

**--WAITE POND DAM--**  
**PHASE I**  
INSPECTION / EVALUATION REPORT



Dam Name: **Waite Pond Dam**

State Dam ID#: **3-14-151-21**

NID ID#: **MA00987**

Owner: **Town of Leicester**

Owner Type: **Municipality**

Town: **Leicester**

Consultant: **Fuss & O'Neill, Inc.**

Date of Inspection: **August 8, 2012**





## EXECUTIVE SUMMARY

Waite Pond Dam is located in Leicester, MA. This dam was inspected on August 8, 2012 by Fuss & O'Neill, Inc. The structure is classified as an Intermediate size, Significant (Class II) hazard potential dam. The dam was found to be in **Poor** condition.

The deficiencies noted during this inspection are:

1. Deteriorating and undermined concrete training walls and embankment walls.
2. Upstream left embankment wall leaning toward impoundment.
3. Downstream right masonry embankment wall overhanging out of plumb and missing stones.
4. Downstream left masonry channel wall collapsing
5. Tree root penetration into embankment.
6. Subsidence/depressions in right crest of dam.
7. Low level outlet structure leaning out of plumb, concrete deteriorated, foundation undermined, no roof.
8. Low level outlet pipe operator inoperability unknown.
9. Low level outlet pipe 50 percent full of sediment.

The Town is initiating a Phase II Investigation for Waite Pond Dam, which will consist of survey, wetland delineation, drilling, performance of hydraulic and hydrologic analyses, and performance of stability analyses. Recommendations for dam repair and associated cost estimates for completing the repairs will be made as part of the Phase II Investigation.

## Dam Evaluation Summary Detail Sheet

1. NID ID: MA00987	4. Inspection Date: August 8, 2012
2. Dam Name: Waite Pond Dam	5. Last Insp. Date: March 10, 1998
3. Dam Location: Leicester, MA	6. Next Inspection: August 8, 2017
7. Inspector: Christopher J. Cullen, P.E.	
8. Consultant: Fuss & O'Neill, Inc.	
9. Hazard Code: Significant	9a. Is Hazard Code Change Requested?: No
10. Insp. Frequency: 5 Years	11. Overall Physical Condition of Dam: POOR
12. Spillway Capacity (% SDF) >100% SDF w/ no actions by Caretaker	
E1. Design Methodology: 1	E7. Low-Level Discharge Capacity: 2
E2. Level of Maintenance: 2	E8. Low-Level Outlet Physical Condition: 2
E3. Emergency Action Plan: 1	E9. Spillway Design Flood Capacity: 5
E4. Embankment Seepage: 5	E10. Overall Physical Condition of the Dam: 2
E5. Embankment Condition: 3	E11. Estimated Repair Cost: NA
E6. Concrete Condition: 1	

### Evaluation Description

**E1: DESIGN METHODOLOGY**

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

**E2: LEVEL OF MAINTENANCE**

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

**E3: EMERGENCY ACTION PLAN**

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

**E4: SEEPAGE (Embankments, Foundations, & Abutments)**

1. Severe piping and/or seepage with no monitoring
2. Evidence of monitored piping and seepage
3. No piping but uncontrolled seepage
4. Minor seepage or high volumes of seepage with filtered collection
5. No seepage or minor seepage with filtered collection

**E5: EMBANKMENT CONDITION (See Note 1)**

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

**E6: CONCRETE CONDITION (See Note 2)**

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

**E7: LOW-LEVEL OUTLET DISCHARGE CAPACITY**

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

**E8: LOW-LEVEL OUTLET PHYSICAL CONDITION**

1. Outlet inoperative needs replacement, non-existent or inaccessible
2. Outlet inoperative needs repair
3. Outlet operable but needs repair
4. Outlet operable but needs maintenance
5. Outlet and operator operable and well maintained

**E9: SPILLWAY DESIGN FLOOD CAPACITY**

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

**E10: OVERALL PHYSICAL CONDITION OF DAM**

1. UNSAFE – Major structural, operational, and maintenance deficiencies exist under normal operating conditions
2. POOR - Significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions
3. FAIR - Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters
4. SATISFACTORY - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.
5. GOOD - No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF

**E11: ESTIMATED REPAIR COST**

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

### Changes/Deviations to Database Information since Last Inspection



## PREFACE

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

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

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

*Licensed Professional's Signature*

Christopher J. Cullen, P.E.  
Massachusetts License No.: 47018  
License Type: Civil

Project Manager  
Fuss & O'Neill, Inc.



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**END OF REPORT**

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## SECTION 1

### 1.0 DESCRIPTION OF PROJECT

#### 1.1 General

##### 1.1.1 Authority

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

##### 1.1.2 Purpose of Work

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

The investigation 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 classification; and 5) miscellaneous.

#### 1.2 Description of Project

##### 1.2.1 Location

The dam is located on Chapel Road north of the center Leicester, approximately 50 feet north of Waite Street. The dam location is latitude 42.2490 degrees and 71.8871 degrees longitude (WGS84). From the center of Leicester, travel west on Route 9 for 0.8 miles. Turn left onto Waite Street and continue for 0.5 miles to the end. Turn left onto Chapel Street. The dam is 200 feet on the left. A locus map is provided as Figure 1.



### 1.2.2 Owner/Caretaker

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

### 1.2.3 Purpose of the Dam

The purpose of the dam is for recreation. Presumably, the dam was originally constructed to power a small mill, of which there are no longer any traces.

### 1.2.4 Description of the Dam and Appurtenances

The dam consists of an earth core with upstream and downstream masonry walls. The structural height is 11 feet, and the hydraulic height at normal pool is 8 feet. The spillway is a concrete broad crested weir structure with 2 feet of wood weir boards supported by steel dowels. The spillway is 41 feet long and 5 feet high from the concrete spillway invert (3 feet from the top of the sharp-crested weir boards) to the dam crest. There is a 24-inch diameter CMP low level outlet with a slide gate located in a circular, roofless masonry structure approximately 10 feet from the upstream edge of the spillway. The outlet pipe exits to the stream at the base of the stilling basin approximately 10 feet downstream of the spillway. The upstream face of the dam consists of deteriorating concrete walls. The downstream right face of the dam consists of a vertical dry-laid masonry wall. The downstream left embankment consists of a relatively flat earthen area used for parking, supported along the stream by a vertical masonry wall that has partially collapsed. The left dam crest is isolated from the parking area by a timber post and rail fence.

### 1.2.5 Operations and Maintenance

Operation and maintenance of the dam is the responsibility of the Town of Leicester. Flow can be controlled through placement and removal of the weir boards, which are always left in place. The low level outlet was partially flowing during our inspection, but the gate operators are not used. Normal pool of the pond is maintained by leaving the weir boards in place. The crest vegetation is periodically mowed by the Town, and some tree cutting has been performed to keep the dam clear.

### 1.2.6 DCR Size Classification

Waite Pond Dam has a maximum structural height of approximately 14 feet and a maximum storage capacity of approximately 350 acre-feet. Therefore, in accordance with Department of Conservation and Recreation Office of Dam Safety classification, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Waite Pond Dam is an **Intermediate** size structure.

### 1.2.7 DCR Hazard Classification

Waite Pond is located approximately 200 feet upstream of Chapel Street, a secondary road. The stream passes under Waite Street through a box culvert, and again under Chapel Street approximately 2,000 feet down gradient before entering City Pond. It appears that a failure of the dam at maximum pool may cause damage to the road it supports and secondary highway(s).





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

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The drainage area for Waite Pond is approximately 4.92 square miles and extends through the Town of Leicester. The drainage area was determined using the USGS StreamStats software for Massachusetts.

1.3.2 Reservoir

See data below for normal, maximum, and spillway design flood (SDF) pools. These data were calculated based on USGS topographic mapping.

1.3.3 Discharges at the Dam Site

There are no formal records of historic flow volumes at the dam site.

1.3.4 General Elevations (feet):

Elevations are based on USGS Topographic mapping. The spillway concrete invert was estimated to be at elevation 821.9.

A.	Top of Dam	826.9
B.	Spillway Design Flood Pool	Unknown
C.	Normal Pool (with weir boards)	823.9
D.	Spillway Crest (without weir boards)	821.9
E.	Top of Stop Logs	823.9
F.	Upstream Water at Time of Inspection	821.9
G.	Streambed at Toe of the Dam	816.0
H.	Low Point along Toe of the Dam	816.0

1.3.5 Main Spillway

A.	Type	Concrete with weir boards
B.	Length	41 feet
C.	Invert Elevation	823.9
D.	Upstream Channel	NA
E.	Downstream Channel	816.0
F.	Downstream Water	816.5

1.3.6 Additional Information and Elevations

A.	Low level outlet pipe invert	816.0
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### 1.3.7 Design and Construction Records

MADCR dam records indicate the dam was constructed in 1898. No design or construction records were available.

### 1.3.8 Operating Records

There are no operating records available at this date for Waite Pond Dam.

## 1.4 Summary Data Table

## 1.1 Summary Data Table

Required Phase I Report Data	Data Provided by the Inspecting Engineer
National ID #	MA00987
Dam Name	Waite Pond Dam
Dam Name (Alternate)	
River Name	Kettle Brook
Impoundment Name	Waite Pond
Hazard Class	Significant
Size Class	Intermediate
Dam Type	Earth/ masonry composite
Dam Purpose	Recreation
Structural Height of Dam (feet)	11
Hydraulic Height of Dam (feet)	8
Drainage Area (sq. mi.)	4.92
Reservoir Surface Area (sq. mi.)	0.0125
Normal Impoundment Volume (acre-feet)	230
Max Impoundment Volume ((top of dam) acre-feet)	350
SDF Impoundment Volume* (acre-feet)	NO H&H
Spillway Type	Broad crest concrete weir with wood weir boards
Spillway Length (feet)	41
Freeboard at Normal Pool (feet)	3
Principal Spillway Capacity* (cfs)	709
Auxiliary Spillway Capacity* (cfs)	NA
Low-Level Outlet Capacity* (cfs)	0
Spillway Design Flood* (flow rate - cfs)	100 yr./343
Winter Drawdown (feet below normal pool)	N/A
Drawdown Impoundment Vol. (acre-feet)	N/A
Latitude	42.249
Longitude	-71.88708
City/Town	Leicester
County Name	Worcester
Public Road on Crest	No
Public Bridge over Spillway	No
EAP Date (if applicable)	NA
Owner Name	Town of Leicester
Owner Address	3 Washburn Square
Owner Town	Leicester, MA 01524-1333
Owner Phone	(508) 892-7000
Owner Emergency Phone	(508) 892-7000
Owner Type	Municipality or Political subdivision
Caretaker Name	Town of Leicester
Caretaker Address	3 Washburn Square
Caretaker Town	Leicester, MA 01524-1333
Caretaker Phone	(508) 892-7000
Caretaker Emergency Phone	(508) 892-7000
Date of Field Inspection	8/8/2012
Consultant Firm Name	Fuss & O'Neill, Inc.
Inspecting Engineer	Christopher J. Cullen, P.E.
Engineer Phone Number	800-286-2469

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



## SECTION 2

### 2.0 INSPECTION

#### 2.1 Visual Inspection

Waite Pond Dam was inspected on August 8, 2012. At the time of the inspection, the weather was clear with temperatures in the 80s. No significant storm event occurred immediately prior to our inspection. Flow at the time of our inspection appeared to relatively low flow conditions. Flow was limited to leakage through the weir boards at the base of the concrete portion of the spillway. Photographs to document the current conditions of the dam were taken during the inspection and are included in Appendix A. The elevation of the impoundment was approximately two feet lower than the normal pool elevation, barely seeping over the concrete spillway. Underwater areas were not inspected. A copy of the inspection checklist is included in Appendix B.

##### 2.1.1 General Findings

In general, Waite Pond Dam was found to be in Poor condition with several deficiencies noted. The specific concerns are identified in more detail in the sections below:

##### 2.1.2 Dam

- **Abutments** Abutments to the dam appeared to be in good condition and in good contact with the earthen and stone portions of the dam.
- **Upstream Face** Severe erosion, cracking and undermining of the concrete covered masonry walls were observed. (See Photos 21 and 23)
- **Crest** The crest of the dam consists of vegetated earth. Depressions were observed on the right crest. Sparse vegetation and tree root encroachment were observed on the left crest. (See Photo 20 )
- **Downstream Face** The right downstream face consists of vertical dry-laid stone masonry wall. The wall appeared to be slightly overhanging and some stones appeared to be missing. The left downstream area consists of a gravel parking area supported by a vertical masonry wall parallel to the brook channel. The wall has partially collapsed. (See Photo 22)
- **Drains** No drains were observed.
- **Instrumentation** There is no permanent instrumentation at the dam.
- **Access Roads and Gates** Access to the dam is possible from the parking area on the downstream left side, and from private residences on the right side. There are no gates.

##### 2.1.3 Appurtenant Structures

- Primary Spillway

The spillway consists of a concrete slab with 2 feet of wooden weir boards. The side walls of the spillway are cracked and eroded. The stilling basin consists of stone rubble covered with concrete that spills overflow to the channel below. The concrete



is breaking into fragments but seems to be functioning satisfactorily. (See Photo 14) Weir boards were in place during our inspection and appeared to be in satisfactory condition, with minor leakage through the boards. (See Photo 13)

- Low Level Outlet

The 24-inch CMP low level outlet was rusted and appeared to be approximately 1/2 full of sediment, but was flowing (See Photo 18). The operator is located in a circular structure in the impoundment. There is currently no access to the structure except by wading or boat. There is no roof on the structure, which is leaning over (See Photo 16). The concrete foundation is severely eroded. It is not known if the gate operator is functional.

- Auxiliary/Emergency Spillway

There is no emergency spillway associated with this dam.

- Dikes

There are no dikes associated with this dam.

#### 2.1.4 Downstream Area

The downstream area is wooded. The stream channel consists of boulders, cobbles and gravel. The left channel embankment consists of a vertical stone masonry wall extending approximately 70 feet downstream from the dam, and has partially collapsed. Approximately 200 feet downstream, the stream passes beneath Chapel Street through a concrete box culvert.

#### 2.1.5 Reservoir Area

The impoundment is approximately 1,700 feet long by 1,500 feet wide. The impoundment is bounded by residential development and wooded areas. Reservoir slopes appeared to be stable. (See Photo 19)

### 2.2 Caretaker Interview

The Town of Leicester is responsible for maintenance of Waite Pond Dam, although there are volunteers from the residences on the pond that contribute to maintenance of the dam. The dam is inspected as needed and following storms. According to Mr. Robert Reed, Town Administrator, debris is removed from the dam spillway on an as-needed basis and the weir boards replaced as needed.

### 2.3 Operation and Maintenance Procedures

There is no Operation & Maintenance (O&M) manual for this dam. An Operating Plan was prepared by the Waite Pond Association in 2010 outlining future steps to be taken to rehabilitate the dam.



### 2.3.1 Operational Procedures

Operation of the dam is limited to making sure weir boards are in place to maintain the pond water level. Normal operation of the dam includes leaving all the stop logs installed.

### 2.3.2 Maintenance of Dam and Operating Facilities

Maintenance of the dam consists of occasional mowing and replacement of weir boards when needed. Some tree clearing has been performed in the past to keep the dam crest clear of woody vegetation.

### 2.4 Emergency Warning System

There is no Emergency Action Plan for this dam.

### 2.5 Hydrologic/Hydraulic Data

Hydrologic/Hydraulic analyses were found during our file review in a 1986 dam inspection report. According to the 1986 report, the peak discharge capacity of the 41-foot by 3-foot sharp crest spillway is approximately 709 cfs with the weir boards in place.

A. Spillway Design Flood (SDF) Return Period	100 years
B. SDF Inflow (CFS)	343 cfs
C. SDF Outflow (CFS)	343 cfs
D. Spillway Capacity (CFS) (with weir boards installed)	709 cfs
E. Depth of Overtopping (FT) (with weir boards installed)	none

### 2.6 Structural and Seepage Stability

#### 2.6.1 Embankment Structural Stability

The embankments are not in danger of immediate collapse, but the upstream and downstream walls all show signs of movement. It is not clear what has caused the movement, but scour and undermining, combined with frost action are likely.

#### 2.6.2 Structural Stability of Non-Embankment Structures

Non-embankment structures include the circular low level outlet gate structure. The structure's concrete base is severely eroded and the structure is no longer plumb, possibly due to scour action.

#### 2.6.3 Seepage Stability

No visual evidence of seepage was observed. No evidence of erosion or piping was observed.



## SECTION 3

### 3.0 ASSESSMENTS AND RECOMMENDATIONS

#### 3.1 Assessments

In general, the overall condition of Waite Pond Dam is Poor. The dam was found to have structural deficiencies during our August 8, 2012 inspection. The dam was found to have the following deficiencies:

1. Deteriorating and undermined concrete training walls and embankment walls.
2. Upstream left embankment wall leaning toward impoundment.
3. Downstream right masonry embankment wall overhanging out of plumb and missing stones.
4. Downstream left masonry channel wall collapsing
5. Tree root penetration into embankment.
6. Subsidence/depressions in right crest of dam.
7. Low level outlet structure leaning out of plumb, concrete deteriorated, foundation undermined, no roof.
8. Low level outlet pipe operator inoperability unknown.
9. Low level outlet pipe 50 percent full of sediment.

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

#### 3.2 Studies and Analyses

The Town has been ordered to perform a Phase II Dam Investigation, which will include hydraulic, hydrologic and stability analyses.

#### 3.3 Recurrent Maintenance Recommendations

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

Regularly remove small diameter (<6 inches) trees, brush, and woody vegetation from the dam embankment and within 20 feet of the downstream toe.

Monitor and repair as needed minor erosion, fill animal burrows, and remove woody vegetation growth.



### 3.4 Minor Repair Recommendations

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

- Clear large trees from the dam for a distance of 20 feet beyond the toe and abutments of the dam. The Conservation Commission should be consulted regarding the need for a permit to cut trees near the dam, and Part A of the Dam Safety Permit Application form should be completed and submitted to the MADCR.

### 3.5 Remedial Modifications Recommendations

Remedial modifications are those that alter the current configuration or design of the dam that are necessary to meet stability, seepage or safety concerns as well as comply with current state requirements. These recommendations will require design by a professional engineer and construction by a contractor experienced in dam repair. A Chapter 253 permit will likely be required.

No remedial recommendations are being made at this time. As part of the Phase II Investigation, remedial measures and options for dam repair will be recommended.

### 3.6 Alternatives

No alternatives are presented based upon the condition and current use of the pond and dam.

### 3.7 Opinion of Probable Construction Costs

The Phase II Investigation will include construction cost estimates for various repair options for the dam.

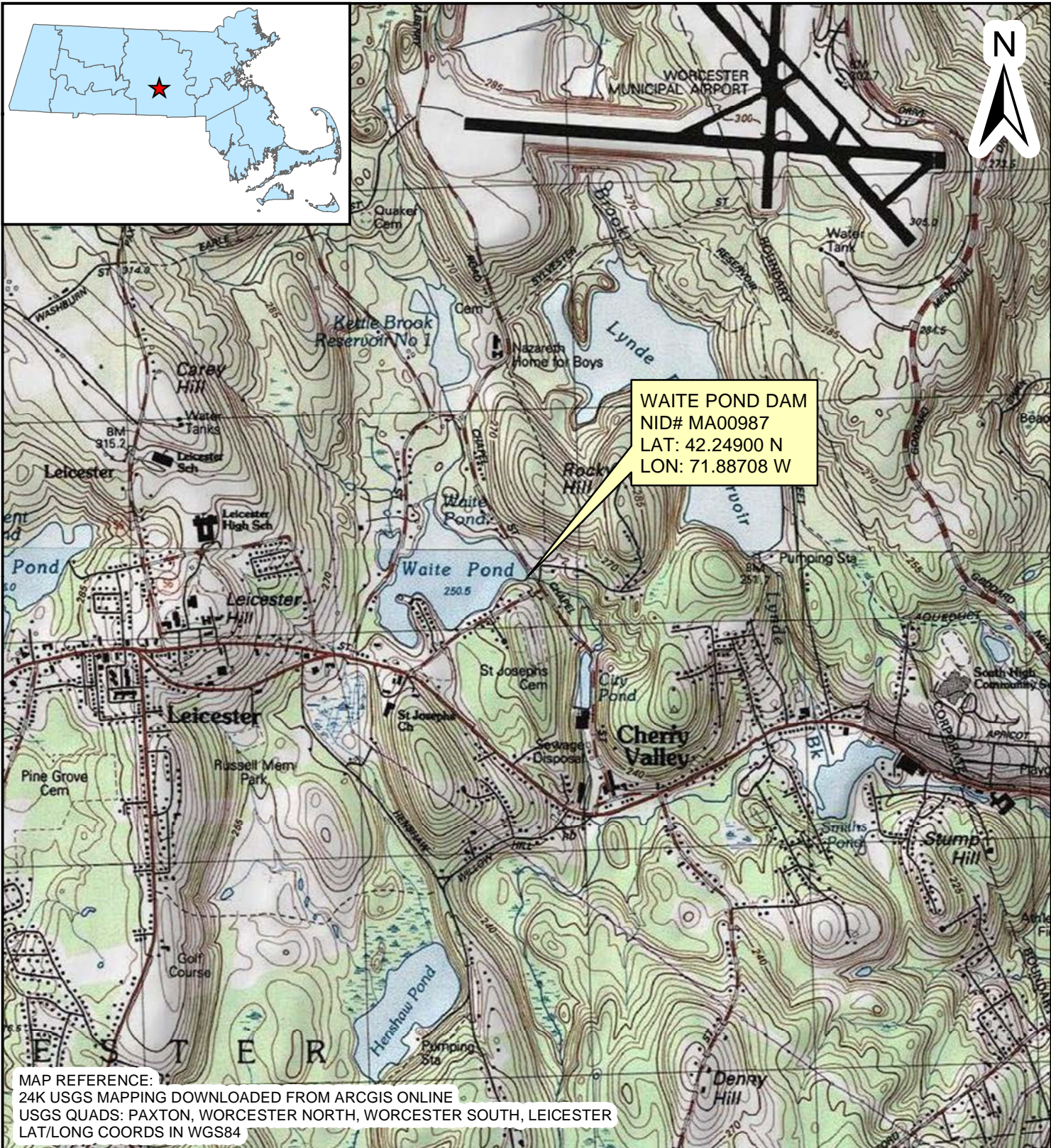
Prior to commencing construction of repairs or maintenance activity, the owner/caretaker should contact the Office of Dam Safety and the local Conservation Commission to determine whether a permit is required. Consultation with a professional engineer familiar with the dam safety regulatory process is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





## FIGURES

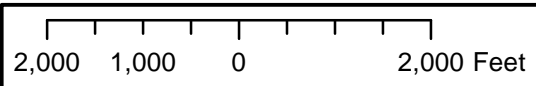
- |                  |                                |
|------------------|--------------------------------|
| <b>Figure 1:</b> | <b>Locus Plan</b>              |
| <b>Figure 2:</b> | <b>Aerial Photograph</b>       |
| <b>Figure 3:</b> | <b>Drainage Area</b>           |
| <b>Figure 4:</b> | <b>Dam and Downstream Area</b> |
| <b>Figure 5:</b> | <b>Site Sketch</b>             |



MAP REFERENCE:  
 24K USGS MAPPING DOWNLOADED FROM ARCGIS ONLINE  
 USGS QUADS: PAXTON, WORCESTER NORTH, WORCESTER SOUTH, LEICESTER  
 LAT/LONG COORDS IN WGS84

AUGUST 2012

FIGURE 1



TOWN OF LEICESTER

**LOCUS MAP**

WAITE POND DAM (MA00987)

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



LEICESTER, MASSACHUSETTS



WAITE POND DAM  
NID# MA00987  
LAT: 42.24900 N  
LON: 71.88708 W

MAP REFERENCE:  
2005 AERIAL DOWNLOADED FROM MASSGIS  
TILES: 169886  
LAT/LONG COORDS IN WGS84

AUGUST 2012

FIGURE 2

TOWN OF LEICESTER

200 100 0 200 Feet

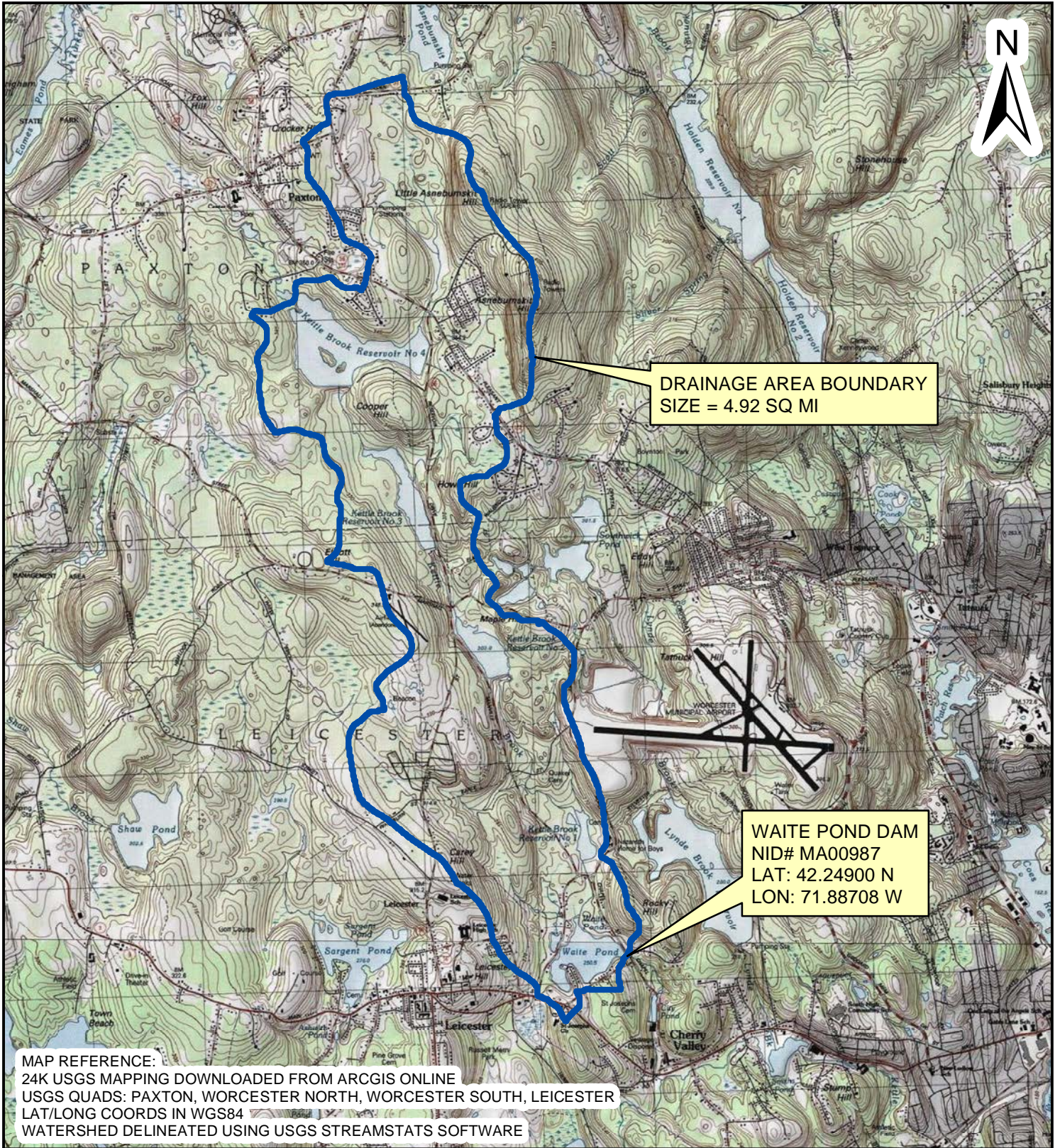
SCALE  
HORZ: 1 INCH = 200 FEET  
VERT:  
DATUM  
HORZ:  
VERT:



# AERIAL PHOTOGRAPH

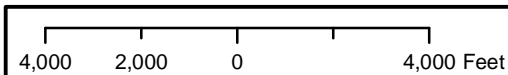
WAITE POND DAM (MA00987)

LEICESTER, MASSACHUSETTS



AUGUST 2012

FIGURE 3



TOWN OF LEICESTER

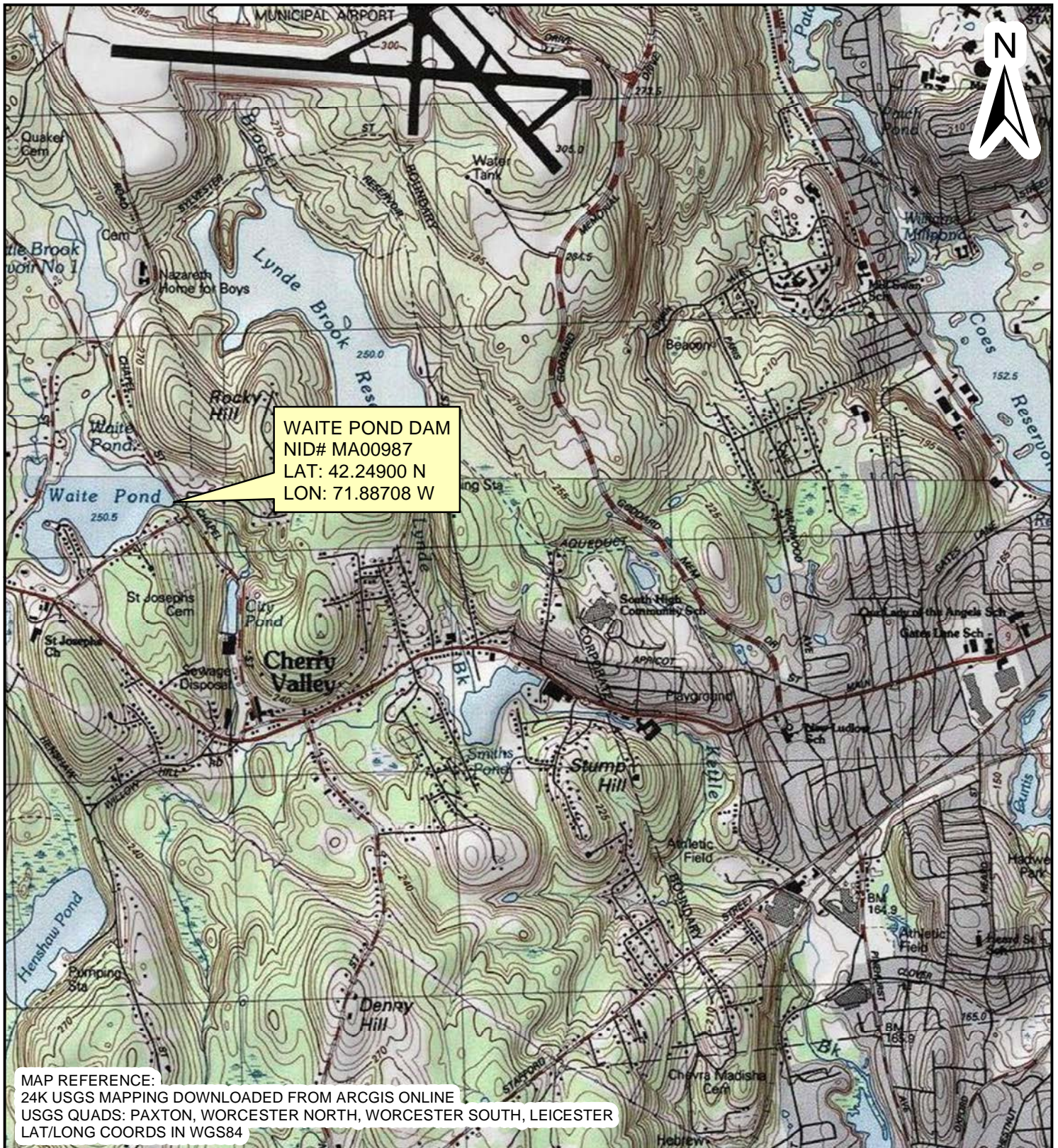
SCALE  
HORZ: 1 INCH = 4,000 FEET  
VERT:  
DATUM  
HORZ:  
VERT: NGVD29 (3-METER CONTOURS)



## DRAINAGE AREA

WAITE POND DAM (MA00987)

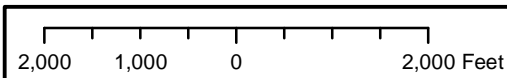
LEICESTER, MASSACHUSETTS



MAP REFERENCE:  
 24K USGS MAPPING DOWNLOADED FROM ARCGIS ONLINE  
 USGS QUADS: PAXTON, WORCESTER NORTH, WORCESTER SOUTH, LEICESTER  
 LAT/LONG COORDS IN WGS84

AUGUST 2012

FIGURE 4



TOWN OF LEICESTER

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



## DOWNSTREAM AREA

WAITE POND DAM (MA00987)

LEICESTER, MASSACHUSETTS



**FUSS & O'NEILL**  
Disciplines to Deliver

PREPARED BY  
CJC

DATE  
8/7/12

CHECKED BY

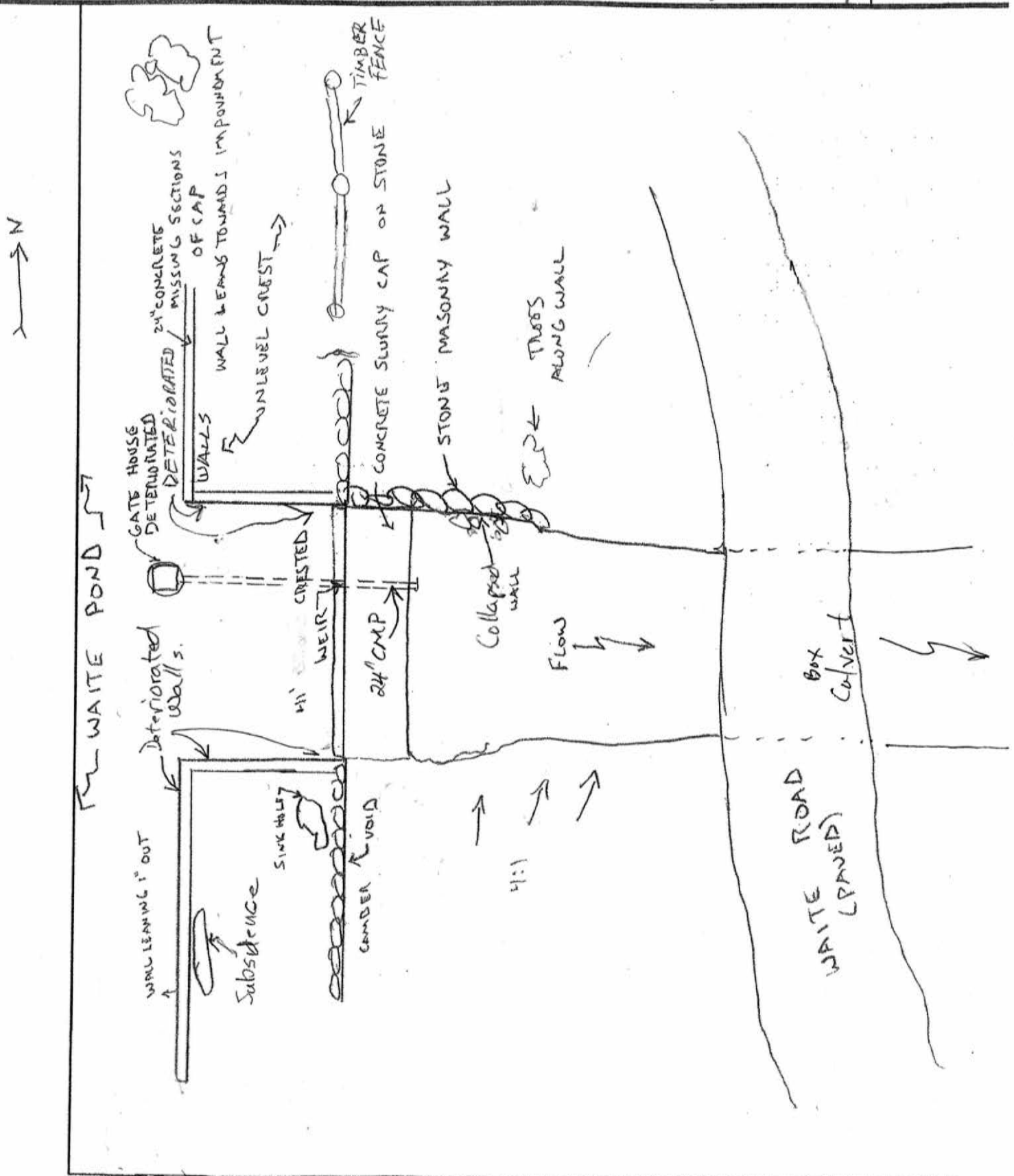
DATE

PROJECT NO.

20081286  
A50

SHEET NO.  
1 of 1

WAITE POND - FIELD SKETCH-MA00987





## APPENDIX A

### Photographs



FUSS & O'NEILL  
Disciplines to Deliver

PREPARED BY  
CJC

DATE  
8/7/12

CHECKED BY

DATE

PROJECT NO.  
20081286  
A50

SHEET NO.  
1 of 1

WAITE POND - FIELD SKETCH-MA00987

Photo Locations

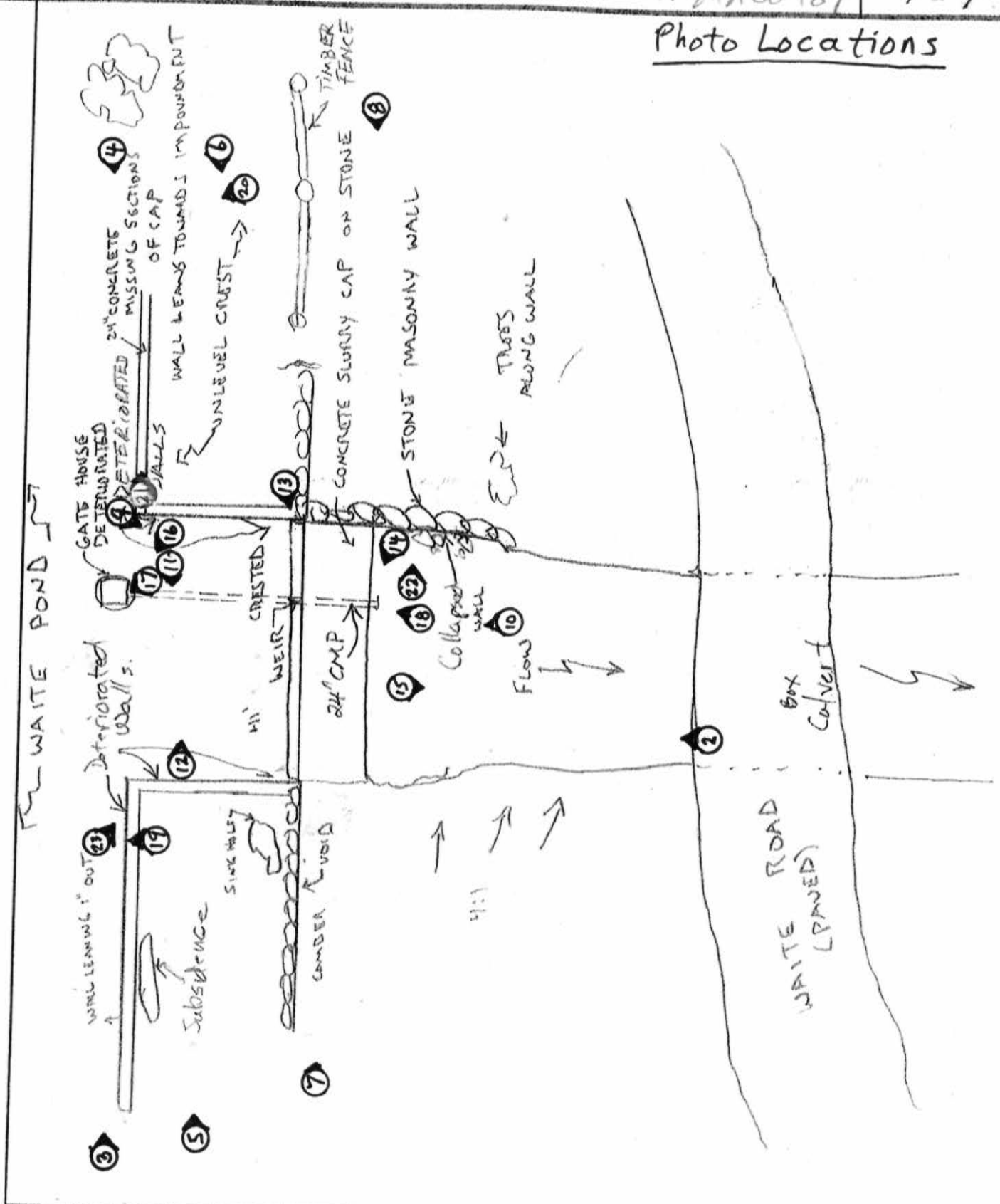






Photo 1: Overview of dam from upstream



Photo 2: Overview of dam from downstream



Photo 3: Overview of upstream face from right abutment



Photo 4: Overview of upstream face from left abutment



Photo 5: Overview of dam crest from right abutment



Photo 6: Overview of dam crest from left abutment



Photo 7: Overview of downstream face from right abutment



Photo 8: Overview of downstream face from left abutment



Photo 9: Overview of spillway from upstream



Photo 10: Overview of spillway from downstream (tailrace or channel area)



Photo 11: Overview of right training wall



Photo 12: Overview of left training wall



Photo 13: Overview of weir



Photo 14: Overview of stilling basin

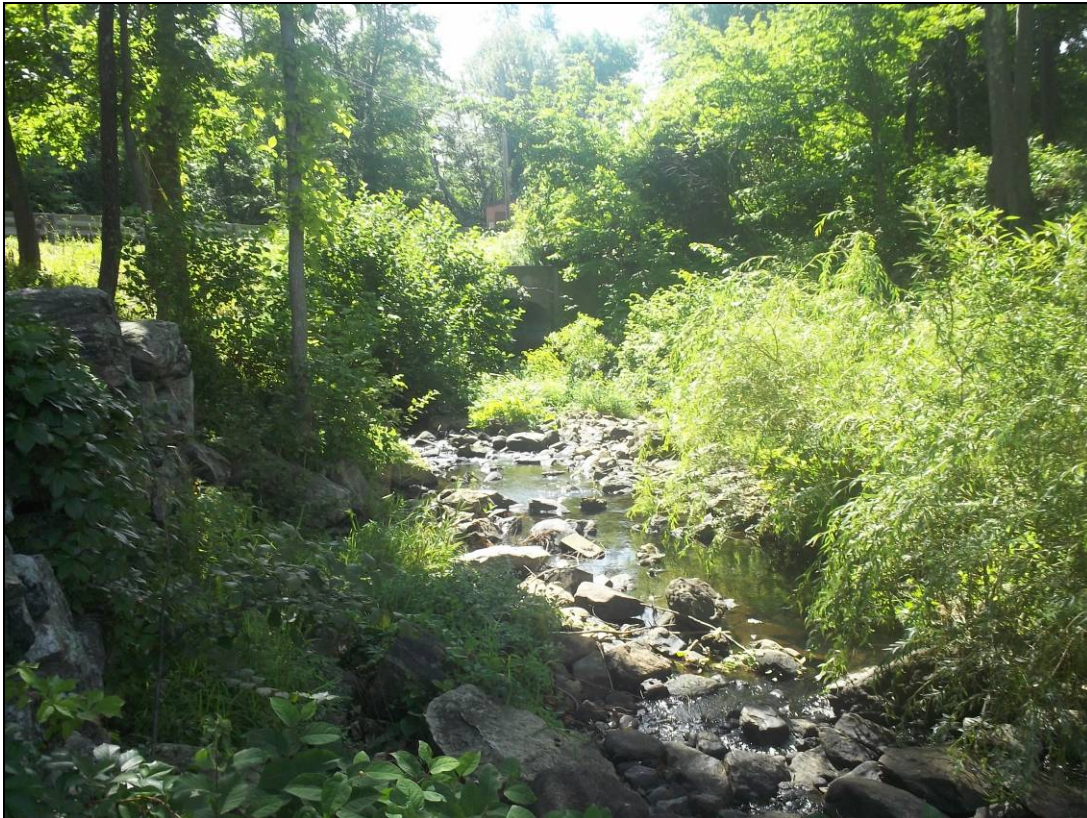


Photo 15: Overview of downstream channel





Photo 16: Overview of gatehouse exterior



Photo 17: Overview of gatehouse interior & operator



Photo 18: Low level outlet – 24” CMP



Photo 19: Overview of reservoir



Photo 20: Areas of specific deficiencies-tree roots, sparse vegetative cover



Photo 21: Areas of specific deficiencies-deteriorating concrete, leaning wall



Photo 22: Areas of specific deficiencies-collapsed masonry wall



Photo 23: Areas of specific deficiencies-undermined cracked wall

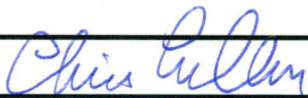


## **APPENDIX B**

### **Inspection Checklist**

### DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: <u>Waite Pond Dam</u>	STATE ID #: <u>3-14-151-21</u>
REGISTERED: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	NID ID #: <u>MA00987</u>
STATE SIZE CLASSIFICATION: <u>Intermediate</u>	STATE HAZARD CLASSIFICATION: <u>Significant</u>
	CHANGE IN HAZARD CLASSIFICATION REQUESTED?: <u>No</u>
<b><u>DAM LOCATION INFORMATION</u></b>	
CITY/TOWN: <u>Leicester</u>	COUNTY: <u>Worcester</u>
DAM LOCATION: <u>West of Chapel/Waite St. intersection</u> (street address if known)	ALTERNATE DAM NAME: _____
USGS QUAD.: <u>Paxton and Leicester</u>	LAT.: <u>42.24900</u> LONG.: <u>-71.88708</u>
DRAINAGE BASIN: <u>Blackstone</u>	RIVER: <u>Kettle Brook</u>
IMPOUNDMENT NAME(S): <u>Waite Pond</u>	
<b><u>GENERAL DAM INFORMATION</u></b>	
TYPE OF DAM: <u>Earth/ masonry composite</u>	OVERALL LENGTH (FT): <u>118</u>
PURPOSE OF DAM: <u>Recreation</u>	NORMAL POOL STORAGE (ACRE-FT): <u>230</u>
YEAR BUILT: <u>1898</u>	MAXIMUM POOL STORAGE (ACRE-FT): <u>350</u>
STRUCTURAL HEIGHT (FT): <u>11</u>	EL. NORMAL POOL (FT): <u>823.9</u>
HYDRAULIC HEIGHT (FT): <u>8</u>	EL. MAXIMUM POOL (FT): <u>826.9</u>
<b><u>FOR INTERNAL MADCR USE ONLY</u></b>	
FOLLOW-UP INSPECTION REQUIRED: <input type="checkbox"/> YES <input type="checkbox"/> NO	CONDITIONAL LETTER: <input type="checkbox"/> YES <input type="checkbox"/> NO

NAME OF DAM: <u>Waite Pond Dam</u>		STATE ID #: <u>3-14-151-21</u>	
INSPECTION DATE: <u>August 8, 2012</u>		NID ID #: <u>MA00987</u>	
<u>INSPECTION SUMMARY</u>			
DATE OF INSPECTION: <u>August 8, 2012</u>	DATE OF PREVIOUS INSPECTION: <u>March 10, 1998</u>		
TEMPERATURE/WEATHER: <u>Sunny 84°F</u>	ARMY CORPS PHASE I: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	If YES, date _____	
CONSULTANT: <u>Fuss &amp; O'Neill, Inc.</u>	PREVIOUS DCR PHASE I: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	If YES, date <u>March 10, 1998</u>	
BENCHMARK/DATUM: <u>NGVD27</u>			
OVERALL PHYSICAL CONDITION OF DAM: <u>POOR</u>	DATE OF LAST REHABILITATION: <u>1986</u>		
SPILLWAY CAPACITY: <u>&gt;100% SDF w/ no actions by Caretaker</u>			
EL. POOL DURING INSP.: <u>821.9</u>	EL. TAILWATER DURING INSP.: <u>816.5</u>		
<u>PERSONS PRESENT AT INSPECTION</u>			
<u>NAME</u>	<u>TITLE/POSITION</u>	<u>REPRESENTING</u>	
<u>Christopher J. Cullen, P.E.</u>	<u>Project Manager</u>	<u>Fuss &amp; O'Neill, Inc.</u>	
<u>EVALUATION INFORMATION</u>			
E1) TYPE OF DESIGN	Click on box to select E-code <input type="text" value="1"/>	E8) LOW-LEVEL OUTLET CONDITION	Click on box to select E-code <input type="text" value="2"/>
E2) LEVEL OF MAINTENANCE	<input type="text" value="2"/>	E9) SPILLWAY DESIGN FLOOD CAPACITY	<input type="text" value="5"/>
E3) EMERGENCY ACTION PLAN	<input type="text" value="1"/>	E10) OVERALL PHYSICAL CONDITION	<input type="text" value="2"/>
E4) EMBANKMENT SEEPAGE	<input type="text" value="5"/>	E11) ESTIMATED REPAIR COST	<input type="text" value="NA"/>
E5) EMBANKMENT CONDITION	<input type="text" value="3"/>	ROADWAY OVER CREST	<input type="text"/>
E6) CONCRETE CONDITION	<input type="text" value="1"/>	BRIDGE NEAR DAM	<input type="text"/>
E7) LOW-LEVEL OUTLET CAPACITY	<input type="text" value="2"/>		
NAME OF INSPECTING ENGINEER: <u>Christopher J. Cullen, P.E.</u>		SIGNATURE: 	



NAME OF DAM: <u>Waite Pond Dam</u>		STATE ID #: <u>3-14-151-21</u>	
INSPECTION DATE: <u>August 8, 2012</u>		NID ID #: <u>MA00987</u>	
OWNER: ORGANIZATION	<u>Town of Leicester</u>	CARETAKER: ORGANIZATION	<u>Town of Leicester</u>
NAME/TITLE	<u>Town of Leicester</u>	NAME/TITLE	<u>Town of Leicester</u>
STREET	<u>3 Washburn Square</u>	STREET	<u>3 Washburn Square</u>
TOWN, STATE, ZIP	<u>Leicester, MA 01524-1333</u>	TOWN, STATE, ZIP	<u>Leicester, MA 01524-1333</u>
PHONE	<u>(508) 892-7000</u>	PHONE	<u>(508) 892-7000</u>
EMERGENCY PH. #	<u>(508) 892-7000</u>	EMERGENCY PH. #	<u>(508) 892-7000</u>
FAX	<u>(508) 892-7070</u>	FAX	<u>(508) 892-7070</u>
EMAIL	<u>reedb@leicesterma.org</u>	EMAIL	<u></u>
OWNER TYPE	<u>Municipality or Political subdivision</u>		
PRIMARY SPILLWAY TYPE <u>Broad crest concrete weir with wood weir boards</u>			
SPILLWAY LENGTH (FT)	<u>41</u>	SPILLWAY CAPACITY (CFS)	<u>709</u>
AUXILIARY SPILLWAY TYPE	<u>NA</u>	AUX. SPILLWAY CAPACITY (CFS)	<u>NA</u>
NUMBER OF OUTLETS	<u>1</u>	OUTLET(S) CAPACITY (CFS)	<u>0</u>
TYPE OF OUTLETS	<u>24-inch CMP</u>	TOTAL DISCHARGE CAPACITY (CFS)	<u>709</u>
DRAINAGE AREA (SQ MI)	<u>4.92</u>	SPILLWAY DESIGN FLOOD (PERIOD/CFS)	<u>100 yr./343</u>
HAS DAM BEEN BREACHED OR OVERTOPPED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO YES, PROVIDE DATE(S)	<u></u>
FISH LADDER (LIST TYPE IF PRESENT)	<u>N/A</u>		
DOES CREST SUPPORT PUBLIC ROAD?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	IF YES, ROAD NAME:	<u></u>
PUBLIC BRIDGE WITHIN 50' OF DAM?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	IF YES, ROAD/BRIDGE NAME:	<u></u>
		MHD BRIDGE NO. (IF APPLICABLE)	<u></u>

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**EMBANKMENT (CREST)**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Earth	X		
	2. SURFACE CRACKING	NA	X		
	3. SINKHOLES, ANIMAL BURROWS	Depressions on right crest			X
	4. VERTICAL ALIGNMENT (DEPRESSIONS)	Depressions in crest			X
	5. HORIZONTAL ALIGNMENT	Satisfactory	X		
	6. RUTS AND/OR PUDDLES	Settlement in isolated locations on crest			X
	7. VEGETATION (PRESENCE/CONDITION)	Very sparse vegetation, tree roots on left crest			X
	8. ABUTMENT CONTACT	Good	X		

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**EMBANKMENT (D/S SLOPE)**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	None observed	X		
	2. SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	Good	X		
	5. SINKHOLE/ANIMAL BURROWS	None observed	X		
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. VEGETATION (PRESENCE/CONDITION)	Right side gravel parking area		X	

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**EMBANKMENT (U/S SLOPE)**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	NA			
	2. SLOPE PROTECTION TYPE AND COND.	NA			
	3. SINKHOLE/ANIMAL BURROWS	NA			
	4. EMB.-ABUTMENT CONTACT	NA			
	5. EROSION	NA			
	6. UNUSUAL MOVEMENT	NA			
	7. VEGETATION (PRESENCE/CONDITION)	NA			

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**INSTRUMENTATION - N/A**

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

ADDITIONAL COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_





NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**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	NA	X		
	5. DRAINAGE SYSTEM	NA	X		
	6. INSTRUMENTATION	NA	X		
	7. VEGETATION	Wooded	X		
	8. ACCESSIBILITY	By foot	X		
	9. DOWNSTREAM HAZARD DESCRIPTION	Wooded downstream. Box culvert under Chapel Street ~200' downstream	X		
	10. DATE OF LAST EAP UPDATE	NA	X		

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**MISCELLANEOUS**

AREA INSPECTED	CONDITION	OBSERVATIONS	
MISC.	1. RESERVOIR DEPTH (AVG)	5'	
	2. RESERVOIR SHORELINE	Residential and wooded areas	
	3. RESERVOIR SLOPES	Moderate	
	4. ACCESS ROADS	Dam is located on public road, Chapel Street	
	5. SECURITY DEVICES	None	
	6. VANDALISM OR TRESPASS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	WHAT: N/A
	7. AVAILABILITY OF PLANS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DATE: N/A
	8. AVAILABILITY OF DESIGN CALCS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DATE: N/A
	9. AVAILABILITY OF EAP/LAST UPDATE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DATE: N/A
	10. AVAILABILITY OF O&M MANUAL	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DATE: N/A
	11. CARETAKER/OWNER AVAILABLE	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DATE: 10-Jul-12
	12. CONFINED SPACE ENTRY REQUIRED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	PURPOSE: N/A

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**PRIMARY SPILLWAY**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	Concrete with wood weir boards	X		
	WEIR TYPE	Sharp Crest	X		
	SPILLWAY CONDITION	Fair	X		
	TRAINING WALLS	Concrete - cracked and eroded			X
	SPILLWAY CONTROLS AND CONDITION	Weir boards-satisfactory condition		X	
	UNUSUAL MOVEMENT	None observed	X		
	APPROACH AREA	Clear	X		
	DISCHARGE AREA	Concrete and masonry rubble; concrete breaking up; vegetation growing in channel		X	
	DEBRIS	None observed	X		
	WATER LEVEL AT TIME OF INSPECTION	Approx. 2 feet below top of weir boards	X		

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**AUXILIARY SPILLWAY**

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

ADDITIONAL COMMENTS:

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NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**OUTLET WORKS**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	24-inch CMP	X		
	INTAKE STRUCTURE	Masonry structure-leaning, undermined			X
	TRASHRACK	Unknown		X	
	PRIMARY CLOSURE	Slide gate- operability unknown			X
	SECONDARY CLOSURE	NA	X		
	CONDUIT	24-inch CMP	X		
	OUTLET STRUCTURE/HEADWALL	Emerges through rubble in stilling basin		X	
	EROSION ALONG TOE OF DAM	Minimal	X		
	SEEPAGE/LEAKAGE	None observed		X	
	DEBRIS/BLOCKAGE	Outlet pipe 50% sedimented			X
	UNUSUAL MOVEMENT	Gate structure noticeably out of plumb			X
	DOWNSTREAM AREA	Stable; some vegetation growing in channel			X
	MISCELLANEOUS				

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**CONCRETE/MASONRY DAMS - N/A**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
GENERAL	TYPE				
	AVAILABILITY OF PLANS				
	AVAILABILITY OF DESIGN CALCS				
	PIEZOMETERS				
	OBSERVATION WELLS				
	INCLINOMETERS				
	SEEPAGE GALLERY				
	UNUSUAL MOVEMENT				

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**CONCRETE/MASONRY DAMS (CREST) - N/A**

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

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**CONCRETE/MASONRY DAMS (DOWNSTREAM FACE) - N/A**

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

ADDITIONAL COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NAME OF DAM: Waite Pond Dam

STATE ID #: 3-14-151-21

INSPECTION DATE: August 8, 2012

NID ID #: MA00987

**CONCRETE/MASONRY DAMS (UPSTREAM FACE) - N/A**

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S FACE	TYPE				
	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. Waite Pond Dam, Follow-up Inspection reports prepared by Fuss & O'Neill, Inc., dated June, 2009, February 2010, July 2010, January 2011, July 2011, and January 2012.
2. "Phase I Inspection/Evaluation, Waite Pond Dam," performed by Haley & Aldrich, March 10, 1998.
3. "Dam Inspection, Safety, and Repair Report, Waite's Pond Dam," prepared by William F. Fay, P.E., dated November 1986.



## APPENDIX D

### Definitions



## COMMON DAM SAFETY DEFINITIONS

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

### Orientation

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

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

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

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

### Dam Components

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

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

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

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

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

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

### Size Classification

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

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

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

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



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

### **Hazard Classification**

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

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

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

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

### **General**

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

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

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

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

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

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

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

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

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



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

### **Condition Rating**

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

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

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

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

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

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

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