

HAMMOND POND DAM
PHASE I
INSPECTION / EVALUATION REPORT



Dam Name: Hammond Pond Dam
State Dam ID#: 2-8-108-1
NID#: MA00176
Owner: Hammond Acres Club
Owner Type: Private
Town: Goshen
Consultant: Tighe & Bond, Inc.
Date of Inspection: October 10, 2009

Executive Summary

This Phase I Inspection/Evaluation Report details the inspection and evaluation of Hammond Pond Dam located in Goshen, Massachusetts. The inspection was conducted by Tighe & Bond on October 10, 2009.

Hammond Pond Dam is classified as an **Intermediate** size, **Significant (Class II)** hazard potential dam. The dam was found to be in **Satisfactory** condition with the following deficiencies noted.

1. The wet area at the downstream toe near the right abutment has increased.
2. Stone masonry training wall at the upstream side of the spillway on the right side is in poor condition.
3. Woody vegetation is growing within the rip rap on the downstream slope adjacent to the spillway on both sides.
4. The downstream slope is irregular and very steep in some areas, making it difficult to maintain.
5. Small potholes from vehicular traffic are developing on the dam crest near the bridge.
6. There are cracks in the concrete retaining walls adjacent to the gatehouse foundation on the upstream face.

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

- A. Monitor the wet area at the downstream toe. Proceed with installation of a curtain drain near the right abutment to remedy the wet area at the downstream toe.
- B. Rebuild the right upstream spillway training wall.
- C. Fill potholes on dam crest and provide crown along centerline of gravel roadway to allow drainage of surface water.
- D. Repair the concrete wall on the upstream face to the right of the gatehouse, or place rip rap upstream of the wall to prevent possible collapse or erosion of the embankment behind the wall.
- E. Continue to clear the woody vegetation from the rip rap on the slopes and regularly mow the embankment crest and slopes to control vegetative growth.
- F. Remove debris from the spillway and downstream channel on an as needed basis.
- G. Clear vegetation and debris from discharge area of low level outlet on an as needed basis.

Dam Evaluation Summary Detail Sheet

| | | | |
|--------------------------------------|--------------------------------------|--|------------------|
| 1. NID ID: | MA00176 | 4. Inspection Date: | October 10, 2009 |
| 2. Dam Name: | Hammond Acres Lake Dam | 5. Last Insp. Date: | October 22, 2003 |
| 3. Dam Location: | Goshen, MA | 6. Next Inspection: | October 10, 2014 |
| 7. Inspector: | Cathleen A. Benben, P.E. | | |
| 8. Consultant: | Tighe & Bond, Inc. | | |
| 9. Hazard Code: | Significant | 9a. Is Hazard Code Change Requested?: | No |
| 10. Insp. Frequency: | 5 Years | 11. Overall Physical Condition of Dam: | SATISFACTORY |
| 12. Spillway Capacity (% SDF) | >100% SDF w/ no actions by Caretaker | | |
| E1. Design Methodology: | 4 | E7. Low-Level Discharge Capacity: | 5 |
| E2. Level of Maintenance: | 5 | E8. Low-Level Outlet Physical Condition: | 5 |
| E3. Emergency Action Plan: | 4 | E9. Spillway Design Flood Capacity: | 5 |
| E4. Embankment Seepage: | 4 | E10. Overall Physical Condition of the Dam: | 4 |
| E5. Embankment Condition: | 5 | E11. Estimated Repair Cost: | \$12,500 |
| E6. Concrete Condition: | 4 | | |

Evaluation Description

E1: DESIGN METHODOLOGY

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

E2: LEVEL OF MAINTENANCE

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

E3: EMERGENCY ACTION PLAN

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

E4: SEEPAGE (Embankments, Foundations, & Abutments)

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

E5: EMBANKMENT CONDITION (See Note 1)

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

E6: CONCRETE CONDITION (See Note 2)

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

E7: LOW-LEVEL OUTLET DISCHARGE CAPACITY

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

E8: LOW-LEVEL OUTLET PHYSICAL CONDITION

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

E9: SPILLWAY DESIGN FLOOD CAPACITY

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

E10: OVERALL PHYSICAL CONDITION OF DAM

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

E11: ESTIMATED REPAIR COST

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

Changes/Deviations to Database Information since Last Inspection

Guidelines and Notes for Evaluations

Each of the evaluation categories has 5 rating levels. In general, the rating levels in each category are intended to reflect the following conditions:

1. Unsafe
2. Poor
3. Fair
4. Satisfactory
5. Good

E10-Overall Safety Rating Guideline

Unless the inspecting engineer presents compelling data, analyses, and observations that justify a higher rating, E10-Overall Safety Rating of the Dam shall not be higher than the lowest ranking in these high importance categories:

- E4-Seepage,
- E5-Embankment Condition (for embankment dams),
- E6-Concrete Condition (for dams where concrete structures retain water).

Note 1 - Embankment Condition Factor of Safety Criteria

In addition to the inspection conditions listed, the embankment condition rating should consider the slope stability Factor of Safety (FS) according to the following guidelines for downstream (D/S) and upstream slopes (U/S).

| Rating | Normal Pool | SDF | Seismic | Rapid Drawdown |
|--------|--------------|--------|--------------|----------------|
| | D/S & U/S FS | D/S FS | D/S & U/S FS | U/S FS |
| 1 | <1.3 | <1.1 | <1.0 | <1.0 |
| 2 | <1.5 | <1.4 | <1.0 | <1.1 |
| 3 | >1.5 | <1.5 | <1.1 | <1.2 |
| 4 | >1.5 | >1.5 | >1.1 | >1.2 |
| 5 | >1.5 | >1.5 | >1.1 | >1.2 |

In the absence of stability analyses, use the following factors to evaluate the stability component of the embankment rating. The inspecting engineer will need to consider all factors in combination as the exact combination of conditions listed will rarely occur. For slopes, > indicates steeper than.

| Rating | Slopes | Seepage | Material | Compaction |
|--------|----------|---------------|----------------|------------------|
| 1 | >2H:1V | >5' above toe | SP, ML*, SM* | Loose or unknown |
| 2 | >2.5H:1V | >2' above toe | ML**, MH | Loose or unknown |
| 3 | >3H:1V | at toe | SM**, SW, CH | Likely compacted |
| 4 | <3H:1V | DS of toe | SC, CL | Compacted |
| 5 | <3H:1V | None | Suitably Zoned | Compacted |

ML* - Non-plastic silt or any silt or clay susceptible to dispersion

ML** - Silt with some plasticity (non-dispersive)

SM* - Uniform silty fine sand

SM** - Widely graded silty sand

Note 2 - Concrete Condition Factor of Safety Criteria

In addition to the inspection conditions listed, ratings should consider the sliding stability Factors of Safety (FS) for any concrete structures that retain water according to the following guidelines.

FS Criteria for Dams with Limited Structure and Foundation Information and Testing

| Rating | Nor. Pool FS | SDF FS | Ice Loading FS | Seismic FS |
|--------|--------------|--------|----------------|------------|
| 1 | <2.0 | <1.3 | <1.3 | <1.0 |
| 2 | <3.0 | <2.0 | <2.0 | <1.3 |
| 3 | >3.0 | >2.0 | >2.0 | <1.5 |
| 4 | >3.0 | >2.0 | >2.0 | >1.5 |
| 5 | >3.0 | >2.0 | >2.0 | >1.5 |

FS Criteria for Dams with Well Defined Structure and Foundation Information and Testing

| Rating | Nor. Pool FS | SDF FS | Ice Loading FS | Seismic FS |
|--------|--------------|--------|----------------|------------|
| 1 | <1.5 | <1.3 | <1.3 | <1.0 |
| 2 | <2.0 | <1.7 | <1.7 | <1.0 |
| 3 | <3.0 | <2.0 | <2.0 | <1.1 |
| 4 | >3.0 | >2.0 | >2.0 | <1.3 |
| 5 | >3.0 | >2.0 | >2.0 | >1.3 |

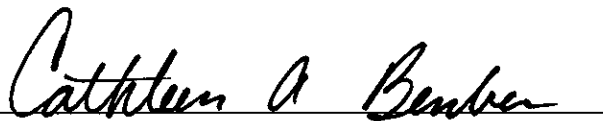
Preface

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.

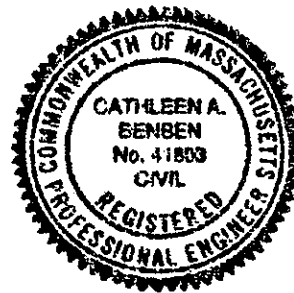
The assessment of the general condition of the dam reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report unless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



Cathleen A. Benben, P.E.
Massachusetts License No.: 41803
License Type: Civil
Project Engineer
Tighe & Bond, Inc.



J:\G\G0403\REPORT\Exec Summ_Preface.doc

Executive Summary**Dam Evaluation Summary Detail Sheet****Preface****Section 1 Description of Project**

| | | |
|-----|--|-----|
| 1.1 | General..... | 1-1 |
| | 1.1.1 Authority..... | 1-1 |
| | 1.1.2 Purpose of Work..... | 1-1 |
| | 1.1.3 Definitions..... | 1-1 |
| | 1.1.4 Figures | 1-1 |
| 1.2 | Description of Project..... | 1-1 |
| | 1.2.1 Location | 1-1 |
| | 1.2.2 Owner/Operator | 1-2 |
| | 1.2.3 Purpose of the Dam | 1-2 |
| | 1.2.4 Description of the Dam and Appurtenances | 1-2 |
| | 1.2.5 Operations and Maintenance | 1-3 |
| | 1.2.6 DCR Size Classification | 1-3 |
| | 1.2.7 DCR Hazard Classification | 1-3 |
| 1.3 | Engineering Data..... | 1-3 |
| | 1.3.1 Drainage Area..... | 1-4 |
| | 1.3.2 Reservoir | 1-4 |
| | 1.3.3 Discharges at the Dam Site..... | 1-4 |
| | 1.3.4 General Elevations | 1-4 |
| | 1.3.5 Main Spillway..... | 1-5 |
| | 1.3.6 Additional Information..... | 1-5 |
| | 1.3.7 Design and Construction Records..... | 1-5 |
| | 1.3.8 Operating Records | 1-5 |
| 1.4 | Summary Data Table | 1-5 |

Section 2 Inspection

| | | |
|-----|---|-----|
| 2.1 | Visual Inspection..... | 2-1 |
| | 2.1.1 General Findings | 2-1 |
| | 2.1.2 Dam | 2-1 |
| | 2.1.3 Appurtenant Structures | 2-2 |
| | 2.1.4 Downstream Area..... | 2-3 |
| | 2.1.5 Reservoir Area | 2-4 |
| 2.2 | Caretaker Interview..... | 2-4 |
| 2.3 | Operation and Maintenance Procedures | 2-4 |
| | 2.3.1 Operational Procedures | 2-4 |
| | 2.3.2 Maintenance of Dam and Operating Facilities | 2-4 |

2.3.3 Emergency Warning System..... 2-4

2.4 Hydrologic/Hydraulic Data 2-4

2.5 Structural Stability/Overtopping Potential 2-5

 2.5.1 Structural Stability..... 2-5

 2.5.2 Overtopping Potential..... 2-5

Section 3 Assessments and Recommendations

3.1 Assessments..... 3-1

3.2 Studies and Analyses 3-2

3.3 Yearly Recommendations..... 3-2

3.4 Recommended Maintenance, and Minor Repairs 3-2

3.5 Remedial Measures..... 3-2

3.6 Alternatives 3-3

3.7 Opinion of Probable Costs 3-3

Tables

1.1 Summary Data Table

Figures

Figure 1: Site Locus

Figure 2: Drainage Area

Figure 3: Aerial Photograph

Appendices

A Photographs

B Inspection Checklist

C Previous Reports and References

D Definitions

J:\G\G0403\REPORT\2009 Phase 1\Report text.doc

Section 1

Description of Project

1.1 General

1.1.1 Authority

The Hammond Acres Club has retained Tighe & Bond to perform a visual inspection and develop a report of the conditions for the Hammond Pond Dam in Goshen, 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 CMR10.07 to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation of the dam.

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.

1.1.4 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. Figure 4 presents a site sketch of the dam and its appurtenant features. This figure also serves as a photo location plan showing location and orientation of photos referenced and included in this report.

1.2 Description of Project

1.2.1 Location

Hammond Pond Dam is located on Webster Brook west of Chesterfield Road, in the Town of Goshen, Massachusetts in Hampshire County. The dam and pond location are shown on the Goshen USGS quadrangle map at coordinates 42.406328, -72.798989. Access to

the dam is from Lakeside Avenue off of Chesterfield Road. See Figures 1 and 2 appended to this report for the USGS site locus map and an aerial photograph of the dam, respectively.

1.2.2 Owner/Operator

| | Dam Owner | Dam Caretaker |
|-----------------|-----------------------------------|------------------------------------|
| Name | Hammond Acres Club | Robert Labrie, Dam Monitor |
| Mailing Address | c/o Robert Labrie P.O. Box 923 | Hammond Acres Club P.O. Box 923 |
| Town | Williamsburg, MA 01096 | Williamsburg, MA 01096 |
| Daytime Phone | (413) 268-7110 | (413) 268-7110 |
| Emergency Phone | (617) 240-6063 | (617) 240-6063 |
| Email Address | bslabrie@msn.com | bslabrie@msn.com |

1.2.3 Purpose of the Dam

Originally constructed to provide hydropower for an on-site mill in the late 1800's, Hammond Pond Dam now provides a private recreational impoundment for the members of the Hammond Acres Club.

1.2.4 Description of the Dam and Appurtenances

The Hammond Pond Dam is an earthen embankment 205 feet long and up to 17 feet high, with a crest width of 24 feet. The spillway is located near the left abutment. A gatehouse for the manual operator for the low level outlet is located on the upstream slope near the right abutment. A gravel road runs along the dam crest with a wood plank bridge supported by steel structural beams providing access across the spillway.

The upstream slope is grassed with a slope of 6 horizontal to 1 vertical (6H:1V) along the top 3 feet and surfaced with cobble stones below that sloped at 1.5H:1V between the spillway and the gatehouse. To the right of the gatehouse, the upstream slope is grassed from the top to the waterline and sloped at 5H:1V.

The downstream slope is grassed with a slope varying from 1H:1V to 3H:1V. There is an irrigation system drain located at the toe of the downstream slope near the low level outlet.

The spillway is a concrete broad crested weir with stone masonry training walls. The total weir length is 23 feet, which is split into two sections by a stone masonry pier providing the mid-span support for the bridge. Flashboards 24-inches high, designed to fail if overtopped by 2 feet or more, were in place on the spillway crest. The spillway discharges to the natural channel of Webster Brook.

A 30-inch diameter ductile iron low level outlet pipe passes through the embankment near the right abutment. A sluice gate mounted on the upstream face of the concrete foundation for the gatehouse is controlled by an operator located in the gatehouse. A

galvanized steel trash rack is bolted to walls extending into the impoundment from the gatehouse foundation to prevent debris from entering the intake when the gate is opened. The low level outlet discharges through a concrete headwall approximately 65 feet downstream of the toe of the embankment and flows into Webster Brook. A 6-inch diameter under drain runs parallel to the low level outlet conduit and also penetrates the headwall to convey groundwater and seepage away from the dam.

The downstream area between the spillway and the low level outlet is open and covered with well maintained grass.

1.2.5 Operations and Maintenance

Hammond Pond Dam is operated and maintained by members of the Hammond Acres Club. Currently, formal operating procedures include removing the flashboards from the spillway for winter drawdown of the pond, and operating the gate for the low level outlet annually.

Maintenance includes annual clearing of vegetation growing within the rip rapped areas adjacent to the spillway, re-pointing the stone masonry at the spillway where needed, and regular mowing of the grassed areas of the embankment and downstream area during the growing season. Debris is also removed from the spillway on an as needed basis.

1.2.6 DCR Size Classification

Hammond Pond Dam has a maximum structural height of 17 feet and a maximum storage capacity of 552 acre-feet. In accordance with Department of Conservation and Recreation classification, under Commonwealth of Massachusetts Regulations 302 CMR Dam Safety revised November 4, 2005, Hammond Pond Dam is an **Intermediate** size structure, based on storage capacity.

1.2.7 DCR Hazard Classification

In accordance with Department of Conservation and Recreation classification procedures, under the Commonwealth of Massachusetts Regulations 302 CMR Dam Safety as revised November 4, 2005, Hammond Pond Dam is classified as a **Significant (Class II)** hazard dam. Because it is located upstream of Scout Pond Dam, Hammond Pond Dam was reclassified from a Low hazard dam by the Office of Dam Safety. Significant hazard dams are located where failure may cause loss of life and damage to property, secondary highways or cause interruption of service from important facilities.

1.3 Engineering Data

The following sections are based on field measurements, review of USGS and MassGIS mapping and existing plans from the latest repair work at the dam. The information presented in this Section is intended to provide an overview of the dam and impoundment.

An assumed datum of 100.0 feet was used to set a benchmark for the survey completed for the design of the Hammond Pond Dam Rehabilitation Project in 2000. Elevations presented in this report were estimated from the 2000 survey using the assumed datum.

1.3.1 Drainage Area

The total drainage area contributing to Hammond Pond is approximately 3.0 square miles. The terrain is mostly gentle slopes and the development within the watershed is light with undeveloped areas being thickly wooded. Figure 3, included in the Figures section of this report, outlines the approximate drainage area boundary for Hammond Pond.

1.3.2 Reservoir

| | Impoundment Elevation (feet) | Surface Area (acres) | Storage Volume (acre-feet) |
|--|------------------------------------|-------------------------|----------------------------------|
| Normal Pool | 96.4 | 37.9 | 250 |
| Maximum Pool (top of dam) | 100.5 | 40.5 | 415 |
| Spillway Design Flood Pool (100-yr) ¹ | 98.5 | 39.0 | 335 |

1.3.3 Discharges at the Dam Site

The normal discharges past the dam are through the concrete and masonry spillway. Discharges past the dam for various pool elevations are summarized below:

Discharges in cubic feet per second (cfs):

| | |
|--|---------|
| A. Maximum known flood at dam site | unknown |
| B. Spillway capacity with water level at the top of the dam (no flashboards) | 870 |
| C. Capacity of low level outlet | 80 |
| D. Spillway Design Flood outflow (100-year flood) | 592 |

1.3.4 General Elevations

Elevations in feet based on assumed spillway crest elevation of 94.4. Top of flashboards is 96.4.

| | |
|---|--------------|
| A. Top of dam | 100.5 |
| B. Spillway Design Flood pool | 98.5 |
| C. Normal pool (with flashboards) | 96.4 |
| D. Spillway crest | 94.4 |
| E. Upstream water at time of inspection | 96.6 |
| F. Low level outlet invert | approx. 87.0 |

¹ The Spillway Design Flood Pool elevation presented in this report is based on the start of the design storm occurring when there are no flashboards in place at the spillway and the H&H Analysis prepared by Tighe & Bond in 2000. See Section 2.5.

G. Streambed at toe of the dam 85.5

1.3.5 Main Spillway

| | |
|---------------------------------|--------------------|
| A. Type | broad crested weir |
| B. Length | 23.0 |
| C. Top of flashboards elevation | 96.4 |
| D. Upstream channel | Hammond Pond |
| E. Downstream channel | Webster Brook |
| F. Downstream water elevation | 86.0 |

1.3.6 Additional Information

1.3.7 Design and Construction Records

Design or construction records for the original construction are not available for Hammond Pond Dam. Record Plans for the replacement of the low level outlet in 2000 are available for review.

1.3.8 Operating Records

There are no operating records available for review for Hammond Pond Dam.

1.4 Summary Data Table

Table 1.1, summarizing the required Phase I Report data collected as part of this inspection, is presented on the following page.

1.1 Summary Data Table

| Required Phase I Report Data | Data Provided by the Inspecting Engineer |
|---|---|
| National ID # | MA00176 |
| Dam Name | Hammond Acres Lake Dam |
| Dam Name (Alternate) | Hammond Pond Dam |
| River Name | Webster Brook, tributary to the Westfield River |
| Impoundment Name | Hammond Pond |
| Hazard Class | Significant |
| Size Class | Intermediate |
| Dam Type | Earthen Embankment |
| Dam Purpose | Recreation |
| Structural Height of Dam (feet) | 17 |
| Hydraulic Height of Dam (feet) | 12.9 |
| Drainage Area (sq. mi.) | 3 |
| Reservoir Surface Area (sq. mi.) | 0.061 (39 acres) |
| Normal Impoundment Volume (acre-feet) | 250 |
| Max Impoundment Volume ((top of dam) acre-feet) | 415 |
| SDF Impoundment Volume* (acre-feet) | 335 |
| Spillway Type | Broad crested weir |
| Spillway Length (feet) | 23 feet |
| Freeboard at Normal Pool (feet) | 4.1 |
| Principal Spillway Capacity* (cfs) | 870 |
| Auxiliary Spillway Capacity* (cfs) | N/A |
| Low-Level Outlet Capacity* (cfs) | 80 |
| Spillway Design Flood* (flow rate - cfs) | 100 year/592 |
| Winter Drawdown (feet below normal pool) | 2 feet |
| Drawdown Impoundment Vol. (acre-feet) | 175 |
| Latitude | 42.406328 |
| Longitude | -72.798989 |
| City/Town | Goshen |
| County Name | Hampshire |
| Public Road on Crest | Yes |
| Public Bridge over Spillway | Yes |
| EAP Date (if applicable) | 3/1/02 |
| Owner Name | Hammond Acres Club |
| Owner Address | P.O. Box 923 |
| Owner Town | Williamsburg, MA |
| Owner Phone | (413) 268-7110 |
| Owner Emergency Phone | (617) 240-6063 |
| Owner Type | Private Association or other non-profit |
| Caretaker Name | Robert Labrie, Dam Monitor |
| Caretaker Address | P.O. Box 923 |
| Caretaker Town | Williamsburg, MA |
| Caretaker Phone | (413) 268-7110 |
| Caretaker Emergency Phone | (617) 240-6063 |
| Date of Field Inspection | 10/10/2009 |
| Consultant Firm Name | Tighe & Bond, Inc. |
| Inspecting Engineer | Cathleen A. Benben, P.E. |
| 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

Hammond Pond Dam was inspected on October 10, 2009. At the time of the inspection, the weather was cloudy with a temperature of in the upper 50's° F. Photographs to document observed conditions of the dam were taken during the inspection and are included in Appendix A. The level of the impoundment was 2 inches over the flashboards. No inspection of underwater areas was made. A copy of the inspection checklist is included in Appendix B.

2.1.1 General Findings

In general, Hammond Pond Dam was found to be in **Satisfactory** condition. The specific observations and concerns are identified in the sections below.

2.1.2 Dam

- **Abutments** (photos 5 & 7)
 - Contact at both abutments appears good.
 - The spillway is located at the left abutment.
 - There is some woody vegetation growing within the rip rap on the downstream slope at the left abutment. This area is also the side slope for the spillway discharge channel.
 - There is a wet area at the downstream toe at the right abutment. It appears that this water is coming from the abutment slope as opposed to seepage through the dam. The dam owner plans to investigate this condition further.
- **Upstream Face** (photos 1, 8, 9, 12 & 13)
 - The grassed surface of the upstream face is well maintained.
 - Minor erosion along normal pool elevation, which is at the interface of the soil and rip rap surface, was observed.
 - The area to the right of the gatehouse is no longer used for storing boats. The shallow rut in the slope caused by dragging boats in and out of the water, noted previously, has been repaired and a well-maintained vegetative cover has been established.
- **Crest** (photos 2, 3, 4, 5, 6 & 7)
 - The gravel road on the dam crest is well maintained. A small pothole was observed near the bridge. During periods of excessive rain, small potholes sometimes appear, but are later repaired.
 - Grass is growing along the edges of the dam crest.

- Vertical and horizontal alignment is good.
- **Downstream Slope** (photos 10, 11, 19, 20 & 21)
 - The downstream slope is covered with well maintained grass.
 - The slope is steep and somewhat irregular closer to the spillway varying from 1H:1V to approximately 3H:1V.
 - Minor sliding has occurred during grass mowing operations due to the steepness of the slope.
 - The area adjacent to the spillway is rip rap covered. Some woody vegetation is growing within the stones.
 - There is a wet area at the toe of the slope between the right abutment and the low level outlet. It is believed this water is coming from the hillside at the abutment and not through the dam.
- **Drains**
 - A steady flow discharges from the 6-inch under drain installed along side the 30-inch low level outlet at a rate of approximately 5 gpm.
 - Oxidation staining is present at the discharge location.
- **Instrumentation**
 - No instrumentation exists at this site.
- **Access Roads and Gates**
 - The dam is easily accessed from either side since a gravel road traverses the dam.
 - The gatehouse is locked to prevent unauthorized entry.

2.1.3 Appurtenant Structures

- **Primary Spillway** (photos 8, 9, 10, 11, 14, 15, 16, 17 & 18)
 - There was approximately two inches of water flowing over the spillway, with 24-inches of flashboards in place at the time of the inspection.
 - Minor spalling on the concrete crest was observed.
 - The stone masonry of the bridge abutments and center support appear sound.
 - There were some voids in the concrete of the spillway crest at the interface with the stone masonry walls. The dam owner reported that any deterioration of the concrete observed in these areas is patched each spring.

- The field stone masonry training wall on the left upstream side is in good condition.
- The stone masonry training wall on the right upstream side is in poor condition, but has stayed relatively unchanged for many years. The wall has separated from the bridge abutment and is leaning towards the impoundment with soil settlement occurring behind the wall at the embankment interface.
- The spillway and downstream channel were clear of any debris.
- Repairs have been made to the bridge since the last inspection. Several boards in the deck were replaced and metal plates were bolted to the surface to reduce the vibrations of the wooden planks when vehicles pass over the bridge.
- **Low Level Outlet** (photos 24, 25 & 26)
 - The low level outlet, gate and operator are in good condition. The gate is sealed tightly in the closed position, as no water was discharging from the outlet.
 - The gate is operated regularly.
 - Other than a chip in the concrete at the right edge, the headwall is in good condition.
 - The gatehouse is generally in good condition.
 - The cracks in the concrete retaining walls at the upstream face adjacent to the gatehouse have been noted in several previous inspection reports and the conditions have not changed. The cracks and separations in the concrete retaining wall observed to the right of the gatehouse are actually in a wall section that is not part of the same pour for the gatehouse foundation. The crack observed at the left side of the gatehouse is part of a horizontal crack that separates the top 4 to 6 inches of the wall at the end not connected to the foundation. See photo 23 included in Appendix A. These deficiencies do not impact the condition of the gatehouse, or its' foundation.
- **Auxiliary/Emergency Spillway**
 - There is no auxiliary spillway at Hammond Pond Dam.
- **Dike**
 - There is no dike associated with Hammond Pond Dam.

2.1.4 Downstream Area (photos 18, 22 & 23)

- The downstream area between the spillway and low level outlet is open and grass covered.
- Discharges past the spillway flow to the natural channel of Webster Brook.

- Discharge from the low level outlet enters the downstream channel about 200 feet downstream of the spillway.
- The downstream area is shown in Figure 1.

2.1.5 Reservoir Area (photo 15, see Figure 3 – Aerial Photo)

- The slopes surrounding the pond are moderately sloped and mostly wooded. There is residential development along most of the shoreline.

2.2 Caretaker Interview

Mr. Robert Labrie, who is the Dam Monitor for Hammond Pond Dam and a member of the Hammond Acres Club, was present at the time of the inspection. Information provided by Mr. Labrie has been incorporated into this report.

2.3 Operation and Maintenance Procedures

2.3.1 Operational Procedures

A written operational procedures document is in place for Hammond Pond Dam. The flashboards are removed from the spillway in the fall for winter drawdown every year. The gate for the low level outlet is opened during the drawdown period to allow flows to bypass the spillway throughout the winter months. The boards are replaced in the spring, after the ice has melted from the pond surface and the gate for the low level outlet is closed.

2.3.2 Maintenance of Dam and Operating Facilities

The dam and surrounding areas are well maintained by the Hammond Acres Club. On an annual basis, the spillway structure is inspected for any voids, or loose mortar in the masonry walls and are patched, woody vegetation is cut back from the rip rap lining the downstream channel and debris is cleared from the spillway. Debris is also cleared on an as needed basis from the spillway and low level discharge areas.

2.3.3 Emergency Warning System

An Emergency Action Plan has been developed for Hammond Pond Dam and is on file with DCR. According to Massachusetts General Law 253, Section 44, Chapter 302 CMR 10.00, significant hazard dams are not required to have an Emergency Action Plan on file with DCR.

2.4 Hydrologic/Hydraulic Data

The dam is classified as an Intermediate size, Significant (Class II) hazard structure and in accordance with Dam Safety Regulations, the spillway design flood (SDF) for the site is a 100-year flood. A Hydrologic/Hydraulic (H&H) Analysis performed in 2000, as part of the design for the rehabilitation work, indicates that the outflow from Hammond Pond during a 100-year storm is 592 cfs with the peak elevation reaching 98.5. These results are based on the pond being at the spillway crest elevation of 94.4, with no flashboards in place at the start of the design storm.

If the H&H analysis were performed with the pond elevation at 96.4, or top of flashboards, at the start of the storm, it can be estimated that the outflow would be similar. Since the flashboards are designed to fail when the pond reaches an elevation

that is more than two feet over the top of the flashboards it can be estimated that the dam would not overtop, even with the flashboards in place at the start of the storm. However, if the boards did not fail the dam would likely overtop due to the fact that the bridge spanning the spillway would force the water elevation to reach a peak elevation greater than 100.5, top of dam.

The estimated capacity of the spillway is 870 cfs with no flashboards in place and 555 with 24-inches of flashboards in place.

2.5 Structural Stability/Overtopping Potential

2.5.1 Structural Stability

There are no records of a stability analysis of the structure available for review. The observations made at the time of the visual inspection did not indicate that there were any stability issues at the dam.

2.5.2 Overtopping Potential

The 2000 H&H analysis estimated that Hammond Pond Dam would not overtop in the event of a 100-year design storm if either there are no flashboards in place at the start of the storm, or the flashboards break away as designed. If boards are in place that do not break away, the dam will be overtopped.

Section 3

Assessments and Recommendations

3.1 Assessments

On the basis of the visual inspection and a review of available information, Dam is generally in **Satisfactory** condition. The dam was found to have the following deficiencies:

1. The wet area at the downstream toe near the right abutment is worsening.
2. The downstream slope is irregular and very steep in some areas, making it difficult to maintain.
3. Small potholes from vehicular traffic are developing on the dam crest near the bridge.
4. Stone masonry training wall at the upstream side of the spillway on the right side is in poor condition.
5. There are cracks in the concrete retaining walls adjacent to the gatehouse foundation on the upstream face.
6. Woody vegetation is growing within the rip rap on the downstream slope adjacent to the spillway on both sides.

Previous Recommendations and Resolutions

| Previous Recommendation | Resolution or Current Condition |
|--|---|
| Monitor wet condition at the toe of the slope | Wet area has increased. Dam owner plans to install curtain drain at abutment to resolve condition. |
| Fill potholes in the road on the dam crest and provide crown on the road | Potholes were filled in 2004. Small potholes have re-appeared after an excessive rainy season. |
| Repair erosion on the upstream slope | No erosion was observed. |
| Repair cracks in the gatehouse foundation | Cracks are still present in the concrete retaining walls adjacent to the gatehouse. As discussed in the text, these walls are not actually part of the gatehouse foundation. |
| Repair the wood bridge deck | Fifty percent of the boards in the bridge deck were replaced to comply with the recommendation made in the previous inspection report. The deck is currently in good condition. |
| Flatten the downstream slope to allow easier maintenance | Downstream slope condition remains the same. The dam owner reports that the local conservation commission will not allow fill to be placed on the downstream slope. |

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies at Hammond Pond Dam. Prior to undertaking recommended maintenance, repairs and remedial measure, 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, MADEP, or other regulatory agencies.

3.2 Studies and Analyses

There are no recommendations to perform any analyses for Hammond Pond Dam at this time. A Hydrologic & Hydraulic analysis was performed in 2000, and an Operations and Maintenance Manual, as well as an Emergency Action Plan were developed in 2002.

3.3 Yearly Recommendations

The following recommendations are intended to be routine maintenance:

1. Continue to clear the woody vegetation from the rip rap on the slopes and regularly mow the embankment crest and slopes to control vegetative growth.
2. Continue to inspect and exercise the low level outlet gate on a regular basis.
3. Remove debris from the spillway and downstream channel as needed.
4. Clear vegetation and debris from discharge area of low level outlet as needed.

3.4 Recommended Maintenance, and Minor Repairs

The following repairs and maintenance items are recommended to improve the overall condition of the dam that do not alter the current design of the dam:

1. Install curtain drain as planned to eliminate the wet area at the downstream toe.
2. Rebuild the right upstream spillway training wall.
3. Add fill material along the downstream side of the embankment to decrease the slope.
4. Repair concrete wall on upstream face to the right of the gatehouse, or place rip rap upstream of wall to prevent possible collapse and erosion of embankment behind wall.
5. Repair potholes that develop in the gravel roadway on the dam crest.

3.5 Remedial Measures

There are no recommendations for remedial measures that alter the current configuration or design of Hammond Pond Dam at this time.

3.6 Alternatives

No alternatives have been developed at this time. Design studies may provide practical alternatives to the recommendations listed above.

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 based on very limited investigations. 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 can be carried out by the Hammond Acres Club are noted as Force Account.

| | Recommendation | Probable Cost |
|---|---|----------------------|
| 1 | Monitor the wet area at the downstream toe. Install curtain drain as planned to eliminate the wet area at the downstream toe. | Force Account |
| 2 | Rebuild the right upstream spillway training wall. | \$ 3,500 |
| 3 | Add fill material along the downstream side of the embankment to decrease the slope. | \$ 5,000 |
| 4 | Repair potholes that develop in the gravel roadway on the dam crest. | Force Account |
| 5 | Repair the concrete wall on the upstream face to the right of the gatehouse, or place rip rap upstream of the wall to prevent possible collapse or erosion of the embankment behind the wall. | \$4,000 |
| 6 | Continue to clear the woody vegetation from the rip rap on the slopes and regularly mow the embankment crest and slopes to control vegetative growth. | Force Account |
| 7 | Continue to inspect and exercise the low level outlet gate at least once a year. | Force Account |
| 8 | Regularly remove debris from the spillway and downstream channel. | Force Account |
| 9 | Regularly clear vegetation and debris from discharge area of low level outlet. | Force Account |
| | Total | \$ 12,500 |

J:\G\G0403\REPORT\2009 Phase 1\Report text.doc

Figures

Latitude: 42.406328
Longitude: -72.798989

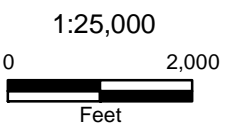
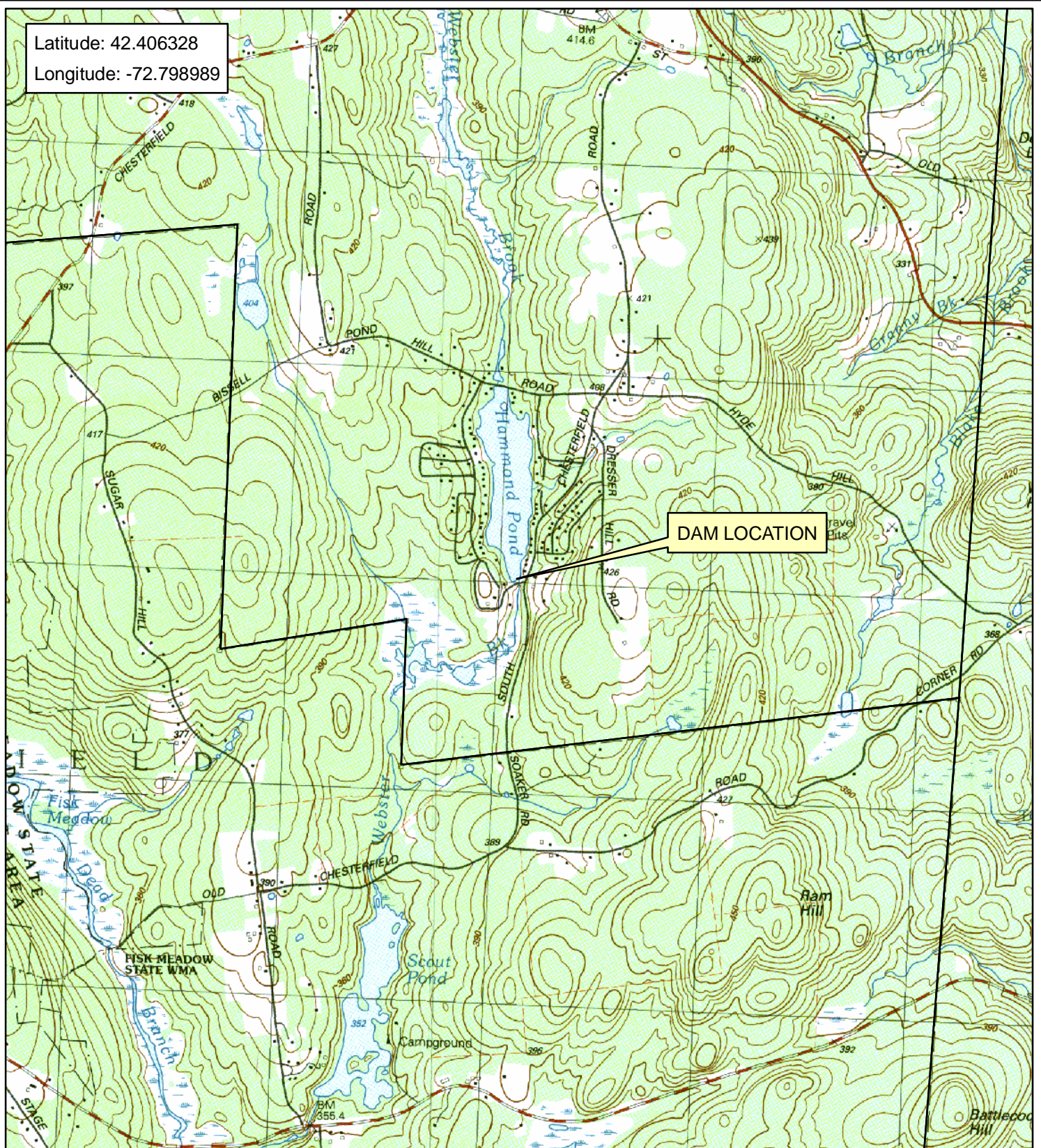


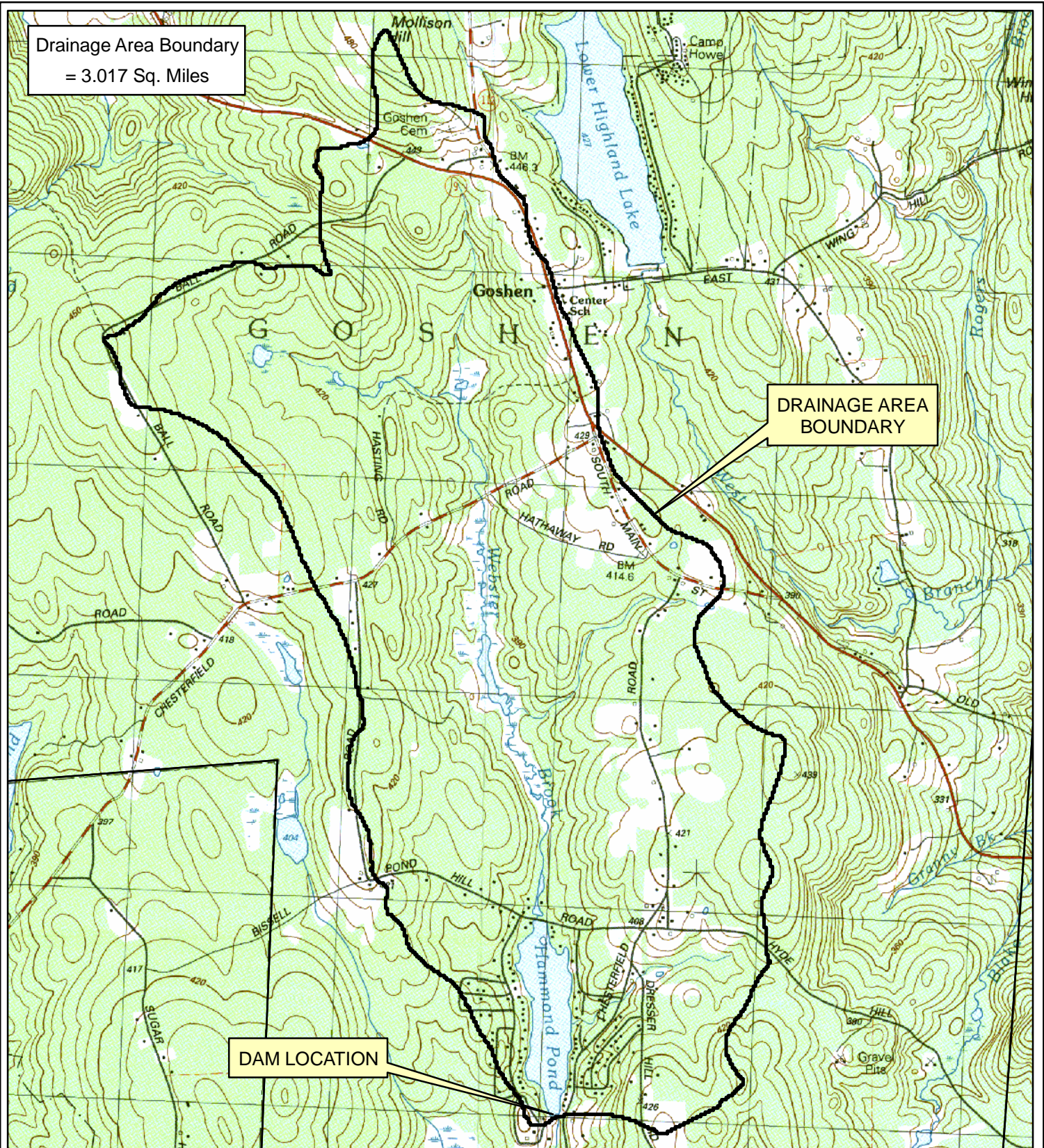
FIGURE 1 SITE LOCUS MAP

Hammond Acres Lake Dam
Goshen, Massachusetts
MA00176

Tighe&Bond

October 2009

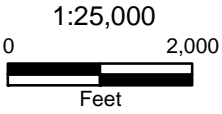
Based on USGS Topographic Map for Goshen, MA Quadrangle. Revised 1990. 6-Meter Contour Interval.



Drainage Area Boundary
= 3.017 Sq. Miles

DRAINAGE AREA
BOUNDARY

DAM LOCATION



**FIGURE 2
DRAINAGE AREA MAP**

Hammond Acres Lake Dam
Goshen, Massachusetts
MA00176

Tighe&Bond

October 2009

Based on USGS Topographic Map for Goshen, MA Quadrangle. Revised 1990. 6-Meter Contour Interval.

Drainage Area Data Courtesy of StreamStat, Oct. 2009.

Latitude = 42.406328
Longitude = -72.798989



DAM LOCATION

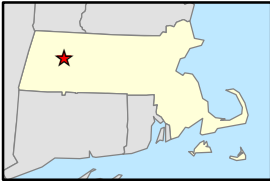
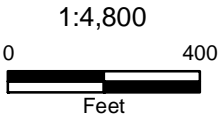


FIGURE 3
AERIAL PHOTOGRAPH

Hammond Acres Lake Dam
Goshen, Massachusetts
MA00176

Tighe & Bond

October 2009

Orthophotos Courtesy of Mass GIS, April 2005
Sheet IDs 93906 & 97906

APPENDIX A
Photographs



Photo 1 – Upstream overview of dam from the left side.



Photo 2 – Upstream overview of dam from the right side.



Photo 3 - Downstream slope viewed from downstream center.



Photo 4 - Downstream slope at right abutment.



Photo 5 - Downstream slope and spillway at left abutment.



Photo 6 – Downstream area viewed from dam crest at center of dam.



Photo 7 - Dam crest viewed from the left abutment.

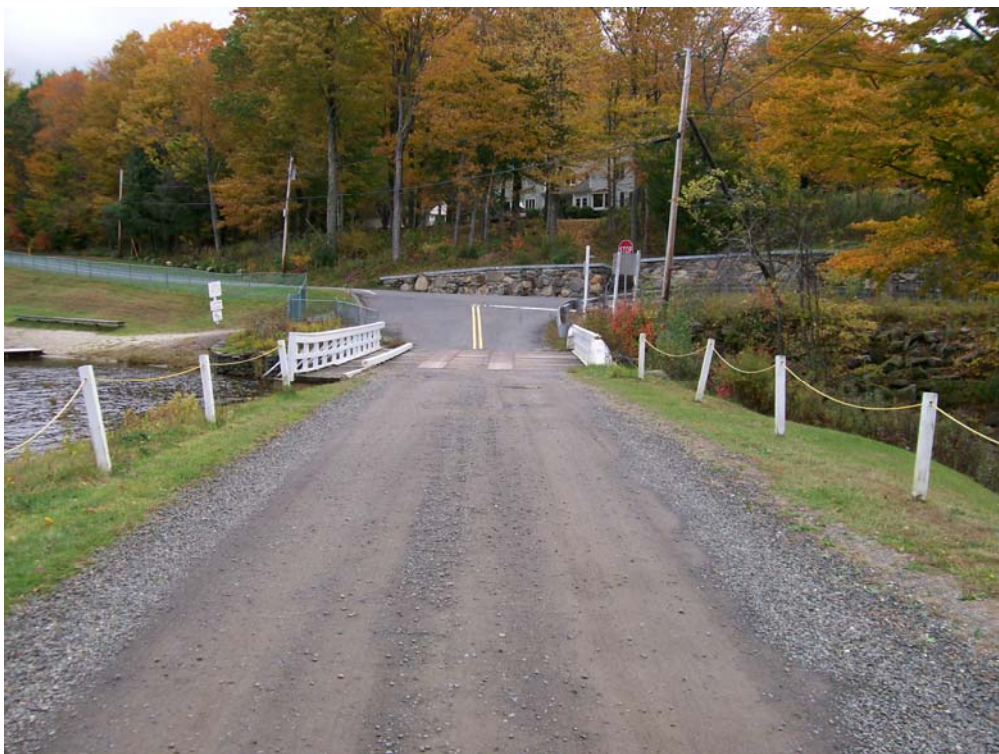


Photo 8 - Dam crest and left abutment viewed from center of dam.



Photo 9 - Downstream view of spillway's right bay.



Photo 10 - Downstream view of spillway's left bay.



Photo 11 - Vegetation growing within rip rap surface on the downstream slope adjacent to the spillway.



Photo 12 - Vegetation growing within rip rap surface on the downstream slope at the left abutment.



Photo 13 - Upstream view at Left abutment.



Photo 14 - Upstream view of spillway.



Photo 15 - Stone masonry and rip rap along lower portion of upstream slope.



Photo 16 - Gatehouse viewed from left side.

Date of Inspection: October 10, 2009



Photo 17 - Upstream slope at right abutment. Note repairs made to previously reported erosion.



Photo 18 - Rip rap on upstream slope, viewed from the right side.



Photo 19 - Field stone masonry training wall at upstream left side of spillway.



Photo 20 - Stone masonry training wall at upstream right side of spillway.



Photo 21 - Hammond Pond viewed from the dam crest.



Photo 22 - Downstream channel viewed from the spillway crest.



Photo 23 - Photo taken during the construction of the improvents at Hammond Pond Dam in 2000. This photo shows that the cracks in the concrete to the left and right of the gatehouse are at locations that are not part of the gatehouse foundation and do not present a threat to the structural integrity of the gatehouse, or the embankment.

APPENDIX B
Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

| | | | |
|---|--|--|--|
| NAME OF DAM: <u>Hammond Acres Lake Dam</u> | | STATE ID #: <u>2-8-108-1</u> | |
| REGISTERED: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | | NID ID #: <u>MA00176</u> | |
| STATE SIZE CLASSIFICATION: <u>Intermediate</u> | | STATE HAZARD CLASSIFICATION: <u>Significant</u> | |
| | | CHANGE IN HAZARD CLASSIFICATION REQUESTED?: <u>No</u> | |
| <i><u>DAM LOCATION INFORMATION</u></i> | | | |
| CITY/TOWN: <u>Goshen</u> | | COUNTY: <u>Hampshire</u> | |
| DAM LOCATION: <u>Lake Avenue, south end of pond</u> (street address if known) | | ALTERNATE DAM NAME: <u>Hammond Pond Dam</u> | |
| USGS QUAD.: <u>Goshen, MA</u> | | LAT.: <u>42.406328</u> LONG.: <u>-72.798989</u> | |
| DRAINAGE BASIN: <u>Westfield</u> | | RIVER: <u>Webster Brook, tributary to the Westfield River</u> | |
| IMPOUNDMENT NAME(S): <u>Hammond Pond</u> | | | |
| <i><u>GENERAL DAM INFORMATION</u></i> | | | |
| TYPE OF DAM: <u>Earthen Embankment</u> | | OVERALL LENGTH (FT): <u>205</u> | |
| PURPOSE OF DAM: <u>Recreation</u> | | NORMAL POOL STORAGE (ACRE-FT): <u>250</u> | |
| YEAR BUILT: <u>prior to 1900</u> | | MAXIMUM POOL STORAGE (ACRE-FT): <u>415</u> | |
| STRUCTURAL HEIGHT (FT): <u>17.0</u> | | EL. NORMAL POOL (FT): <u>96.4</u> | |
| HYDRAULIC HEIGHT (FT): <u>12.9</u> | | EL. MAXIMUM POOL (FT): <u>100.5</u> | |
| <i><u>FOR INTERNAL MADCR USE ONLY</u></i> | | | |
| 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: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

INSPECTION SUMMARY

DATE OF INSPECTION: October 10, 2009

DATE OF PREVIOUS INSPECTION: October 22, 2003

TEMPERATURE/WEATHER: low 50's ° F

ARMY CORPS PHASE I: YES NO If YES, date _____

CONSULTANT: Tighe & Bond, Inc.

PREVIOUS DCR PHASE I: YES NO If YES, date October 22, 2003

BENCHMARK/DATUM: Assumed datum used in report, USGS normal pool elevation is approximately 1,222 feet

OVERALL PHYSICAL
CONDITION OF DAM: SATISFACTORY

DATE OF LAST REHABILITATION: 2000

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

EL. POOL DURING INSP.: 96.6

EL. TAILWATER DURING INSP.: N/A

PERSONS PRESENT AT INSPECTION

| <u>NAME</u> | <u>TITLE/POSITION</u> | <u>REPRESENTING</u> |
|----------------------------------|-------------------------|-------------------------------|
| <u>Cathleen A. Benben, P. E.</u> | <u>Project Engineer</u> | <u>Tighe & Bond, Inc.</u> |
| <u>Robert Labrie</u> | <u>Dam Monitor</u> | <u>Hammond Acres Club</u> |
| | | |
| | | |
| | | |

EVALUATION INFORMATION

E1) TYPE OF DESIGN

Click on box to select E-code

4

E2) LEVEL OF MAINTENANCE

5

E3) EMERGENCY ACTION PLAN

4

E4) EMBANKMENT SEEPAGE

4

E5) EMBANKMENT CONDITION

5

E6) CONCRETE CONDITION

4

E7) LOW-LEVEL OUTLET CAPACITY

5

E8) LOW-LEVEL OUTLET CONDITION

Click on box to select E-code

5

E9) SPILLWAY DESIGN FLOOD CAPACITY

5

E10) OVERALL PHYSICAL CONDITION

4

E11) ESTIMATED REPAIR COST

\$12,500

ROADWAY OVER CREST

YES

BRIDGE NEAR DAM

YES

NAME OF INSPECTING ENGINEER:

Cathleen A. Benben, P.E.

SIGNATURE:

Cathleen A Benben

| | | |
|---|--|---|
| NAME OF DAM: <u>Hammond Acres Lake Dam</u> | | STATE ID #: <u>2-8-108-1</u> |
| INSPECTION DATE: <u>October 10, 2009</u> | | NID ID #: <u>MA00176</u> |
| OWNER: ORGANIZATION | <u>Hammond Acres Club</u> | CARETAKER: ORGANIZATION <u>Hammond Acres Club</u> |
| NAME/TITLE | <u>Robert Labrie, Dam Monitor</u> | NAME/TITLE <u>Robert Labrie, Dam Monitor</u> |
| STREET | <u>P.O. Box 923</u> | STREET <u>P.O. Box 923</u> |
| TOWN, STATE, ZIP | <u>Williamsburg, MA</u> | TOWN, STATE, ZIP <u>Williamsburg, MA</u> |
| PHONE | <u>(413) 268-7110</u> | PHONE <u>(413) 268-7110</u> |
| EMERGENCY PH. # | <u>(617) 240-6063</u> | EMERGENCY PH. # <u>(617) 240-6063</u> |
| FAX | | FAX |
| EMAIL | <u>bslabrie@msn.com</u> | EMAIL <u>bslabrie@msn.com</u> |
| OWNER TYPE | <u>Private Association or other non-profit</u> | |
| PRIMARY SPILLWAY TYPE <u>Broad crested weir</u> | | |
| SPILLWAY LENGTH (FT) | <u>23 feet</u> | SPILLWAY CAPACITY (CFS) <u>870</u> |
| AUXILIARY SPILLWAY TYPE | <u>N/A</u> | AUX. SPILLWAY CAPACITY (CFS) <u>N/A</u> |
| NUMBER OF OUTLETS | <u>1</u> | OUTLET(S) CAPACITY (CFS) <u>80</u> |
| TYPE OF OUTLETS | <u>30 inch, gated, D.I.conduit</u> | TOTAL DISCHARGE CAPACITY (CFS) <u>950</u> |
| DRAINAGE AREA (SQ MI) | <u>3</u> | SPILLWAY DESIGN FLOOD (PERIOD/CFS) <u>100 year/592</u> |
| HAS DAM BEEN BREACHED OR OVERTOPPED | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | IF YES, PROVIDE DATE(S) _____ |
| FISH LADDER (LIST TYPE IF PRESENT) | <u>None</u> | |
| DOES CREST SUPPORT PUBLIC ROAD? | <input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO | IF YES, ROAD NAME: <u>Lake Avenue</u> |
| PUBLIC BRIDGE WITHIN 50' OF DAM? | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | IF YES, ROAD/BRIDGE NAME: <u>Lake Ave. off of Chesterfield Road</u> MHD BRIDGE NO. (IF APPLICABLE) _____ |

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

EMBANKMENT (CREST)

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|-------------------------------------|---|-----------|---------|--------|
| CREST | 1. SURFACE TYPE | Gravel road along center, grassed edges | | X | |
| | 2. SURFACE CRACKING | None observed | | X | |
| | 3. SINKHOLES, ANIMAL BURROWS | None observed | | X | |
| | 4. VERTICAL ALIGNMENT (DEPRESSIONS) | Good alignment | | X | |
| | 5. HORIZONTAL ALIGNMENT | Good alignment | | X | |
| | 6. RUTS AND/OR PUDDLES | Small ruts at right side of bridge | | | X |
| | 7. VEGETATION (PRESENCE/CONDITION) | Thin stand of grass cover along edges of gravel road on crest | | X | |
| | 8. ABUTMENT CONTACT | Good | | X | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

ADDITIONAL COMMENTS: _____

groundwater flow

NAME OF DAM: Hammond Acres Lake Dam STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009 NID ID #: MA00176

EMBANKMENT (D/S SLOPE)

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|------------------------------------|--|-----------|---------|--------|
| D/S SLOPE | 1. WET AREAS (NO FLOW) | Wet area at downstream toe at right abutment | | | X |
| | 2. SEEPAGE | None observed | | X | |
| | 3. SLIDE, SLOUGH, SCARP | Minor slough caused by mowing equipment | | | X |
| | 4. EMB.-ABUTMENT CONTACT | Good | | X | |
| | 5. SINKHOLE/ANIMAL BURROWS | None observed | | X | |
| | 6. EROSION | No erosion | | X | |
| | 7. UNUSUAL MOVEMENT | None observed | | X | |
| | 8. VEGETATION (PRESENCE/CONDITION) | Grass covered slope is well maintained | X | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

ADDITIONAL COMMENTS: The wet area at the toe near the right abutment is believed to be caused by groundwater flowing down the slope from the right abutment. The dam owner is currently planning to install a curtain drain downstream of the right abutment to intercept, and redirect, the water past the downstream toe.

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

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. | Stone masonry training wall at spillway - poor condition; rip rap between spillway and gatehouse | | | X |
| | 3. SINKHOLE/ANIMAL BURROWS | None observed | | X | |
| | 4. EMB.-ABUTMENT CONTACT | Good | | X | |
| | 5. EROSION | None observed | | X | |
| | 6. UNUSUAL MOVEMENT | None observed | | X | |
| | 7. VEGETATION (PRESENCE/CONDITION) | Upstream slope is covered with well maintained grass above the rip rap | | X | |

ADDITIONAL COMMENTS: Recommend repair of right spillway training wall

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

INSTRUMENTATION

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|----------------------------|---|-----------|---------|--------|
| INSTR. | 1. PIEZOMETERS | None | X | | |
| | 2. OBSERVATION WELLS | None | X | | |
| | 3. STAFF GAGE AND RECORDER | None | X | | |
| | 4. WEIRS | None | X | | |
| | 5. INCLINOMETERS | None | X | | |
| | 6. SURVEY MONUMENTS | None at dam | X | | |
| | 7. DRAINS | 30-inch low level outlet; 6-inch toe drain installed parallel to low level outlet | | X | |
| | 8. FREQUENCY OF READINGS | N/A | X | | |
| | 9. LOCATION OF READINGS | N/A | X | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

DOWNSTREAM MASONRY WALLS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR | |
|----------------|-----------------------------------|-----------------------|------------|---------|--------|--|
| D/S WALLS | 1. WALL TYPE | | | | | |
| | 2. WALL ALIGNMENT | | | | | |
| | 3. WALL CONDITION | | | | | |
| | 4. HEIGHT: TOP OF WALL TO MUDLINE | min: _____ m _____ g: | N/A | | | |
| | 5. SEEPAGE OR LEAKAGE | | | | | |
| | 6. ABUTMENT CONTACT | | | | | |
| | 7. EROSION/SINKHOLES BEHIND WALL | | | | | |
| | 8. ANIMAL BURROWS | | | | | |
| | 9. UNUSUAL MOVEMENT | | | | | |
| | 10. WET AREAS AT TOE OF WALL | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

UPSTREAM MASONRY WALLS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|-----------------------------------|--|-----------|---------|--------|
| U/S WALLS | 1. WALL TYPE | Spillway training walls: Left is field stone masonry, Right is stone masonry | | | X |
| | 2. WALL ALIGNMENT | Left is good, right is tipping forward | | | X |
| | 3. WALL CONDITION | Left is good, right is cracked and misaligned | | | X |
| | 4. HEIGHT: TOP OF WALL TO MUDLINE | min: 1.5 feet max: 4.5 feet avg: 2.0 feet | | | X |
| | 5. ABUTMENT CONTACT | Good at left side | | | |
| | 6. EROSION/SINKHOLES BEHIND WALL | Erosion behind right wall, no erosion behind left wall | | X | |
| | 7. ANIMAL BURROWS | None | | X | |
| | 8. UNUSUAL MOVEMENT | Right training wall is tipping forward however the wall has been in this condition for several years | | | X |

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam STATE ID #: 2-8-108-1
 INSPECTION DATE: October 10, 2009 NID ID #: MA00176

DOWNSTREAM AREA

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|----------------------------------|---|-----------|---------|--------|
| D/S AREA | 1. ABUTMENT LEAKAGE | Wet area at right abutment | | | X |
| | 2. FOUNDATION SEEPAGE | Controlled seepage discharging from 6-inch under drain | | X | |
| | 3. SLIDE, SLOUGH, SCARP | None observed | | X | |
| | 4. WEIRS | N/A | X | | |
| | 5. DRAINAGE SYSTEM | 6-inch toe drain runs parallel to low level outlet conduit - steady discharge | X | | |
| | 6. INSTRUMENTATION | N/A | X | | |
| | 7. VEGETATION | Downstream area is covered with well maintained grass | X | | |
| | 8. ACCESSIBILITY | Easy access from top of dam | X | | |
| | 9. DOWNSTREAM HAZARD DESCRIPTION | Significant Hazard - dam is located upstream of Scout Pond Dam | | | |
| | 10. DATE OF LAST EAP UPDATE | March-02 | | | update |

ADDITIONAL COMMENTS: Wet area at right abutment appears to be the result of water flowing from the area upgradient to the right of the dam.
It does not appear to be seepage through the dam. The owner is currently planning to install a curtain drain on the slope to the right of right of the dam to mitigate the wet conditions at the toe after heavy rainfall events.

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

MISCELLANEOUS

| AREA INSPECTED | CONDITION | OBSERVATIONS |
|----------------|------------------------------------|--|
| MISC. | 1. RESERVOIR DEPTH (AVG) | 4-5 feet |
| | 2. RESERVOIR SHORELINE | Wooded with development along the perimeter of the pond |
| | 3. RESERVOIR SLOPES | Moderately sloped along shorlines |
| | 4. ACCESS ROADS | Access is by Lake Ave., a gravel road that traverses the dam. |
| | 5. SECURITY DEVICES | No security devices preventing access to the dam. The gatehouse is locked. |
| | 6. VANDALISM OR TRESPASS | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO WHAT: |
| | 7. AVAILABILITY OF PLANS | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO DATE: 2000 Replacemnt of Low Level Outlet |
| | 8. AVAILABILITY OF DESIGN CALCS | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO DATE: |
| | 9. AVAILABILITY OF EAP/LAST UPDATE | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO DATE: March-02 |
| | 10. AVAILABILITY OF O&M MANUAL | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO DATE: March-02 |
| | 11. CARETAKER/OWNER AVAILABLE | <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO DATE: at time of inspection |
| | 12. CONFINED SPACE ENTRY REQUIRED | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO PURPOSE: |

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

PRIMARY SPILLWAY

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|-----------------------------------|--|-----------|---------|--------|
| SPILLWAY | SPILLWAY TYPE | Overflow wier with flashboards in place | | X | |
| | WEIR TYPE | Broad crested | | X | |
| | SPILLWAY CONDITION | Masonry training walls, masonry bridge pier in center, concrete crest - good cond. | | X | |
| | TRAINING WALLS | Right upstream training wall in poor condition; other stone masonry in good cond. | | | X |
| | SPILLWAY CONTROLS AND CONDITION | 24-inches of flashboards in place - good condition | X | | |
| | UNUSUAL MOVEMENT | None observed | | X | |
| | APPROACH AREA | Hammond Pond | X | | |
| | DISCHARGE AREA | Natural stony channel - Webster Brook | X | | |
| | DEBRIS | No debris present | | X | |
| | WATER LEVEL AT TIME OF INSPECTION | Approximately 2 inches of water flowing through the spillway. | | | |

ADDITIONAL COMMENTS: Flashboards are removed for the winter months.

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

AUXILIARY SPILLWAY

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

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

OUTLET WORKS

| AREA INSPECTED | CONDITION | OBSERVATIONS | NO ACTION | MONITOR | REPAIR |
|----------------|---------------------------|---|-----------|---------|--------|
| OUTLET WORKS | TYPE | 30-inch low level conduit | X | | |
| | INTAKE STRUCTURE | 30-inch circular opening on upstream face of gatehouse foundation | X | | |
| | TRASHRACK | Attached to upstream face of gatehouse | X | | |
| | PRIMARY CLOSURE | Sluice gate | X | | |
| | SECONDARY CLOSURE | None | X | | |
| | CONDUIT | 30-inch ductile iron | X | | |
| | OUTLET STRUCTURE/HEADWALL | Headwall in good condition. Small chipped area on downstream face | | | X |
| | EROSION ALONG TOE OF DAM | None observed. Outlet location protected by rip rap stone | X | | |
| | SEEPAGE/LEAKAGE | No leakage past gate; seady flow from toe drain | | X | |
| | DEBRIS/BLOCKAGE | None , recently operated by caretaker | X | | |
| | UNUSUAL MOVEMENT | None observed | X | | |
| | DOWNSTREAM AREA | Natural channel to Webster Brook - no debris | X | | |
| | MISCELLANEOUS | | | | |

ADDITIONAL COMMENTS: _____

NAME OF DAM: Hammond Acres Lake Dam

STATE ID #: 2-8-108-1

INSPECTION DATE: October 10, 2009

NID ID #: MA00176

CONCRETE/MASONRY DAMS

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

ADDITIONAL COMMENTS: _____

APPENDIX C
Previous Reports and References

PREVIOUS REPORTS AND REFERENCES

Inspection/Evaluation Report for Hammond Pond Dam prepared by Tighe & Bond, Inc., dated May, 2004.

Notice of Inspection of Hammond Acres Lake Dam completed by the DEM Office of Dam Safety and dated May 3, 2000.

Inspection Report for Hammond Acres Lake Dam performed by the Massachusetts DPW on September 10, 1976.

Inspection Report for Hammond Acres Lake Dam performed by the Massachusetts DPW on October 9, 1974.

Inspection Report for Hammond Acres Lake Dam performed by the Massachusetts DPW on January 14, 1972.

Reports on the general condition of Hammond Lake Dam as part of the Reports of Inspection of Dams Located in Goshen, MA, dated 1970, 1964, 1963, 1958 and 1957.

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.