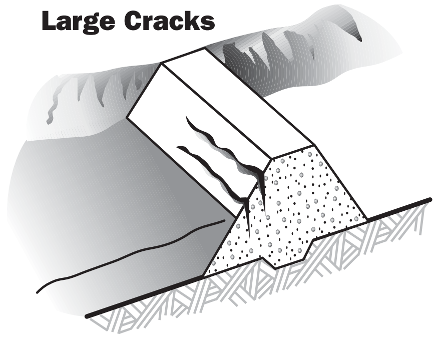



**Figure 5.1b**

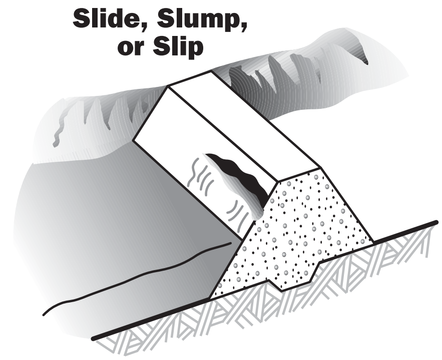



**Figure 5.1c**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Sinkhole**<br>***(Figure 5.1a)*** | Piping or internal erosion of embankment materials or foundation causes a sinkhole. The cave-in of an eroded cavern can result in a sinkhole. A small hole in the wall of an outlet pipe can develop into a sinkhole. Dirty water at the exit indicates erosion of the dam.<br>Piping can empty a reservoir through a small hole in the wall or can lead to failure of a dam as soil pipes erode through the foundation or a pervious part of the dam. Dispersive soils are particularly susceptible to sinkholes. | Inspect other parts of the dam for seepage or more sinkholes. Check seepage and leakage outflows for dirty water. A qualified engineer should inspect the conditions, identify the exact cause of sinkholes, and recommend further actions. Depending on the location in the embankment, the reservoir may need to be drawn down.<br>ENGINEER REQUIRED |
| **Large Cracks**<br>***(Figure 5.1b)*** | A portion of the embankment has moved because of loss of strength, or the foundation may have moved, causing embankment movement.<br>Indicates onset of massive slide or settlement caused by foundation failure. | Depending on embankment involved, draw reservoir level down. A qualified engineer should inspect the condition and recommend further actions.<br>ENGINEER REQUIRED |
| **Slide, Slump, or Slip**<br>***(Figure 5.1c)*** | Earth or rocks move down the slope along a slippage surface because of too steep a slope, or the foundation moves. Also, look for slide movements in reservoir basin. A series of slides can lead to obstruction of the inlet or failure of the dam. | Evaluate extent of the slide. Monitor slide. (See Chapter 6.) Draw the reservoir level down if safety of dam is threatened. A qualified engineer should inspect the conditions and recommend further actions.<br>ENGINEER REQUIRED |

**Figure 5.1** ***(cont.)***
**Inspection Guidelines - Upstream Slope**

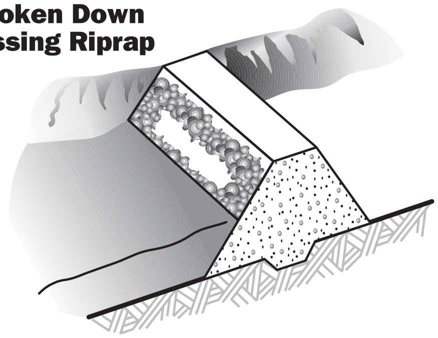



Figure 5.1d

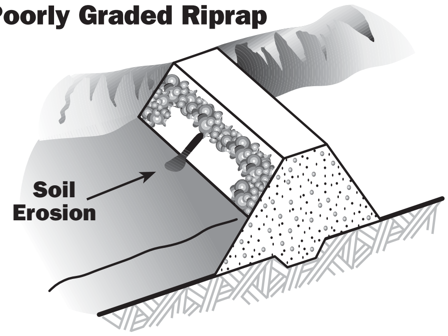



Figure 5.1e

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Scarps, Benches, Oversteep Areas** | Wave action, local settlement, or ice action cause soil and rock to erode and slide to the lower part of the slope, forming a bench.<br>Erosion lessens the width and possible height of the embankment and could lead to seepage or overtopping of the dam. | Determine exact cause of scarps. Do necessary earthwork, restore embankment to original slope, and supply adequate protection (bedding and riprap). (See Chapter 7.) |
| **Broken Down, Missing Riprap** *(Figure 5.1d)* | Poor-quality riprap has deteriorated. Wave action or ice action has displaced riprap. Round and similar-sized rocks have rolled downhill.<br>Wave action against these unprotected areas decreases embankment width. | Reestablish normal slope. Place bedding and competent riprap. (See Chapter 7.) |
| **Erosion Behind Poorly Graded Riprap** *(Figure 5.1e)* | Similar-sized rocks allow waves to pass between them and erode small gravel particles and soil.<br>Soil is eroded away from behind the riprap. This allows riprap to settle, offering less protection and decreased embankment width. | Reestablish effective slope protection. Place bedding material.<br>ENGINEER REQUIRED for design—for graduation and size for rock for bedding and riprap. A qualified engineer should inspect the conditions and recommend further actions. |

**Figure 5.2**
**Inspection Guidelines - Downstream Slope**

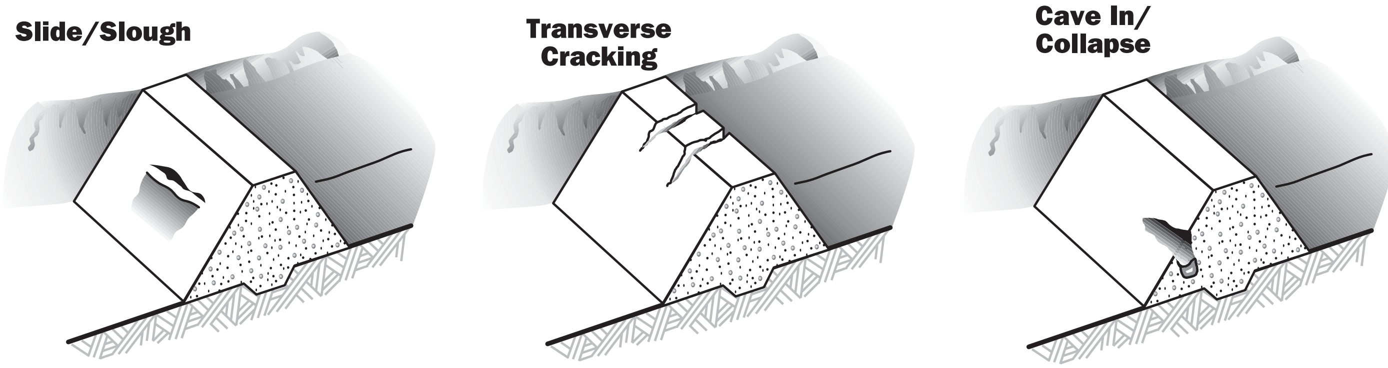



Figure 5.2a Figure 5.2b Figure 5.2c

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Slide or Slough** *(Figure 5.2a)* | Lack loss of strength of embankment material. Loss of strength can be attributed to infiltration of water into the embankment or loss of support by the foundation.<br><br>Massive slide cuts through crest or upstream slope reducing freeboard and cross-section. Structural collapse or overtopping can result | 1. Measure extent and displacement of slide. If continued movement is seen, begin lowering water level until movement stops.<br>2. Have a qualified engineer inspect the condition and recommend further action.<br><br>ENGINEER REQUIRED |
| **Transverse Cracking** *(Figure 5.2b)* | 1. Uneven movement between adjacent segments of the embankment.<br>2. Deformation caused by structural stress or instability.<br><br>1. Can provide a path for seepage through the embankment cross-section.<br>2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin.<br>3. Provides entrance point for surface runoff to enter embankment | 1. Inspect crack and carefully record crack location, length, depth, width and other pertinent physical features. Stake out limits of cracking. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition.<br>2. Excavate slope along crack to a point below the bottom of the crack. Then, backfill excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. This should be supervised by engineer. Continue to monitor crest routinely for evidence of future cracking.<br><br>ENGINEER REQUIRED |
| **Cave-in or Collapse** *(Figure 5.2c)* | 1. Lack of adequate compaction.<br>2. Rodent hole below.<br>3. Piping through embankment or foundation.<br>4. Presence of dispersive soils.<br><br>Indicates possible washout of embankment. | 1. Inspect for and immediately repair rodent holes. Control rodents to prevent future damage.<br>2. Have a qualified engineer inspect the condition and recommend further action.<br><br>ENGINEER REQUIRED |

**Figure 5.2 *(cont.)***
**Inspection Guidelines - Downstream Slope**

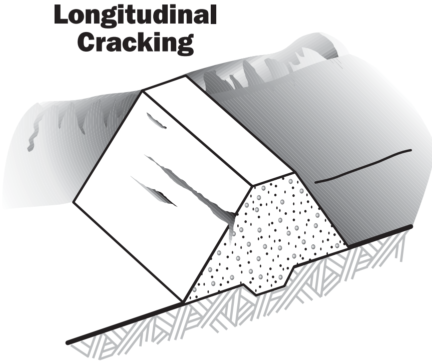



Figure 5.2d

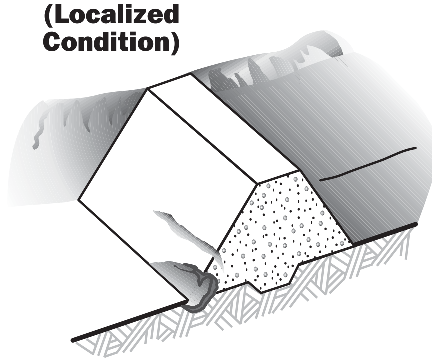



Figure 5.2e

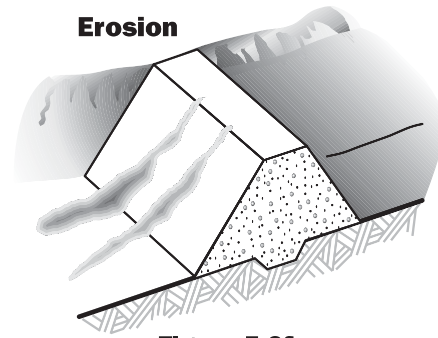



Figure 5.2f

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Longitudinal Cracking** *(Figure 5.2d)* | 1. Drying and shrinkage of surface material.<br>2. Downstream movement or settlement of embankment.<br><br>1. Can be an early warning of a potential slide.<br>2. Shrinkage cracks allow water to enter the embankment and freezing will further crack the embankment.<br>3. Settlement or slide, showing loss of strength in embankment that can lead to failure. | 1. If cracks are from drying, dress area with well-compacted material to keep surface water out and natural moisture in.<br>2. If cracks are extensive, a qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Slump *(localized condition)*** *(Figure 5.2e)* | Preceded by erosion undercutting a portion of the slope. Can also be found on steep slopes.<br><br>Can expose impervious zone to erosion and lead to additional slumps. | 1. Inspect area for seepage.<br>2. Monitor for progressive failure.<br>3. Have a qualified engineer inspect the condition and recommend further action.<br><br>ENGINEER REQUIRED |
| **Erosion** *(Figure 5.2f)* | Water from intense rainstorms or snowmelt carries surface material down the slope, resulting in continuous troughs.<br><br>Can be hazardous if allowed to continue. Erosion can lead to eventual deterioration of the downstream slope and failure of the structure. | 1. The preferred method to protect eroded areas is rock or riprap.<br>2. Reestablishing protective grasses can be adequate if the problem is detected early. |

## Figure 5.2 *(cont.)*
## Inspection Guidelines - Downstream Slope

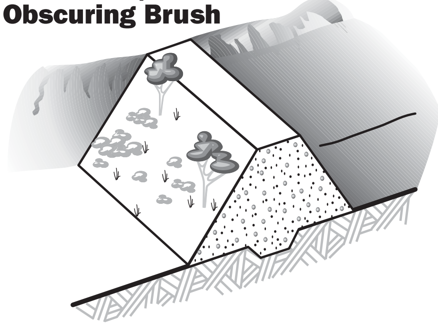



Figure 5.2g

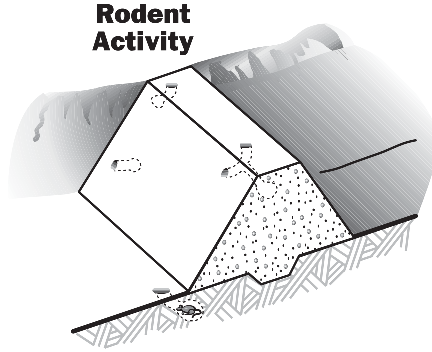



Figure 5.2h

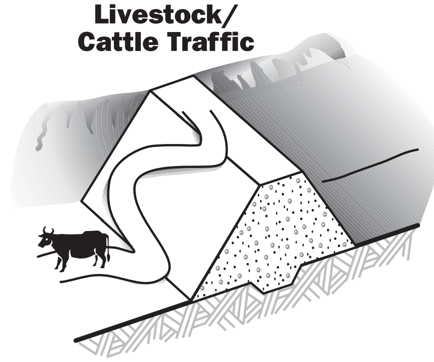



Figure 5.2i

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Trees, Obscuring Brush**<br>***(Figure 5.2g)*** | Natural vegetation in area.<br>Large tree roots can create seepage paths. Large trees can blow over during storms and damage dam or cause breach. Bushes can obscure visual inspection and harbor rodents. | 1. Remove all brush and trees less than 4" in diameter. Larger trees may be allowed to stay until they die. At that time, the tree, with its root system, should be removed and the void properly filled with compacted soil. (See Chapter 7.)<br>2. Control vegetation on the embankment that obscures visual inspection. (See Chapter 7.) |
| **Rodent Activity**<br>***(Figure 5.2h)*** | Overabundance of rodents. Animal burrowing creates holes, tunnels, and caverns. Certain habitats, such as cattail-filled areas and trees close to the reservoir encourage these animals.<br>Can reduce length of seepage path and lead to piping failure. If tunnel runs through most of the dam, it can lead to collapse. | 1. Control rodents to prevent more damage.<br>2. Backfill existing rodent holes.<br>3. Remove rodents. Determine exact location and extent of tunneling. Remove habitat and repair damages. (See Chapter 7.) |
| **Livestock**<br>***(such as cattle)***<br>**Traffic**<br>***(Figure 5.2i)*** | Excessive travel by livestock especially harmful to slope when wet.<br>Creates areas bare of erosion protection and causes erosion channels. Allows water to stand. Area susceptible to drying cracks. | 1. Fence livestock outside embankment area.<br>2. Repair erosion protection, i.e. riprap, grass. |

## Figure 5.3
## Inspection Guidelines - Embankment Crest

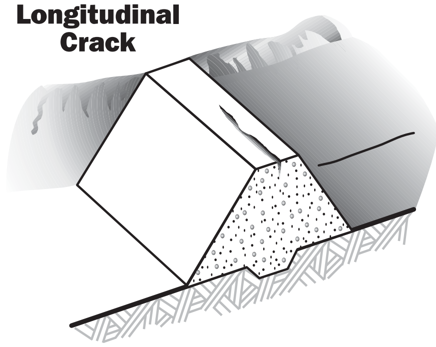



**Figure 5.3a**

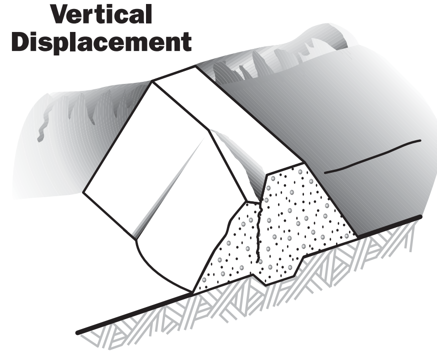



**Figure 5.3b**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Longitudinal Crack** *(Figure 5.3a)* | 1. Uneven settlement between adjacent sections or zones within the embankment.<br>2. Foundation failure causing loss of support to embankment.<br>3. Initial stages of embankment slide.<br><br>1. Creates local area of low strength within an embankment. Could be the point of initiation of future structural movement, deformation or failure.<br>2. Provides entrance point for surface runoff into embankment, allowing saturation of adjacent embankment area and possible lubrication which could lead to localized failure. | 1. Inspect crack and carefully record location, length, depth, width, alignment, and other pertinent physical features. Immediately stake out limits of cracking. Monitor frequently.<br>2. Engineer should determine cause of cracking and supervise steps necessary to reduce danger to dam and correct condition.<br>3. Effectively seal the cracks at the crest surface to prevent infiltration by surface water.<br>4. Continue to routinely monitor crest for evidence of further cracking.<br><br>ENGINEER REQUIRED |
| **Vertical Displacement** *(Figure 5.3b)* | 1. Vertical movement between adjacent sections of the embankment.<br>2. Structural deformation or failure caused by structure stress or instability, or by failure of the foundation.<br><br>1. Creates local area of low strength within embankment which could cause future movement.<br>2. Leads to structural instability or failure.<br>3. Creates entrance point for surface water that could further lubricate failure plane.<br>4. Reduces available embankment cross-section. | 1. Carefully inspect displacement and record its location, vertical and horizontal displacement, length and other physical features. Immediately stake out limits of cracking.<br>2. Engineer should determine cause of displacement and supervise all steps necessary to reduce danger to dam and correct condition.<br>3. Excavate area to the bottom of the displacement. Backfill excavation using competent material and correct construction techniques, under supervision of engineer.<br>4. Continue to monitor areas routinely for evidence of cracking or movement. (See Chapter 6.)<br><br>ENGINEER REQUIRED |

**Figure 5.3 *(cont.)***
**Inspection Guidelines - Embankment Crest**

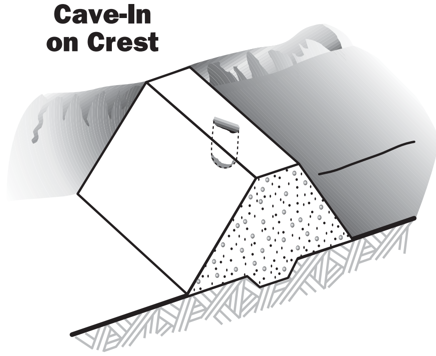



Figure 5.3c

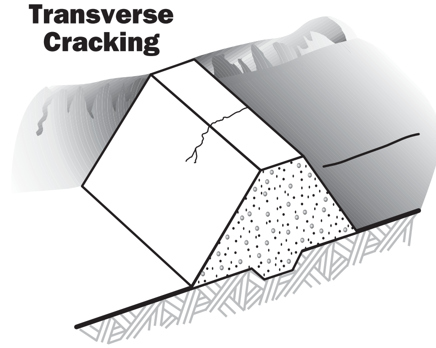



Figure 5.3d

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Cave-in On Crest**<br>*(Figure 5.3c)* | 1. Rodent activity.<br>2. Hole in outlet conduit is causing erosion of embankment material.<br>3. Internal erosion or piping of embankment material by seepage.<br>4. Breakdown of dispersive clays within embankment by seepage waters.<br>1. Void within dam could cause localized caving, sloughing, instability or reduced embankment cross-section.<br>2. Entrance point for surface water. | 1. Carefully inspect and record location and physical characteristics (depth, width, length) of cave-in.<br>2. Engineer should determine cause of cave-in and supervise all steps necessary to reduce threat to dam and correct condition.<br>3. Excavate cave-in, slope sides of excavation and backfill hole with competent material using proper construction techniques. (See Chapter 7.) This should be supervised by engineer.<br><br>ENGINEER REQUIRED |
| **Transverse Cracking**<br>*(Figure 5.3d)* | 1. Uneven movement between adjacent segments of the embankment.<br>2. Deformation caused by structural stress or instability.<br>1. Can provide a path for seepage through the embankment cross-section.<br>2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin.<br>3. Provides entrance point for surface runoff to enter embankment. | 1. Inspect crack and carefully record crack location, length, depth, width and other pertinent physical features. Stake out limits of cracking.<br>2. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition.<br>3. Excavate crest along crack to a point below the bottom of the crack. Then backfilling excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. (See Chapter 7.) This should be supervised by engineer.<br>4. Continue to monitor crest routinely for evidence of future cracking.<br>(See Chapter 4.)<br><br>ENGINEER REQUIRED |

## Figure 5.3 *(cont.)*
## Inspection Guidelines - Embankment Crest

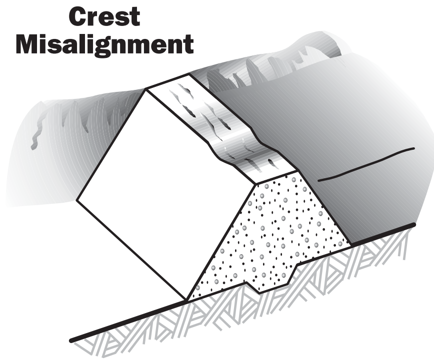



Figure 5.3e

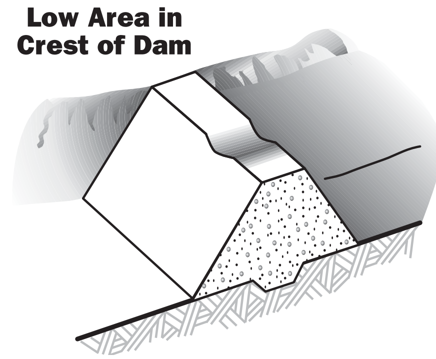



Figure 5.3f

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Crest Misalignment**<br>***(Figure 5.3e)*** | 1. Movement between adjacent parts of the structure.<br>2. Uneven deflection of dam under loading by reservoir.<br>3. Structural deformation or failure near area of misalignment.<br>1. Area of misalignment is usually accompanied by low area in crest which reduces freeboard.<br>2. Can produce local areas of low embankment strength which may lead to failure. | 1. Establish monuments across crest to determine exact amount, location, and extent of misalignment.<br>2. Engineer should determine cause of misalignment and supervise all steps necessary to reduce threat to dam and correct condition.<br>3. Following remedial action, monitor crest monuments according to a schedule to detect any movement.<br>(See Chapter 6.)<br><br>ENGINEER REQUIRED |
| **Low Area in Crest**<br>***(Figure 5.3f)*** | 1. Excessive settlement in the embankment or foundation directly beneath the low area in the crest.<br>2. Internal erosion of embankment material.<br>3. Foundation spreading to upstream and/or downstream direction.<br>4. Prolonged wind erosion of crest area.<br>5. Improper final grading following construction.<br>Reduces freeboard available to pass flood flows safely through spillway. | 1. Establish monuments along length of crest to determine exact amount, location, and extent of settlement in crest.<br>2. Engineer should determine cause of low area and supervise all steps necessary to reduce possible threat to the dam and correct condition.<br>3. Reestablish uniform crest elevation over crest length by filling in low area using proper construction techniques. This should be supervised by engineer.<br>4. Reestablish monuments across crest of dam and routinely monitor monuments to detect any settlement.<br><br>ENGINEER REQUIRED |

**Figure 5.3** ***(cont.)***
**Inspection Guidelines - Embankment Crest**

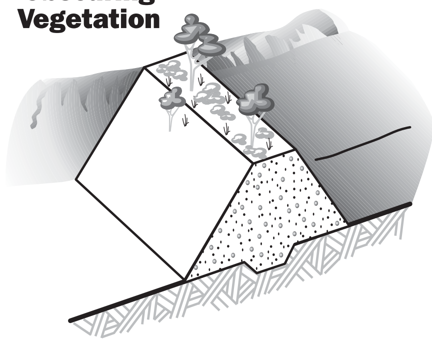



Figure 5.3g

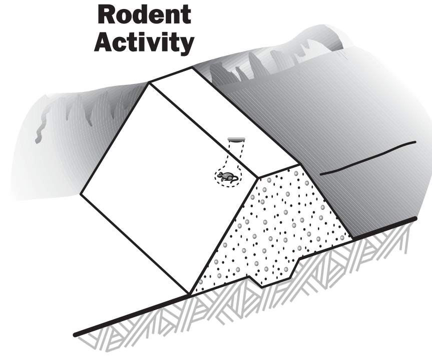



Figure 5.3h

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Obscuring Vegetation** *(Figure 5.3g)* | Neglect of dam and lack of proper maintenance procedures.<br>1. Obscures large parts of the dam, preventing adequate, accurate visual inspection of all parts of the dam. Problems which threaten the integrity of the dam can develop and remain undetected until they progress to a point that threatens the dam's safety.<br>2. Associated root systems develop and penetrate into the dam's cross-section. When the vegetation dies, the decaying root systems can provide paths for seepage. This reduces the effective seepage path through the embankment and could lead to possible piping situations.<br>3. Prevents easy access to all parts of the dam for operation, maintenance and inspection.<br>4. Provides habitat for rodents.<br>5. Large trees can blow over during storms, resulting in damage and possible breach of the dam. | 1. Remove all damaging growth from the dam. This would include removal of trees (4-inches or less in diameter), bushes, brush, conifers and growth other than grass. Grass should be encouraged on all segments of the dam to prevent erosion by surface runoff. Root systems should also be removed to the maximum practical extent. The void which results from removing the root system should backfilled with well-competent, well-compacted material.<br>2. Future undesirable growth should be removed by cutting or spraying, as part of an annual maintenance program. (See Chapter 7.)<br>3. All cutting or debris resulting from the vegetative removal should be immediately taken from the dam and properly disposed of outside the reservoir basin.<br>An engineer should be involved if the tree removal process poses a threat to the dam. |
| **Rodent Activity** *(Figure 5.3h)* | Burrowing animals.<br>1. Entrance point for surface runoff to enter dam. Could saturate adjacent portions of the dam.<br>2. Especially dangerous if hole penetrates dam below phreatic line. During periods of high storage, seepage path through the dam would be greatly reduced and a piping situation could develop. Tunnels can lead to collapse of crest and possible failure. | 1. Completely backfill the hole with competent well-compacted material.<br>2. Initiate a rodent control program to reduce the burrowing animal population and to prevent future damage to the dam. (See Chapter 7.) |

**Figure 5.3 *(cont.)***
**Inspection Guidelines - Embankment Crest**

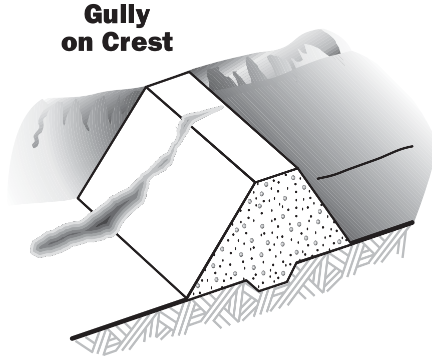



Figure 5.3i

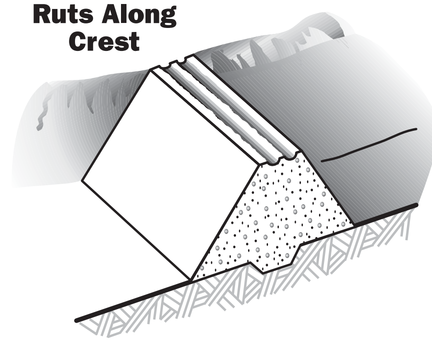



Figure 5.3j

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Gully on Crest** *(Figure 5.3i)* | 1. Poor grading and improper drainage of crest. Improper drainage causes surface runoff to collect and drain off crest at low point in upstream or downstream shoulder.<br>2. Inadequate spillway capacity which has caused dam to overtop.<br><br>1. Can reduce available freeboard.<br>2. Reduces cross-sectional area of dam.<br>3. Inhibits access to all parts of the crest and dam.<br>4. Can result in a hazardous condition if due to overtopping. | 1. Restore freeboard to dam by adding fill material to low area, using proper construction techniques. (See Chapter 7.)<br>2. Regrading crest to provide proper drainage of surface runoff.<br>3. If gully was caused by overtopping, create adequate spillway that meets current design standards. This should be done by engineer.<br>4. Reestablish protective cover. |
| **Ruts Along Crest** *(Figure 5.3j)* | Heavy vehicle traffic without adequate or proper maintenance or proper crest surfacing<br><br>1. Inhibits easy access to all parts of crest.<br>2. Allows continued development of rutting.<br>3. Allows standing water to collect and saturate crest of dam.<br>4. Operating and maintenance vehicles can get stuck. | 1. Drain standing water from ruts.<br>2. Regrade and re-compact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.)<br>3. Provide gravel or roadbase material to accommodate traffic.<br>4. Periodically maintain and regrade to prevent ruts reforming. |

**Figure 5.3** ***(cont.)***
**Inspection Guidelines - Embankment Crest**

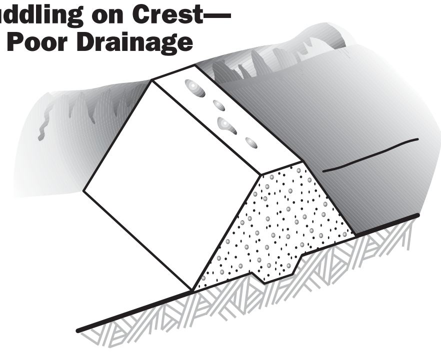



Figure 5.3k

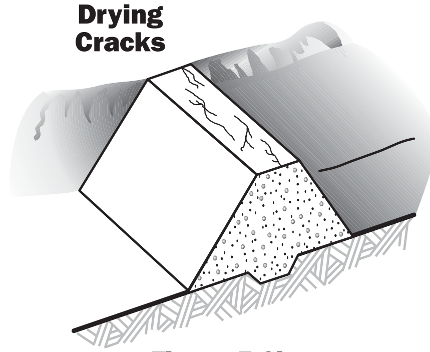



Figure 5.3l

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Puddling on Crest— Poor Drainage** *(Figure 5.3k)* | 1. Poor grading and improper drainage of crest.<br>2. Localized consolidation or settlement on crest allows puddles to develop.<br>1. Causes localized saturation of the crest.<br>2. Inhibits access to all parts of the dam and crest.<br>3. Becomes progressively worse if not corrected. | 1. Drain standing water from puddles.<br>2. Regrade and re-compact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.)<br>3. Provide gravel or roadbase material to accommodate traffic.<br>4. Periodically maintain and regrade to prevent low areas reforming. |
| **Drying Cracks** *(Figure 5.3l)* | Material on the crest of dam expands and contracts with alternate wetting and drying of weather cycles. Drying cracks are usually short, shallow, narrow, and numerous.<br>Point of entry for surface runoff and surface moisture, causing saturation of adjacent embankment areas. This saturation, and later drying of the dam, could cause further cracking. | 1. Seal surface cracks with a tight, impervious material. (See Chapter 7.)<br>2. Routinely grade crest to proper drainage and fill cracks.<br>3. Cover crest with non-plastic material (not clay) to prevent large variations in moisture content. |

**Figure 5.4**
**Inspection Guidelines - Embankment Seepage Areas**

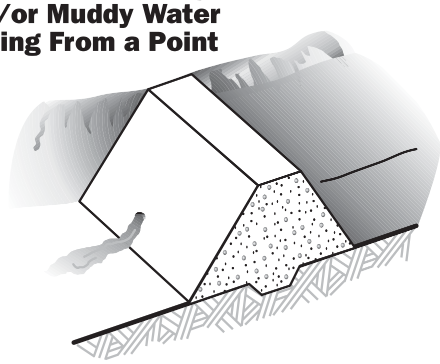



Figure 5.4a

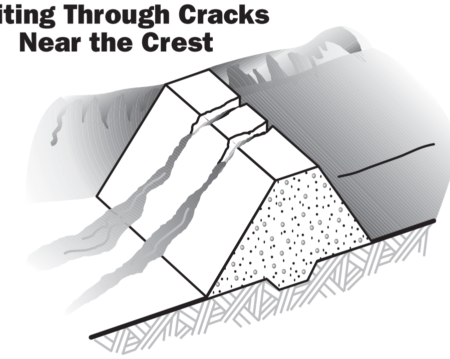



Figure 5.4b

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Excessive Quantity and/or Muddy Water Exiting From a Point** *(Figure 5.4a)* | 1. Water has created an open pathway, channel or pipe through the dam. The water is eroding and carrying embankment material.<br>2. Large amounts of water have accumulated in the downstream slope. Water and embankment materials are exiting at one point. Surface agitation may be causing the muddy water.<br>3. Rodents, frost action or poor construction have allowed water to create an open pathway or pipe through the embankment.<br>1. Continued flows can saturate parts of the embankment and lead to slides in the area.<br>2. Continued flows can further erode embankment materials and lead to failure of the dam. | 1. Begin measuring outflow quantity and establishing whether water is getting muddier, staying the same or clearing up.<br>2. If quantity of flow is increasing, water level in reservoir should be lowered until flow stabilizes or stops.<br>3. Search for opening on upstream side and plug if possible.<br>4. A qualified engineer should inspect the condition and recommend further actions to be taken.<br><br>ENGINEER REQUIRED |
| **Stream of Water Exiting Through Cracks Near the Crest** *(Figure 5.4b)* | 1. Severe drying has caused shrinkage of embankment material.<br>2. Settlement in the embankment or foundation is causing the transverse cracks.<br>Flow through the crack can cause failure of the dam. | 1. Plug upstream side of crack to stop flow.<br>2. Lower water level in the reservoir should be lowered until below level of cracks.<br>3. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |

**Figure 5.4** ***(cont.)***
**Inspection Guidelines - Embankment Seepage Areas**

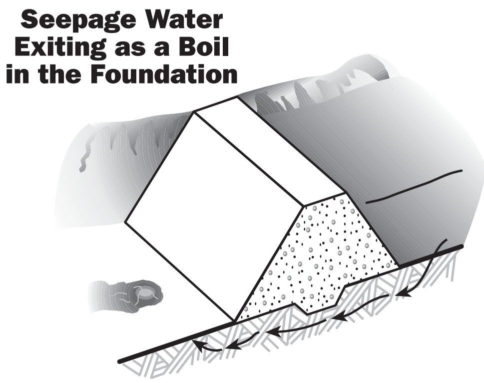



**Figure 5.4c**

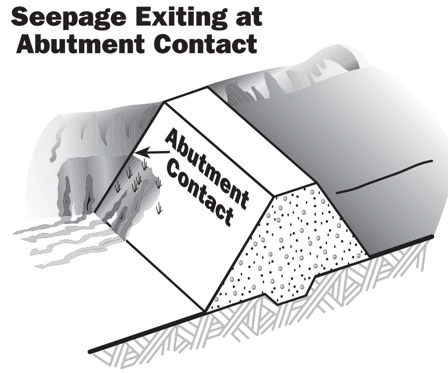



**Figure 5.4d**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Seepage Water Exiting as a Boil in the Foundation** *(Figure 5.4c)* | Some part of the foundation material is supplying a flow path. This could be caused by a sand or gravel layer in the foundation.<br>Increased flows can lead to erosion of the foundation and failure of the dam. | 1. Examine the boil for transportation of foundation materials.<br>2. If soil particles are moving downstream, sandbags or earth should be used to create a dike around the boil. The pressures created by the water level with the dike may control flow velocities and temporarily prevent further erosion.<br>3. If erosion is becoming greater, the reservoir level should be lowered.<br>4. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Seepage Exiting at Abutment Contact** *(Figure 5.4d)* | 1. Water flowing through pathways in the abutment.<br>2. Water flowing through the embankment.<br>Can lead to erosion of embankment materials and failure of the dam. | 1. Study leakage area to determine quantity of flow and extent of saturation.<br>2. Inspect daily for developing slides.<br>3. Water level in reservoir may need to be lowered to assure the safety of the embankment.<br>4. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |

## Figure 5.4 *(cont.)*
## Inspection Guidelines - Embankment Seepage Areas

**Large Area Wet or Producing Flow**

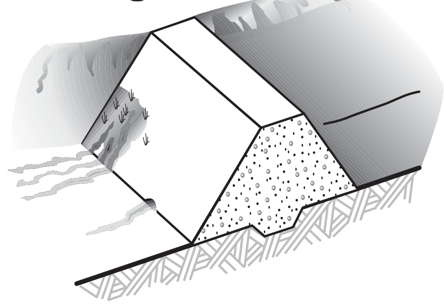


**Figure 5.4e**

**Marked Change in Vegetation**

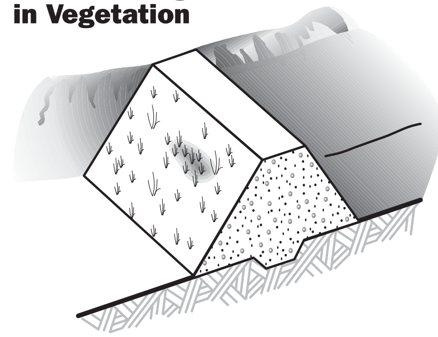


**Figure 5.4f**

**Bulge in Large Wet Area**

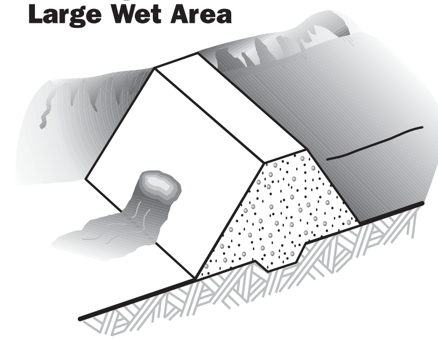


**Figure 5.4g**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Large Area Wet or Producing Flow**<br>*(Figure 5.4e)* | A seepage path has developed through the abutment or embankment materials and failure of the dam can occur.<br>1. Increased flows could lead to erosion of embankment material and failure of the dam.<br>2. Saturation of the embankment can lead to local slides which could cause failure of the dam. | 1. Stake out the saturated area and monitor for growth or shrinking.<br>2. Measure any outflows as accurately as possible.<br>3. Reservoir level may need to be lowered if saturated areas grow at a fixed storage level or if flow increases.<br>4. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Marked Change in Vegetation**<br>*(Figure 5.4f)* | 1. Embankment materials are supplying flow paths.<br>2. Natural seeding by wind.<br>3. Change in seed type during early post-construction seeding.<br>Can show a saturated area. | 1. Use probe and shovel to establish if the materials in this area are wetter than surrounding areas.<br>2. If area shows wetness, when surrounding areas are dry or drier, a qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Bulge in Large Wet Area**<br>*(Figure 5.4g)* | Downstream embankment materials have begun to move.<br>Failure of the embankment resulting from massive sliding can follow these early movements. | 1. Compare embankment cross-section to the end of construction condition to see if observed condition may reflect end of construction.<br>2. Stake out affected area and accurately measure outflow.<br>3. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |

## Figure 5.4 *(cont.)*
## Inspection Guidelines - Embankment Seepage Areas

**Trampoline Effect in Large Soggy Area**

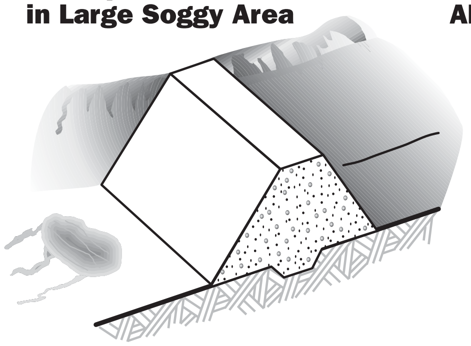


Figure 5.4h

**Leakage From Abutments Beyond the Dam**

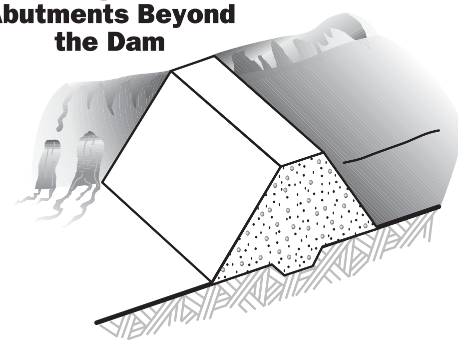


Figure 5.4i

**Wet Area in Horizontal Band**

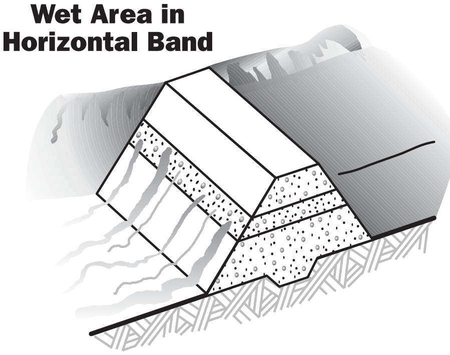


Figure 5.4j

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
| --- | --- | --- |
| **Trampoline Effect *(bouncy when jumped on)* in Large Soggy Area** *(Figure 5.4h)* | Water moving rapidly through the embankment or foundation is being controlled or contained by a well- established turf root system.<br>Condition shows excessive seepage in the area. If control layer of turf is destroyed, rapid erosion of foundation materials could result in failure of the dam. | 1. Carefully inspect the area for outflow quantity and any transported material.<br>2. A qualified engineer should inspect the condition and recommend further actions.<br>ENGINEER REQUIRED |
| **Leakage From Abutments Beyond the Dam** *(Figure 5.4i)* | Water moving through cracks and fissures in the abutment materials.<br>Can lead to rapid erosion of abutment and evacuation of the reservoir. Can lead to massive slides near or downstream from the dam. | 1. Carefully inspect the area to determine quantity of flow and amount of transported material.<br>2. A qualified engineer or geologist should inspect the condition and recommend further actions.<br>ENGINEER REQUIRED |
| **Wet Area in Horizontal Band** *(Figure 5.4j)* | Frost layer or layer of sandy material in original construction.<br>1. Wetting of areas below the area of excessive seepage can lead to localized instability of the embankment, resulting in slides.<br>2. Excessive flows can lead to accelerated erosion of embankment materials and failure of the dam. | 1. Determine as closely as possible the flow being produced.<br>2. If flow increases, reservoir level should be reduced until flow stabilizes or stops.<br>3. Stake out the exact area involved.<br>4. Using hand tools, try to identify the material allowing the flow.<br>5. A qualified engineer should inspect the condition and recommend further actions.<br>ENGINEER REQUIRED |

## Figure 5.5
## Inspection Guidelines - Concrete Upstream Slope

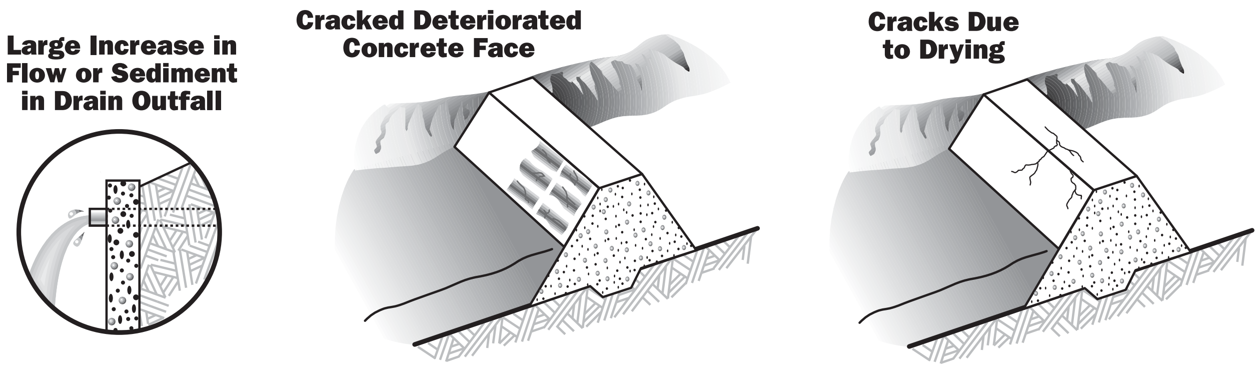



Figure 5.5a Figure 5.5b Figure 5.5c

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Large Increase in Flow or Sediment in Drain Outfall** *(Figure 5.5a)* | Shortened seepage path or increased storage levels.<br>1. Higher-velocity flows can cause erosion of drain, then embankment materials.<br>2. Can lead to piping failure. | 1. Accurately measure outflow quantity and determine amount of increase over previous flow.<br>2. Collect jar samples to compare turbidity.<br>3. If either quantity or turbidity has increased by 25%, a qualified engineer should evaluate the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Cracked Deteriorated Concrete Face** *(Figure 5.5b)* | Concrete deteriorated from weathering. Joint filler deteriorated or displaced.<br>Soil is eroded behind the face and caverns can be formed. Unsupported sections of concrete crack. Ice action may displace concrete. | 1. Determine cause. Either patch with grout or contact engineer for permanent repair method.<br>2. If damage is extensive, a qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Cracks Due to Drying** *(Figure 5.5c)* | Soil loses its moisture and shrinks, causing cracks. *Note:* Usually limited to crest and downstream slope.<br>Heavy rains can fill cracks and cause small parts of embankment to move along internal slip surface. | 1. Monitor cracks for increases in width, depth , or length.<br>2. A qualified engineer should inspect condition and recommend further actions.<br><br>ENGINEER REQUIRED |

**Figure 5.6**
**Inspection Guidelines - Spillways**

**Excessive Vegetation or Debris in Channel**

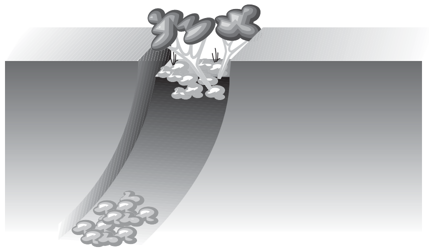


Figure 5.6a

**Erosion Channels**

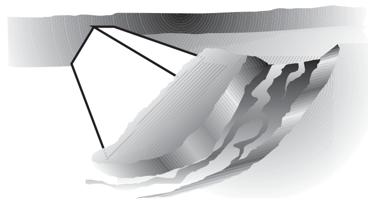


Figure 5.6b

**Excessive Erosion in Earth-Slide Causes Concentrated Flows**

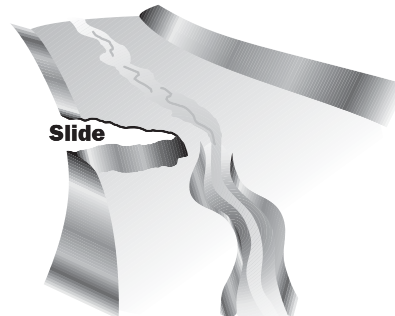



Figure 5.6c

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Excessive Vegetation or Debris in Channel** *(Figure 5.6a)* | Accumulation of slide materials, dead trees, excessive vegetative growth, etc., in spillway channel.<br>Reduced discharge capacity; overflow of spillway, overcropping of dam. Prolonged overtopping can cause failure of the dam. | Clean out debris periodically; control vegetative growth in spillway channel. Install log boom in front of spillway entrance to intercept debris. |
| **Erosion Channels** *(Figure 5.6b)* | Surface runoff from intense rainstorms or flow from spillway carries surface material down the slope, resulting in continuous troughs. Livestock traffic creates gullies where flow concentrates varies.<br>Unabated erosion can lead to slides, slumps or slips which can result in reduced spillway capacity. Inadequate spillway capacity can lead to embankment overtopping and result in dam failure. | Photograph condition. Repair damaged areas by replacing eroded material with compacted fill. Protect areas against future erosion by installing suitable rock riprap. Re-vegetate area if appropriate. Bring condition to the attention of the engineer during next inspection. |
| **Excessive Erosion in Earth-Slide Causes Concentrated Flows** *(Figure 5.6c)* | Discharge velocity too high; bottom and slope material loose or deteriorated; channel and bank slopes too steep; bare soil unprotected; poor construction protective surface failed.<br>Disturbed flow pattern; loss of material, increased sediment load downstream, collapse of banks; failure of spillway; can lead to rapid evacuation of the reservoir through the severely eroded spillway. | Minimize flow velocity by proper design. Use sound material. Keep channel and bank slopes mild. Encourage growth of grass on soil surface. Construct smooth and well- compacted surfaces. Protect surface with riprap, asphalt or concrete. Repair eroded portion using sound construction practices. |

## Figure 5.6 *(cont.)*
## Inspection Guidelines - Spillways

**End of Spillway Chute Undercut**

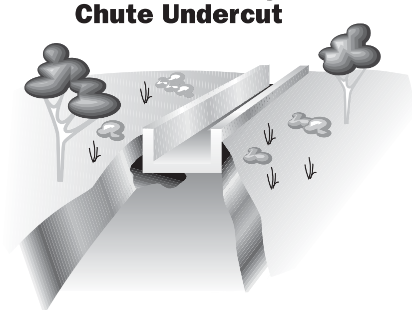


Figure 5.6d

**Wall Displacement**

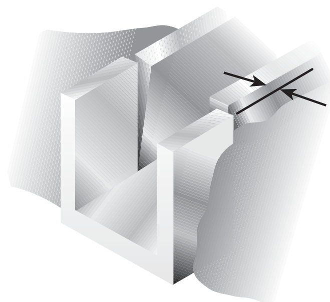


Figure 5.6e

**Large Cracks**

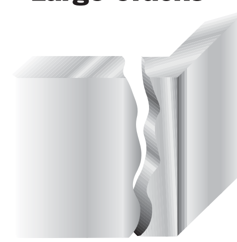


Figure 5.6f

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **End of Spillway Chute Undercut** *(Figure 5.6d)* | Poor configuration of stilling basin area. Highly erodible materials. Absence of cut-off wall at end of chute.<br>Structural damage to spillway structure; collapse of slab and wall lead to costly repair. | Dewater affected area; clean out eroded area and properly backfill. Improve stream channel below chute; provide properly sized riprap in stilling basin area. Install cutoff wall. |
| **Wall Displacement** *(Figure 5.6e)* | Poor workmanship; uneven settlement of foundation; excessive earth and water pressure; insufficient steel bar reinforcement of concrete.<br>Minor displacement will create eddies and turbulence in the flow, causing erosion of the soil behind the wall. Major displacement will cause severe cracks and eventual failure of the structure. | Reconstruction should be done according to sound engineering practices. Foundation should be carefully prepared. Adequate weep holes should be installed to relieve water pressure behind wall. Use enough reinforcement in the concrete. Anchor walls to present further displacement. Install struts between spillway walls. Clean out and backflush drains to assure proper operations. Consult an engineer before actions are taken.<br>ENGINEER REQUIRED |
| **Large Cracks** *(Figure 5.6f)* | Construction defect; local concentrated stress; local material deterioration; foundation failure, excessive backfill pressure.<br>Disturbance in flow patterns; erosion of foundation and backfill; eventual collapse of structure. | Large cracks without large displacement should be repaired by patching.<br>Surrounding areas should be cleaned or cut out before patching material is applied. (See Chapter 7.) Installation of weep holes or other actions may be needed. |

## Figure 5.6 *(cont.)*
## Inspection Guidelines - Spillways

**Open or Displaced Joints**

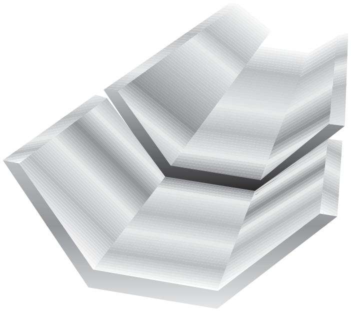


Figure 5.6g

**Breakdown and Loss of Riprap**

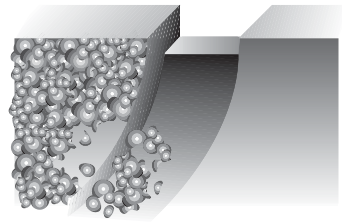


Figure 5.6h

**Material Deterioration—Spalling and Disintegration of Riprap, Concrete, Etc.**

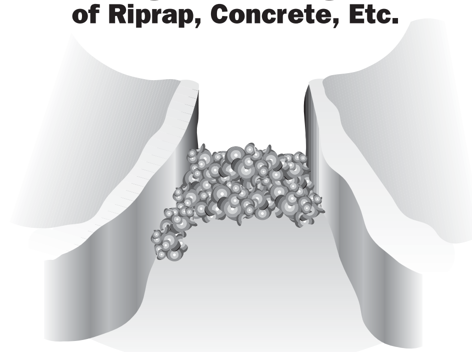


Figure 5.6i

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Open or Displaced Joints**<br>*(Figure 5.6g)* | Excessive and uneven settlement of foundation; sliding of concrete slab; construction joint too wide and left unsealed. Sealant deteriorated and washed away.<br>Erosion of foundation material may weaken support and cause further cracks; pressure induced by water flowing over displaced joints may wash away wall or slab, or cause extensive undermining. | Construction joint should be no wider than 1/2”. All joints should be sealed with asphalt or other flexible materials. Water stops should be used where feasible. Clean the joint, replace eroded materials, and seal the joint. Foundations should be properly drained and prepared. Underside of chute slabs should have ribs of enough depth to prevent sliding. Avoid steep chute slope.<br>ENGINEER REQUIRED |
| **Breakdown and Loss of Riprap**<br>*(Figure 5.6h)* | Slope too steep; material poorly graded; failure of subgrade; flow velocity too high; improper placement of material; bedding material or foundation washed away.<br>Erosion of channel bottom and banks; failure of spillway. | Design a stable slope for channel bottom and banks. Riprap material should be well-graded (the material should contain small, medium and large particles). Subgrade should be properly prepared before placement of riprap. Install filter fabric if necessary. Control flow velocity in the spillway by proper design. Riprap should be placed according to specification.<br>ENGINEER REQUIRED |
| **Material Deterioration—Spalling and Disintiegration of Riprap, Concrete, Etc.**<br>*(Figure 5.6i)* | Use of unsound or defective materials; structures subject to freeze-thaw cycles; improper maintenance practices; harmful chemicals. Structure life will be shortened; premature failure. | Avoid using shale or sandstone for riprap. Add air-entraining agent when mixing concrete. Use only clean, good-quality aggregates in the concrete. Steel bars should have at least 1" of concrete cover. Concrete should be kept damp and protected from freezing during curing. |

## Figure 5.6 *(cont.)*
## Inspection Guidelines - Spillways

**Poor Surface Drainage**

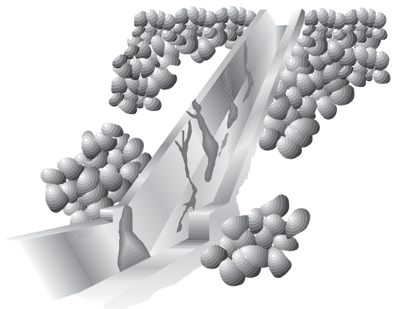


**Figure 5.6j**

**Concrete Erosion, Abrasion, and Fracturing**

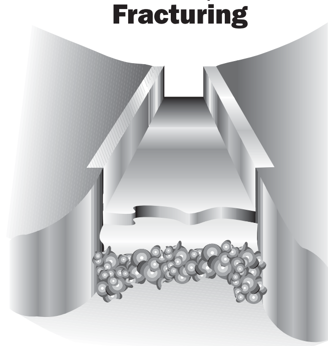


**Figure 5.6k**

**Leakage in or Around Spillway**

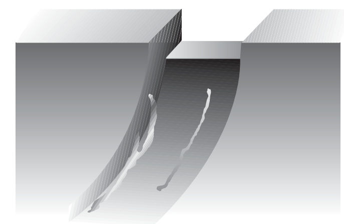


**Figure 5.6l**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Poor Surface Drainage**<br>*(Figure 5.6j)* | No weep holes; no drainage facility; plugged drains.<br>Wet foundation has lower supporting capacity; uplift pressure resulting from seepage water may damage spillway chute; accumulation of water may also increase total pressure on spillway walls and cause damage. | Install weep holes on spillway walls. Inner end of hole should be surrounded and packed with graded filtering material. Install drain system under spillway near downstream end. Clean out existing weep holes. Backflush and rehabilitate drain system under the supervision of an engineer.<br>ENGINEER REQUIRED |
| **Concrete Erosion, Abrasion, and Fracturing**<br>*(Figure 5.6k)* | Flow velocity too high (usually occurs at lower end of chute in high dams); rolling of gravel and rocks down the chutes; cavity behind or below concrete slab.<br>Pockmarks and spalling of concrete surface may progressively worsen; small hole may cause undermining of foundation, leading to failure of structure. | Remove rocks and gravels from spillway chute before flood season. Raise water level in stilling basin. Use good-quality concrete. Assure concrete surface is smooth.<br>ENGINEER REQUIRED |
| **Leakage in or Around Spillway**<br>*(Figure 5.6l)* | 1. Cracks and joints in geologic formation at spillway are permitting seepage.<br>2. Gravel or sand layers at spillway are permitting seepage.<br>1. Could lead to excessive loss of stored water.<br>2. Could lead to a progressive failure if velocities are high enough to cause erosion of natural materials. | 1. Examine exit area to see if type of material can explain leakage.<br>2. Measure flow quantity and check for erosion of natural materials.<br>3. If flow rate or amount of eroded materials increases rapidly, reservoir level should be lowered until flow stabilizes or stops.<br>4. A qualified engineer should inspect the condition and recommend further actions.<br>ENGINEER REQUIRED |

## Figure 5.6 *(cont.)*
## Inspection Guidelines - Spillways

**Too Much Leakage From Spillway Under Drains**

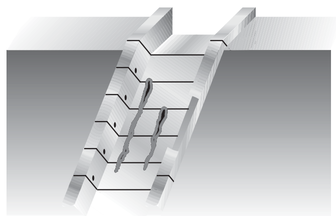


**Figure 5.6m**

**Seepage From a Construction Joint or Crack in Concrete Structure**

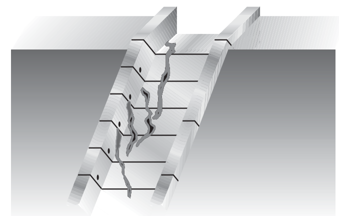


**Figure 5.6n**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Too Much Leakage From Spillway Under Drains** *(Figure 5.6m)* | Drain or cutoff may have failed.<br>1. Excessive flows under the spillway could lead to erosion of foundation material and collapse of parts of the spillway.<br>2. Uncontrolled flows could lead to loss of stored water. | 1. Examine exit area to see if type of material can explain leakage.<br>2. Measure flow and check for erosion of natural materials.<br>3. If flow rate or amount of eroded materials increases rapidly, reservoir level should be lowered until flow stabilizes or stops.<br>4. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |
| **Seepage From a Construction Joint or Crack in Concrete Structure** *(Figure 5.6n)* | Water is collecting behind structure because of insufficient drainage or clogged weep holes.<br>1. Can cause walls to tip in and over. Flows through concrete can lead to rapid deterioration from weathering.<br>2. If spillway is located within embankment, rapid erosion can lead to failure of the dam. | 1. Check area behind wall for puddling of surface water.<br>2. Check and clean as needed; drain outfalls, flush lines and weep holes.<br>3. If condition persists, a qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |

## Figure 5.7
## Inspection Guidelines - Inlets, Outlets, and Drains

### Outlet Pipe Damage

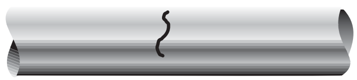



Figure 5.7a-1

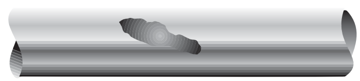



Figure 5.7a-2

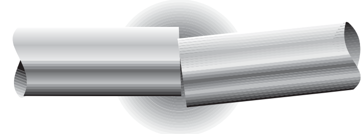



Figure 5.7a-3

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Outlet Pipe Damage: Crack** *(Figure 5.7a-1)* | Settlement; impact.<br>Excessive seepage, possible internal erosion. | Check for evidence of water either entering or exiting pipe at crack, hole, etc. |
| **Outlet Pipe Damage: Hole** *(Figure 5.7a-2)* | Rust (steel pipe); erosion (concrete pipe); cavitation.<br>Excessive seepage, possible internal erosion. | Tap pipe in vicinity of damaged area, listening for hollow sound which indicates a void has formed along the outside of the conduit. |
| **Outlet Pipe Damage: Joint Offset** *(Figure 5.7a-3)* | Settlement or poor construction practice. Provides passageway for water to exit or enter pipe, resulting in erosion of internal materials of the dam. | If a progressive failure is suspected, request engineering advice. |

**Figure 5.7** ***(cont.)***
**Inspection Guidelines - Inlets, Outlets, and Drains**

**Control Works**

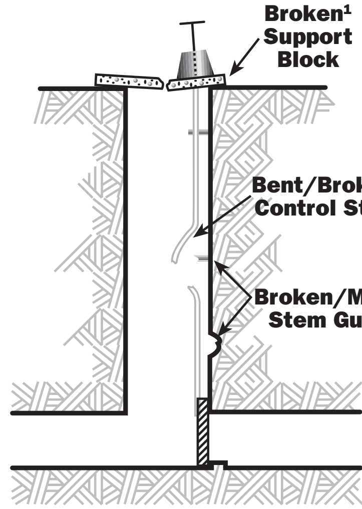



**Figure 5.7b**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Damage to Control Works** *(Figure 5.7b)* | 1. BROKEN SUPPORT BLOCK<br>Concrete deterioration. Excessive force exerted on control stem by trying to open gate when it was jammed.<br>Causes control support block to tile; control stem may bind. Control head works may settle. Gate may not open all the way. Support block may fail completely, leaving outlet inoperable.<br>2. BENT/BROKEN CONTROL STEM<br>Rust. Excess force used to open or close gate. Inadequate or broken stem guides.<br>Outlet is inoperable.<br>3. BROKEN/MISSING STEM GUIDES<br>Rust. Inadequate lubrication. Excess force used to open or close gate when jammed.<br>Loss of support for control stem. Stem may buckle and break under normal use (as in this example). | Any of these conditions can mean the control is either inoperable or, at best, partly operable. Use of the system should be minimized or discontinued. If the outlet system has a second control valve, consider using it to regulate releases until repairs can be made. Engineering help is recommended. |

## Figure 5.7 *(cont.)*
## Inspection Guidelines - Inlets, Outlets, and Drains

**Failure of Concrete Outfall Structure**

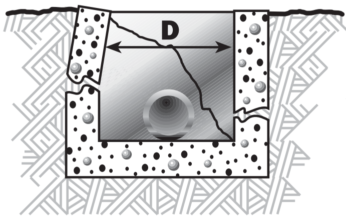



**Figure 5.7c**

**Outlet Releases Eroding Toe of Dam**

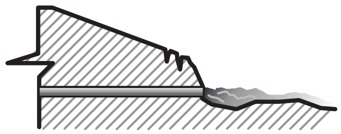


**Figure 5.7d**

**Valve Leakage**

**Debris Stuck Under Gate**


**Figure 5.e-1**

**Cracked Gate Leaf**

**Figure 5.e-2**

**Damage Gate Seat or Guides**


**Figure 5.e-3**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Failure of Concrete Outfall Streucture** *(Figure 5.7c)* | Excessive side pressures on nonreinforced concrete structure. Poor concrete quality.<br>Loss of outfall structure exposes embankment to erosion by outlet releases. | 1. Check for progressive failure by monitoring typical dimension, such as "D" shown in figure.<br>2. Repair by patching cracks and supplying drainage around concrete structure. Outfall structure may need total replacement. |
| **Outlet Releases Eroding Toe of Dam** *(Figure 5.7d)* | Outlet pipe too short. Lack of energy-dissipating pool or structure at downstream end of conduit.<br>Erosion of toe oversteepens downstream slope, causing progressive sloughing. | 1. Extend pipe beyond toe (use pipe of same size and material, and form watertight connection to existing conduit).<br>2. Protect embankment with riprap over suitable bedding. |
| **Valve Leakage: Debris Stuck Under Gate** *(Figure 5.7e-1)* | Trashrack missing or damaged.<br>Gate will not close. Gate or stem may be damaged in effort to close gate. | Raise and lower gate slowly until debris is loosened and floats past valve. When reservoir is lowered, repair or replace trashrack. |
| **Valve Leakage: Cracked Gate Leaf** *(Figure 5.7e-2)* | Ice action, rust, affect vibration, or stress resulting from forcing gate closed when it is jammed.<br>Gate-leaf main fail completely, evacuating reservoir. | Use valve only in fully open or closed position. Minimize use of valve until leaf can be repaired or replaced. |
| **Valve Leakage: Damaged Gate Seat or Guides** *(Figure 5.7e-3)* | Rust, erosion, cavitation, vibration or wear.<br>Leakage and loss of support for gate leaf. Gate may bind in guides and become inoperable. | Minimize use of valve until guides or seats can be repaired. If cavitation is the cause, check to see if air-vent pipe exists, and is unobstructed. |

**Figure 5.7** ***(cont.)***
**Inspection Guidelines - Inlets, Outlets, and Drains**

**Seepage Water Exiting From a Point Adjacent to the Outlet**

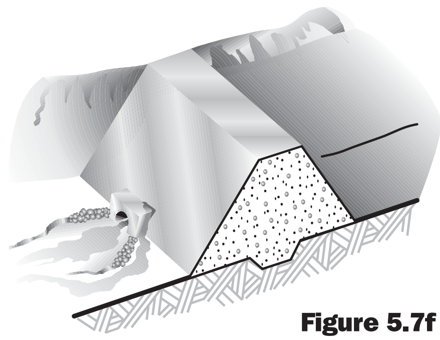


**Figure 5.7f**

| Problem | Probable Cause and Possible Consequences | Recommended Actions |
|---|---|---|
| **Seepage Water Exiting From a Point Adjacent to the Outlet** *(Figure 5.7f)* | 1. A break in the outlet pipe.<br>2. A path for flow has developed along the outside of the outlet pipe.<br><br>Continued flows can lead to erosion of the embankment materials and failure of the dam. | 1. Thoroughly investigate the area by probing and/or shoveling to try to determine cause.<br>2. Determine if leakage water is carrying soil particles.<br>3. Determine quantity of flow.<br>4. If flow increases or is carrying embankment materials, reservoir level should be lowered until leakage stops.<br>5. A qualified engineer should inspect the condition and recommend further actions.<br><br>ENGINEER REQUIRED |

# Appendix G

# Limitations

# APPENDIX G
# LIMITATONS

Use of Report

1. GeoEnvironmental, Inc. (GZA) prepared this Emergency Action Plan Update (EAP) 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 EAP. 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 EAP, 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 EAP and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions based on 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. The preparation of the EAP was 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 EAP 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 the EAP, 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. Observations were made of the site and of structures on the site as indicated within the EAP. 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.

7. In reviewing this EAP, 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.

8. It should be noted that the overall contents of this EAP, including recommendations describing organization and duties, are not intended for the dam owner to usurp the responsibility of other state and local governmental entities responsible for the evacuation of people and protection of life and property.

9. It should be understood that this EAP is intended for use in dam emergency conditions only, and does not address any other emergency operation. This plan should be used at all times in conjunction with established General Electric Company and Town of Great Barrington policies and procedures.

10. 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.

11. The dam breach analysis and inundated areas shown on the Inundation Maps included in this document reflect events of an extremely remote nature. They are not in any way intended to reflect upon the integrity of the dam.

12. The analysis presented is for the breach scenarios stated herein. For conditions other than those analyzed, the estimated flood wave and resulting inundation area has not been analyzed.

13. It should be clearly understood that the limits of flooding developed through the DAMBRK modeling effort and presented on the Inundation Map is approximate and should be used by public safety personnel as a guideline for establishing emergency notification and evacuation zones. The DAMBRK results shown on the accompanying Inundation Map and Profile are a function of the method, procedures, and assumptions employed for the model. Actual inundation areas will depend on actual failure conditions and may therefore differ somewhat from areas shown on the maps.

<u>Additional Services</u>

14. 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.

J:\19,000-20,999\19896\19896-50.LAG Engrg Services for Rising+Woods\EAP Update 2017\Rising\DS Rising 2017Update\Appendix G - Limitations\APPENDIX G additional services.docx

# APPENDIX C - QUARTERLY OBSERVATION CHECKLIST

# RISING POND DAM

## 1.0 GENERAL COMMENTS AND SUMMARY OF INSPECTION

Date of Inspection: ____________________________________________

Inspection By:
1. ________________________________________
2. ________________________________________
3. ________________________________________
4. ________________________________________

Surface Water Readings:

1. Reservoir Water Level: EL. _______________ft
2. Flow over Spillway Crest: Depth _____________in
3. Tailwater Level: EL. _______________ft
4. River Flow (USGS Gage at Great Barrington): ___________________cfs

Weather:

________________________________________________________________________

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________________________________________________________________________

Comments:

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## 2.0 LEFT (EAST) EARTHEN EMBANKMENT

The crest, upstream slope and downstream slope of the embankment are to be inspected, from the intake structure to the end of the embankment (where it blends in to natural ground). Is there any evidence of:

| | | YES | NO |
|---|---|---|---|
| A. | Local subsidence, sinkholes, animal burrows, or depressions? | | |
| B. | Erosion at the water line? | | |
| C. | Surface cracking on the crest? | | |
| D. | Settlement/rutting or low spots in crest? | | |
| E. | Seepage or wetness on downstream face of embankment? | | |
| F. | Trees, heavy brush or other woody vegetation? | | |
| G. | Deterioration of grass cover? | | |
| H. | Sloughing, slides, scarps or erosion gullies? | | |
| I. | Bowing, openings in or deterioration of sheetpile next to intake structure? | | |
| J. | Unusual conditions? | | |
| K. | Vandalism? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 3.0 INTAKE STRUCTURE, PENSTOCK, AND GATE

Is there any evidence of:

| | | YES | NO |
|---|---|---|---|
| A. | Missing or damaged trashracks or supports? | | |
| B. | Excessive debris on trashracks (causing more than one-foot difference in water level across the trashracks)? | | |
| C. | Cracking or displacement of concrete/masonry walls? | | |
| D. | Vegetation growth in joints of masonry/concrete? | | |
| E. | Deterioration of masonry/concrete? | | |
| F. | Settlement of fill adjacent to the structure, on the sides or behind the structure over the penstock? | | |
| G. | Damage to gate leaf or gate stem and operator? | | |
| H. | Leakage visible downstream of the gate? | | |
| I. | Debris in channel downstream of gate/penstock that could block flow? | | |
| J. | Unusual conditions? | | |
| K. | Vandalism? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 4.0 OVERFLOW SPILLWAY

Inspect the approach and discharge areas, as well as the upstream side, crest, and downstream side of the spillway itself. Inspect the river bed at the toe of the spillway. Is there any evidence of:

| | | **YES** | **NO** |
|---|---|---|---|
| A. | Accumulation of debris upstream or downstream of spillway? | | |
| B. | Vortices or other unusual flow patterns upstream of the spillway? | | |
| C. | Discontinuity of smooth flow over spillway? | | |
| D. | Damage to sheetpile at upstream or downstream ends of spillway slab (bowing, interlock separation, bending)? | | |
| E. | Cracking, deterioration, settlement, displacement or other damage to upstream concrete slab, crest plate, or downstream concrete slabs or joints? | | |
| F. | Visible missing or displaced riprap at the toe? | | |
| G. | Visible erosion or scour of the river bed near the toe? | | |
| H. | Unusual flow coming from the weepholes in the downstream face? | | |
| I. | Signs of seepage or unusual flow at the toe? | | |
| J. | Unusual conditions? | | |
| K. | Vandalism? | | |
| L. | Damage or debris on energy dissipaters? | | |
| M. | Grout bags visibly damaged? | | |
| N. | Changes to crack in forebay wall? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 5.0 SPILLWAY TRAINING WALLS

Inspect both left and right training walls, from upstream of the spillway to downstream of the spillway. Is there any evidence of:

| | | YES | NO |
|---|---|---|---|
| A. | Cracking or deterioration of concrete/masonry? | | |
| B. | Displacement/rotation/settlement of top of wall? | | |
| C. | Displacement/offset at joints? | | |
| D. | Missing mortar in joints? | | |
| E. | Seepage or leaks through walls or joints? | | |
| F. | Seepage/wet areas/unusual flow at base of walls? | | |
| G. | Unusual conditions? | | |
| H. | Vandalism? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 6.0 RIGHT (WEST) EARTHEN EMBANKMENT

The crest, upstream slope and downstream slope of the embankment are to be inspected, from the spillway wall to the end of the embankment (where it blends in to natural ground). Is there any evidence of:

| | | YES | NO |
|---|---|---|---|
| A. | Local subsidence, sinkholes, animal burrows, or depressions? | | |
| B. | Missing or displaced riprap or material erosion at the reservoir water line? | | |
| C. | Missing or displaced riprap or material erosion at the downstream toe? | | |
| D. | Surface cracking on the crest? | | |
| E. | Settlement/rutting or low spots in crest? | | |
| F. | Seepage or wetness on downstream face of embankment? | | |
| G. | Trees, heavy brush or other woody vegetation? | | |
| H. | Deterioration of grass cover? | | |
| I. | Sloughing, slides, scarps or erosion gullies? | | |
| J. | Bowing, openings in or deterioration of sheetpile next to spillway? | | |
| K. | Unusual conditions? | | |
| L. | Vandalism? | | |
| M. | Damage to sheetpile on upstream side of the embankment (bowing, interlock separation, bending)? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 7.0 SPRING AT TOE OF RIGHT (WEST) EARTHEN EMBANKMENT

A small spring has periodically been observed approximately 20 feet downstream and parallel to the corner of the right training wall, and 7 feet east of the face of this wall. The spring flows under pressure at an estimated 1 to 1.5 gallons per minute. The spring has a high iron content and there is orange-rust color staining at the point of discharge. If visible, the spring should be monitored for any changing condition, particularly any signs of material being carried or moved by the water. The toe area should continue to be monitored for signs of additional spring locations. Is there any evidence of:

| | | **YES** | **NO** |
|---|---|---|---|
| A. | Is spring visible at the time of inspection? | | |
| B. | Change in size or flow rate from the spring? | | |
| C. | Cloudy, milky, or muddy (i.e. not clear) flow from the spring? | | |
| D. | Silt, sand, or gravel deposited around the exit? | | |
| E. | Iron floc near exit? | | |
| F. | Additional springs nearby? | | |
| G. | Unusual conditions? | | |

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 8.0 OBSERVATION WELLS

Is there any evidence of:

| | | YES | NO |
|---|---|---|---|
| A. | Damage to casing? | | |
| B. | Is the cap locked and in place? | | |
| C. | Is there debris or other obstruction inside the casing? | | |
| D. | Is there ice inside the casing? | | |
| E. | Is there settlement around the piezometers? | | |
| H. | Unusual conditions? | | |
| I. | Vandalism? | | |

**Well Readings**

| Well | Elevation at Top of Pipe (ft) (a) | Height of the Pipe Above Ground (ft) (b) | Depth to Water (ft) (c) | Water Elevation (ft) (d) = (a) – (b) – (c) | Historic Range |
|---|---|---|---|---|---|
| GZ-2 | | | | | 699.6 to 703.3 |
| GZ-5 | | | | | 697.2 to 706.0 |
| GZ-7 | | | | | 694.4 to 697.9 |

Note: Circle any readings out of historic range.

Comments:

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Status of any detrimental conditions, if any, observed during last inspection:

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## 9.0 VIBRATING WIRE PIEZOMETER READINGS

**Method for reading vibrating wire piezometers within instrumentation shed:**

1. Plug the two leads into the connectors below the first dial inside the terminal box. Connect the GK-403 Readout Box to the lead using the provided connector with alligator clips. Connect green to green, red to red, etc.
2. Turn the GK-403 readout selector to Channel “B”.
3. Turn the dial in the terminal box to “1”.  Record the reading from the GK-403 in the table below for Piezometer Number P-1B (Dial Selection “1”).
4. Cycle through all selections in the first dial, then repeat the process for the other two dials.

**Method for reading vibrating wire piezometers within well casing (GZ-2 and GZ-5):**

1. Connect the GK-403 Readout Box to the bare wire in the casing using the provided connector with alligator clips. Connect green to green, red to red, etc.
2. Turn the GK-403 readout selector to Channel “B”.
3. Record the number on the GK-403 in the table below.

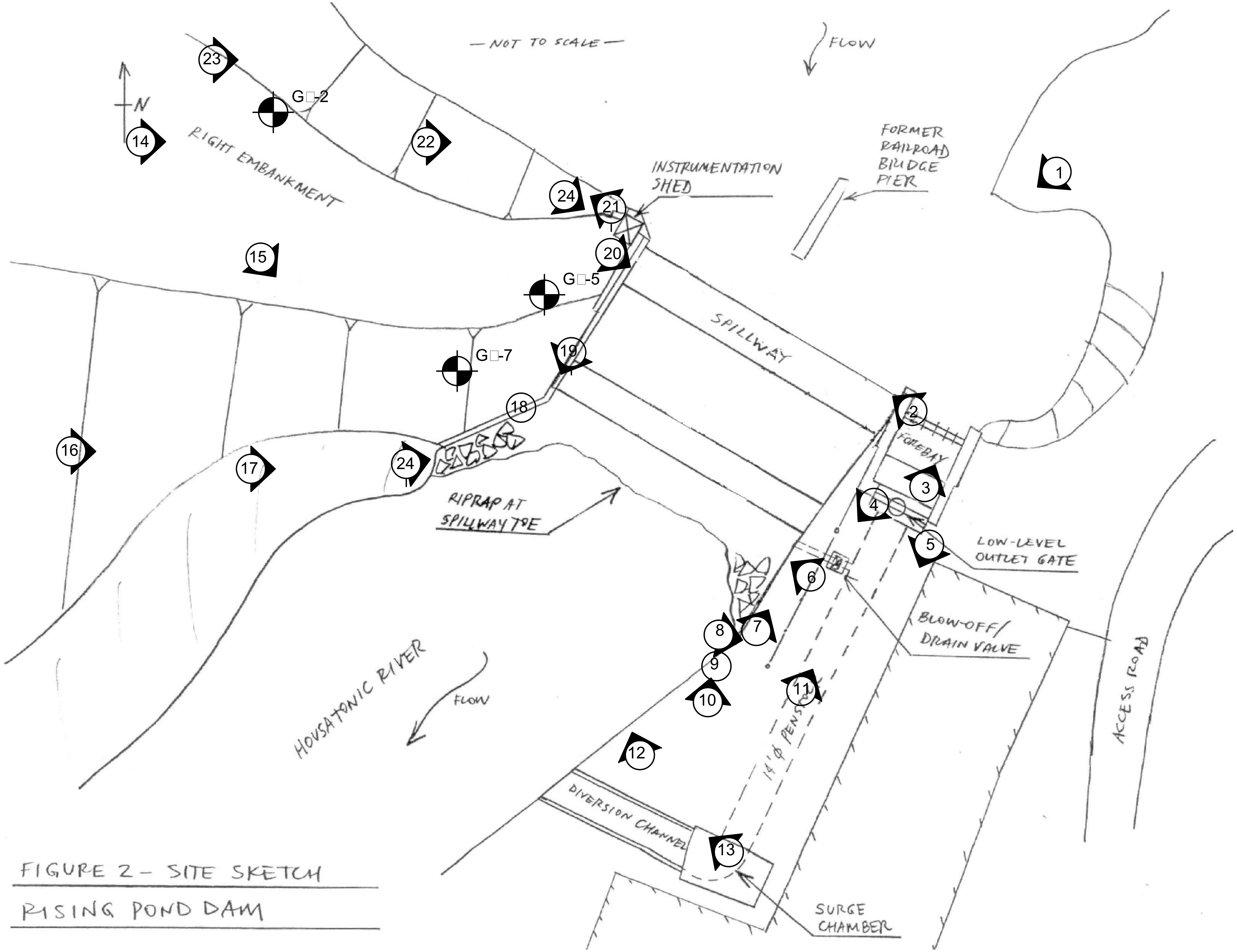
| Piezometer Number | Dial Selection | Reading | Historic Readings |
|---|---|---|---|
| P-5A | 9 | | 8421.0 to 8555.9 |
| P-5B | 10 | | 8485.0 to 8520.0 |
| P-5C | 11 | | 8037.0 to 8065.0 |
| P-7A | 13 | | 9719.0 to 9795.5 |
| P-7B | 14 | | 9305.0 to 9346.7 |
| P-8A | 15 | | 9701.0 to 9786.2 |
| P-8B | 16 | | 8759.0 to 8793.0 |
| P-8C | 17 | | 5701.0 to 6026.0 |
| P-9A | 18 | | 9441.0 to 9518.0 |
| P-9B | 19 | | 8677.0 to 8707.0 |
| P-10B | 20 | | 9006.0 to 9040.0 |
| P-10C | 21 | | 8684.8 to 8720.0 |
| P-11C | 22 | | 8453.0 to 8473.0 |
| P-12B | 23 | | 9112.0 to 9153.9 |
| P-12C | 24 | | 7688.0 to 7745.0 |
| P-14C2 | 12 | | 8037.0 to 8065.0 |
| P-14B | 27 | | 8034.0 to 8066.0 |
| P-14C1 | 28 | | 8364.0 to 8389.0 |
| GZ-2 | | | 8039.4 to 8157.4 |
| GZ-5 | | | 7897.6 to 8030.4 |

Note: Circle any readings out of historic range.
Piezometers P-14-B, P-14C1, and P-14C2 were repaired as part of the 2012 rehabilitation.

## 10.0 PHOTOGRAPHS

A photo location plan is attached with suggested photographs to be taken at the Quarterly Inspection shown. Additional photos of identified deficiencies should also be taken.

Comments:

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RISING POND DAM
□UARTERLY INSPECTION PHOTO LOCATIONS
AND INSTRUMENTATION LOCATIONS
GREAT BARRINGTON, MA

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| --- | --- |
| **GZA GeoEnvironmental, Inc.** **Engineers and Scientists** ONE EDGEWATER DRIVE NORWOOD, MA 02062 □781□278-3700 | GENERAL ELECTRIC COMPANY |

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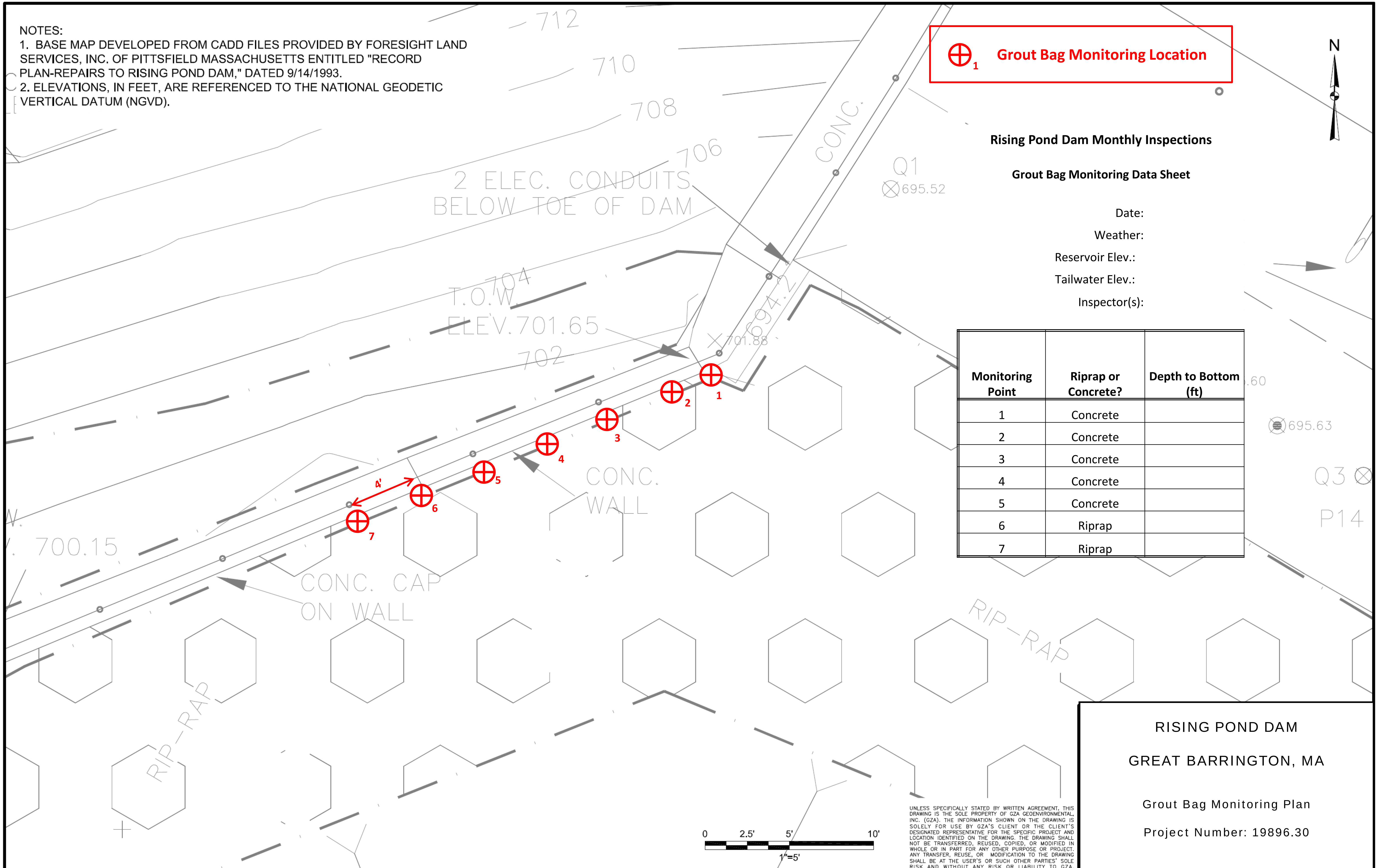
## 11.0 GROUT BAG MONITORING

As shown on the attached Grout Bag Monitoring Plan, GZA has located 7 grout bag monitoring points along the top of the right downstream training wall. The locations are marked and labeled in the field along the top of the fence on the right training wall. The depth is to be measured at these locations from the top of the training wall to the channel bottom. The channel bottom at monitoring locations 1 through 5 are the top of the grout bags, while monitoring locations 6 and 7 are existing rip rap. Dependent on flow conditions and amount of turbulence, the monitor should probe the top of the grout bags further away from the wall and between established points along the wall, as accessible, for the presence of localized depression(s) on the top of concrete grout bag surface. The depth to channel bottom data can then be entered onto the Grout Bag Monitoring Plan.

Individuals performing grout bag monitoring should at all times be aware of site conditions including proximity to the training wall and the potential for slipping, tripping or falling into the Housatonic River during monitoring.

NOTES:
1. BASE MAP DEVELOPED FROM CADD FILES PROVIDED BY FORESIGHT LAND SERVICES, INC. OF PITTSFIELD MASSACHUSETTS ENTITLED "RECORD PLAN-REPAIRS TO RISING POND DAM," DATED 9/14/1993.
2. ELEVATIONS, IN FEET, ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD).

⊕1 Grout Bag Monitoring Location




**Rising Pond Dam Monthly Inspections**

**Grout Bag Monitoring Data Sheet**

Date:

Weather:

Reservoir Elev.:

Tailwater Elev.:

Inspector(s):

| Monitoring Point | Riprap or Concrete? | Depth to Bottom (ft) |
|---|---|---|
| 1 | Concrete | |
| 2 | Concrete | |
| 3 | Concrete | |
| 4 | Concrete | |
| 5 | Concrete | |
| 6 | Riprap | |
| 7 | Riprap | |



RISING POND DAM

GREAT BARRINGTON, MA

Grout Bag Monitoring Plan

Project Number: 19896.30

# APPENDIX D – BIENNIAL ENGINEERING PHASE 1 INSPECTION/EVALUATION CHECKLIST

# DAM SAFETY INSPECTION CHECKLIST

| | |
|---|---|
| NAME OF DAM: Rising Pond Dam | STATE ID #: 1-2-113-14 |
| REGISTERED: ☑ YES ☐ NO | NID ID #: MA00250 |
| STATE SIZE CLASSIFICATION: Intermediate | STATE HAZARD CLASSIFICATION: Significant<br>CHANGE IN HAZARD CLASSIFICATION REQUESTED?: No |

*DAM LOCATION INFORMATION*

| | |
|---|---|
| CITY/TOWN: Great Barrington | COUNTY: Berkshire |
| DAM LOCATION: (street address if known) Off Route 183 by Mountain Street | ALTERNATE DAM NAME: Rising Paper Company Dam, Rising Dam |
| USGS QUAD.: Great Barrington | LAT.: 42.2424° N LONG.: 73.3577° W |
| DRAINAGE BASIN: Housatonic | RIVER: Housatonic River |
| IMPOUNDMENT NAME(S): Rising Pond | |

*GENERAL DAM INFORMATION*

| | |
|---|---|
| TYPE OF DAM: Earthfill Embankment w/Gravity Spillway | OVERALL LENGTH (FT): 670 ft |
| PURPOSE OF DAM: Originally to power adjacent mill | NORMAL POOL STORAGE (ACRE-FT): 195 |
| YEAR BUILT: Late 1800s | MAXIMUM POOL STORAGE (ACRE-FT): 710 |
| STRUCTURAL HEIGHT (FT): 38 | EL. NORMAL POOL (FT): 716.4 |
| HYDRAULIC HEIGHT (FT): 30 | EL. MAXIMUM POOL (FT): 726.2 |

*FOR INTERNAL MADCR USE ONLY*

FOLLOW-UP INSPECTION REQUIRED: ☐ YES ☐ NO CONDITIONAL LETTER: ☐ YES ☐ NO

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

NID ID #: MA00250

## *INSPECTION SUMMARY*

DATE OF INSPECTION: ______

DATE OF PREVIOUS INSPECTION: ______

TEMPERATURE/WEATHER: ______

ARMY CORP PHASE I: ☑ YES ☐ NO If YES, date September 1979

CONSULTANT: GZA GeoEnvironmental, Inc.

PREVIOUS DCR PHASE I: ☐ YES ☐ NO If YES, date ______

BENCHMARK/DATUM: NGVD

OVERALL CONDITION: ______

DATE OF LAST REHABILITATION: 2011-2013

EL. POOL DURING INSP.: ______

EL. TAILWATER DURING INSP.: ______

## *PERSONS PRESENT AT INSPECTION*

| NAME | TITLE/POSITION | REPRESENTING |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

## *EVALUATION INFORMATION*

E1) TYPE OF DESIGN

E2) LEVEL OF MAINTENANCE

E3) EMERGENCY ACTION PLAN

E4) EMBANKMENT SEEPAGE

E5) EMBANKMENT CONDITION

E6) CONCRETE CONDITION

E7) LOW-LEVEL OUTLET CAP

E8) LOW-LEVEL OUTLET COND.

E9) SPILLWAY DESIGN FLOOD

E10) GENERAL CONDITIONS

E11) ESTIMATED REPAIR COST

ROADWAY OVER CREST ☐ YES ☑ NO

BRIDGE NEAR DAM ☐ YES ☑ NO

SIGNATURE OF INSPECTING ENGINEER: ______

| | | | |
|---|---|---|---|
| NAME OF DAM: | Rising Pond Dam | STATE ID #: | 1-2-113-14 |
| | | NID ID #: | MA00250 |

| | | | | | |
|---|---|---|---|---|---|
| OWNER: | ORGANIZATION | General Electric Company | CARETAKER: | ORGANIZATION | General Electric Company |
| | NAME/TITLE | Kevin Mooney, Facility Manager | | NAME/TITLE | Kevin Mooney. Facility Manager |
| | STREET | 159 Plastics Ave. | | STREET | 159 Plastics Ave. |
| | TOWN, STATE, ZIP | Pittsfield, MA 01201 | | TOWN, STATE, ZIP | Pittsfield, MA 01201 |
| | PHONE | 413-553-6610 | | PHONE | 413-553-6610 |
| | FAX | N/A | | FAX | N/A |
| | EMAIL | kevin.mooney@ge.com | | EMAIL | kevin.mooney@ge.com |
| | OWNER TYPE | Private | | | |

| | | | |
|---|---|---|---|
| PRIMARY SPILLWAY TYPE | Ogee overflow weir | | |
| SPILLWAY LENGTH (FT) | 130 | SPILLWAY CAPACITY (CFS) | 17,093 cfs @ Elev. 726.4 ft (500 year flood) |
| AUXILIARY SPILLWAY TYPE | N/A | AUX. SPILLWAY CAPACITY (CFS) | N/A |
| NUMBER OF OUTLETS | 1 | OUTLET(S) CAPACITY (CFS) | ±3,300 cfs @ Elev. 726.4 ft |
| TYPE OF OUTLETS | 14-ft penstock | TOTAL DISCHARGE CAPACITY (CFS) | 20,000+ cfs |
| DRAINAGE AREA (SQ MI) | 279 | SPILLWAY DESIGN FLOOD (PERIOD/CFS) | 100-yr / 11,700 cfs |
| HAS DAM BEEN BREACHED OR OVERTOPPED | ☐ YES ☑ NO | IF YES, PROVIDE DATE(S) | |
| FISH LADDER (LIST TYPE IF PRESENT) | None | | |
| DOES CREST SUPPORT PUBLIC ROAD? | ☐ YES ☑ NO | IF YES, ROAD NAME: | |
| PUBLIC BRIDGE WITHIN 50' OF DAM? | ☐ YES ☑ NO | IF YES, ROAD/BRIDGE NAME: | |

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: ____________________

NID ID #: MA00250

## EMBANKMENT CREST

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| CREST | SURFACE TYPE<br>SURFACE CRACKING<br>SINKHOLES, ANIMAL BURROWS<br>VERTICAL ALIGNMENT (DEPRESSIONS)<br>HORIZONTAL ALIGNMENT<br>RUTS AND/OR PUDDLES<br>VEGETATION (PRESENCE/CONDITION)<br>ABUTMENT CONTACT | | | | |

ADDITIONAL COMMENTS: ____________________

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: ____________________

NID ID #: MA00250

## EMBANKMENT DOWNSTREAM SLOPE

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| D/S SLOPE | WET AREAS (NO FLOW)<br>SEEPAGE<br>SLIDE, SLOUGH, SCARP<br>EMB.-ABUTMENT CONTACT<br>SINKHOLE/ANIMAL BURROWS<br>EROSION<br>UNUSUAL MOVEMENT<br>VEGETATION (PRESENCE/CONDITION) | | | | |

ADDITIONAL COMMENTS: ____________________

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: ____________________

NID ID #: MA00250

## EMBANKMENT UPSTREAM SLOPE

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| U/S SLOPE | SLIDE, SLOUGH, SCARP<br>SLOPE PROTECTION TYPE AND COND.<br>SINKHOLE/ANIMAL BURROWS<br>EMB.-ABUTMENT CONTACT<br>EROSION<br>UNUSUAL MOVEMENT<br>VEGETATION (PRESENCE/CONDITION) | | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## EMBANKMENT

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| INSTR. | PIEZOMETERS<br>OBSERVATION WELLS<br>STAFF GAGE AND RECORDER<br>WEIRS<br>INCLINOMETERS<br>SURVEY MONUMENTS<br>DRAINS<br>FREQUENCY OF READINGS<br>LOCATION OF READINGS | | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: 

NID ID #: MA00250

**UPSTREAM MASONRY WALLS**

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| U/S WALLS | WALL TYPE<br>WALL ALIGNMENT<br>WALL CONDITION<br>HEIGHT: TOP OF WALL TO MUDLINE<br>SEEPAGE OR LEAKAGE<br>ABUTMENT CONTACT<br>EROSION/SINKHOLES BEHIND WALL<br>ANIMAL BURROWS<br>UNUSUAL MOVEMENT<br>WET AREAS AT TOE OF WALL | N/A<br>m max: avg: | | | |

ADDITIONAL COMMENTS: 

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE:

NID ID #: MA00250

**DOWNSTREAM MASONRY WALLS**

| AREA INSPECTED | CONDITION | OBSERVATIONS | | | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|---|---|
| D/S WALLS | WALL TYPE | N/A | | | | | |
| | WALL ALIGNMENT | | | | | | |
| | WALL CONDITION | | | | | | |
| | HEIGHT: TOP OF WALL TO MUDLINE | | max: | avg: | | | |
| | SEEPAGE OR LEAKAGE | | | | | | |
| | ABUTMENT CONTACT | | | | | | |
| | EROSION/SINKHOLES BEHIND WALL | | | | | | |
| | ANIMAL BURROWS | | | | | | |
| | UNUSUAL MOVEMENT | | | | | | |
| | WET AREAS AT TOE OF WALL | | | | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: ______

NID ID #: MA00250

## DOWNSTREAM AREA

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| D/S AREA | ABUTMENT LEAKAGE<br>FOUNDATION SEEPAGE<br>SLIDE,SLOUGH,SCARP<br>WEIRS<br>DRAINAGE SYSTEM<br>INSTRUMENTATION<br>VEGETATION<br>ACCESSIBILITY | | | | |
| | DOWNSTREAM HAZARD DESCRIPTION | | | | |
| | DATE OF LAST EAP UPDATE | | | | |

ADDITIONAL COMMENTS: ______

| | | | |
|---|---|---|---|
| NAME OF DAM: | Rising Pond Dam | STATE ID #: | 1-2-113-14 |
| INSPECTION DATE: | | NID ID #: | MA00250 |

## MISCELLANEOUS

| AREA INSPECTED | CONDITION | OBSERVATIONS | | |
|---|---|---|---|---|
| MISC. | RESERVOIR DEPTH (AVG) | | | |
| | RESERVOIR SHORELINE | | | |
| | RESERVOIR SLOPES | | | |
| | ACCESS ROADS | | | |
| | SECURITY DEVICES | | | |
| | VANDALISM OR TRESPASS | YES: ☑ | NO: ☐ | WHAT: pedestrian access to water |
| | AVAILABILITY OF PLANS | YES: ☑ | NO: ☐ | DATE: 1991 and 2012 Rehab @GZA |
| | AVAILABILITY OF DESIGN CALCS | YES: ☑ | NO: ☐ | DATE: 1991 and 2012 Rehab @GZA |
| | AVAILABILITY OF EAP/LAST UPDATE | YES: ☐ | NO: ☐ | DATE: |
| | AVAILABILITY OF O&M MANUAL | YES: ☐ | NO: ☐ | DATE: |
| | CARETAKER/OWNER AVAILABLE | YES: ☐ | NO: ☐ | DATE: |
| | CONFINED SPACE ENTRY REQUIRED | YES: ☐ | NO: ☐ | PURPOSE: |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: ____________________

NID ID #: MA00250

## PRIMARY SPILLWAY

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| SPILLWAY | SPILLWAY TYPE | | | | |
| | WEIR TYPE | | | | |
| | SPILLWAY CONDITION | | | | |
| | TRAINING WALLS | | | | |
| | SPILLWAY CONTROLS AND CONDITION | | | | |
| | UNUSUAL MOVEMENT | | | | |
| | APPROACH AREA | | | | |
| | DISCHARGE AREA | | | | |
| | DEBRIS | | | | |
| | WATER LEVEL AT TIME OF INSPECTION | | | | |

ADDITIONAL COMMENTS: ____________________

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## AUXILIARY SPILLWAY

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| SPILLWAY | SPILLWAY TYPE<br>WEIR TYPE<br>SPILLWAY CONDITION<br>TRAINING WALLS<br>SPILLWAY CONTROLS AND CONDITION<br>UNUSUAL MOVEMENT<br>APPROACH AREA<br>DISCHARGE AREA<br>DEBRIS<br>WATER LEVEL AT TIME OF INSPECTION | N/A | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## OUTLET WORKS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| OUTLET WORKS | TYPE | | | | |
| | INTAKE STRUCTURE | | | | |
| | TRASHRACK | | | | |
| | PRIMARY CLOSURE | | | | |
| | SECONDARY CLOSURE | | | | |
| | CONDUIT | | | | |
| | OUTLET STRUCTURE/HEADWALL | | | | |
| | EROSION ALONG TOE OF DAM | | | | |
| | SEEPAGE/LEAKAGE | | | | |
| | DEBRIS/BLOCKAGE | | | | |
| | UNUSUAL MOVEMENT | | | | |
| | DOWNSTREAM AREA | | | | |
| | | | | | |
| | MISCELLANEOUS | | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## CONCRETE/MASONRY DAMS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| GENERAL | TYPE<br>AVAILABILITY OF PLANS<br>AVAILABILITY OF DESIGN CALCS<br>PIEZOMETERS<br>OBSERVATION WELLS<br>INCLINOMETERS<br>SEEPAGE GALLERY<br>UNUSUAL MOVEMENT | N/A | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016 NID ID #: MA00250

## CONCRETE/MASONRY DAMS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| U/S FACE | TYPE<br>SURFACE CONDITIONS<br>CONDITIONS OF JOINTS<br>UNUSUAL MOVEMENT<br>ABUTMENT CONTACTS | N/A | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## CONCRETE/MASONRY DAMS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|---|---|---|---|---|---|
| D/S FACE | TYPE<br>SURFACE CONDITIONS<br>CONDITIONS OF JOINTS<br>UNUSUAL MOVEMENT<br>ABUTMENT CONTACTS<br>DRAINS<br>LEAKAGE | N/A | | | |

ADDITIONAL COMMENTS:

NAME OF DAM: Rising Pond Dam

STATE ID #: 1-2-113-14

INSPECTION DATE: December 19, 2016

NID ID #: MA00250

## CONCRETE/MASONRY DAMS

| AREA INSPECTED | CONDITION | OBSERVATIONS |
| --- | --- | --- |
| CREST | TYPE<br>SURFACE CONDITIONS<br>CONDITIONS OF JOINTS<br>UNUSUAL MOVEMENT<br>HORIZONTAL ALIGNMENT<br>VERTICAL ALIGNMENT | N/A |

ADDITIONAL COMMENTS:


**GZA GeoEnvironmental, Inc.**