

August 29, 2019

Mr. Paul Marinelli
Department of Conservation and Recreation
Office of Dam Safety
251 Causeway Street, Suite 800
Boston, MA 02114

DRAFT

Re: **Follow-Up Inspection – August 2019**
Danielson Mill Dam (MA03351)
Medfield, Massachusetts
(PARE Project No.: 19126.00)

Dear Mr. Marinelli:

On behalf of Town of Medfield (Owner), Pare Corporation (Pare) completed a follow-up inspection of the Danielson Mill Dam located in Medfield, Massachusetts. The inspection was completed on August 23, 2019. Based upon the observed conditions, the dam appears to remain in **Poor** condition with deficiencies similar in nature and extent as those observed during previous inspections.

Danielson Mill Dam consists of a roughly 225-foot earthen embankment dam with a 4-foot wide stop log controlled spillway channel. The dam has a reported hydraulic height of approximately 6 feet and a maximum structural height of approximately 7 feet. Danielson Mill Dam is currently classified as a **Small** sized, **Significant** (Class II) hazard potential dam.

At the time of the inspection, the level of the impoundment level was slightly below the top of the stop logs at the spillway.

As noted during the inspection, the dam was found to have the following deficiencies:

1. Signification deterioration of the spillway system with the following noted:
 - a) Leakage through the stone masonry channel training walls with apparent subsidence of embankment soils behind the walls
 - b) Significant deterioration of the concrete portion of the channel training walls with apparent wall movement, significant deterioration of the timbers between wall sections, as well as noted erosion and potential sloughing of the embankment behind sections of the walls.
 - c) Potential bulge/movement of downstream portion of right stone masonry channel training wall.
 - d) Cracked mortar with slight stone separation at the ends of both of the mortared stone masonry upstream wing walls.
2. Irregular downstream boulder/stone wall with apparent failed/displaced sections
3. Unwanted vegetation in areas of the dam including:
 - a) Tree and brush growth along the downstream side and downstream area including large tree growth along the top of the downstream wall.
 - b) Weeds and brush along the upstream slope.
4. Areas of previously reported seepage along the downstream toe and within the downstream area (Majority of downstream area is soft and saturated with wetland vegetation).
5. Scarping along the waterline of the upstream slope.



Mr. Paul Marinelli

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August 29, 2019

6. Unknown ability to accommodate the spillway design flood (SDF)
7. Additional areas of deterioration and dam safety concerns.

It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future.

We trust that the attached Follow-up Inspection Form meets the requirements of the follow up inspection for the Danielson Mill Dam. Should you have any questions please feel free to contact me at 508.543.1755 or via email at aorsi@parecorp.com.

Sincerely,

PARE CORPORATION

Matthew Dunn, P.E.
Project Engineer

Allen R. Orsi, P.E.
Vice President

Attachment: Poor Condition Dam Follow-Up Inspection Form (with attachments)



Commonwealth of Massachusetts
Department of Conservation and Recreation
Office of Dam Safety Poor Condition Dam Follow-up Inspection Form

Dam Name: Danielson Mill Dam

Dam Owner: Town of Medfield

Nat. ID Number: MA03351

Hazard Potential: Significant (Class II)

Location of Dam (town): Medfield

Coordinate location (lat,long): 42.17054°N/71.29507°W

Date of Inspection: August 23, 2019

Weather: 70°F, Light Rain

Consultant Inspector(s): Pare Corporation, Matthew Dunn, P.E.

Others in Attendance at Field Inspection: None

Attachments: Figure 1: Locus Plan

Figure 2: Aerial Plan

Figure 3: Site Sketch

Photographs

Inspection Limitations

I. Previous Inspection date/Overall Condition:

- November 25, 2014 Phase I Inspection (Polaris Consultants, LLC) / Poor
- October 18, 2017 Poor Condition Follow-Up Inspection (Tighe & Bond, Inc) / Poor

II. Previous Inspection Deficiencies:

November 2014 Phase I:

- Trees along the downstream side with one uprooted tree.
- Downstream stone masonry wall failed in sections.
- Downstream spillway training walls had deflected slightly.
- Seepage/leakage through the spillway training walls.
- Erosion of the dam crest near the spillway
- Bare soil along the dam crest near the benches
- Beaver lodge on the right upstream slope
- Right downstream area saturated with two areas of seepage observed 20 feet downstream of the right embankment
- Unknown ability to accommodate the spillway design flood (SDF)
- No formal Operations and Maintenance Plan

October 2017 FUI:

- Small trees and brush growing on the upstream slope.
- Riprap slope protection along the upstream slope was sparse
- Small sinkhole at the right upstream spillway return wall
- Small sinkhole at the left downstream corner of the spillway bridge slab with apparent soil loss.
- Severe deterioration of the vertical timbers in the spillway training walls
- Dense brush growth along the downstream side, which prevent inspection of the seepage areas.



III. Overall Condition of Dam at the Time of the Current Follow-up Inspection:

- State the current condition:** Poor
- Have conditions changed since the previous inspection? Yes or No.** See list of deficiencies provided within cover letter.

IV. Comparison of Current Conditions to Condition Listed in Previous Phase I Inspection Report:

- Have any of the deficiencies listed in the previous Phase I Inspection Report worsened?** Yes
- If yes, list the changes.**
 - No significant changes; but continued deterioration.
 - See list of deficiencies provided within cover letter.
- Are there any additional deficiencies that have been identified in the current inspection?** No
- If yes, list the deficiencies and describe.** Not Applicable

V. Dam Safety Orders:

- Certificate of Non-Compliance and Dam Safety Order – November 9, 2015

VI. Maintenance:

- Indicate if there exists an operation and maintenance plan for the dam.** No formal operations and maintenance plan is known to exist.
- Indicate if it appears the dam is being maintained.** Per the 2014 Phase I Report, The Owner maintains vegetation along the crest and performs a general cleanup of the site including debris from the spillway. The Owner also performs routine inspections after significant rain events.

VII. Recommendations:

Based on the visual observations during this Follow-Up Inspection, Pare recommends the following be completed at the dam:

- Studies and Analyses**
 - Complete a hazard classification assessment to determine if the dam warrants reclassification to Low Hazard. (*In Progress*)
 - Complete an H&H analyses for the dam to assess its ability to accommodate the SDF. (*In Progress*)
 - Further evaluate the seepage and saturation along the downstream side of the dam.
 - Develop an Emergency Action Plan (EAP).
 - Prepare an Operations and Maintenance (O&M) Manual.
- Recurring Monitoring and Maintenance**
 - Perform routine monitoring and inspections to check for indications of increasing and/or new deficiencies at the dam. Continue the 6-month poor condition follow up inspections. Complete a Phase I Inspection on or before November 24, 2019 (5 years since previous Phase I Inspection).
 - Perform routine maintenance activities.



iii. Repairs

- a) Rehabilitate / reconstruct the spillway system to address the noted concerns.
- b) Remove the irregular downstream boulder wall and replace with an earthen slope.
- c) Clear and grub areas of unwanted vegetation. Fill resulting holes.
- d) Develop and install a seepage mitigation system at the dam to address the seepage concerns along the downstream side of the dam.
- e) Provide riprap slope protection along the upstream slope.

iv. Remedial Measures

- a) Based on the results of the H&H analyses the dam's hydraulic capacity may need to be increased to accommodate the SDF.

VIII. Other Comments or Observations:

- a. The following was noted along the spillway system:
 - i. The stepped concrete weir and timber stop log controls generally appeared to be in fair condition with no major deficiencies noted. The top stop log was partially displaced at the left end.
 - ii. Mortar cracking and potential stone displacement were noted at the left end of the left upstream wall and the right end of the right upstream wing wall.
 - iii. Leakage was observed through several joints of the stone masonry training walls of the spillway channel. The majority of the leakage was occurring within 5 feet of the weir with the highest leakage (estimated at 20-30 GPM) from one joint in the left wall located 3 feet downstream of the weir.
 - iv. Two small sinkholes were noted along the crest left of the spillway:
 - a) A 6-inch diameter by 6-inch deep hole at the corner between the upstream wing wall and channel training wall.
 - b) A 12-inch diameter by >12-inch deep hole 5 feet downstream of the wing wall and 3 feet left of the channel wall.
 - v. The channel right wall was noted to be bulging in towards the channel from 15-20 feet downstream of the weir, just upstream of the transition to the concrete walls.
 - vi. The concrete portion of the walls are significantly deteriorated with through cracking, apparent displacement, and undermined/missing bottom section of the walls. Potential embankment sliding was noted behind the right wall
 - vii. The vertical timbers located at the transition between the stone masonry and concrete training walls were deteriorated. Soil loss from apparent erosion was noted at the top of the walls at these locations.
 - viii. The bridge deck appeared okay with general weathering noted.
- b. Scarping (up to 12 inches deep) was noted along waterline of the upstream slope of the embankment right of the spillway. Tall weeds and developing brush vegetation was noted along the majority of the slope.
- c. The following was noted along the downstream side and downstream area:
 - i. Access/visibility of the area was limited due to dense tree and brush vegetation.
 - ii. The area of the previously reported seepage within the downstream area right of the spillway was not accessible. Wetland vegetated and soft saturated soils were noted throughout the downstream area both left and right of the spillway channel.
 - iii. Areas of failed/displaced sections of the irregular boulder/stone wall right of the spillway were noted.
 - iv. Iron oxide staining was noted on one boulder located along the left side of the downstream channel, approximately 10 feet downstream of the spillway channel.



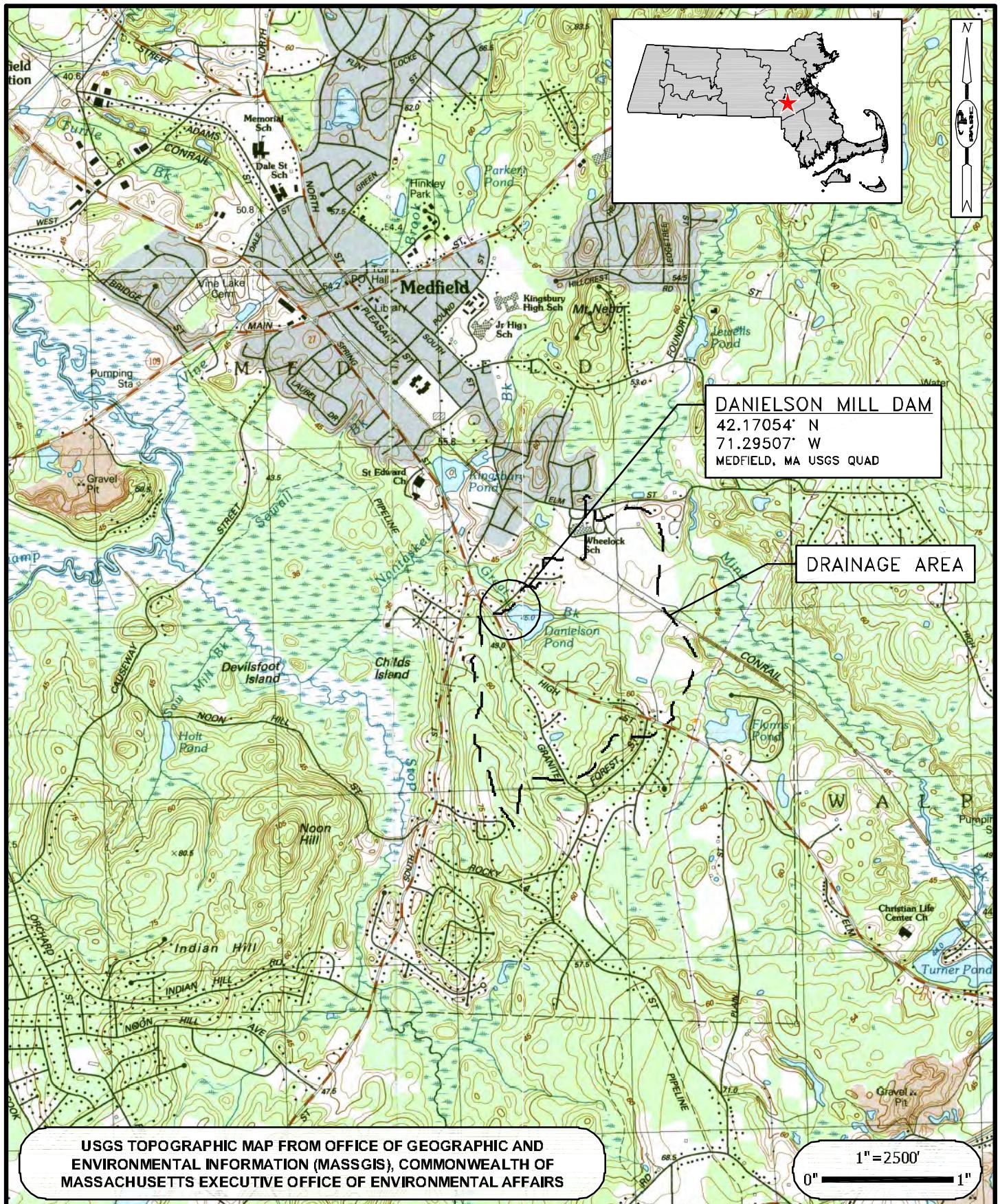
- d. The width of the spillway stop logs was measured at 4 feet. The top of the spillway training walls to the top of the concrete control weir was measured at 4 feet. 3 feet of stop logs were measured.
- e. The depth of the impoundment was measured at between 2 to 3 feet deep in the area immediately upstream of the spillway.
- f. The depth of the impoundment was measured at between 1 to 2 feet deep within 5 feet of the waterline along the upstream slope.

IX. Updated Site Sketch with Photo Locations: Attached

X. Updated Photos: Attached

XI. Copy of Locus Map from Phase I Report: Figure 1: Locus Plan attached

XII. Other applicable attachment: Figure 2: Aerial Plan, Inspection Limitations

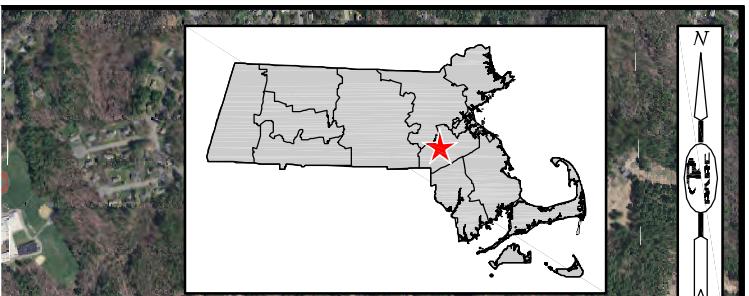


DANIELSON MILL DAM
MA03351
MEDFIELD, MASSACHUSETTS
OWNER : TOWN OF MEDFIELD

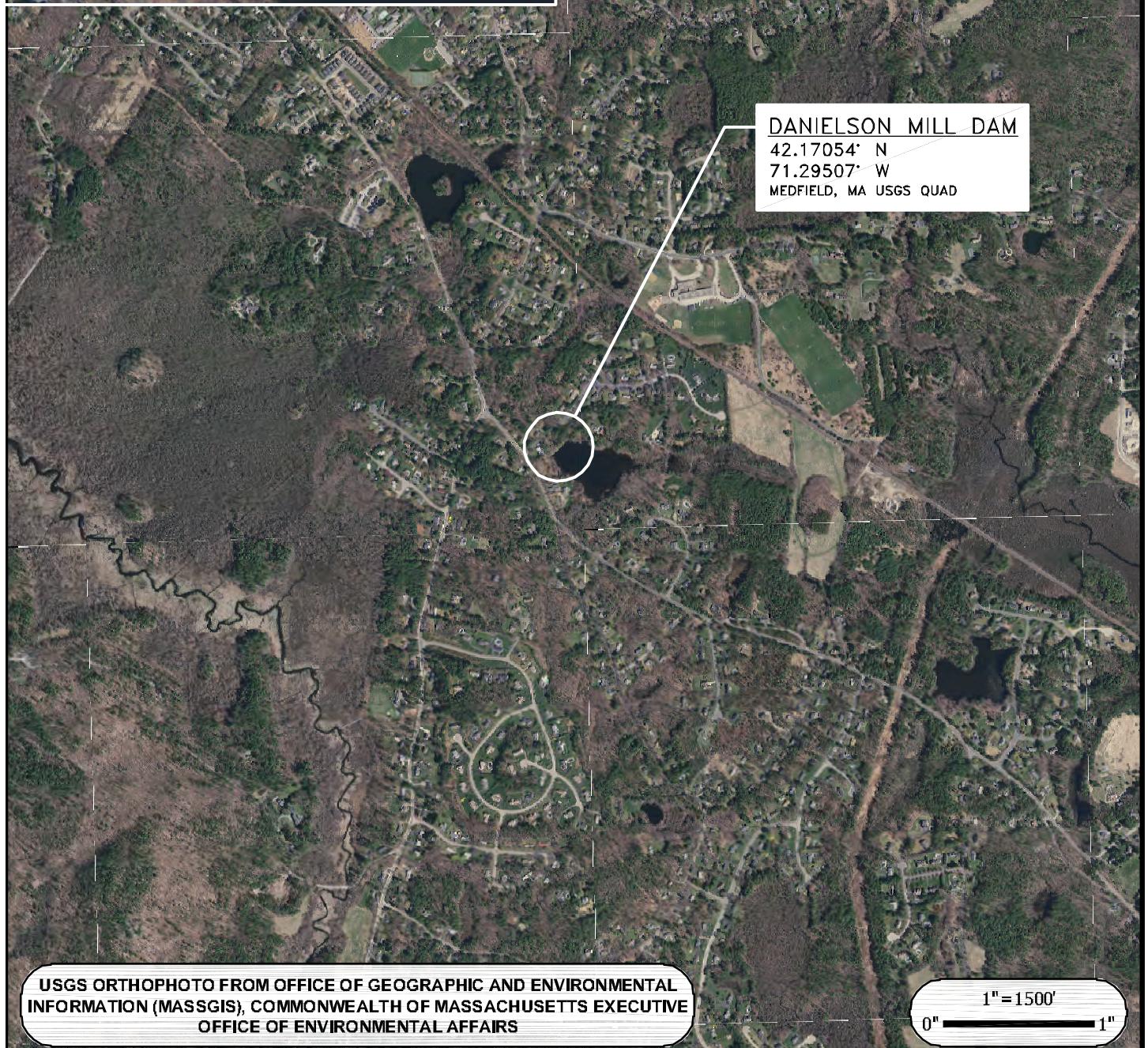
LOCUS PLAN

AUGUST 2019

FIGURE 1



DANIELSON MILL DAM
42.17054° N
71.29507° W
MEDFIELD, MA USGS QUAD



DANIELSON MILL DAM
MA03351
MEDFIELD, MASSACHUSETTS
OWNER : TOWN OF MEDFIELD

AERIAL PLAN

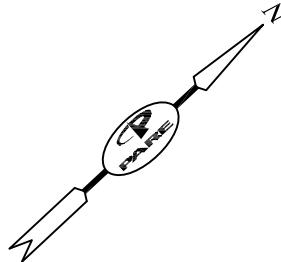
AUGUST 2019

FIGURE 2

NOTES AND LEGEND

1. PLAN DEVELOPED FROM NOTES TAKEN DURING THE CURRENT FOLLOW UP INSPECTION, PREVIOUS SITE SKETCHES FROM PREVIOUS INSPECTION REPORTS, AND AVAILABLE AERIAL IMAGERY FROM MASSGIS. INFORMATION IS PROVIDED FOR REFERENCE PURPOSES ONLY.

Ⓐ# DENOTES APPROXIMATE LOCATION AND DIRECTION OF PHOTOGRAPH.



23

HOMESTEAD DRIVE

48" RCP

24

WOODED WETLAND

WOODED WETLAND

REMNANTS OF FORMER TURBINE

CONCRETE TRAINING WALL

CONCRETE SLAB OVER SPILLWAY CHANNEL

IRREGULAR BOULDER WALL

IRREGULAR BOULDER WALL

CONCRETE TRAINING WALL

PATH FROM HIGH STREET

BOULDERS

GRANITE BLOCK UPSTREAM WING WALL

STONE MASONRY TRAINING WALL

SPILLWAY WITH 4' WIDE STOP LOG
BAY ATOP STEPPED CONCRETE WEIR

36" DIA. TREE

IRREGULAR BOULDER WALL

UNPROTECTED UPSTREAM SLOPE

DANIELSON POND

SITE SKETCH

SCALE: 1"=20'



PARE
PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
508-543-1755

SCALE ADJUSTMENT
GUIDE

0"

1"

BAR IS ONE INCH ON
ORIGINAL DRAWING.

DANIELSON MILL DAM

MA03351

MEDFIELD, MASSACHUSETTS

OWNER: TOWN OF MEDFIELD

REVISIONS:

PROJECT NO.: 19126.00
DATE: AUGUST 2019
SCALE: AS NOTED
DESIGNED BY: ARO
CHECKED BY: ARO
DRAWN BY: LMC
APPROVED BY: ARO

**SITE
SKETCH**

FIGURE NO.:

3



Photo No. 1: Impoundment from the spillway looking upstream.



Photo No. 2: Upstream side of the dam from the left abutment looking right.



Photo No. 3: Upstream side of the dam from the spillway looking left.



Photo No. 4: Upstream side of the dam from the spillway looking right.



Photo No. 5: Crest from the spillway looking left.



Photo No. 6: Crest from the spillway looking right.



Photo No. 7: Crest near the right abutment looking left. Note large diameter trees along the top of the downstream side of the dam.



Photo No. 8: Downstream side of the dam from the spillway looking left. Note large diameter trees and underbrush limiting the inspection in this area.



Photo No. 9: Iron oxide staining at toe of the downstream wall immediately left of the spillway downstream channel.



Photo No. 10: Downstream side of the dam from the spillway looking right. Note large diameter trees and thick underbrush that limited the inspection of this area.



Photo No. 11: Failed/failing sections of the irregular stone masonry wall along the downstream side of the dam right of the spillway. Typical several locations. Note soft and saturated ground surface with wetland vegetation within the downstream area.



Photo No. 12: Another view of the irregular stone masonry wall along the downstream side of the dam.



Photo No. 13: Approach and upstream wing/return walls of the spillway.



Photo No. 14: Spillway stops logs and stepped concrete invert.



Photo No. 15: Leakage from the left and right training walls of spillway channel. Note the highest area of leakage from the left wall approximated at 20-30 GPM.



Photo No. 16: 6-inch diameter by 6-inch deep potential subsidence behind the upstream end of the left training wall.



Photo No. 17: 12-inch diameter by 12-inch plus deep subsidence/sinkhole located 5 feet downstream and 3 feet left of the left training wall (Yellow Arrow).

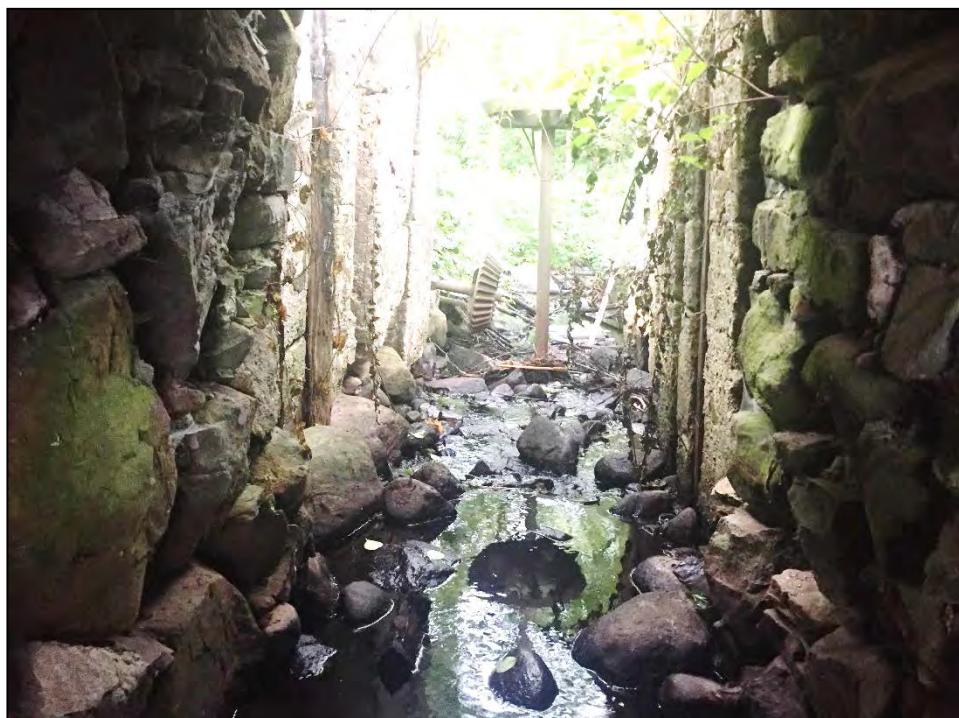


Photo No. 18: Spillway channel from 5 feet downstream of the spillway looking downstream. Note transition to concrete walls at approximately 20 feet downstream of the spillway controls.



Photo No. 19: Potential bulge in the downstream portion of the right training wall within 5 feet of the transition to the concrete wall.



Photo No. 20: Left concrete training wall. Note significant deterioration and apparent displacement of the wall. Right wall is similar



Photo No. 21: View of the erosion of the ground surface behind the left training wall at the transition between the stone masonry and concrete sections. Note deteriorated timber at transition.



Photo No. 22: Downstream channel from the end of the spillway channel looking downstream. Note the Homestead Drive roadway embankment located 150 feet downstream of the dam.



Photo No. 23: View of the dam from Homestead Drive looking upstream.



Photo No. 24: View of the 4-foot diameter RCP culvert that extends under Homestead Drive.



VISUAL DAM INSPECTION LIMITATIONS

Visual Inspection

1. The assessment of the general condition of the dam is based upon available data and abbreviated visual inspections completed as part of the follow up inspection. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.
2. In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, along with data available to the inspection team.
3. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.
4. It is critical to note that the condition of the dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Use of Report

1. The applicability of other environmental permits (ie., NOI, PGP, Water Quality Certificate, etc.) needs to be determined prior to undertaking maintenance activities that may occur within resource areas under the jurisdiction of MADEP, the local conservation commission or other regulatory agency.
2. This report has been prepared for the exclusive use of the Town of Medfield for specific application to the Danielson Mill Dam in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made.
3. This report has been prepared for this project by Pare. This report is for preliminary evaluation purposes only and is not necessarily sufficient to support design or repairs or recommendations or to prepare an accurate bid.