GREENVILLE POND DAM

PHASE I

INSPECTION / EVALUATION REPORT

Dam Name:	Greenville Pond Dam
National ID No.:	MA00982
Owner:	Town of Leicester
Town:	Leicester, MA
Consultant:	Fuss & O'Neill, Inc.
Date of Inspection:	June 30, 2021

FUSS & O'NEILL

EXECUTIVE SUMMARY

Greenville Pond Dam is a High Hazard, Intermediate Size dam located on a tributary to the French River in Leicester, Massachusetts. The dam was visually inspected by Fuss & O'Neill, Inc. on June 30, 2021 and appeared to be in Fair condition.

The deficiencies or potential items of concern identified are as follows:

1. Trees and brush growing in the spillway discharge area and within 15 feet of the right spillway training wall.
2. Several small surface cracks in the training walls of the dam.
3. Structural deficiency with the low-level outlet gate operator platform.
4. Encroachment of small trees and brush at the left abutment on upstream face.
5. Flash boards missing and rotted.
6. No operations and maintenance manual.
7. No stability analysis has been performed.
8. No Updated H&H analysis.

The major recommendations offered are:

1. Remove trees and brush from spillway discharge area and within 15 feet of the right spillway training wall.
2. Repair cracks in concrete training walls.
3. Make repairs to structural deficiencies with the low-level outlet gate operator platform.
4. Remove encroaching trees and brush at the left abutment on the upstream face.
5. Develop an Operations and Maintenance Manual.
6. Perform a Stability Analysis.
7. Perform a detailed Hydrologic & Hydraulic Analysis using current rainfall data.

Dam Evaluation Summary Detail Sheet

1. NID ID:	**MA00982**		**4. Inspection Date:**	**June 30, 2021**	
2. Dam Name:	**Greenville Pond Dam**		**5. Last Insp. Date:**	**June 3, 2019**	
3. Dam Location:	**Leicester, MA**		**6. Next Inspection:**	**June 30, 2023**	
7. Inspector:	**Ken Berchielli, EIT**				
8. Consultant:	**Fuss & O'Neill, Inc.**				
9. Hazard Code:	**High**	**9a. Is Hazard Code Change Requested?:**		**No**	
10. Insp. Frequency:	**2 Years**	**11. Overall Physical Condition of Dam:**		**FAIR**	
12. Spillway Capacity (% SDF)		**50-90% of the SDF**			
E1. Design Methodology:	**3**		**E7. Low-Level Discharge Capacity:**		**4**
E2. Level of Maintenance:	**3**		**E8. Low-Level Outlet Physical Condition:**		**4**
E3. Emergency Action Plan:	**4**		**E9. Spillway Design Flood Capacity:**		**2**
E4. Embankment Seepage:	**5**		**E10. Overall Physical Condition of the Dam:**		**3**
E5. Embankment Condition:	**3**		**E11. Estimated Repair Cost:**		**$58K-$105K**
E6. Concrete Condition:	**4**				

Evaluation Description

E1: DESIGN METHODOLOGY
1. Unknown Design – no design records available
2. No design or post-design analyses
3. No analyses, but dam features appear suitable
4. Design or post design analysis show dam meets most criteria
5. State of the art design – design records available & dam meets all criteria

E2: LEVEL OF MAINTENANCE
1. Dam in disrepair, no evidence of maintenance, no O&M manual
2. Dam in poor level of upkeep, very little maintenance, no O&M manual
3. Dam in fair level of upkeep, some maintenance and standard procedures
4. Adequate level of maintenance and standard procedures
5. Dam well maintained, detailed maintenance plan that is executed

E3: EMERGENCY ACTION PLAN
1. No plan or idea of what to do in the event of an emergency
2. Some idea but no written plan
3. No formal plan but well thought out
4. Available written plan that needs updating
5. Detailed, updated written plan available and filed with MADCR, annual training

E4: SEEPAGE (Embankments, Foundations, & Abutments)
1. Severe piping and/or seepage with no monitoring
2. Evidence of monitored piping and seepage
3. No piping but uncontrolled seepage
4. Minor seepage or high volumes of seepage with filtered collection
5. No seepage or minor seepage with filtered collection

E5: EMBANKMENT CONDITION (See Note 1)
1. Severe erosion and/or large trees
2. Significant erosion or significant woody vegetation
3. Brush and exposed embankment soils, or moderate erosion
4. Unmaintained grass, rodent activity and maintainable erosion
5. Well maintained healthy uniform grass cover

E6: CONCRETE CONDITION (See Note 2)
1. Major cracks, misalignment, discontinuities causing leaks, seepage or stability concerns
2. Cracks with misalignment inclusive of transverse cracks with no misalignment but with potential for significant structural degradation
3. Significant longitudinal cracking and minor transverse cracking
4. Spalling and minor surface cracking
5. No apparent deficiencies

E7: LOW-LEVEL OUTLET DISCHARGE CAPACITY
1. No low level outlet, no provisions (e.g. pumps, siphons) for emptying pond
2. No operable outlet, plans for emptying pond, but no equipment
3. Outlet with insufficient drawdown capacity, pumping equipment available
4. Operable gate with sufficient drawdown capacity
5. Operable gate with capacity greater than necessary

E8: LOW-LEVEL OUTLET PHYSICAL CONDITION
1. Outlet inoperative needs replacement, non-existent or inaccessible
2. Outlet inoperative needs repair
3. Outlet operable but needs repair
4. Outlet operable but needs maintenance
5. Outlet and operator operable and well maintained

E9: SPILLWAY DESIGN FLOOD CAPACITY
1. 0 - 50% of the SDF or unknown
2. 50-90% of the SDF
3. 90 - 100% of the SDF
4. >100% of the SDF with actions required by caretaker (e.g. open outlet)
5. >100% of the SDF with no actions required by caretaker

E10: OVERALL PHYSICAL CONDITION OF DAM
1. UNSAFE – Major structural, operational, and maintenance deficiencies exist under normal operating conditions
2. POOR - Significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions
3. 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
4. SATISFACTORY - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result In deficiencies.
5. GOOD - No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF

E11: ESTIMATED REPAIR COST

Estimation of the total cost to address all identified structural, operational, maintenance deficiencies. Cost shall be developed utilizing standard estimating guides and procedures

Changes/Deviations to Database Information since Last Inspection

PREFACE

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

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

It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

*Licensed Professional's Signature**

** 302 CMR 10.00 requires inspecting engineers to be Commonwealth of Massachusetts Registered Professional Engineers with a **Civil Engineering license** with experience in dam safety inspections and engineering.*

Andrea Judge
Massachusetts License No.: 51068
License Type: Civil
Project Manager
Fuss & O'Neill, Inc.

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SECTION 1

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The Town of Leicester retained Fuss & O'Neill, Inc. to perform a visual inspection and develop a report of conditions for the dam at Greenville Pond Dam along Meadow Brook/French River in Leicester, Worcester Country, Massachusetts. The inspection and report were performed in accordance with MGL Chapter 253, Sections 44-50 of the Massachusetts General Laws as amended by Chapter 330 of the Acts of 2002.

1.1.2 Purpose of Work

The purpose of this investigation was to inspect and evaluate the present condition of the dam and appurtenant structures in accordance with 302 CMR10.07 to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation was divided into four parts: 1) obtain and review available reports, investigations, and data previously submitted to the owner pertaining to the dam and appurtenant structures; 2) perform a visual inspection of the site; 3) evaluate the status of an emergency action plan for the site and, 4) prepare and submit a final report presenting the evaluation of the structure, including recommendations and remedial actions, and opinion of probable costs.

1.1.3 Definitions

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

1.2 Description of Project

1.2.1 Location

Greenville Pond Dam is located on the southeast end of Greenville Pond in the Town of Leicester, Worcester County, Massachusetts. The coordinates of the dam are 42.20292° North 71.91744° West (WGS 84 Datum), determined using Google Earth geographic information software.

To reach the dam from the center of Leicester, drive south on Pleasant Street / Route 56 for 1.8 miles. When Route 56 turns left, continue straight on Pleasant Street for another 1.2 miles. Just before the bridge over the French River, turn right into the driveway of Lincoln Laboratory and Bond-Tite Tank Service, at 710 Pleasant Street. The dam can be accessed from the back side of the parking lot. A locus map is provided as Figure 1.

1.2.2 Owner/Caretaker

See Table 1.1 for current owner and caretaker data (names and contact information).

1.2.3 Purpose of the Dam

See Table 1.1 for the current purpose of the dam.

1.2.4 Description of the Dam and Appurtenances

Greenville Pond Dam consists of a 140-foot long 22-foot tall earthen embankment. The crest and downstream slope have of well-established grass. The left upstream face of the embankment is protected by 3-4 foot stone armoring. An 80-foot wide concrete ogee spillway founded on bedrock is situated on the right end of the embankment. Concrete training walls at either end of the spillway allow a maximum flow depth of 8.5 feet over the spillway crest. One-foot-tall flashboards are installed on top of the concrete spillway.

The low-level outlet consists of an approximate 2-foot by 2.5-foot rectangular formed concrete culvert controlled by a slide gate located in the left end of the spillway. The slide gate is operated from a platform extending out from the top of the left training wall. The outlet discharges through the downstream face of the ogee spillway.

Chain-link fencing installed on the left and right training wall. The slide gate operator is protected by the fence and is accessed through a locked swing gate.

1.2.5 Operations and Maintenance

The Town of Leicester is responsible for maintenance of Greenville Pond Dam. The dam embankment is mowed regularly by Bond-Tite Tank Services, a business located immediately downstream of the dam. The Town Highway Department opens the low level outlet gate to increase storage capacity within the impoundment when heavy rains are anticipated. No other routine maintenance is performed, and there are no maintenance records or written operating procedures for the dam.

1.2.6 DCR Size Classification

Greenville Pond Dam has a height of dam of approximately 22 feet and a maximum storage capacity of 490 acre-feet. Refer to Appendix D for definitions of height of dam and storage. Therefore, 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, Greenville Pond Dam is an Intermediate size structure.

1.2.7 DCR Hazard Potential Classification

Greenville Pond Dam is located upstream of an industrial/commercial building. Several residential dwellings adjacent to the stream channel are located within 300 feet of the dam. Secondary highway bridges and other industrial buildings are located along the French River downstream of the dam. It appears that a failure of the dam at maximum pool 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). Therefore, 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, Greenville Pond Dam should be classified as a High hazard potential (Class I) dam. The Hazard Potential Classification recommendation is consistent with the Hazard Potential Classification on record with the Office of Dam Safety for Greenville Pond Dam.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The drainage area for Greenville Pond Dam is approximately 14.46 square miles as determined using USGS StreamStats online software tools, and extends into the communities of Leicester and Spencer. The watershed is partially forested with rolling hills and some residential development, with mild to steep slopes. The upstream watershed contains a number of ponds and swampy areas. Large dammed impoundments upstream of Greenville Pond include Stiles Reservoir, Cedar Meadow Pond, Burncoat Pond, and Sargent Pond. Greenville Pond is part of the French River Watershed. The drainage area is depicted in Figure 3.

1.3.2 Reservoir

The following data was obtained from the USACE National Inventory of Dams (NID) database and is deemed to be reasonable:

	Length (feet)	Width (feet)	Surface Area (acres)	Storage Volume (acre-feet)
Normal Pool	3,000	600	32	300
Maximum Pool	4,200	1,000	58	490

See Table 1.1 for spillway design flood (SDF) pool data.

1.3.3 Discharges at the Dam Site

No Record of Discharges is available for Greenville Pond Dam.

1.3.4 General Elevations (feet)

Elevations included in this report were obtained from previous inspection reports and checked against the 2011 Flood Insurance Study. All elevations are referenced to the NGVD29 vertical datum. The Spillway Design Flood (SDF) pool elevation was obtained from the 1987 Phase I Inspection Report.

A.	Top of Dam	768.5
B.	Spillway Design Flood Pool	769.7
C.	Normal Pool (with flashboards)	761.5
D.	Spillway Crest (concrete ogee)	759.3
E.	Upstream Water at Time of Inspection	759.4
F.	Downstream Water at Time of Inspection	749.0

G.	Streambed at Toe of the Dam	746.0

1.3.5 Main Spillway Data

A.	Type	Concrete Ogee
B.	Weir Length	80 ft
C.	Weir Crest Elevation (flashboards)	760.3
D.	Upstream Channel	Unknown
E.	Downstream Channel	749.0
F.	Downstream Water	749.0

1.3.6 Low-level Outlet Structure

A.	Type	Gated low-level outlet
B.	Conduit Size/Description	2 ft x 2.5 ft concrete sluiceway
C.	Valve/Operator	Manually controlled slide gate
D.	Outlet Structure	Opening in downstream face of ogee spillway
E.	Outlet Invert Elevation	750.0

1.3.7 Design and Construction Records and History

No design or construction records are available for the dam. According to DCR records and the 1979 Phase I Report, the dam was built in 1912 to store water for manufacturing purposes. The original discharge pipe was 16 inches. The concrete wall on the upstream face of the dam was extended 30 feet to the north in 1933 and a new inlet chamber was constructed at that time.

1.3.8 Operating Records

There are no operating records available for the dam.

1.4 Summary Data Table

See Table 1.1, Summary Data Table, on the next page.

1.1 Summary Data Table

Required Phase I Report Data	Data Provided by the Inspecting Engineer
National ID #	MA00982
Dam Name	Greenville Pond Dam
Dam Name (Alternate)	Greenville Reservoir Dam
River Name	Town Meadow Brook
Impoundment Name	Greenville Pond
Hazard Class	High
Size Class	Intermediate
Dam Type	Earthen Embankment
Dam Purpose	Recreation
Structural Height of Dam (feet)	22
Hydraulic Height of Dam (feet)	13.5
Drainage Area (sq. mi.)	14.46
Reservoir Surface Area (acres)	32
Normal Impoundment Volume (acre-feet)	300
Max Impoundment Volume ((top of dam) acre-feet)	490
SDF Impoundment Volume* (acre-feet)	Unknown
Spillway Type	Concrete ogee
Spillway Length (feet)	80
Freeboard at Normal Pool (feet)	7
Principal Spillway Capacity* (cfs)	7,446 w/o flashboards; 6,145 w/ flashboards
Auxiliary Spillway Capacity* (cfs)	N/A
Low-Level Outlet Capacity* (cfs)	106
Spillway Design Flood* (flow rate - cfs)	1/2 PMF / 9,600 cfs
Winter Drawdown (feet below normal pool)	N/A
Drawdown Impoundment Vol. (acre-feet)	N/A
Latitude	42.20292
Longitude	-71.91744
City/Town	Leicester
County Name	Worcester
Public Road on Crest	No
Public Bridge over Spillway	No
EAP Date (if applicable)	May-20
Owner Name	Town of Leicester
Owner Address	3 Washburn Square
Owner Town	Leicester, MA 01524
Owner Phone	(508) 892-7077
Owner Emergency Phone	(978) 833-0306
Owner Type	Municipality or Political subdivision
Caretaker Name	Dennis Griffin
Caretaker Address	59 Peter Salem Road
Caretaker Town	Leicester, MA 01524
Caretaker Phone	(508) 892-7021
Caretaker Emergency Phone	(774) 293-0303
Date of Field Inspection	6/30/2021
Consultant Firm Name	Fuss & O'Neill, Inc.
Inspecting Engineer	Ken Berchielli, EIT
Engineer Phone Number	401.861.3070 x4547

*In the event a hydraulic and hydrologic analysis has not been completed for the dam, indicate "No H&H" in this table, recommendation section shall include specific recommendation to hire a qualified dam engineering consultant to conduct analysis to determine spillway adequacy in conformance with 302 CMR 10.00.

SECTION 2

2.0 INSPECTION

2.1 Visual Inspection

Greenville Pond Dam was inspected on June 30, 2021. At the time of the inspection, the weather was sunny with a temperature of approximately 95 degrees Fahrenheit. Photographs to document the current conditions of the dam were taken during the inspection and are included in Appendix A. The level of the impoundment was .1 feet above the crest of the concrete ogee. Underwater areas were not inspected. A copy of the inspection checklist is included in Appendix B.

2.1.1 General Findings

In general, Greenville Pond Dam was found to be in Fair condition with. The specific concerns are identified in more detail in the sections below:

2.1.2 Dam

- Abutments

Abutment contact appears to be good. The left abutment is a wooded area that opens up into a church yard uphill. The right abutment includes River Street and a small densely vegetated area adjacent to the right training wall.

- Upstream Face

The upstream face of the dam is reinforced with large stone armor that was fitted and placed. There are small trees and brush encroaching on the downstream face at the left abutment.

- Crest

The dam crest left of the spillway is earthen with grass cover. No animal burrow or other deficiencies were noted. To the right of the spillway, brush and small trees cover the dam crest.

- Downstream Face

The downstream face of the dam left of the spillway is grass-covered and well kept. Small trees and brush have grown between River Street and the right spillway training wall along the downstream face of the dam. Two minor animal burrows were observed at the toe of the downstream face. Minor sloughing, erosion and bare areas were observed adjacent to the left training wall.

- Drains

No drains were visible during the dam inspection.

- Instrumentation

There is no instrumentation installed at the dam.

- Access Roads and Gates

Access to the dam is through the driveway of Bond-Tite Tank Service at 710 Pleasant Street. It is not clear whether or not the Town has a formalized right of way for access to the dam.

2.1.3 Appurtenant Structures

- Primary Spillway

The spillway consists of a concrete ogee weir constructed on bedrock. There is minor concrete erosion on the downstream face of the weir. The 1-foot high flashboards were rotted and three were missing. Debris has collected against the flashboards. There were vertical cracks in each of the spillway training walls, though neither shows signs of displacement. The left training wall joint at the outlet discharge point is deteriorating. There are trees growing along the spillway discharge channel near the right training wall. The fencing along the right and left training wall was replaced and is in good condition. The discharge channel is predominantly bedrock. The left downstream channel is formed by a stone masonry wall that is in generally good condition.

- Low Level Outlet

The low-level outlet consists of an approximately 2-foot by 2.5 foot concrete sluiceway formed in the concrete ogee weir. A Rodney Hunt Gate and Operator is mounted on the upstream face of the weir. The operator platform is cantilevered from the left spillway training wall above the spillway. Several cracks in the operator platform at the connection to the left training wall were observed. The fence and access gate to the operator platform are locked with a chain and padlock. The gate is reportedly operable and utilized multiple times per year.

- Auxiliary/Emergency Spillway

Greenville Pond Dam does not have an emergency spillway structure.

- Dikes

There is no dike associated with this dam.

2.1.4 Downstream Area

The discharge from the spillway flows over bedrock ledges to a rocky channel. The left side of the channel is formed by a grouted stone masonry wall down to the bridge over Pleasant Street. The right side of the channel is a natural bank. The stream bed is lightly vegetated. Trees are growing on the bank above the normal waterline.

2.1.5 Reservoir Area

Greenville Pond has a maximum length of approximately 4.200 feet and a maximum width of about 1,000 feet, and a surface area of approximately 58 acres. Water flows through the impoundment from northwest

to southeast. The dam is located in a narrow section of the French River with exposed bedrock. The pond shoreline consists of moderate slopes. There is isolated residential development on the westerly shore of the pond. River Street runs along the westerly shore of the pond for most of its length. An aerial photograph of the reservoir area is shown in Figure 2.

2.2 Caretaker Interview

The caretaker was not present during the inspection.

2.3 Operation and Maintenance Procedures

There are no formal operational procedures for Greenville Pond Dam. The impoundment level is occasionally lowered by several feet if heavy rainfall is anticipated.

2.3.1 Operational Procedures

There are no formal operational procedures for Greenville Pond Dam. The impoundment level is occasionally lowered by several feet if heavy rainfall is anticipated.

2.3.2 Maintenance of Dam and Operating Facilities

There are no formal written maintenance procedures for this dam. The only maintenance task performed on a regular basis is mowing of the embankment.

2.4 Emergency Warning System

The Emergency Action Plan (EAP) for Greenville Pond Dam was completed in May 2014. The EAP was updated by Fuss & O'Neill, Inc. in May, 2020. It includes details, call lists, and instructions for use during emergencies.

2.5 Awareness of Potential Dam Related Safety Hazards at, near, and on Dams

- **Potential safety hazards at, near or on the dam**
  - Fencing on training walls limits access to the spillway but does not prevent it. Unwanted personnel can still access the stilling basin and spillway through the downstream channel.
  - No signage present to inform potential unwanted personnel from hazards at the dam.
- **Recommendations to prevent exposure to potential safety hazards**
  - Erect fencing farther down the channel to further prevent access to the channel.
  - Provide signage to keep off the dam.

Implementation of any recommendations may require local, state, or federal permits as well as securing property rights if subject areas are not owned by the dam owner. Securing such permits and/or land rights is the sole responsibility of the dam owner.

The dam owner is reminded that the Dam Safety Regulations *302 CMR Section 10.13: Liability (1),* states: *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 miss-operation of a dam.

2.6 Hydrologic/Hydraulic Data

Greenville Pond Dam is currently classified as an Intermediate Size, High Hazard potential dam. As such, in accordance with MGL 302 CMR 10, the required spillway design flood (SDF) the dam must pass is one half the probable maximum flood (1/2 PMF), i.e. one half the flood resulting from the Probable Maximum Precipitation (PMP) over the watershed. The 1998 Phase 1 Report indicates that this is the same test flood that the 1987 Inspection Report used to determine the overtopping potential. The analyses from these previous reports indicate that the peak test inflow for the dam is approximately 9,600 cfs. The previous report conservatively assumed the outflow to be equal to the peak test inflow. The spillway capacity with the flashboards removed and the low-level outlet open was calculated to be 7,550 cfs, or about 80 percent of the test flow prior to overtopping of the dam.

Hydrologic and hydraulic data from previous reports are summarized below.

A.	Spillway Design Flood (SDF) Return Period	½ PMF
B.	SDF Inflow	9,600 cfs
C.	SDF Outflow	9,600 cfs
D.	Spillway Capacity (flashboards removed, low level outlet closed)	7,446 cfs
E.	Spillway Capacity (flashboards in place, low level outlet closed)	6,145 cfs
F.	Depth of Overtopping (flashboards removed)	1.2 ft
G.	Depth of Overtopping (flashboards in place)	2.0 ft

2.7 Structural and Seepage Stability

2.7.1 Embankment Structural Stability

No design calculations or geotechnical data were reviewed as part of this Phase I inspection that would allow a formal structural stability analysis of the dam. Based on visual observations made at the time of inspection, the embankment portion of the dam appears to be stable.

2.7.2 Structural Stability of Non-Embankment Structures

No design calculations were reviewed and no independent assessments were performed as part of this Phase I Inspection that would allow a formal structural stability analysis of the structure. Minor cracks were observed in each of the spillway training walls; however, there did not appear to be misalignment associated with these cracks. Based on the visual observations made during the inspection, the dam appears to be stable at the current time. Extreme care should be exercised when operating the gate valve due to the severe cracking observed at the platform/wall joint.

2.7.3 Seepage Stability

There was no evident seepage observed around the dam structure at the time of the inspection. Seepage has not been observed in recent inspections.

SECTION 3

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, the overall condition of Greenville Pond Dam is Fair. The dam was found to have the following deficiencies:

1. Trees and brush growing in the spillway discharge area and within 15 feet of the right spillway training wall.
2. Several small surface cracks in the training walls of the dam.
3. Structural deficiency with the low-level outlet gate operator platform.
4. Encroachment of small trees and woody vegetation at left abutment on the upstream face.
5. Flashboards missing and rotted.
6. No Operations and Maintenance Manual.
7. No stability analysis has been performed.
8. No updated H&H analysis

Previously identified deficiencies and major recommendations from prior inspection reports are summarized in the table below. The table also presents the present condition or resolution of the specified deficiencies and recommendations.

Previously Identified Deficiency	Resolution or Current Condition
Trees growing in the spillway discharge area and within 20 feet of the right spillway training wall.	Unresolved – Trees have not been cleared.
Surface cracking on both training walls.	Unresolved – Cracking remains in both training walls.
Cracking and concrete erosion on the low-level outlet operator platform.	Unresolved – Cracking and concrete erosion remains.
Encroachment of woody vegetation and young trees on left abutment and upstream face.	Unresolved – Trees and vegetation have not been cleared.
EAP is out of date	Resolved – EAP was updated by Fuss & O'Neill, Inc. in May 2020.
No Operations and Maintenance Manual	Unresolved – No O&M manual has been written.
No Stability Analysis	Unresolved – No stability analysis has been competed
No updated H&H Analysis	Unresolved – No H&H analysis has been completed since previous inspection

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies at the dam. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of environmental permits needs to be determined for activities that may occur within resource areas under the jurisdiction of local conservation commissions, MADEP, or other regulatory agencies.

3.2 Studies and Analyses

Studies and Analyses

The following studies or analyses are recommended to evaluate concerns and comply with current regulations.

- An operation and maintenance (O&M) plan should be developed and implemented for this dam. The O&M manual should contain explicit schedules and instructions for maintenance activities to be performed on the dam and its appurtenances, as well as operational procedures to be followed under both routine and flood conditions.
- A detailed hydrologic and hydraulic (H&H) study should be completed to assess the hydraulic adequacy of the current spillway in conveying the spillway design flood using current rainfall data. The study should account for flood attenuation associated with pond storage, as past studies have not done.
- Perform a stability analysis of the dam to comply with Dam Safety Regulations.

3.3 Recurrent Maintenance Recommendations

The activities presented below should be undertaken on a regular or yearly basis by the dam owner/caretaker to improve the safety, maintenance, and operation of the dam. Typically these activities do not require engineering design.

- Periodically remove debris from the spillway and downstream channel.
- Maintain a healthy vegetative cover on the dam. Grass or other vegetation should be mowed periodically and kept to a height of 3 to 12 inches
- Perform regular monitoring and inspection of the dam, especially in areas of suspected movement or seepage. Eliminate any burrowing animals from the embankment and fill and compact existing burrows.

3.4 Minor Repair Recommendations

The following recommendations do not alter the current design of the dam. These recommendations may require design by a professional engineer and construction by a contractor experienced in dam repair. A Chapter 253 permit may be required. Within this section the rationale for the recommended repairs or maintenance activity should be provided to assist the owner/caretaker

- Remove all trees and woody vegetation from within 15 feet of the right spillway training wall.
- Repair cracked concrete in the spillway training walls.

- Repair structural deficiencies with the cantilevered low-level outlet platform.
- Remove encroaching trees and brush at the left abutment on the upstream face.

3.5 Remedial Modifications Recommendations

The following recommendations are intended to improve the overall condition of the dam but do not alter the current design of the dam. The recommendations will probably require assistance by a professional engineer and construction by a contractor experienced in dam construction or repair. A Chapter 253 permit may be required.

- No remedial modification are recommended for Greenville Pond Dam at this time.

3.6 Alternatives

Greenville Pond is a significant recreational and ecological resource to the community of Leicester. Therefore, no alternatives have been considered.

3.7 Opinion of Probable Construction Costs

The following conceptual order-of-magnitude opinions of cost have been developed for the recommendations and remedial measures noted above. Order-of-Magnitude opinions of cost are normally expected to be accurate within plus 50 percent to minus 30 percent. The costs shown herein are based on a limited investigation and are provided for general information only. They should not be considered an engineer's estimate, as construction costs may be less or considerably more than indicated.

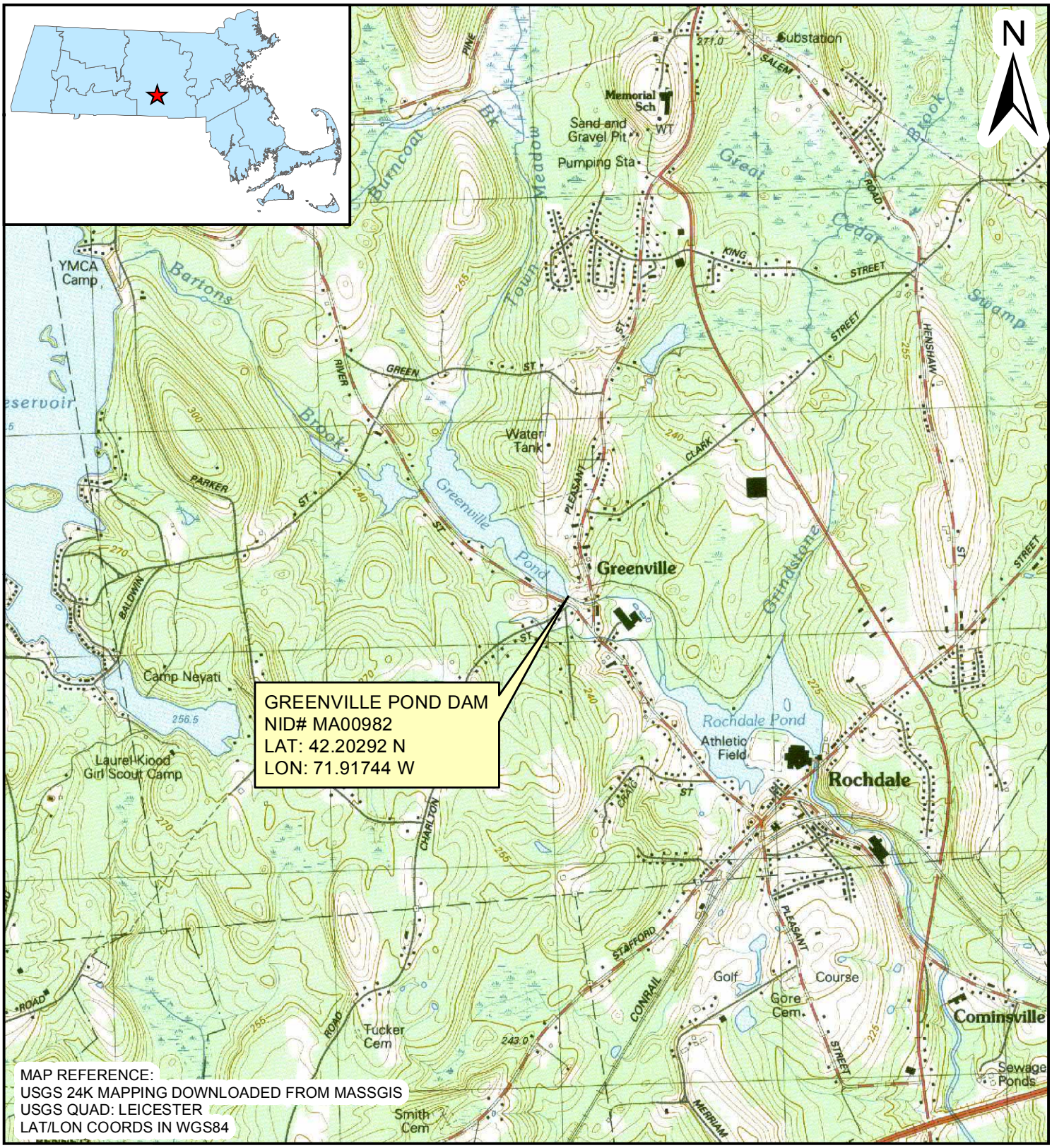
Prior to commencing construction of repairs or maintenance activities, the owner/caretaker should contact the Office of Dam Safety and the local Conservation Commission to determine whether a permit is required. Consultation with a professional engineer familiar with the dam safety regulatory process is recommended to determine which other federal, state, and local permits may apply.

Recommendations	Order-of-Magnitude Range of Cost		
Studies/Analyses/Manuals			
Develop O&M manual	$4,000	-	$5,000
Detailed H&H Analysis	$20,000	-	$40,000
Stability Analysis	$10,000	-	$15,000
Subtotal:	**$34,000**	-	**$60,000**
10% Contingency	$4,000	-	$6,000
Total:	**$38,000**	**-**	**$66,000**
Minor Repair Recommendations			
Remove all trees and woody vegetation from within 15 feet of the right spillway training wall.	$3,000	-	$6,000
Repair cracked concrete in the spillway training walls.	$5,000	-	$10,000
Repair structural deficiencies with the cantilevered low-level outlet platform.	$8,000	-	$15,000
Remove encroaching trees and brush at the left abutment on the upstream face.	$2,000	-	$4,000
Subtotal:	**$18,000**	**-**	**$35,000**
10% Contingency	$2,000	-	$4,000
Total:	**$20,000**	**-**	**$39,000**
Remedial Modifications Recommendations			
None			
Grand Total	**$58,000**	**-**	**$105,000**

Recommendations			Order-of-Magnitude Range of Cost
Studies/Analyses/Manuals			
Develop O&M manual	$4,000	-	$5,000
Detailed H&H Analysis	$20,000	-	$40,000
Stability Analysis	$10,000	-	$15,000
Subtotal:	**$34,000**	-	**$60,000**
10% Contingency	$4,000	-	$6,000
Total:	**$38,000**	**-**	**$66,000**

FIGURES

Figure 1: Locus Plan
Figure 2: Aerial Photograph
Figure 3: Drainage Area
Figure 4: Dam and Area Downstream from Dam
Figure 5: Site Sketch
Figure 6: Photo Locations



JUNE 2021

FIGURE 1

2,000 1,000 0 2,000 Feet

TOWN OF LEICESTER

LOCUS MAP

GREENVILLE POND DAM (MA00982)

LEICESTER, MASSACHUSETTS

SCALE
HORZ: 1 INCH = 2,000 FEET
VERT:
DATUM
HORZ:
VERT: NGVD29 (3-METER CONTOURS)

FUSS & O'NEILL

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JUNE 2021

FIGURE 2

500 250 0 Feet

TOWN OF LEICESTER

AERIAL PHOTOGRAPH

GREENVILLE POND DAM (MA00982)

LEICESTER, MASSACHUSETTS

SCALE
HORZ: 1 INCH = 500 FEET
VERT:
DATUM
HORZ:
VERT:

FUSS & O'NEILL

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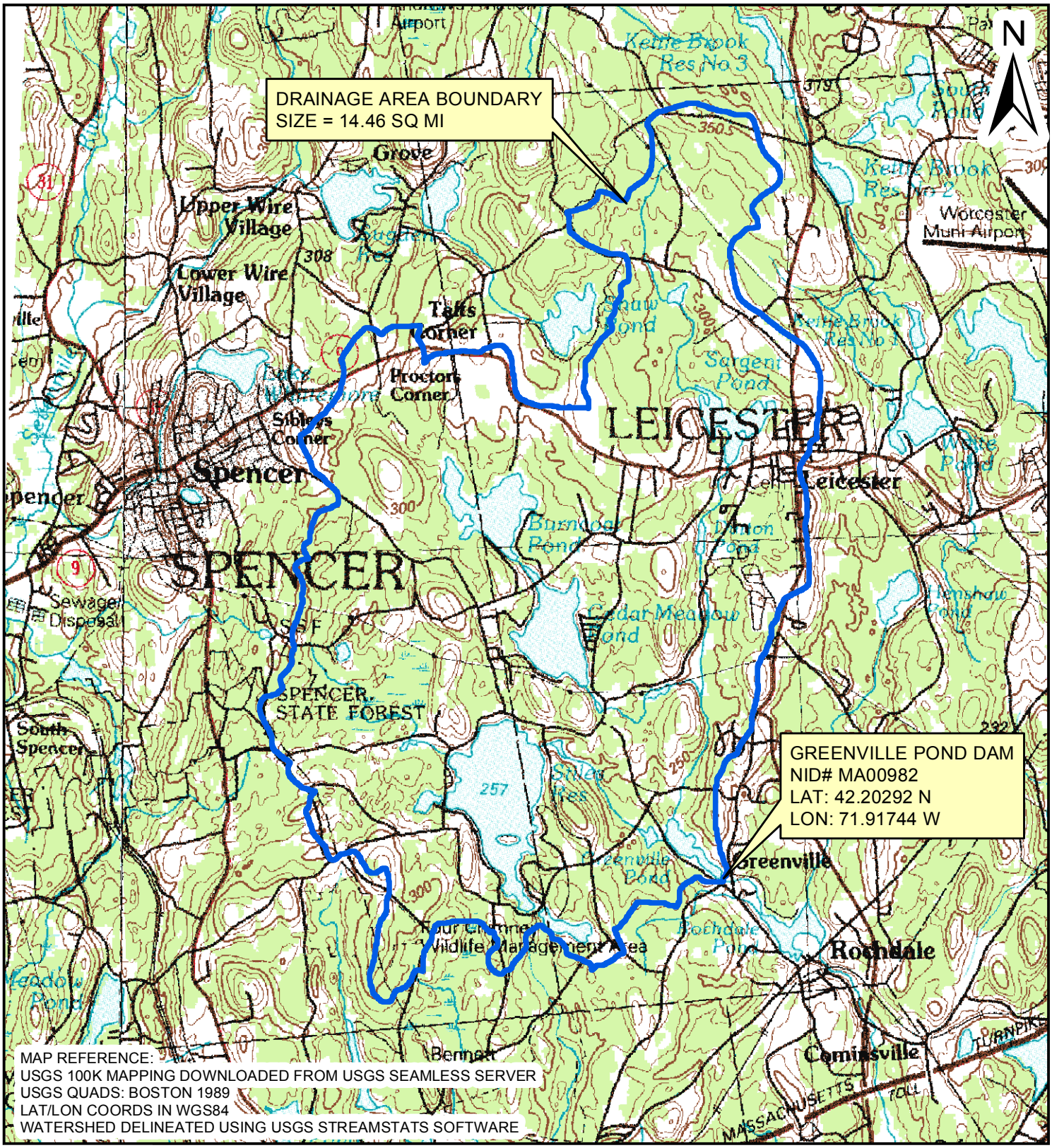

JUNE 2021

FIGURE 3

5,000 2,500 0 Feet

TOWN OF LEICESTER

DRAINAGE AREA

GREENVILLE POND DAM (MA00982)

LEICESTER, MASSACHUSETTS

SCALE
HORZ: 1 INCH = 5,000 FEET
VERT:
DATUM
HORZ:
VERT: NGVD29 (10-METER CONTOURS)

FUSS & O'NEILL

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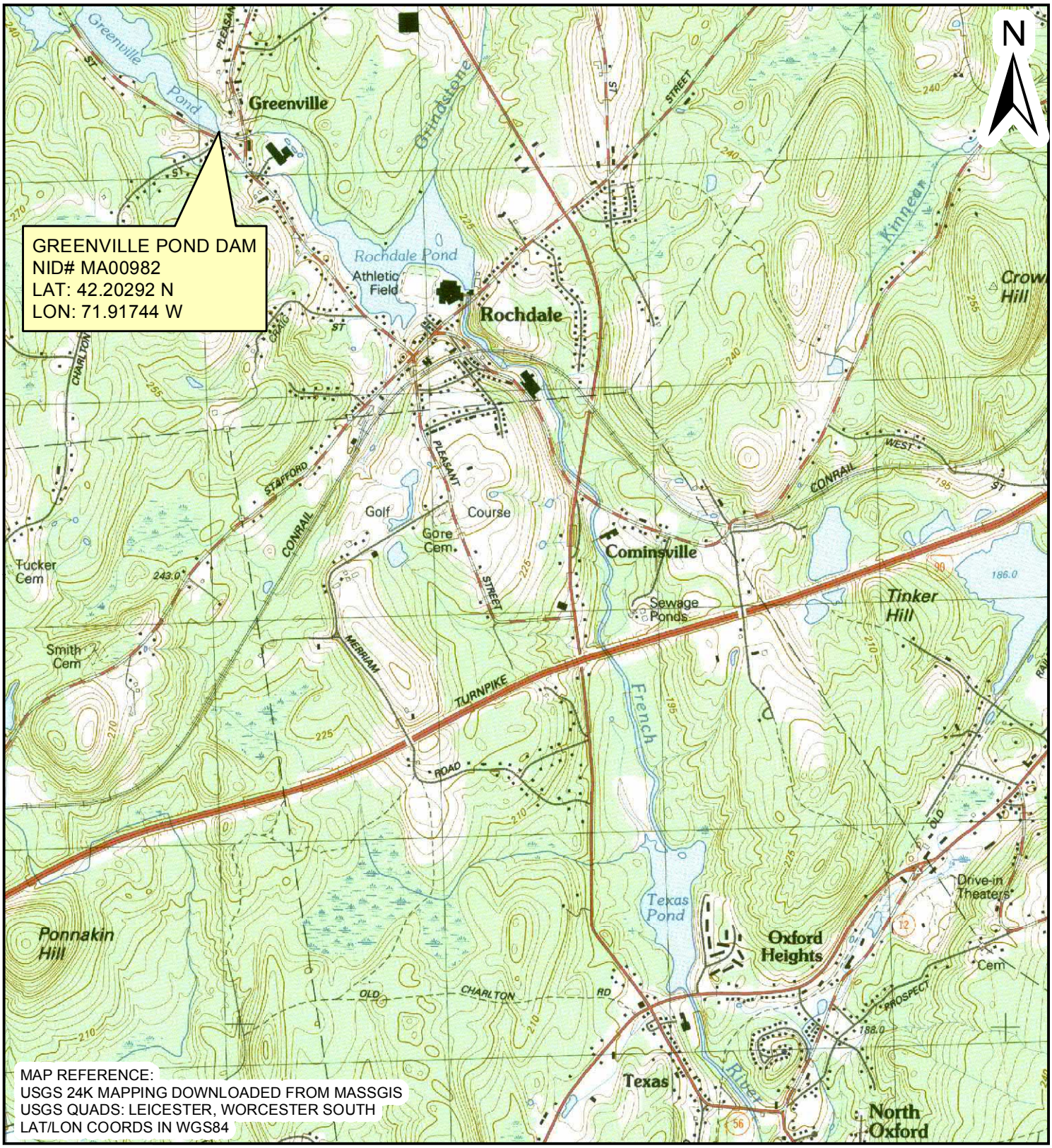

JUNE 2021

FIGURE 4

2,000 1,000 0 Feet

TOWN OF LEICESTER

DOWNSTREAM AREA

GREENVILLE POND DAM (MA00982)

LEICESTER, MASSACHUSETTS

SCALE
HORZ: 1 INCH = 2,000 FEET
VERT:
DATUM
HORZ:
VERT: NGVD29 (3-METER CONTOURS)

FUSS & O'NEILL

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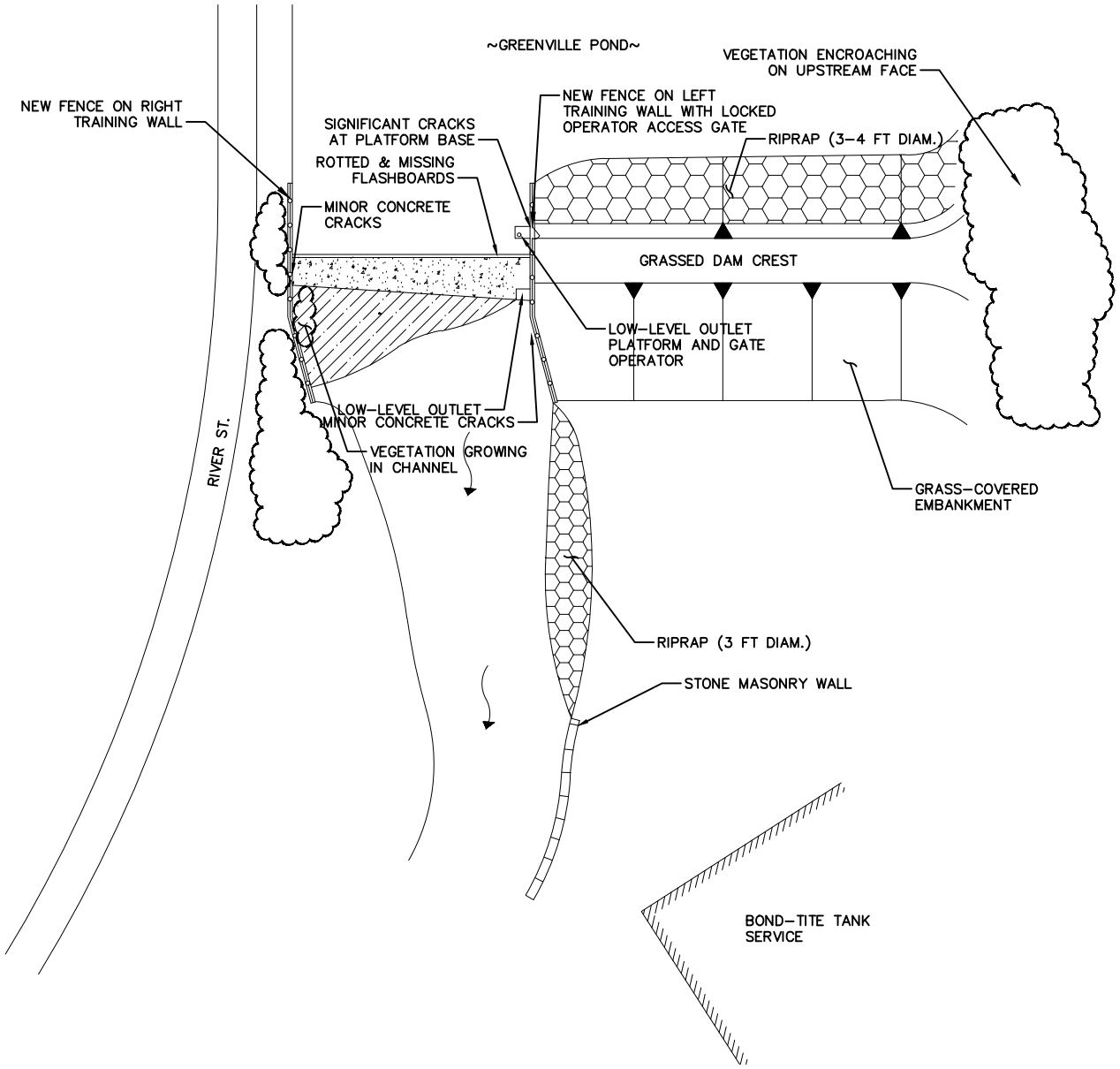

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Plotter: DWG TO PDF.PC3 CTB File: FO.STB
MS VIEW: LAYER STATE:

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HORZ.:	
VERT.:	

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GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

TOWN OF LEICESTER

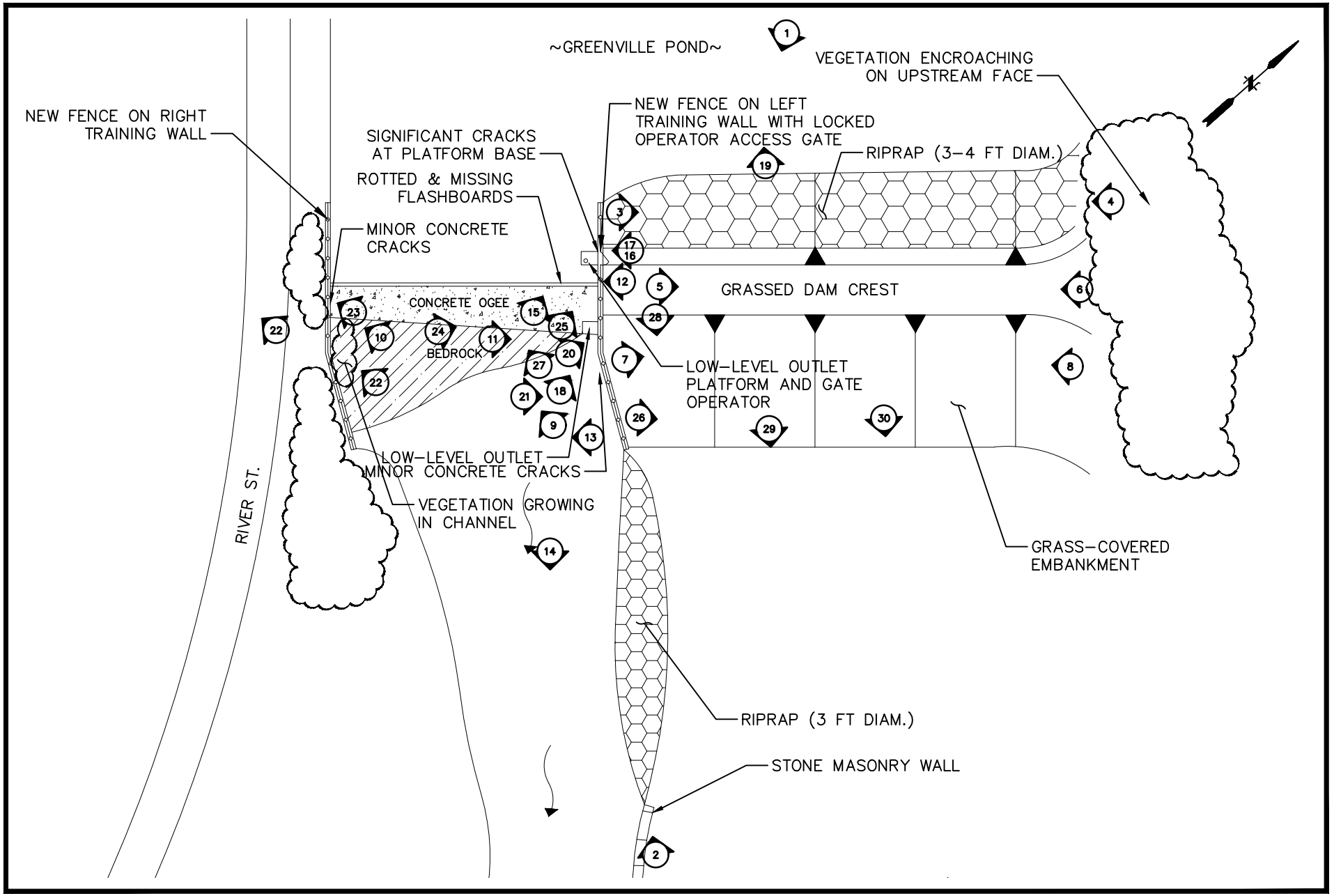
SITE SKETCH

GREENVILLE POND DAM (MA00982) PHASE I INSPECTION

LEICESTER MASSACHUSETTS

PROJ. No.: 20070813.B10
DATE: 06/30/2021

Fig 5



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GRAPHIC SCALE

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TOWN OF LEICESTER

PHOTO LOCATIONS

GREENVILLE POND DAM (MA00982) PHASE I INSPECTION

LEICESTER MASSACHUSETTS

PROJ. No.:	20070813.B10
DATE:	06/30/2021

FIG 6

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APPENDIX A
Photographs

Photo 1: Overview of dam from upstream

Photo 2: Overview of dam from downstream

Photo 3: Overview of upstream face from right abutment

Photo 4: Overview of upstream face from left abutment

Photo 5: Overview of dam crest from right abutment

Photo 6: Overview of dam crest from left abutment

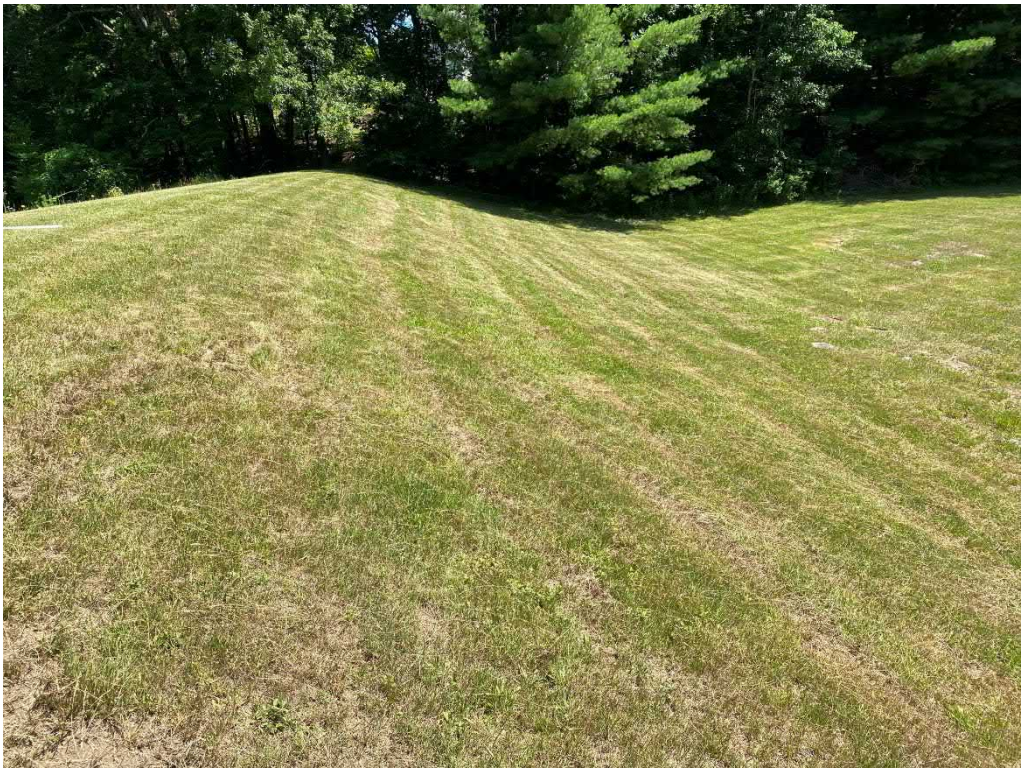

Photo 7: Overview of downstream face from right abutment

Photo 8: Overview of downstream face from left abutment

Photo 9: Overview of spillway from downstream (tailrace or channel area)

Photo 10: Overview of right training wall

Photo 11: Overview of left training wall

Photo 12: Overview of weir – note debris, failing flashboards

Photo 13: Overview of stilling basin

Photo 14: Overview of downstream channel

Photo 15: Overview of gatehouse exterior – note new chain link fence

Photo 16: Overview of operator-note new fencing and locked gate

Photo 17: Overview of operator

Photo 18: Low level outlet through spillway

Photo 19: Overview of reservoir

Photo 20: Crack and deteriorating joint left training wall

Photo 21: Cracks in left training wall

Photo 22: Vegetation growing in spillway channel near right abutment

Photo 23: Cracks in right training wall

Photo 24: Concrete erosion in ogee weir face

Photo 25: Cracked concrete in cantilevered gate operator pedestal and training wall

Photo 26: Previous sloughed area on downstream embankment – now vegetated and stable

Photo 27: Overview of spillway flashboards (note missing boards)

Photo 28: Minor erosion and bare spots on downstream slope

Photo 29: Animal burrow #1 on the downstream slope (area of specific deficiencies)

Photo 30: Animal burrow #2 on the downstream slope (area of specific deficiencies)

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APPENDIX B
Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: Greenville Pond Dam

STATE ID #: 3-14-151-6

REGISTERED: ☑ YES ☐ NO

NID ID #: MA00982

STATE SIZE CLASSIFICATION: Intermediate

STATE HAZARD CLASSIFICATION: High

CHANGE IN HAZARD CLASSIFICATION REQUESTED?: No

DAM LOCATION INFORMATION

CITY/TOWN: Leicester

COUNTY: Worcester

DAM LOCATION: Near Intersection of Pleasant Street & River Street
(street address if known)

ALTERNATE DAM NAME: Greenville Reservoir Dam

USGS QUAD.: Leicester

LAT.: 42.20292

LONG.: -71.91744

DRAINAGE BASIN: French

RIVER: Town Meadow Brook

IMPOUNDMENT NAME(S): Greenville Pond

GENERAL DAM INFORMATION

TYPE OF DAM: Earthen Embankment

OVERALL LENGTH (FT): 140

PURPOSE OF DAM: Recreation

NORMAL POOL STORAGE (ACRE-FT): 300

YEAR BUILT: 1959 (reconstructed)

MAXIMUM POOL STORAGE (ACRE-FT): 490

STRUCTURAL HEIGHT (FT): 22

EL. NORMAL POOL (FT): 761.5

HYDRAULIC HEIGHT (FT): 13.5

EL. MAXIMUM POOL (FT): 768.5

FOR INTERNAL MADCR USE ONLY

FOLLOW-UP INSPECTION REQUIRED: ☐ YES ☐ NO

CONDITIONAL LETTER: ☐ YES ☐ NO

NAME OF DAM: Greenville Pond Dam | STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 | NID ID #: MA00982

INSPECTION SUMMARY

DATE OF INSPECTION: June 30, 2021 | DATE OF PREVIOUS INSPECTION: June 3, 2019

TEMPERATURE/WEATHER: Sunny, 95 degrees | ARMY CORPS PHASE I: ☐ YES ☑ NO | If YES, date

CONSULTANT: Fuss & O'Neill, Inc. | PREVIOUS DCR PHASE I: ☑ YES ☐ NO | If YES, date 6/3/2019

BENCHMARK/DATUM: NVGD29

OVERALL PHYSICAL CONDITION OF DAM: FAIR | DATE OF LAST REHABILITATION: 1959

SPILLWAY CAPACITY: 50-90% of the SDF

EL. POOL DURING INSP.: 759.4 | EL. TAILWATER DURING INSP.: 749

PERSONS PRESENT AT INSPECTION

NAME	TITLE/POSITION	REPRESENTING
Ken Berchielli, EIT	Geotechnical Engineer	Fuss & O'Neill, Inc.
Derek Newhall	Water Resources Engineer	Fuss & O'Neill, Inc.

EVALUATION INFORMATION

	Click on box to select E-code		Click on box to select E-code
E1) TYPE OF DESIGN	3	E8) LOW-LEVEL OUTLET CONDITION	4
E2) LEVEL OF MAINTENANCE	3	E9) SPILLWAY DESIGN FLOOD CAPACITY	2
E3) EMERGENCY ACTION PLAN	4	E10) OVERALL PHYSICAL CONDITION	3
E4) EMBANKMENT SEEPAGE	5	E11) ESTIMATED REPAIR COST	$58K-$105K
E5) EMBANKMENT CONDITION	3	ROADWAY OVER CREST	NO
E6) CONCRETE CONDITION	4	BRIDGE NEAR DAM	NO
E7) LOW-LEVEL OUTLET CAPACITY	4		

NAME OF INSPECTING ENGINEER: Ken Berchielli, EIT | SIGNATURE: Ken Berchielli

NAME OF DAM:	Greenville Pond Dam	STATE ID #:	3-14-151-6
INSPECTION DATE:	June 30, 2021	NID ID #:	MA00982

OWNER:	ORGANIZATION	Town of Leicester	CARETAKER:	ORGANIZATION	Leicester Highway Department
	NAME/TITLE	David Genereux, Town Administr		NAME/TITLE	Dennis Griffin
	STREET	3 Washburn Square		STREET	59 Peter Salem Road
	TOWN, STATE, ZIP	Leicester, MA 01524		TOWN, STATE, ZIP	Leicester, MA 01524
	PHONE	(508) 892-7077		PHONE	(508) 892-7021
	EMERGENCY PH. #	(978) 833-0306		EMERGENCY PH. #	(774) 293-0303
	FAX	508-987-3934		FAX	508-987-3934
	EMAIL	GenereuxD@leicesterma.org		EMAIL	griffind@leicesterma.org
	OWNER TYPE	Municipality or Political subdivision			

PRIMARY SPILLWAY TYPE	Concrete ogee		
SPILLWAY LENGTH (FT)	80	SPILLWAY CAPACITY (CFS)	7,446 w/o flashboards; 6,145 w/ flashboards
AUXILIARY SPILLWAY TYPE	N/A	AUX. SPILLWAY CAPACITY (CFS)	N/A
NUMBER OF OUTLETS	1	OUTLET(S) CAPACITY (CFS)	106
TYPE OF OUTLETS	Low-level, 2' x 2.5' concrete sluiceway	TOTAL DISCHARGE CAPACITY (CFS)	7,550
DRAINAGE AREA (SQ MI)	14.46	SPILLWAY DESIGN FLOOD (PERIOD/CFS)	1/2 PMF / 9,600 cfs

HAS DAM BEEN BREACHED OR OVERTOPPED ☐ YES ☑ NO IF YES, PROVIDE DATE(S)

FISH LADDER (LIST TYPE IF PRESENT) N/A

DOES CREST SUPPORT PUBLIC ROAD? ☐ YES ☑ NO IF YES, ROAD NAME:

PUBLIC BRIDGE WITHIN 50' OF DAM? ☐ YES ☑ N IF YES, ROAD/BRIDGE NAME:
MHD BRIDGE NO. (IF APPLICABLE)

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Earthen, good grass cover	x		
	2. SURFACE CRACKING	None observed	x		
	3. SINKHOLES, ANIMAL BURROWS	None observed	x		
	4. VERTICAL ALIGNMENT (DEPRESSIONS	Good	x		
	5. HORIZONTAL ALIGNMENT	Good	x		
	6. RUTS AND/OR PUDDLES	None observed	x		
	7. GRASS COVER CONDITION	Good, healthy stand of grass on crest	x		
	8. WOODY VEGETATION (TREES/BRUSH)	Minor brush and small trees growing at the right abutment	x		
	9. ABUTMENT CONTACT	Abutment contact is good, fencing is damaged at the right abutment			x

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	None observed	x		
	2. SEEPAGE	None observed	x		
	3. SLIDE, SLOUGH, SCARP	Minor sloughing near left training wall		x	
	4. EMB.-ABUTMENT CONTACT	Good	x		
	5. SINKHOLE/ANIMAL BURROWS	Two minor animal burrows on downstream slope			x
	6. EROSION	Minor erosion along toe of left training wall with minor bare spots		x	
	7. UNUSUAL MOVEMENT	See observation #3 (minor sloughing)		x	
	8. GRASS COVER CONDITION	Good, mown grass	x		
	9. WOODY VEGETATION (TREES/BRUSH)	None observed	x		

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

EMBANKMENT (U/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	None observed	x		
	2. SLOPE PROTECTION TYPE AND COND.	Large sized stone armor, appears to be in good condition, minor weeds and brush (1)		x	
	3. SINKHOLE/ANIMAL BURROWS	None observed	x		
	4. EMB.-ABUTMENT CONTACT	Good	x		
	5. EROSION	None observed	x		
	6. UNUSUAL MOVEMENT	None observed	x		
	7. GRASS COVER CONDITION	No grass cover due to stone armor	x		
	8. WOODY VEGETATION (TREES/BRUSH)	Small bushes and aquatic vegetation at water surface, small trees encroaching (2)	x		

ADDITIONAL COMMENTS: (1) growth near left abutment in between stone armor
(2) the left abutment

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	N/A	x		
	2. OBSERVATION WELLS	N/A	x		
	3. STAFF GAGE AND RECORDER	N/A	x		
	4. WEIRS	N/A	x		
	5. INCLINOMETERS	N/A	x		
	6. SURVEY MONUMENTS	N/A	x		
	7. DRAINS	N/A	x		
	8. FREQUENCY OF READINGS	N/A	x		
	9. LOCATION OF READINGS	N/A	x		

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	None observed	x		
	2. FOUNDATION SEEPAGE	None observed	x		
	3. SLIDE, SLOUGH, SCARP	None observed	x		
	4. WEIRS	N/A	x		
	5. DRAINAGE SYSTEM	N/A	x		
	6. INSTRUMENTATION	N/A	x		
	7. VEGETATION WITHIN 15 FT	Mown grass, trees growing in the downstream channel along right training wall			x
	8. ACCESSIBILITY	Good access via former mill building off Pleasant Street	x		
	9. DOWNSTREAM HAZARD DESCRIPTION	Industrial Building (Bond-Tite Tanks); Residential			

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

MISCELLANEOUS

AREA INSPECTED	CONDITION	OBSERVATIONS
MISC.	1. RESERVOIR DEPTH (AVG)	Unknown
	2. RESERVOIR SHORELINE	Wooded, isolated residential on west shores of impoundment
	3. RESERVOIR SLOPES	Moderately sloped
	4. ACCESS ROADS	River Street along west shore of Greenville Pond or Pleasant Street
	5. SECURITY DEVICES	Locked chain link fence gate
	6. WATER PUBLIC HAZARDS & PROTECTION	None observed
	7. LAND-SIDE PUBLIC HAZARDS & PROTECTION	Fencing along left and right training wall to prevent
	7. VANDALISM OR TRESPASS	☐ YES ☑ NO WHAT:
	8. AVAILABILITY OF PLANS	☐ YES ☑ NO DATE:
	9. AVAILABILITY OF DESIGN CALCS	☐ YES ☑ NO DATE:
	10. AVAILABILITY OF EAP/LAST UPDATE	☑ YES ☐ NO DATE: May-20
	11. AVAILABILITY OF O&M MANUAL	☐ YES ☑ NO DATE:
	12. CARETAKER/OWNER AVAILABLE	☐ YES ☑ NO DATE:
	13. CONFINED SPACE ENTRY REQUIRED	☐ YES ☑ NO PURPOSE:

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	Concrete ogee built on bedrock	x		
	WEIR TYPE	Ogee	x		
	SPILLWAY CONDITION	Minor concrete erosion, cracking and spalling		x	
	TRAINING WALLS	Minor vertical cracks on training walls, minor horizontal cracking on right (1)		x	
	SPILLWAY CONTROLS AND CONDITION	1 foot of flashboards, poor condition, 3 boards are missing and water is flowing (2)			x
	UNUSUAL MOVEMENT	None observed	x		
	APPROACH AREA	Generally clear, 2 large sticks obstructing flow on left side of the spillway			x
	DISCHARGE AREA	Trees and brush growing along right D/S training wall, minor debris in channel			x
	DEBRIS	Some woody debris in the downstream channel			x

ADDITIONAL COMMENTS: (1) training walls
(2) around the boards

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

AUXILIARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	N/A	x		
	WEIR TYPE	N/A	x		
	SPILLWAY CONDITION	N/A	x		
	TRAINING WALLS	N/A	x		
	SPILLWAY CONTROLS AND CONDITION	N/A	x		
	UNUSUAL MOVEMENT	N/A	x		
	APPROACH AREA	N/A	x		
	DISCHARGE AREA	N/A	x		
	DEBRIS	N/A	x		

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	Concrete sluiceway	x		
	INTAKE STRUCTURE	Not observed	x		
	TRASHRACK	Not observed	x		
	PRIMARY CLOSURE	Rodney Hunt Gate & operator	x		
	SECONDARY CLOSURE	N/A	x		
	CONDUIT	Rectangular concrete sluiceway through ogee	x		
	OUTLET STRUCTURE/HEADWALL	In face of ogee spillway (1) Separation of training wall at outlet discharge point			x
	EROSION ALONG TOE OF DAM	Minor erosion at toe of the dam near left training wall		x	
	SEEPAGE/LEAKAGE	None observed	x		
	DEBRIS/BLOCKAGE	None observed	x		
	UNUSUAL MOVEMENT	None observed	x		
	DOWNSTREAM AREA	Clear	x		
	MISCELLANEOUS				

ADDITIONAL COMMENTS: Concrete platform of operator has significant cracking at abutment with left training wall

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

CONCRETE/MASONRY DAMS (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	TYPE	N/A	x		
	SURFACE CONDITIONS	N/A	x		
	CONDITIONS OF JOINTS	N/A	x		
	UNUSUAL MOVEMENT	N/A	x		
	HORIZONTAL ALIGNMENT	N/A	x		
	VERTICAL ALIGNMENT	N/A	x		

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

CONCRETE/MASONRY DAMS (DOWNSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S FACE	TYPE	N/A	x		
	SURFACE CONDITIONS	N/A	x		
	CONDITIONS OF JOINTS	N/A	x		
	UNUSUAL MOVEMENT	N/A	x		
	ABUTMENT CONTACT	N/A	x		
	LEAKAGE	N/A	x		

ADDITIONAL COMMENTS:

NAME OF DAM: Greenville Pond Dam STATE ID #: 3-14-151-6

INSPECTION DATE: June 30, 2021 NID ID #: MA00982

CONCRETE/MASONRY DAMS (UPSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S FACE	TYPE	N/A	x		
	SURFACE CONDITIONS	N/A	x		
	CONDITIONS OF JOINTS	N/A	x		
	UNUSUAL MOVEMENT	N/A	x		
	ABUTMENT CONTACTS	N/A	x		
			x		

ADDITIONAL COMMENTS:

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APPENDIX C
Previous Reports and References

PREVIOUS REPORTS AND REFERENCES

The following is a list of reports that were located during the file review, or were referenced in previous reports.

1. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., July 3, 2019.
2. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., July 10, 2015.
3. "Greenville Pond Dam Emergency Action Plan," Fuss & O'Neill, Inc., June 2014.
4. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., January 28, 2013.
5. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., January 20, 2011.
6. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., August 21, 2009.
7. "Greenville Pond Dam Phase I Inspection/Evaluation Report," Fuss & O'Neill, Inc., July 24, 2007.
8. Dam Inspection Report prepared for The Massachusetts Department of Environmental Management (DEM) by Haley & Aldrich, Inc., May 14, 1998.
9. "Municipally Owned Dam Inspection/Evaluation Report – Greenville Pond Dam," Department of Environmental Management Office of Dam Safety, July 1987.

The following references were utilized during the preparation of this report and the development of the recommendations presented herein.

1. "Recommended Guidelines for Safety Inspection of Dams" (ER 1110-2-106 – National Program of Inspection of Dams, Volume I, Appendix D), U.S. Army Corps of Engineers, Washington, DC, 1976.

FUSS & O'NEILL

APPENDIX D
Definitions

FUSS & O'NEILL

COMMON DAM SAFETY DEFINITIONS

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

Orientation

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

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

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

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

Dam Components

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

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

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

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

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

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

Size Classification

(As listed in Commonwealth of Massachusetts, 302 CMR 10.00 *Dam Safety*)

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

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

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

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

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

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

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

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

General

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

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

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

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

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

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

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

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

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

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

Condition Rating

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

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

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

Satisfactory – Minor operational and maintenance 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)

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