ASHFIELD LAKE DAM

PHASE I

INSPECTION / EVALUATION REPORT

Dam Name:	Ashfield Lake Dam
NID#:	MA00523
Owner:	Town of Ashfield
Town:	Ashfield, Massachusetts
Consultant:	Tighe & Bond, Inc.
Date of Inspection:	May 18, 2023

Tighe&Bond

Executive Summary

This Phase I Inspection/Evaluation Report details the inspection and evaluation of Ashfield Lake Dam located in Ashfield, Massachusetts. The inspection was conducted on May 18, 2023 by Tighe & Bond of Westfield, Massachusetts. Ashfield Lake Dam is classified as an Intermediate-size, Significant (Class II) hazard potential dam.

The overall physical condition of Ashfield Lake Dam was found to be **Good** based on the Office of Dam Safety's September 2008 rating guidelines. The following deficiencies were noted during the inspection and evaluation:

- Fast-growing vegetation remains established in the dam's riprap slopes since residents prohibited town officials from allowing the use of herbicides.
- In areas disturbed during the 2022 construction project, grass has not yet regrown in areas, particularly along portions of the crest, the left abutment, one area on the downstream slope, and in the wet area west of the dry hydrant access.
- Minor erosion is present at the downstream edge of the crest adjacent to the spillway training wall.
- Trees are present on the downstream face and in the downstream area near the right abutment. The trees are being monitored. The trees are on private property, and the Town has negotiated an agreement with the landowner to allow the removal of the trees under certain conditions.

Tighe & Bond recommends the following actions be taken to address the deficiencies found at the dam during this inspection and evaluation.

- Reestablish grass in sparse and bare areas.
- Remove unsuitable vegetation from riprap areas by increasing the frequency of cutting, removal by the roots, controlled burning, or the use of an herbicide that would be safe for swimming areas.
- Remove the trees near the right abutment if they exhibit disease. Tree removal should include removing stumps and roots within 20 feet of the dam and establishing a healthy stand of grass. Permitting, including a dam safety permit, will be needed for tree removal.
- After vacating animals, fill burrows with a mud pack consisting of a thin soil-cement mix.

These recommendations should be performed under the direction of a registered professional engineer familiar with the methods and materials used in the design, construction, and repair of dams.

The conditions noted in this 2023 dam inspection report are improved compared to those noted in the 2020 report as a result of the rehabilitation project performed in 2022.

Dam Evaluation Summary Detail Sheet

1. NID ID:	**MA00523**	**4. Inspection Date:**	**May 18, 2023**
2. Dam Name:	**Ashfield Lake Dam**	**5. Last Insp. Date:**	**October 28, 2020**
3. Dam Location:	**Ashfield, MA**	**6. Next Inspection:**	**May 18, 2025**
7. Inspector:	**Daniel R. Buttrick**		
8. Consultant:	**Tighe & Bond**		
9. Hazard Code:	**High**	**9a. Is Hazard Code Change Requested?:**	**No**
10. Insp. Frequency:	**2 Years**	**11. Overall Physical Condition of Dam:**	**GOOD**
12. Spillway Capacity (% SDF)	**>100% SDF w/ no actions by Caretaker**		

E1. Design Methodology:	**4**	**E7. Low-Level Discharge Capacity:**	**4**
E2. Level of Maintenance:	**4**	**E8. Low-Level Outlet Physical Condition:**	**5**
E3. Emergency Action Plan:	**5**	**E9. Spillway Design Flood Capacity:**	**5**
E4. Embankment Seepage:	**4**	**E10. Overall Physical Condition of the Dam:**	**5**
E5. Embankment Condition:	**5**	**E11. Estimated Repair Cost:**	**$50,000**
E6. Concrete Condition:	**5**		

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

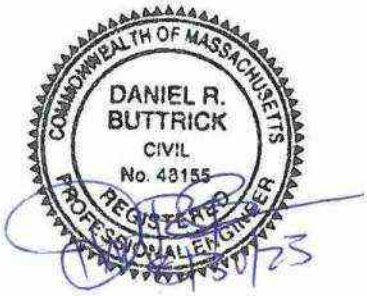
Preface

The following three paragraphs were excerpted from the sample dam inspection format provided by the Massachusetts Department of Conservation and Recreation. The paragraphs are valid for the dam inspection and assessment provided in this report.

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 noted 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 dynamic 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.



Daniel R. Buttrick, PE
Massachusetts License No.: 48155
License Type: Civil
Senior Project Manager
Tighe & Bond, Inc.

J:\A\A0699\019 - Ashfield Lake Dam Repair\Phase I Dam Inspection\Report\Exec Summ_Preface.doc

Executive Summary
Dam Evaluation Summary Detail Sheet
Preface

Section 1 Description of Project

Section 2 Inspection

Section 3 Assessments and Recommendations

Tables

Figures

Appendices

J:\A\A0699\019 - Ashfield Lake Dam Repair\Phase I Dam Inspection\Report\Ashfield Lake Dam - Report Text.docx

Section 1
Description of Project

1.1 General

1.1.1 Authority

The Town of Ashfield retained Tighe & Bond to perform a visual inspection and prepare a report of the observed conditions at Ashfield Lake Dam in Ashfield, Massachusetts. This inspection and report were performed in general 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 is to inspect and evaluate the present condition of the dam and appurtenant structures in general accordance with 302 CMR 10.07 to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation is 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 potential classification; and 5) miscellaneous. Reference to left and right directions assume an orientation facing downstream.

1.1.4 Figures

Figures were created for this report to aid the reader in understanding the dam, its features, and the surrounding area. Figure 1 presents a topographic image showing the site locus and downstream area. Figure 2 presents an aerial overview of the dam and surrounding area. Figure 3 presents a topographic image showing the watershed area associated with the dam.

1.2 Description of Project

1.2.1 Location

Ashfield Lake Dam is located on South River in Ashfield, MA in Franklin County. The structure and impoundment are shown on the Ashfield USGS quadrangle map at coordinates 42.528878°, -72.798412°. The dam is located approximately 200’ to 300’ north of Main Street (Route 116) and about 300’ east of Buckland Road. Access to the

dam and spillway is from Buckland Road. See Figures 1 and 2 in the Figures section of this report for the USGS site locus map and the aerial photograph, respectively.

1.2.2 Owner/Caretaker

The dam is owned and operated by the Town of Ashfield. See Table 1.1 for current owner/caretaker data (names and contact information).

1.2.3 Purpose of the Dam

Ashfield Lake Dam impounds Ashfield Lake, which is used recreationally and for firefighting water supply. The Town maintains a public beach adjacent to the east abutment. There is a dry hydrant on the dam crest to the west of the spillway that can be accessed by vehicles from Route 116.

The original dam was smaller and reportedly built circa 1750 to power a grist mill, but later failed. The present dam was built circa 1897 and rehabilitated in 1990 and in 2022.

1.2.4 Description of the Dam and Appurtenances

Ashfield Lake Dam is a 775-foot-long earthen dam with a maximum height of 16.4 feet and a typical crest width of 14 feet. A 2022 topographic survey indicates that the crest's vertical alignment is generally level and with minor variations, ranging between 1256.7 feet and 1257.9 feet. The upstream and downstream slopes are protected by riprap. The upstream slope is inclined at approximately 3 units horizontal run to 1 unit vertical rise (3H:1V) and the downstream slope is inclined at 2H:1V, although it is flatter in areas.

The 30-foot-long primary spillway is confined by mortared stone training walls (El. 1256.4') and has a stepped stone masonry downstream face. The spillway crest is a broad-crested weir type (El. 1251.2'), and both spillway and training walls are concrete capped. The spillway was internally grouted in 2022 to fill voids and reduce leakage. A concrete apron is present upstream of the spillway weir, sloping upwards to the crest at approximately 10 units horizontal run to 1 unit vertical rise (10H:1V). A steel footbridge supported by the training walls spans the spillway.

The low-level outlet is positioned at the east end of the spillway and consists of a 40-foot-long rectangular concrete conduit (4 feet wide by 2.25 feet tall) lined with an 18-inch diameter HDPE pipe. Discharges are controlled by a manually-operated stainless steel sluice gate, which is located in a stone masonry gate shaft (3 feet by 4.5 feet) adjacent to the east training wall. The inlet is located within the impoundment about 30 feet from the gate shaft upstream wall and consists of a riser-pipe with a trash rack (El. 1247.87). The outlet discharges through the spillway at the base of the lowest step (El. 1240.65').

The primary and secondary downstream channels carry flows from the spillway and the low-level outlet. The 10-foot-wide by 3-foot-deep primary channel carries low flows along the natural brook path downstream approximately 500 feet before flowing underground in 48-inch diameter steel pipe for an additional 500 feet. The secondary channel (10-foot-wide by 6-foot-deep) is located to the east of the primary channel can accommodate higher flow conditions. The channels converge upstream of Buckland Road to form the South River which flows into the Deerfield River, a tributary of the Connecticut River.

The Town entered into an easement agreement in 2014 with three private property owners with parcels located to the west of the spillway and on the downstream side of the toe of the embankment. The agreement allows the Town to perform dam safety related repairs and maintenance. Several trees on the dam embankment near the left end are allowed

to remain under an agreement with the property owners. The agreement allows the Town to remove the trees at their expense if they become unhealthy.

On the eastern side of the lake, a 160-foot-long dike was constructed along Buckland Road to reduce roadway overtopping events during large storms. The 1988 dam rehabilitation design plans called for the dam and the dike to have matching crest elevations (El. 1256.7 NGVD 1929); however, the existing dike crest elevation is approximately 0.5 feet below the dam crest at 1255.2 feet. The dike's low point is on the downstream side at 1251.6 feet. As part of the 2022 upgrade, a parapet wall was constructed along the dike, which raised the overall elevation to El. 1257.5'. The dike is not registered separately from the dam with the Office of Dam Safety.

Surface runoff from Buckland Road collects in a low area on the downstream side of the dike. Collected water discharges into the lake via an 8-inch polyvinyl chloride (PVC) pipe into the lake. The pipe was installed in 2022 and has an 8" gate valve to control flow. The pipe invert elevation lakeside is El. 1250.73 and El. 1251.98 near Buckland Road. Note flow within the pipe will reverse when the water surface of the lake rises above the level in the low area, so under these conditions the valve is to be closed until water levels subside

1.2.5 Operations and Maintenance

A formal operation and maintenance plan is being prepared for Ashfield Lake Dam prepared by Tighe & Bond for the Town of Ashfield in June 2023. The Town Highway Department performs annual routine operation and maintenance including mowing, cutting vegetation from riprap areas, and operating the low-level outlet gate.

1.2.6 DCR Size Classification

Ashfield Lake Dam has a maximum structural height of approximately 15.3 feet and a maximum storage capacity of approximately 501 acre-feet. Therefore, in accordance with Department of Conservation and Recreation classification procedures, under Commonwealth of Massachusetts 302 CMR 10.00 Dam Safety, revised February 10, 2017, Ashfield Lake Dam is an **Intermediate** size structure based on height and storage. Refer to Appendix D for definitions of dam height and storage.

If the Ashfield Lake Dike were to be registered separately from the dam, it could potentially be considered a non-jurisdictional structure since it is less than 6 feet in height and Low hazard (see Section 1.2.7).

1.2.7 DCR Hazard Potential Classification

Ashfield Lake Dam is located upstream of residences, roadways. and commercial properties. A failure of the dam at maximum pool may cause loss of life and damage homes and commercial facilities.

Therefore, in accordance with Department of Conservation and Recreation classification procedures, under the Commonwealth of Massachusetts Regulations 302 CMR 10.00 Dam Safety, as revised February 10, 2017, Ashfield Lake Dam is currently classified as a **High** (Class I) hazard potential dam.

Failure of the Ashfield Lake Dike would be expected only to cause minor property damage without loss of life. Dike failure at maximum pool would result in a flood wave that would pond in a low area across Buckland Road from the dam, and some flow could be expected to travel down Buckland Road at a depth of less than two feet before discharging back into the South River.

1.3 Engineering Data

The following sections are based on available information from previously submitted reports listed in Appendix C, and are intended to provide an overview of the dam and impoundment.

1.3.1 Drainage Area

The total drainage area contributing to the dam is approximately 1.07 square miles, based on a watershed delineated using USGS StreamStats and adjusted using MassGIS LiDAR data and field observations of the Route 116 drainage system. The drainage area is located entirely within the Town of Ashfield and is comprised mainly of wooded, hilly terrain with limited areas of residential and agricultural land use. Figure 3, included in the Figures section of this report, outlines the drainage area boundary for Ashfield Lake Dam.

1.3.2 Reservoir

See Table 1.1 for data on normal and maximum pools.

1.3.3 Discharges at the Dam Site

No recorded discharges from the dam were available at the time of the inspection. Past inspections report that the dam has never overtopped. In advance of Hurricane Irene in 2011, the caretaker opened the low-level outlet and lowered the lake level to the top of the outlet riser structure. The caretaker reported that approximately 11 inches of rain fell in Ashfield during that storm, and the dam did not overtop.

1.3.4 General Elevations

Elevations presented are in units of feet and based on the NAVD 1988 datum.

A.	Top of Dam	1256.8
B.	Top of Dike Parapet	1257.5
C.	Spillway Design Flood Pool	1255.15
D.	Normal Pool	1251.2
E.	Upstream Water at Time of the Inspection	1251.3 ±
F.	Streambed at Toe of the Dam	1240.4
G.	Low Point along Toe of the Dam	1240.4

1.3.5 Primary Spillway

Elevations presented are in units of feet and based on the NAVD 1988 datum.

A.	Type	Concrete broad-crested weir
B.	Length of Weir	30 feet
C.	Crest Elevation of Weir	1251.2

D.	Upstream Channel	Ashfield Lake
E.	Downstream Channel	South River
F.	Downstream Water Elevation	1241 ±

1.3.6 Low-Level Outlet

Elevations presented are in units of feet and based on the NAVD 1988 datum.

A.	Type	Plastic pipe grouted into stone conduit
B.	Size	18-inch diameter
C.	Closure Type	Seating head sluice gate
D.	Inlet Invert Elevation	1244*±
E.	Top of PVC standpipe	1247.87**
F.	Outlet Invert Elevation	1240.65
G.	Downstream Water Elevation	1241±

**Currently plugged; estimated based on bathymetry and the 1988 construction drawings.*

***Standpipe limits current drawdown depth*

1.3.7 Design and Construction Records

Tighe & Bond designed and provided construction administration and observation for the 2022 dam reconstruction. Drawings and specifications were dated December 2021. Record drawings for the project are in preparation. The project included:

- Raising the dam crest.
- Providing a parapet on the dike.
- Pressure grouting the spillway and repointing the masonry.
- Replacing the upstream spillway apron.
- Replacing the culvert through the dike and adding a valve.
- Clearing the area on and within 20 feet of the dam.
- Increasing the size of the culvert under the dam crest access ramp.
- Replacing the low-level outlet gate disc and performing operator maintenance.
- Providing erosion protection at the right abutment.
- Raising and repainting the spillway bridge.

The design plans for the 1990 dam reconstruction, dated 1988, were made available to Tighe & Bond. Design reports and construction records and photos are on-file with the Office of Dam Safety.

1.3.8 Operating Records

No known operating records are available for Ashfield Lake Dam.

1.4 Summary Data Table

Table 1.1, summarizing the required Phase I Report data collected during the preparation of this report is presented on the following page.

1.1 Summary Data Table

Required Phase I Report Data	Data Provided by the Inspecting Engineer
National ID #	MA00523
Dam Name	Ashfield Lake Dam
Dam Name (Alternate)	N/A
River Name	South River
Impoundment Name	Ashfield Lake
Hazard Class	High
Size Class	Intermediate
Dam Type	Earth Embankment and Stone Masonry Spillway
Dam Purpose	Recreational
Structural Height of Dam (feet)	16.4
Hydraulic Height of Dam (feet)	10.8
Drainage Area (sq. mi.)	1.07
Reservoir Surface Area (acres)	37.12
Normal Impoundment Volume (acre-feet)	306 +/-
Max Impoundment Volume ((top of dam) acre-feet)	501 +/-
SDF Impoundment Volume* (acre-feet)	Approx. 515
Spillway Type	Uncontrolled broad-crested weir
Spillway Length (feet)	30
Freeboard at Normal Pool (feet)	5
Principal Spillway Capacity* (cfs)	753
Auxiliary Spillway Capacity* (cfs)	N/A
Low-Level Outlet Capacity* (cfs)	50
Spillway Design Flood* (flow rate - cfs)	1/2 PMF / 1,814 cfs
Winter Drawdown (feet below normal pool)	2
Drawdown Impoundment Vol. (acre-feet)	232
Latitude	42.528878
Longitude	-72.798412
City/Town	Ashfield
County Name	Franklin
Public Road on Crest	No
Public Bridge over Spillway	Footbridge
EAP Date (if applicable)	5/1/2023
Owner Name	Town of Ashfield
Owner Address	412 Main Street PO Box 560
Owner Town	Ashfield, MA 01330
Owner Phone	413-628-4441
Owner Emergency Phone	413-625-8200
Owner Type	Municipality or Political subdivision
Caretaker Name	Tom Poissant, Director
Caretaker Address	896 Cape Street
Caretaker Town	Ashfield, MA 01330
Caretaker Phone	413-628-4448
Caretaker Emergency Phone	413-625-8200
Date of Field Inspection	5/18/2023
Consultant Firm Name	Tighe & Bond
Inspecting Engineer	Daniel R. Buttrick
Engineer Phone Number	413-562-1600

*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
Inspection

2.1 Visual Inspection

Ashfield Lake Dam was visually inspected on May 18, 2023. At the time of the inspection, the weather was clear with temperatures in the 60's °F. Underwater areas were not inspected. Photographs to document the current conditions of the dam were taken during the inspection and are included in Appendix A. A copy of the inspection checklist is included in Appendix B.

2.1.1 General Findings

In general, Ashfield Lake Dam was found to be in **Good** condition as defined by DCR's current rating guidelines. Observations are identified in more detail in the sections below.

2.1.2 Dam

- Abutments (Photos 4, 48, 49)
    - The dam embankment appeared to have stable contact with natural ground at both abutments.
    - The public beach is located immediately beyond the east abutment and appeared to be generally free of erosion. Although there were isolated areas of exposed soil, the grassy vegetation was reestablishing after construction and appeared well-maintained overall.
    - A bare area is present where the beach blends into the embankment; reseeding of the area was planned following the inspection.
    - In the area immediately adjacent to the west abutment, the dam embankment is protected from erosion by modified rockfill. Minor surface erosion was noted but the erosion was not impacting the dam.
- Upstream Slope (Photos 5, 7, 29, 41, 44)
    - Most of the upstream slope is armored with riprap, extending from the crest to below the waterline. The beach and the area near the west abutment do not have protective riprap.
    - Some vegetation was observed growing in the voids in between the riprap on the upstream slope. The vegetation appears to be regularly maintained but consists of fast-growing species.
- Embankment Crest (Photos 30, 40, 42, 46, 55)
    - The crest has a 5-foot-wide stone footpath with grass vegetation along the sides. A 120-foot-long section has stone across the full width to provide vehicular access to the dry hydrant located on the crest. No evidence of horizontal misalignment was observed.
    - The previously observed minor undulations along the crest were corrected as part of the 2022 rehabilitation, and the resulting vertical alignment was generally flat.
    - A small animal burrow was noted on the crest near the west abutment.

- Minor erosion was observed at the left side of the footbridge, near the spillway operator concrete access pad.
- Sparse vegetation is present in areas along the crest where the grass has not fully revegetated.

- Downstream Slope (Photos 3, 26, 33, 35, 36, 39, 43)
  - Riprap on the downstream slope east and west of the spillway appeared stable and generally free of vegetation. However, there are some areas densely vegetated with herbaceous plant material growing between riprap. The vegetation was removed multiple times as part of the 2022 rehabilitation but has grown back quickly.
  - Herbaceous vegetation was observed growing in the riprap swale to the right of the spillway near the toe drain cleanout.
  - A bare area was present right of the dry hydrant access area. The area was scheduled to be reseeded under the contractor's warrantee.
  - Extending northwest from the dry hydrant, most of the western embankment and toe is vegetated with grass on the downstream slope. The previously observed trees and vegetation in areas adjacent to the western embankment were removed as part of the 2022 rehabilitation and seeded with grass.
  - The east portion of the stone masonry wall on the downstream face near the right abutment is obscured by thick off-property vegetation and an off-property shed.
  - Three to four large trees and a dense stand of landscape vegetation were present on the downstream slope along the section of masonry wall near the west abutment. Along this segment of embankment, the elevation of the downstream area is at the same or higher elevation than the impoundment normal pool elevation, mitigating the potential impact of the tree roots on the embankment under normal pool conditions. In addition, the Town and abutters have agreed that the health of the trees will be monitored and unhealthy trees removed and not replaced.

- Drains (Photos 24, 31, 34, 37)
  - Both the east and west embankments have 6-inch toe drains that discharge near the spillway. A riprap swale runs from dry hydrant access drive on the western embankment to the downstream discharge channel. A cleanout for the west drain was located in the swale during the inspection; however, the outlet could not be located and was possibly obscured by riprap.
  - A 36-inch concrete culvert under the dry hydrant access road conveys water from the area north of the dry hydrant to the riprap swale. The culvert was installed as part of the 2022 rehabilitation and is in good condition.

- Instrumentation (Photos 9)
  - There are reported monitoring wells observed during previous inspections but are not believed to be functional.

- Access Roads and Gates (Photos 32, 38, 47, 50)

- The dam can be accessed from either abutment. A public parking area off Buckland Road provides access to easterly end. The western abutment is accessible from a boat launch off Route 116. No gates are present.
- A dry hydrant is located about 180 feet west of the spillway and vehicular access is provided via an access road through a commercial property off Route 116. A locked swing gate was installed at the commercial property as part of the 2022 rehabilitation.

2.1.3 Appurtenant Structures

- Primary Spillway (Photos 4, 6, 10-13, 15-21, 23-25, 27, 56)
  - The previously observed deteriorating mortar on the downstream spillway steps was repaired as part of the 2022 rehabilitation. The mortar on the faces of the spillway training walls was rehabilitated as well.
  - Minor seepage was observed from the left training wall, including from the masonry and from a concrete footing below the downstream end of the wall.
  - The steel footbridge was recoated as part of the 2022 rehabilitation and in good condition. An area along the downstream rail had some scratches and paint chipping.
  - The spillway approach channel was clear of previously observed debris and vegetation. One log was noted along the edge of the crest.
  - The voids in the spillway weir and training walls were filled by drilling vertically through the spillway and injecting cementitious grout under pressure, along with lancing and grouting known voids that were not filled. The grouting significantly reduced leakage discharge from the spillway, training walls, and into the outlet gate chamber.
  - The spillway approach slab was new and in good condition.
- Auxiliary Spillway
  - There is no auxiliary spillway associated with this dam.
- Outlets (Photos 8, 14, 22)
  - The stainless-steel slide gate was rehabilitated with a new disc and stop collar. The gate was reportedly in good working order and exercised annually. The old disc had bent and was leaking significantly from being closed with too much force, likely because the stop collar was missing. The gate operator is chained and locked to prevent unauthorized use. The grating was new and in good condition. The operator was recently recoated and in good condition.
  - The low-level intake was submerged and not visible during the inspection. A new trash rack was installed as part of the 2022 rehabilitation and is in fair condition.
  - The outlet was operated repeatedly during the construction project.
- Dikes (Photos 51-54)
  - The dike crest and downstream slope were vegetated with grass, and the upstream slope was armored with riprap. There were no other trees or bushes present on the dike.
  - An 8-inch C-900 PVC drainpipe passes through the dike to drain a low area on

the downstream side. An 8-inch DI gate valve was installed on the line to control the flow of water during a high-water event. The valve can be closed to stop the reverse flow into the culvert from the impoundment to Buckland Road.

- A parapet was installed in 2022 along the dike to increase the overall elevation and match the dam crest.

2.1.4 Downstream Area

(Photo 2, 28)

- The property boundary for the parcel on which the dam is located is close to the downstream toe, which, until 2014, limited the Town's ability to maintain vegetation in the area. However, in 2014, the Town executed an easement agreement with the two downstream property owners to allow repairs and maintenance to the dam.
- The terms of the agreement requires the Town to maintain 5 trees that are either on the dam or in the easement area until the trees become diseased, damaged, or are ordered by the Office of Dam Safety to be removed. We understand, through discussions with the Town that these trees were planned for removal during the 1990 repair project but that negotiation between the Town and the Office of Dam Safety resulted in the trees being retained.
- A low area that is frequently wet is present on the downstream side of the embankment west of the spillway on the west side of the dry hydrant access drive. The wet area inhibits maintenance. The source of the water appears to be drainage from Route 116, which discharges into the area via parallel 18-inch and 24-inch drainage pipes. Previously, only a 12-inch pipe carried flows below the dry hydrant access drive to the spillway discharge channel. That pipe has been increased in size to 36-inches. Vegetation had not yet regrown in this area at the time of the inspection.
- A wet area is present at the toe of the downstream slope east of the spillway.

2.1.5 Impoundment Area

(Photo 1, 45)

- The dam is located at the southeastern end of the oblong-shaped impoundment. The impoundment is oriented along a northwest-southeast axis (approximately 0.5 miles). Some areas of the embankment adjacent to the spillway could be subject to significant waves with a strong wind from the northwest.
- The area surrounding the reservoir is mostly steep and wooded. There are a few homes and structures on the lake shoreline, but the area is not densely populated.
- No evidence of past or potential future slides were noted along the impoundment shoreline.

2.2 Caretaker Interview

Tom Poissant, the Highway Superintendent for the Town of Ashfield, was available during the inspection to answer questions related to the history, operation, and maintenance of the dam. Information provided by the caretaker has been incorporated into this report.

2.3 Operation and Maintenance Procedures

2.3.1 Operational Procedures

A formal operation and maintenance plan is being prepared in June 2023 for the Ashfield Lake Dam by Tighe & Bond. The spillway sets the normal pool elevation. If a large storm event is anticipated, the Town has reportedly lowered the water surface elevation to reduce overtopping risks.

2.3.2 Maintenance of Dam and Operating Facilities

A formal operation and maintenance plan is being prepared in June 2023 for the Ashfield Lake Dam by Tighe & Bond. Routine maintenance includes mowing grassed areas, removing herbaceous vegetation, filling animal burrows, and performing limited repointing on the spillway masonry.

2.4 Emergency Warning System

An Emergency Action Plan (EAP) is available for Ashfield Lake Dam. The EAP includes procedures for responding to emergency conditions at the dam, procedures for contacting emergency personnel, local and State officials and downstream residents, and a downstream inundation map. The EAP was reportedly last updated in May 2023.

2.5 Hydrologic/Hydraulic Data

Ashfield Lake Dam is an Intermediate size, High hazard potential structure. In accordance with current state dam safety regulations, the spillway design flood (SDF) is the ½ probable maximum flood (1/2 PMF). A Hydraulic & Hydrologic (H&H) Analysis was performed as part of the proposed dam rehabilitation design, prepared by Tighe & Bond, dated October 3, 2014.

The following values were estimated in the analysis:

A. Spillway Design Flood (SDF) Return Period ½ PMF
B. SDF Peak Inflow (cfs) 1,814
C. SDF Peak Outflow (cfs) 619
D. Primary Spillway Capacity (cfs) 753
E. SDF Peak Impoundment Elevation (ft) 1,255.15
F. SDF Freeboard (ft) 1.55 feet at dam; 2.35 feet at dike

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

During the Ashfield Lake Dam inspection, no safety hazards that may exist at, near, or on the dam were identified. The project improved site safety, including adding fencing to inhibit access to the top of the steep portions of the downstream riprap slopes, and adding riprap to inhibit beach users from walking onto the spillway weir.

The low-level outlet capacity is not anticipated to cause a significant increase in downstream flow rates if there is a deliberate release of water.

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 mis-operation of a dam.*

2.7 Structural Stability/Overtopping Potential

2.7.1 Structural Stability

A general slope stability analysis was performed before construction began on the 1990 dam repairs project. The analysis appears to have included calculation of factors of safety for normal pool, earthquake, and maximum pool flooding conditions for conditions present prior to implementation of repairs, finding insufficient factors of safety at one station under maximum pool conditions.

The repair design appears to have addressed the report's recommendations for improving the factors of safety, and the 2022 repairs returned the dam to its designed condition. In addition, visual observations made at the time of the inspection indicate that the structure appears to be stable.

2.7.2 Overtopping Potential

Based on the H&H information presented in Section 2.4, the spillway has sufficient capacity to safely pass the SDF with approximately 1.6 feet of freeboard, which is adequate.

Section 3
Assessments and Recommendations

3.1 Assessments

Based on the visual inspection and a review of available information, Ashfield Lake Dam is generally considered in **Good** condition as defined by current DCR rating guidelines. The dam was found to have the following deficiencies:

1. Fast-growing vegetation remains established in the dam's riprap slopes since residents prohibited town officials from allowing the use of herbicides.
2. Grass has not yet regrown in areas, particularly along portions of the crest, the left abutment, one area on the downstream slope, and in the wet area west of the dry hydrant access.
3. Minor erosion is present at the downstream edge of the crest adjacent to the spillway training wall.
4. Trees are present on the downstream face and in the downstream area near the right abutment. The trees are being monitored.

Conditions during the May 2023 inspection were improved compared to the conditions reported in the October 2020 Phase I Inspection Report for Ashfield Lake Dam, the most recent inspection report obtained for review, since this dam was rehabilitated in 2022. Presented below is a comparison of previously reported conditions to current conditions at the dam:

Previously Identified Deficiency	Resolution or Current Condition
Trees on downstream slope of right embankment on private property. Town has negotiated an agreement with the landowner to allow the removal of the trees under certain conditions near the west abutment.	Trees are being monitored.
Vegetation within 20 feet of the toe of the dam on the right embankment.	Trees and brush were removed during the 2022 rehabilitation project. Area was seeded and grassy vegetation is being established. This item has been resolved.
There are shifting masonry stones on the downstream wall to the west of the spillway and the adjacent embankment is uneven, potentially from vegetation maintenance activities. Vegetation and a small structure on the downstream side of the wall impeded inspection of the face of the wall.	The wall is in serviceable condition and will be monitored.
Vegetation is growing in the spillway approach area and from the joints of the masonry spillway structure.	Vegetation has been removed from spillway approach channel and from the joints of the masonry spillway structure. The masonry was repointed, and a new concrete pad was poured in the spillway approach channel in 2022. This item has been resolved.
Small woody and vine-type vegetation is growing between the riprap on the upstream and downstream slopes of the left	Woody and vine-type vegetation was removed from the riprap in 2022. The vines have regrown several times and subsequently

embankment and adjacent to both spillway training walls.	removed during the rehabilitation project. The Town has indicated that they are looking into ongoing maintenance approaches, including using flame weeded to remove vines.
Vegetation is growing in the stone-lined swale downstream of the access drive and adjacent to the culvert drainage outlet.	Vegetation was removed in 2022, but some has regrown. Town plans to implement a removal program.
The stone masonry spillway training walls require repair and repointing. The mortar is deteriorated in areas and there are some missing stones. Vegetation is growing between the stone masonry joints.	The stone masonry spillway training walls were repaired and repointed as part of the 2022 upgrade. Areas with missing stones were filled. Vegetation was removed. This item has been resolved.
The spillway weir is leaking, with the leakage rate increasing significantly with relatively minor increases in lake level.	The spillway was grouted which significantly reduced leakage rates.
A sinkhole is present in the sediment upstream of the low-level outlet structure, and there was audible flow into the structure.	The grouting of the spillway filled voids surrounding the outlet structure as well. This item has been resolved.
There are numerous corroded areas on the spillway footbridge and the low-level outlet operator mechanism that require recoating.	The spillway footbridge and low-level outlet operator were recoated as part of the 2022 rehabilitation. This item has been resolved.
The embankment crest at the footbridge appears to have settled a few inches relative to the original slab.	The embankment crest was raised and regraded as part of the 2022 upgrade. This item has been resolved.
There embankment crest and downstream face have areas with bare soil, sparse grass cover, and rutting.	A stone footpath was installed along the crest and the crest and downstream face were regraded and reseeded. New areas of bare soil were noted where seed has not yet sufficiently germinated.
The western embankment has numerous small animal burrows.	One animal burrow was observed. Continue to monitor.
There are minor vertical undulations of the dam crest.	The dam crest was regraded as part of the 2022 rehabilitation. This item has been resolved.
The dike crest is lower than the dam crest.	A parapet was installed as part of the 2022 rehabilitation. This item has been resolved.
Trees appear to have been planted in the dike.	The trees have been removed. This item has been resolved.
A drainage pipe passes through the dike and would flow in reverse during high water events.	The drainage pipe was removed and replaced. A gate valve was installed on the pipeline that can be closed during high-water events to prevent water from flowing up the pipe. This item has been resolved.
The west embankment toe drain discharge could not be located.	Unchanged
Inadequate freeboard would be available during the spillway design flood (SDF).	The dam crest was raised to provide adequate freeboard during the SDF.
No Operation and Maintenance manual is available	An O&M manual is being written as of June 2023. This item will be resolved upon completion.

The following recommendations and remedial modifications generally describe the recommended approach to address current deficiencies at the dam. Prior to undertaking

recommended maintenance, repairs, and remedial measures, the applicability of environmental permits needs to be determined to assess those activities that may occur within resource areas under the jurisdiction of local conservation commissions, MassDEP, or other regulatory agencies.

3.2 Studies and Analyses

There are no studies or analyses recommended at this time.

3.3 Recurrent Maintenance Recommendations

The following recommended activities should be performed on a regular, or yearly, basis and recorded:

1. Regularly monitor the embankment for animal burrows, localized depressions, bare spots, and any other type of unusual activity. Fill burrows with a mud pack consisting of a thin soil-cement mix.
2. Regularly mow (minimum of three times per year) the embankment, abutments, and within 20 feet of the dam to control tree and brush growth which inhibits visual observations of the dam.
3. Exercise the sluice gates and drain valve at least twice annually, quarterly is preferred. Check that the stop collar is in place and secure prior to opening gate.
4. Remove debris and vegetation from the spillway approach and downstream channels.
5. Remove vegetation growing from the riprap portions of the embankment and in the joints of the spillway masonry.
6. Monitor concrete for cracking, spalling, and erosion; repair as necessary.
7. Inspect and repoint masonry joints, as required.
8. Loam and seed bare and rutting areas.
9. Update the Emergency Action Plan annually.
10. Monitor the trees near the right abutment for deterioration.

3.4 Recommended Minor Repairs

The following repairs and maintenance items are recommended to improve the overall condition of the dam:

1. Reestablish grass in sparse and bare areas.
2. Remove unsuitable vegetation from riprap areas by increasing the frequency of cutting, removal by the roots, controlled burning, or the use of herbicide.
3. Remove the trees near the right abutment if they exhibit disease. Tree removal should include removing stumps and roots within 20 feet of the dam and establishing a healthy stand of grass. Permitting, including a dam safety permit, will be needed for tree removal.
4. Fill burrows with a mud pack consisting of a thin soil-cement mix.

3.5 Recommended Remedial Modifications

There are no recommended modifications that would alter the current configuration or design of the dam.

3.6 Alternatives

No repair alternatives have been developed at this time.

3.7 Opinion of Probable Costs

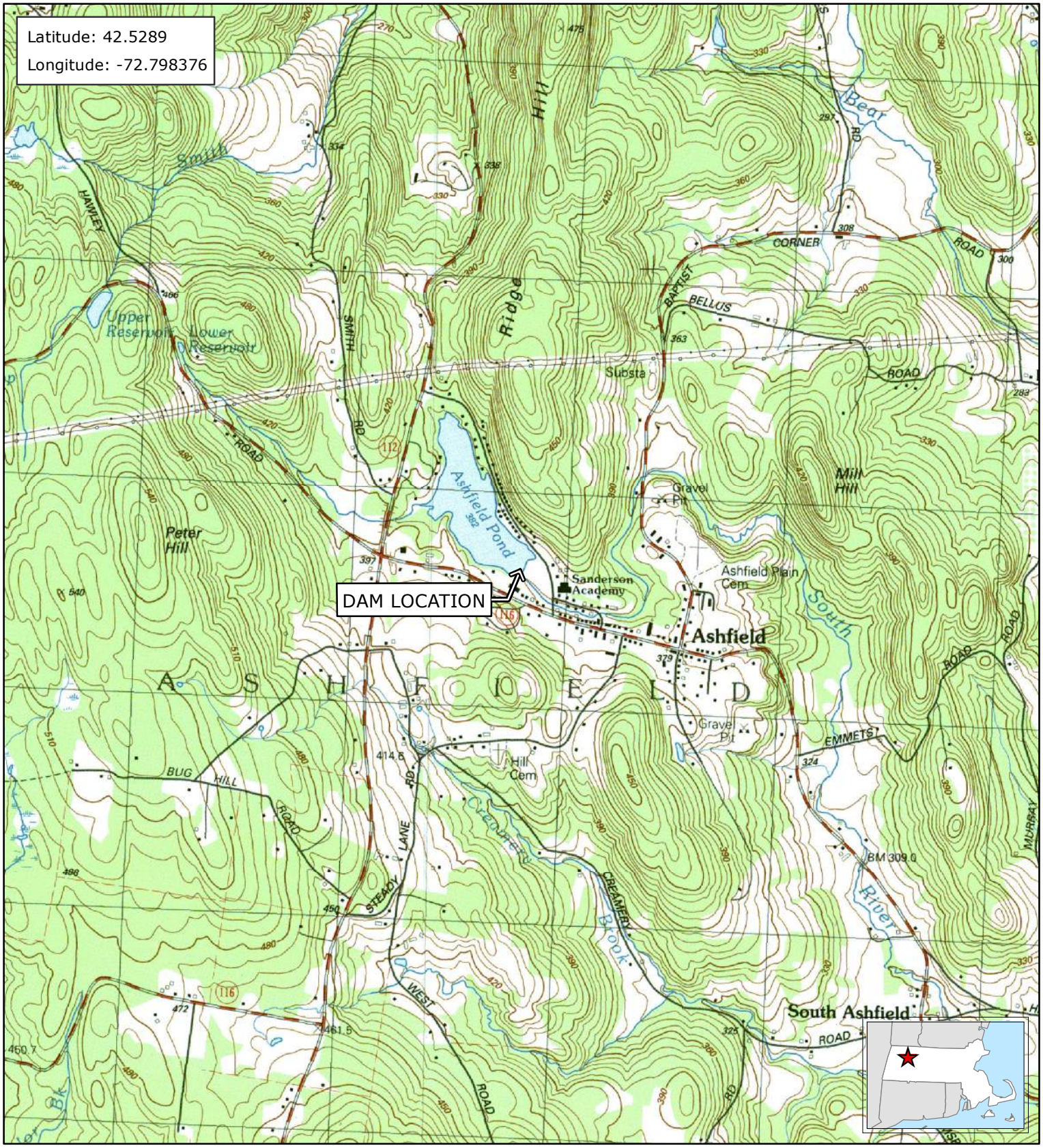
The following opinion of probable costs has been developed for the studies, analyses, recommendations and remedial measures noted above. The probable construction costs are an approximation based on limited investigations and our experience on other similar sized projects and are not based on detailed quantity takeoffs or designs. Once further detailed investigations are performed, the scope of work may change, affecting the actual construction costs. The estimates include engineering, permits and contingencies where applicable. Tasks that likely could be carried out by the dam owner/caretaker are noted as Force Account. The yearly recommendations provided above can likely be carried out by the dam owner/caretaker and are not included in the table below.

	Recommendation	**Probable Cost(1)**
1	Reestablish grass in sparse and bare areas*	Force Account
2	Remove vegetation from riprap areas	Force Account
3	Remove trees near right abutment as they exhibit disease	$10,000 per tree x 5 trees
4	Fill animal burrow	Force Account
	Total	**$50,000**

**Currently under contractor warrantee*

J:\A\A0699\019 - Ashfield Lake Dam Repair\Phase I Dam Inspection\Report\Ashfield Lake Dam - Report Text.docx

Figures



Tighe&Bond

Based on USGS Topographic Map for Ashfield, MA Revised 1990.
Contour Interval Equals 6-Meters.

1:24,000

0 1,000 2,000

Feet

N

FIGURE 1
SITE LOCUS AND DOWNSTREAM AREA MAP

Ashfield Pond Dam
Town, Massachusetts
MA00523

June 2023

V:\Projects\A\A0699\Maps\MA00523\MA00523_Dam_Topo.mxd [Exported By: kjw, 11/12/2020, 10:21:59 AM]

A-0699

FIGURE 2
ORTHOPHOTOGRAPH
Ashfield Pond Dam
Ashfield, Massachusetts
MA00523

Tighe&Bond

Based on MassGIS Color Orthophotography (2019)

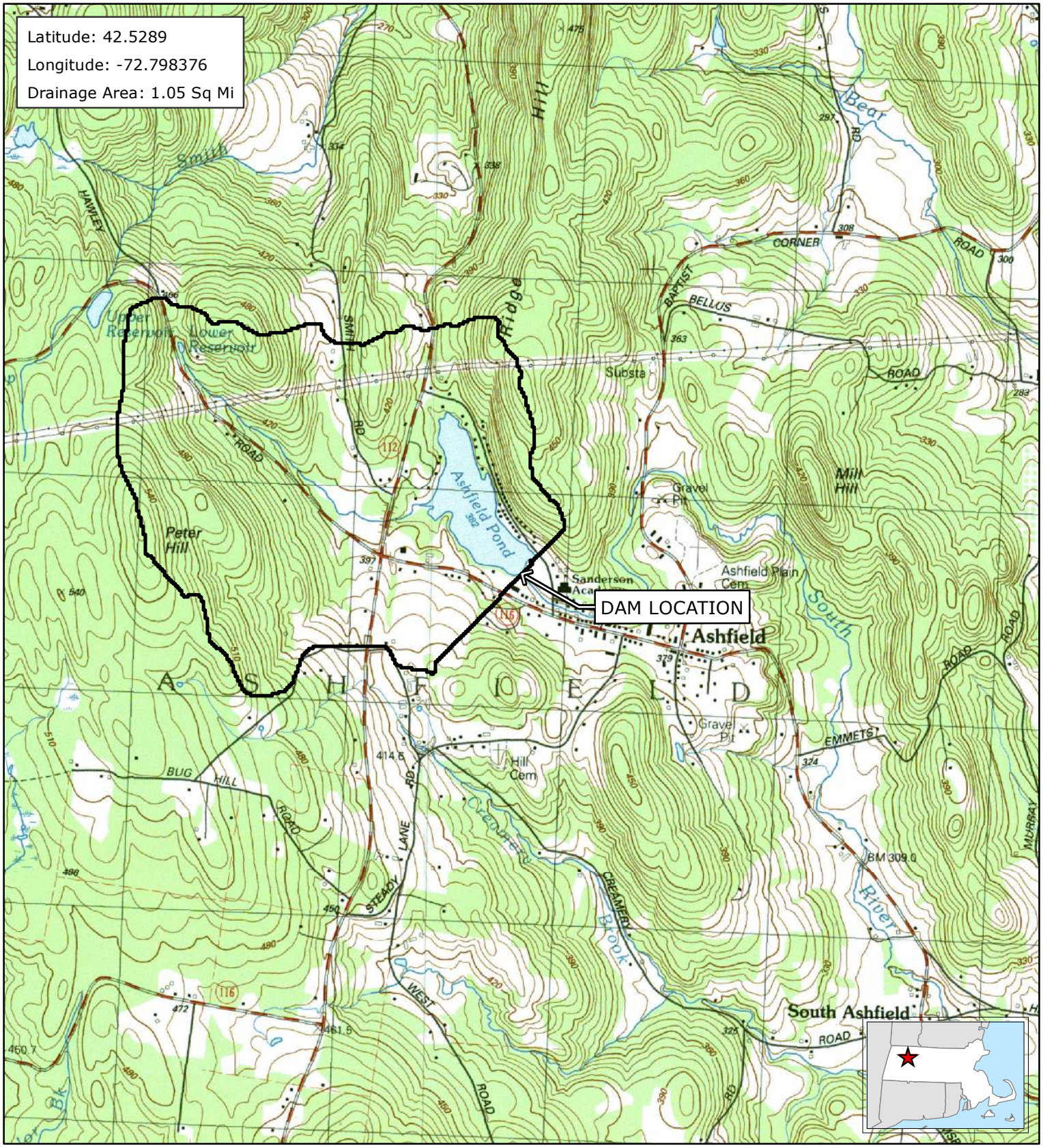
1:4,800
0 200 400
Feet

N

June 2023

V:\Projects\A\A0699\Maps\MA00523\MA00523_Dam_Aerial.mxd [Exported By: kjw, 11/12/2020, 10:21:51 AM]

A-0699



Legend

Drainage Area

Tighe&Bond

Based on USGS Topographic Map for Ashfield, MA Revised 1990.
Contour Interval Equals 6-Meters.
Drainage Area Calculated in USGS StreamStats V4.4.0: MA

1:24,000

0 1,000 2,000

Feet

N

FIGURE 3
DRAINAGE AREA MAP

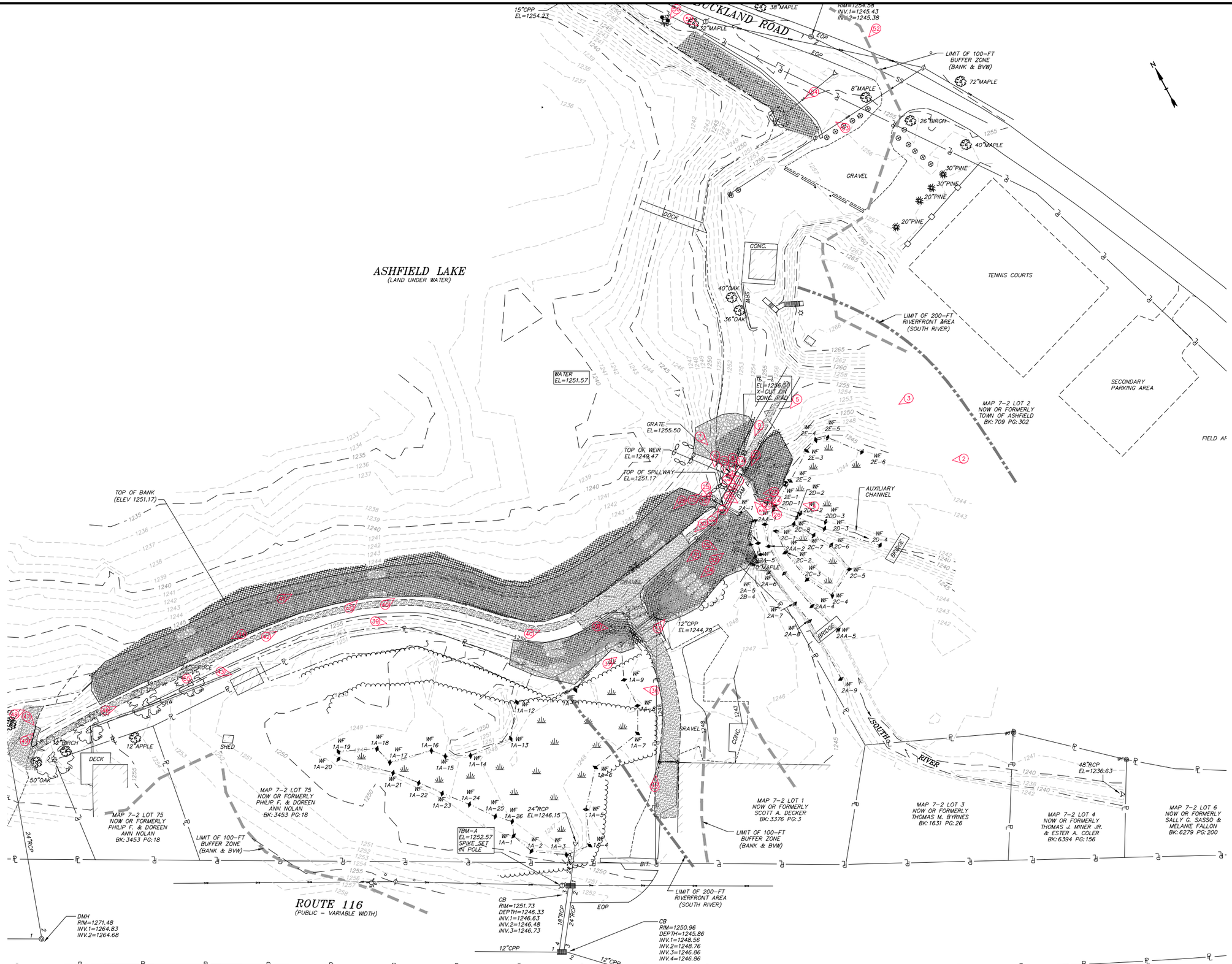
Ashfield Pond Dam
Ashfield, Massachusetts
MA00523

June 2023

V:\Projects\A\A0699\Maps\MA00523\MA00523_Dam_Drainage.mxd [Exported By: kjw, 11/12/2020, 10:22:05 AM]

A-0699

APPENDIX A
Photographs



J:\A\A0699\019 - Ashfield Lake Dam Repair\Phase I Dam Inspection\Report\Photo Plan\2023 Inspection Photo Plan.dwg Jun 20, 2023-12:44pm Plotted By: LPT

Tighe&Bond
Consulting Engineers
www.tighebond.com

NOT FOR CONSTRUCTION

Town Of Ashfield

Ashfield Lake Dam Repair Project

Ashfield, Massachusetts

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 ■■■■■■■■ 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Mark	Date	Description

PROJECT NO:	A0699-009
FILE:	2023 Inspection Photo Plan.dwg
DRAWN BY:	TMP,ARB
CHECKED:	DRB
APPROVED BY:	

PHOTO LOCATION PLAN

SCALE: 1"=40'

Photo 1 - Overview of impoundment from spillway footbridge

Photo 2 – View of downstream area and spillway

Photo 3 –Downstream slope viewed from left abutment

Photo 4 – Spillway and steel footbridge viewed from downstream

Photo 5- Overview of dam and upstream slope from left abutment; note stone footpath and splitrail fencing

Photo 6 - Spillway approach channel looking downstream; note concrete apron replaced in 2022

Photo 7 – Upstream slope to the left of the spillway; note some vegetative regrowth in riprap

Photo 8 – Low-level outlet sluice gate operator repainted, and new grating installed as part of the 2022 improvements project

Photo 9 – Stone footpath approaching spillway footbridge left abutment; arrow points to monitoring well

Photo 10 – View of spillway approach from right training wall

Photo 11 – Rehabilitated steel footbridge with fresh paint and new wooden floor and handrails, upgraded as part of the 2022 improvements project

Photo 12 – Note minor erosion at concrete pad next to spillway footbridge

Photo 13 – New concrete curbing at footbridge improved accesibilty

Photo 14 – New concrete pad adjacent to low-level outlet operator installed in 2022 improved operator accesibilty

Photo 15 - View of right training wall with with mortared joints; note new concrete bridge pad with anchor bolts (arrow) and log in channel

Photo 16 – View of left training wall with mortared joints; note new concrete bridge pad with anchor bolts (arrow)

Photo 17 – Spillway steps and left training wall; note some seepage through downstream training wall

Photo 18 – Close up view of mortar instllaed to repair cracks in left training wall

Photo 19 – Closer view of weeping in left downstream training wall; arrow points to previous void repaired during 2022 upgrades

Photo 20 – Right training wall and spillway viewed from downstream; note some vegetative regrowth

Photo 21 – Downstream spillway and low-level outlet gate operator and outlet pipe; note riprap thrown onto spillway from footbridge

Photo 22 – Low-level outlet pipe

Photo 23 – End of left spillway training wall; note vegetative regrowth

Photo 24- View of spillway from downstream; note toe drain in foreground

Photo 25- Concrete-capped training wall with new concrete pad supporting steel footbridge

Photo 26- Downstream slope to left of spillway with some vegetative regrowth through riprap

Photo 27- View of right training wall and spillway from left; arrow points to minor erosion

Photo 28 – Downstream area viewed from footbridge; note herbaceous vegetation in the channel and plastic barrel

Photo 29 – Overview of upstream slope from spillway

Photo 30 – View of dam crest right of spillway footbridge

Photo 31 – New culvert under dry hyrant access drive viewed from dam crest

Photo 32 – Locked swing gate at Decker property access drive restricts dam and dry hydrant access to Town officicals

Photo 33 – Downstream slope and swale left of access driveway

Photo 34 –View of culvert and access drive from from swale; arrow points to cleanout

Photo 35 – Downstream slope to the right of the spillway viewed from the dam crest; note vegetative regrowth through riprap

Photo 36 – Downstream slope viewed from access driveway

Photo 37 – Culvert through access drive

Photo 38 – Access drive viewed from dam crest

Photo 39 – Downstream slope and toe area; note sparse grass cover

Photo 40 – Graveled area on dam crest provides vehicular access to dry hydrant

Photo 41 – Upstream slope armored with riprap; note sparse grass cover

Photo 42 –View along dam crest looking towards spillway and access driveway; note sparse grass cover

Photo 43 – Shed abutting the downstream embankment slope

Photo 44 – Upstream slope near right abutment and boat ramp

Photo 45 – Overview of impoundment looking towards the dike along Buckland Road and recreational area on the right

Photo 46 – Dam crest near right abutment; note large trees growing on embankment

Photo 47 – Boat access drive with rutting and erosion from storm runoff, although dam embankment is protected with modified rockfill

Photo 48 – View of right abutment and boat ramp on right

Photo 49 – View of footpath at boat ramp; note modified rockfill providing erosion protection

Photo 50 – Dry hydrant off Buckland Road near dike

Photo 51 – View of dike and parapet wall

Photo 52 – View of dike from Buckland Road; arrow is pointing to storm drain

Photo 53 – View of parapet wall along dike

Photo 54 – Arrow points to storm drain outlet through dike

Photo 55 – Animal burrow on dam crest near boat ramp

Photo 56 – Paint damaged on footbridge from people throwing riprap onto spillway steps

APPENDIX B
Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: Ashfield Lake Dam

STATE ID #: 2-6-13-1

REGISTERED: ☑ YES ☐ NO

NID ID #: MA00523

STATE SIZE CLASSIFICATION: Intermediate

STATE HAZARD CLASSIFICATION: High

CHANGE IN HAZARD CLASSIFICATION REQUESTED?: No

DAM LOCATION INFORMATION

CITY/TOWN: Ashfield

COUNTY: Franklin

DAM LOCATION: Buckland Road
(street address if known)

ALTERNATE DAM NAME: N/A

USGS QUAD.: Ashfield

LAT.: 42.528878

LONG.: -72.798412

DRAINAGE BASIN: Deerfield

RIVER: South River

IMPOUNDMENT NAME(S): Ashfield Lake

GENERAL DAM INFORMATION

TYPE OF DAM: Earth Embankment and Stone Masonry Spillway

OVERALL LENGTH (FT): 775 +/-

PURPOSE OF DAM: Recreational

NORMAL POOL STORAGE (ACRE-FT): 306 +/-

YEAR BUILT: 1894; rehabilitated in 1990 and 2022

MAXIMUM POOL STORAGE (ACRE-FT): 501 +/-

STRUCTURAL HEIGHT (FT): 16

EL. NORMAL POOL (FT): 1251.2

HYDRAULIC HEIGHT (FT): 10.8

EL. MAXIMUM POOL (FT): 1256.8

FOR INTERNAL MADCR USE ONLY

FOLLOW-UP INSPECTION REQUIRED: ☐ YES ☐ NO

CONDITIONAL LETTER: ☐ YES ☐ NO

NAME OF DAM: Ashfield Lake Dam | STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 | NID ID #: MA00523

INSPECTION SUMMARY

DATE OF INSPECTION: May 18, 2023 | DATE OF PREVIOUS INSPECTION: October 28, 2020

TEMPERATURE/WEATHER: Clear/sunny; 60s | ARMY CORPS PHASE I: ☑ YES ☐ NO | If YES, date August 1978

CONSULTANT: Tighe & Bond | PREVIOUS DCR PHASE I: ☑ YES ☐ NO | If YES, date '98, '06, '06, '10, '12, '14, '16, '18

BENCHMARK/DATUM: NAVD88

OVERALL PHYSICAL CONDITION OF DAM: GOOD | DATE OF LAST REHABILITATION: 2022

SPILLWAY CAPACITY: >100% SDF w/ no actions by Caretaker

EL. POOL DURING INSP.: 1251.5 | EL. TAILWATER DURING INSP.: 1241 +/-

PERSONS PRESENT AT INSPECTION

NAME	TITLE/POSITION	REPRESENTING
Daniel R Buttrick	Senior Engineer	Tighe & Bond
Amber R Boles	Staff Engineer	Tighe & Bond
Todd Olanyk	Selectboard Member	Town of Ashfield
Tom Poissant	Highway Dept. Director	Town of Ashfield
Ricki Carroll	Parks Department	Town of Ashfield

EVALUATION INFORMATION

	Click on box to select E-code
E1) TYPE OF DESIGN	4
E2) LEVEL OF MAINTENANCE	4
E3) EMERGENCY ACTION PLAN	5
E4) EMBANKMENT SEEPAGE	4
E5) EMBANKMENT CONDITION	5
E6) CONCRETE CONDITION	5
E7) LOW-LEVEL OUTLET CAPACITY	4

	Click on box to select E-code
E8) LOW-LEVEL OUTLET CONDITION	5
E9) SPILLWAY DESIGN FLOOD CAPACITY	5
E10) OVERALL PHYSICAL CONDITION	5
E11) ESTIMATED REPAIR COST	$50,000
ROADWAY OVER CREST	NO
BRIDGE NEAR DAM	NO

NAME OF INSPECTING ENGINEER: Daniel R. Buttrick | SIGNATURE:

NAME OF DAM:	Ashfield Lake Dam	STATE ID #:	2-6-13-1
INSPECTION DATE:	May 18, 2023	NID ID #:	MA00523

OWNER:		CARETAKER:	
ORGANIZATION	Town of Ashfield	ORGANIZATION	Highway Department
NAME/TITLE	Board of Selectmen	NAME/TITLE	Tom Poissant, Director
STREET	412 Main Street PO Box 560	STREET	896 Cape Street
TOWN, STATE, ZIP	Ashfield, MA 01330	TOWN, STATE, ZIP	Ashfield, MA 01330
PHONE	413-628-4441	PHONE	413-628-4448
EMERGENCY PH. #	413-625-8200	EMERGENCY PH. #	413-625-8200
FAX		FAX	
EMAIL	townhall@ashfield,org	EMAIL	highway@ashfield.org
OWNER TYPE	Municipality or Political subdivision		

PRIMARY SPILLWAY TYPE	Uncontrolled broad-crested weir		
SPILLWAY LENGTH (FT)	30	SPILLWAY CAPACITY (CFS)	753
AUXILIARY SPILLWAY TYPE	N/A	AUX. SPILLWAY CAPACITY (CFS)	N/A
NUMBER OF OUTLETS	1	OUTLET(S) CAPACITY (CFS)	50
TYPE OF OUTLETS	18-inch conduit	TOTAL DISCHARGE CAPACITY (CFS)	803
DRAINAGE AREA (SQ MI)	1.07	SPILLWAY DESIGN FLOOD (PERIOD/CFS)	1/2 PMF / 1,814 cfs

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

FISH LADDER (LIST TYPE IF PRESENT)

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

PUBLIC BRIDGE WITHIN 50' OF DAM? ☐ YES ☑ NO IF YES, ROAD/BRIDGE NAME: Steel footbridge over spillway

MHD BRIDGE NO. (IF APPLICABLE)

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Grass and crushed stone	X		
	2. SURFACE CRACKING	None observed	X		
	3. SINKHOLES, ANIMAL BURROWS	One observed near boat ramp			X
	4. VERTICAL ALIGNMENT (DEPRESSIONS	None observed	X		
	5. HORIZONTAL ALIGNMENT	None noted; dam is curved	X		
	6. RUTS AND/OR PUDDLES	None observed	X		
	7. GRASS COVER CONDITION	Grass is generally in fair condition, some areas are thin or bare*		X	X
	8. WOODY VEGETATION (TREES/BRUSH)	None observed	X		
	9. ABUTMENT CONTACT	Appeared stable on both sides	X		

ADDITIONAL COMMENTS: *Note: grass is still in post-construction warranty period and is under Contractor's care

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	None observed; wet areas have been noted during some past inspections		X	
	2. SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Appeared stable	X		
	5. SINKHOLE/ANIMAL BURROWS	None observed	X		
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. GRASS COVER CONDITION	Grass along areas faced with earth; some areas thin or bare*		X	X
	9. WOODY VEGETATION (TREES/BRUSH)	None except approved trees being monitored	X		

ADDITIONAL COMMENTS: *Note: grass is still in post-construction warranty period and is under Contractor's care

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

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.	Riprap along the entire slope with good coverage extending below the water line	X		
	3. SINKHOLE/ANIMAL BURROWS	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Appears stable	X		
	5. EROSION	None observed	X		
	6. UNUSUAL MOVEMENT	None observed	X		
	7. GRASS COVER CONDITION	Not much grass on upstream slope; primarily riprap	X		
	8. WOODY VEGETATION (TREES/BRUSH)	Previously observed woody vegetation was removed during 2022 rehabilitation		X	

ADDITIONAL COMMENTS:

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	None observed			
	2. OBSERVATION WELLS	One left of spillway (missing cap_; one 150' right of spillway (damaged)	X		
	3. STAFF GAGE AND RECORDER	None observed			
	4. WEIRS	None observed			
	5. INCLINOMETERS	None observed			
	6. SURVEY MONUMENTS	None observed			
	7. DRAINS	Toe drains left and right of spillway			
	8. FREQUENCY OF READINGS	None available; observation wells are likely non-functional			
	9. LOCATION OF READINGS	None available	X		

ADDITIONAL COMMENTS:

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

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	None observed	X		
	5. DRAINAGE SYSTEM	Toe drain outlets noted at left and right side of stream channel d/s of spillway left toe dra		X	
	6. INSTRUMENTATION	None observed	X		
	7. VEGETATION WITHIN 15 FT	Heavy brush and vegetation	X		
	8. ACCESSIBILITY	Foot access from both sides; potential equipment access from left side	X		
	9. DOWNSTREAM HAZARD DESCRIPTION	High; downstream roadways (Rt 116 & Buckland Rd), residences, and downtown area			

ADDITIONAL COMMENTS: *discharge point has been previously observed to be bent upwards.

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

MISCELLANEOUS

AREA INSPECTED	CONDITION	OBSERVATIONS
MISC.	1. RESERVOIR DEPTH (AVG)	Unknown
	2. RESERVOIR SHORELINE	Residences and wooded areas
	3. RESERVOIR SLOPES	Moderate; no signs of past or potential future slides
	4. ACCESS ROADS	Vehicular access from boat launch driveway off Route 116 and at dry hydrant
	5. SECURITY DEVICES	Locked swing gate at dry hydrant access road
	6. WATER PUBLIC HAZARDS & PROTECTION	None observed
	7. LAND-SIDE PUBLIC HAZARDS & PROTECTION	None observed
	7. VANDALISM OR TRESPASS	☐ YES ☑ NO WHAT:
	8. AVAILABILITY OF PLANS	☑ YES ☐ NO DATE: 1990 and 2022 Improvements
	9. AVAILABILITY OF DESIGN CALCS	☐ YES ☑ NO DATE:
	10. AVAILABILITY OF EAP/LAST UPDATE	☑ YES ☐ NO DATE: May-23
	11. AVAILABILITY OF O&M MANUAL	☑ YES ☐ NO DATE: In progress
	12. CARETAKER/OWNER AVAILABLE	☐ YES ☑ NO DATE:
	13. CONFINED SPACE ENTRY REQUIRED	☐ YES ☑ NO PURPOSE:

ADDITIONAL COMMENTS: Erosion scour noted during the inspection on the boat launch directly adjacent to the left abutment but rockfill added to dam for erosion protection

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	Stone masonry	X		
	WEIR TYPE	Broad-crested weir	X		
	SPILLWAY CONDITION	Rehabilitated	X		
	TRAINING WALLS	Stone masonry with previously deteriorating mortar repaired in 2022		X	
	SPILLWAY CONTROLS AND CONDITION	None	X		
	UNUSUAL MOVEMENT	None observed	X		
	APPROACH AREA	New concrete pad installed in 2022; previously observed silt, sand, and grass is gone	X		
	DISCHARGE AREA	Minor debris in spillway channel			X
	DEBRIS	Log observed near spillway under footbridge			X

ADDITIONAL COMMENTS: Previously observed minor seepage in bottom tier of spillway was not observed; minor seepage from left d/s training wall was observed. Significant decrease in leakage flow was apparent compared to previous inspections.

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

AUXILIARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	PAGE NOT APPLICABLE			
	WEIR TYPE				
	SPILLWAY CONDITION				
	TRAINING WALLS				
	SPILLWAY CONTROLS AND CONDITION				
	UNUSUAL MOVEMENT				
	APPROACH AREA				
	DISCHARGE AREA				
	DEBRIS				

ADDITIONAL COMMENTS:

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	Gated 18-inch conduit located through left side of spillway	X		
	INTAKE STRUCTURE	Rise pipe approximately 40 feet upstream of spillway	X		
	TRASHRACK	Previous trashrack removed and replaced in 2022	X		
	PRIMARY CLOSURE	Seating-head stainless steel sluice gate at upstream face of spillway; disc replaced	X		
	SECONDARY CLOSURE	N/A	X		
	CONDUIT	18-inch PVC upstream of gate (reported); 18-inch HDPE downstream	X		
	OUTLET STRUCTURE/HEADWALL	Outlet at base of stone masonry spillway	X		
	EROSION ALONG TOE OF DAM	None observed	X		
	SEEPAGE/LEAKAGE	None observed	X		
	DEBRIS/BLOCKAGE	None observed	X		
	UNUSUAL MOVEMENT	None observed		X	
	DOWNSTREAM AREA	Stream channel	X		
	MISCELLANEOUS	Sluice gate plate and stop collar replaced in 2022			

ADDITIONAL COMMENTS:

Outlet was operated in 2011 to draw down impoument in advance of Hurricane Irene

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

CONCRETE/MASONRY DAMS (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	TYPE	PAGE NOT APPLICABLE			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	HORIZONTAL ALIGNMENT				
	VERTICAL ALIGNMENT				

ADDITIONAL COMMENTS:

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

CONCRETE/MASONRY DAMS (DOWNSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S FACE	TYPE	PAGE NOT APPLICABLE			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACT				
	LEAKAGE				

ADDITIONAL COMMENTS:

NAME OF DAM: Ashfield Lake Dam STATE ID #: 2-6-13-1

INSPECTION DATE: May 18, 2023 NID ID #: MA00523

CONCRETE/MASONRY DAMS (UPSTREAM FACE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S FACE	TYPE	PAGE NOT APPLICABLE			
	SURFACE CONDITIONS				
	CONDITIONS OF JOINTS				
	UNUSUAL MOVEMENT				
	ABUTMENT CONTACTS				

ADDITIONAL COMMENTS:

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. 2020 Phase I Inspection/Evaluation Report by Tighe & Bond, Inc.
2. 2018 Phase I Inspection/Evaluation Report by Tighe & Bond, Inc.
3. 2016 Phase I Inspection/Evaluation Report by Tighe & Bond, Inc.
4. 2014 Phase I Inspection/Evaluation Report by Tighe & Bond, Inc.
5. 2012 Phase I Inspection/Evaluation Report by Tighe & Bond, Inc.
6. 2010 Phase 1 Inspection/Evaluation Report by Tighe & Bond Engineers
7. 2008 Phase 1 Inspection/Evaluation Report by Tighe & Bond Engineers
8. 2006 Phase 1 Inspection/Evaluation Report by Tighe & Bond Engineers
9. 1998 Phase 1 Inspection/Evaluation Report by Root Engineers
10. 1995 Phase 1 Inspection/Evaluation Report by Tighe & Bond Engineers
11. 1988 Ashfield Lake Dam Rehabilitation Design Drawings by GZA
12. 1978 Phase 1 Report by the U.S. Army Corps of Engineers
13. 1974 Visual Inspection Report by MA DPW
14. 1974 Visual Inspection Report by MA DPW

EASEMENTS AND AGREEMENTS

The following easements and agreements, copies of which are included in this appendix, were negotiated by the Town with abutting property owners since the previous inspection.

1. Dam Access and Maintenance Easement Deed for Decker Machine Works, Inc. parcel.

2. Dam Access and Maintenance Easement Deed for Philip R. Nolan, Jr. Funding Trust parcels.

3. Agreement to Retain Certain Trees on the Ashfield Lake Dam

APPENDIX D
Definitions

COMMON DAM SAFETY DEFINITIONS

To provide a better understanding of this report, definitions of commonly used terms associated with dams are provided below. The terms are presented under the following common categories:

1) Orientation;
2) Dam components;
3) Size classification;
4) Hazard classification; and
5) General.

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 barrier that impounds water.

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

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

Appurtenant Works – Shall mean any ancillary feature of a dam and shall include but not be limited to, such structures as training walls, spillways, either in the dam or separate there from and low level outlet works; also water conduits such as tunnels, channels, pipelines, or penstocks, either through the dam or its abutments.

Riprap – Shall mean a loose assemblage of broken stones erected in water or soft ground as erosion protection.

Toe – Shall mean the protruding base of the dam on the downstream side either natural or man-made.

Weir – Shall mean the top of the spillway where the water flows to the downstream side

Size Classification

(as listed in Commonwealth of Massachusetts, 302 CMR *Dam Safety Rules and Regulations,* revised 11/04/05)

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

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

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

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

Hazard Classification

(as listed in Commonwealth of Massachusetts, 302 CMR *Dam Safety Rules and Regulations,* revised 11/04/05)

High Hazard (Class I) – Shall mean dams located where failure or misoperation will likely cause loss of life and/or serious damage to homes, industrial or commercial facilities, important public utilities, or major transportation arteries.

Significant Hazard (Class II) – Shall mean dams located where failure or misoperation may cause loss of life and/or damage to homes, industrial or commercial facilities, secondary highways or railroads, or cause the interruption of the use or service of important facilities.

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

General

DCR – Department of Conservation and Recreation, formerly the Department of Environmental Management (DEM).

EAP – Emergency Action Plan; shall mean a predetermined 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 break.

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 volume equal to one foot of water over a one-acre area.

Height of Dam – 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 crest of the dam.

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.