

Feasibility Study:

Short-Term, Six-Foot Draw Down of Bare Hill Pond

SUBMITTED TO: Bare Hill Pond Committee

PREPARED BY: David E. Ross Associates, Inc.

November 2000

DAVID E. ROSS ASSOCIATES, INC.

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Overview

The purpose of this report is to provide a general feasibility evaluation of a six-foot draw down below the normal level of Bare Hill Pond. The purpose of the drawdown is for the purpose of weed control. It is our understanding that 43-inch winter draw down has been used in the past, and that the Committee's limnology consultant (Lycott) has recommended a short-term, six-foot draw down for more effective weed control results.

No evaluation of the effectiveness of the draw down, nor any comparison with other methods to address the weed control problem, is included in the scope of this report.

This report is based upon the concept of implementing a draw down that would begin in early October of each year and extend until a five-to-ten day period of freezing temperatures had elapsed, as suggested to the Committee by others. The following sections provide general descriptions, cost estimates and time frames for the services required to implement the draw down.

Given the level of data available at this time, only generalizations are provided regarding the permit process and the level of site disturbance. Specific recommendations and analysis are not a part of this study, as they cannot be given at this time. The intent of this study is to provide guidance to the Bare Hill Pond Committee in regard to obstacles upstream and downstream of the dam, with cost estimates needed to study these obstacles.

Description

Bare Hill Pond is a recreational pond with a surface area of 329 acres at normal pool elevation. The pond is used for swimming, fishing, boating and other water sports. Surrounding the pond are seasonal and year-round homes, a camp, and the Town beach. The reported maximum depth of the pond is approximately 10 feet.

Bowers Brook, the pond's principal tributary, flows northerly into the pond and exits again below the dam. Water continues to flow northerly from the dam, flows under Route 110 and flows under Under Pin Hill Road. It joins Cold Spring Brook to become Nonacoicus Brook, then flows easterly through a series of ponds in Ayer, then into the Nashua River.

Bare Hill Pond Dam is a six-foot (6') earthen dam, approximately 235 feet long, constructed in the 1940s. The principal spillway is an eight-foot (8') long concrete sluiceway with stoplogs 60 feet from the left abutment. An inspection of the dam by Hydraulic & Water Resources Engineers, Inc. for the MA Department of Environmental Management in 1987 reported the dam's condition as "fair." Remedial measures were recommended. The dam is identified by number as follows: MA DEM (Massachusetts Department of Environmental Management) ID# 3-14-125-1; U. S. Army Corp of Engineers ID # MA 00822

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Physical Obstacles

Dam Outlet Control Structure

Robert Gillespie from RW Gillespie & Associates a geotechnical firm, examined the dam at our request. Their proposal indicates that it appears possible to construct an outlet control structure which would allow a 6 foot drawdown without having to rebuild the dam structure.

Rt. 110 and Underpin Hill Road Culverts

Mr. Gillespie indicated that the culverts at Rt. 110 and Under Pin Hill Road will need to be lowered or by-passed. It appears at this time, that it would be preferable to bore under the existing roads and install additional culverts. This would not disturb the existing culverts and would avoid the long term impacts of draining the wetlands due to the consequences of the lowered culverts. This task appears to be feasible, but will entail a geotechnical analysis and significant sheeting, bracing and de-watering under Rt. 110.

Depot Road Culvert

Based on field location of the culvert inlets at Depot, it appears to this office that this culvert will also have to be lowered. It can be assumed the same type of geotechnical analysis and borings will have to be prepared for this task. Additional culverts will also need to be installed under the road to maintain adequate slope for gravity flow.

Installation of a culvert through the wetlands between the dam and Rt. 110 and Rt. 110 and Under Pin Hill Road

Since the invert of the cross culvert at Rt. 110 is higher than the elevation of the 6 foot drawdown, it will be necessary to install approximately 1500 linear feet of pipe from the dam, through the wetlands to Rt. 110 and Under Pin Hill Road. The pipe must be at slope which will allow for a gravity flow out of the pond. This firm walked the area with a representative of Reginald Bates and Sons, Inc. and had additional conversations with Rob Gillespie. They both indicated that installation of a pipe is preferable to excavating a ditch and that it is possible to accomplish this task. The pipe will be subsurface and therefore, disturbance to the wetlands will be temporary. However, there is also a potential for impacts to the groundwater, wetlands and the wildlife within the wetlands during construction.

Installation of a culvert between Under Pin Hill Road and Depot Road

Approximately 3,000 linear feet of culvert will need to be installed within the wetland between Under Pin Hill Road and Depot Road so as to allow for continued gravity flow out of the pond. During the walk with Mr. Bates, he indicated that the installation of a pipe is a preferable to excavating a ditch. There is also a potential for impacts to the groundwater, wetlands and the wildlife within the wetlands during construction.

Excavation (dredging) within Bare Hill Pond

This firm measured the approximate depth of the pond in the vicinity of the dam structure. The results are that a pipe approximately 115 feet long will have to be excavated into Bare Hill Pond to provide for a gravity flow for a drawdown of 6 feet. Further discussions with Mr. Gillespie indicated an Outlet Works structure, similar to a drain standpipe with controls, could be installed to control the outflow from the pond.

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Groundwater

In order to lower the level of the pond six feet, potential impacts to groundwater will have to be studied. Denis D'Amore, PhD, P.E., L.P.S., of D'Amore Associates, Inc., was contacted by this office to provide a proposal to complete this study. The study will include a drainage analysis and predictive stream flow analysis to predict how the water table will be affected by the proposed project. In addition to this study, an investigation of how the scientific data relates to the community will be necessary. Private drinking water wells serve households in the area of the pond. Depending upon their depth, a six-foot draw down could affect the ability of these wells to provide water supply. The 1987 Whitman and Howard study includes a survey of private wells in the vicinity of the pond. A new survey may be needed to determine wells that may be affected and to provide a basis for selecting a temporary means to supply water to affected households.

Environmental Issues

- Reports from consulting specialists in wetlands, geotechnical engineering, wildlife biology and hydrology would be necessary to complete the environmental impact studies and permitting processes.

Wetlands

A study of the impacts caused by the short term, six-foot draw down on the wetland value function will be required completed the permitting process. The project will have to be designed so that there is compliance with local, state and federal regulations. This may involve design and implementation of mitigating measures for both the installation of a pipe and lowering of water table.

Wildlife

There may be potential effects of a six-foot draw down on wildlife in the pond, in its watershed and in the area downstream of Bare Hill Pond Dam. These may include, but not be limited to the following: impacts to invertebrate species diversity when sediment thoroughly freezes; impacts to beavers observed downstream; impacts to any vernal pools affected by lowering of water table; impacts to fisheries due to decline in invertebrates and insects; impacts to fish mortality due to a decline in dissolved oxygen; and impacts to habitat of state-protected species downstream (Bowers Brook).

Lee McLaughlin, an aquatic biologist/fisheries specialist for MA Fisheries & Wildlife, was contacted by this office to review and update comments from that office included in the Whitman and Howard Feasibility Study prepared in 1987. Mr. McLaughlin indicated that downstream stocking is still practiced. Maintaining some flow downstream is important; stopping flow altogether is not acceptable. The pond must be full by ice melt to protect spring spawners. In general, draw downs have negative impacts on some fish populations (chain pickerel, golden shiners, yellow perch) and positive impacts on others (small mouth bass). McLaughlin emphasized the need for a wildlife study that would include a close look at invertebrates and rare species.

The 2000-2001 Atlas of the Natural Heritage & Endangered Species Program (NHESP), MA Division of Fisheries & Wildlife, identifies an area on Bowers Brook downstream from the pond as a priority habitat of rare species and an estimated habitat of rare wildlife. Usually, notification of NHESP occurs as part of the Notice of Intent Process

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(please see Harvard Conservation Commission). Earlier notification is recommended. The relationship of this project to the Massachusetts Endangered Species Act regulations (MESA) is significant to its general feasibility. Pursuant to MESA, a "taking" of a state-protected species requires a Conservation Permit. A "taking" is defined as "to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt nesting, breeding, feeding or other migratory activity..." (321 CMR 10.02). Brian Butler of Oxbow Associates, Inc., a wildlife zoologist, has been contacted by this office to provide a proposal for field work, analysis and documentation regarding impacts to wildlife and wildlife habitat. The proposal will be tiered, showing scope and costs for a wildlife study and, if needed, Conservation Permit preparation and representation.

Groundwater

Please see **Physical Obstacles**, above.

Cultural Resources (archaeological/historical)

No known unique historical or archaeological features would be impacted by the proposed project. A 1986 letter from the Massachusetts Historical Commission indicated their agency had no concerns regarding proposed weed control strategies, including water level manipulation. Further research is needed to determine whether new data exists that may change the MHC's previous determination of "no significant impact."

Permitting

Town of Harvard

Planning Board/ Board of Selectmen – While it is not clear at this time whether or not Site Plan Review by the Planning Board or Board of Selectmen is required for this project, we recommend voluntary submission. Section 7.2 of the Protective Bylaw says that "Site Plan review may be 'informal' in which case the result is a recommendation to another Board or to an applicant; or 'formal', in which case the result is a recommendation to the Inspector of Buildings." Because it is our understanding that public funding will be needed for this project, and because public cooperation will be needed for some aspects of the project (e.g. well survey – see **Physical Obstacles -Groundwater**), we suggest that the level of public comment and participation afforded by the Site Plan review process is advisable, regardless of whether it is technically required.

In addition to Site Plan approval, an Earth Moving permit may be required, for dredging activities.

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Conservation Commission— Permitting under the local wetlands bylaw and Wetlands Protection Act is concurrent and requires filing a Notice or Notices of Intent with the Harvard Conservation Commission for work within areas subject to protection. The new Riverfront Regulations also apply, as Bowers Brook falls under that jurisdiction. Filings would be necessary for the dredging and structural changes, for any culvert alterations or additions, and for the draw down itself. In response to a Notice of Intent, the Commission issues an Order of Conditions that sets conditions and performance for the proposed work.

Board of Health – Further inquiries are needed to determine how local regulations pertaining to the Harvard Board of Health apply to this project. In any case, it is recommended that the Board of Health be involved in local permitting early in the process due to the potential for impacts to private drinking water wells and the need for cooperation if the project is to succeed.

• Commonwealth of Massachusetts

MA Department of Environmental Protection - Chapter 91 Waterways Permit
Since Bare Hill Pond is a Great Pond and dredging will be proposed, a Chapter 91 Waterway Permit will be required. This application is filed after the Conservation Commission has issued a valid Order of Conditions and a MEPA filing has been completed. (Please also see Harvard Conservation Commission and Army Corp of Engineers.)

MA Department of environmental Protection - Water Quality Certificate (401)
A Water Quality Certificate is required for certain activities that meet or exceed defined thresholds for work in vegetated wetlands and land under a waterbody. The purpose of the state 410 permit is to ensure that a project will comply with state water quality standards and other appropriate requirements of the state law.

MA Historical Commission - Project Notification Form
A letter of 1986 included in the Whitman and Howard study appendices notes that the Massachusetts Historical Commission believed “no significant impacts” to cultural resources were anticipated in relation to any of the proposed remedies to eutrophication of Bare Hill Pond. Fieldwork and other research continually expand the state’s inventory of cultural resources, so notification of MHC may now produce different results. Additionally, MHC now requires applicants to submit a Project Notification Form (PNF) for their review of projects before permits from other state agencies are issued. If the project requires MEPA review, the cultural resources section of the Environmental Notification Form (ENF) acts in place of the PNF. It has been the experience of this office that, as with the notification to NHESP, submitting a PNF early in the planning stages of a project is advisable in order to expose early any issues that may substantially affect the feasibility of a project. We recommend that a PNF be filed as early as possible, in advance of and in addition to the ENF required for MEPA.

MEPA - ENF/EIR

Project review under the Massachusetts Environmental Policy Act regulations (301 CMR 11.00) is an extensive, statewide process of examination of major

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development projects and other proposed activities with potential major impacts to the environment. The process is conducted and coordinated by the office of the Secretary of Environmental Affairs. The MEPA review is a critical juncture in permitting, as no state agency is allowed to issue permits for a project that qualifies for MEPA review until the Executive Office of Environmental Affairs issues a Certificate, a document certifying that the MEPA review process has been completed.

The MEPA regulations require that an Environmental Notification Form (ENF) be filed if a project is expected to exceed certain thresholds of impact(s) specifically noted in state regulations. In this case of this project, we anticipate that MEPA review will be required for alteration for wetlands and, possibly, other issues, e.g. rare species. Data supplied by technical consultants (D'Amore, Oxbow Associates, R. W. Gillespie & Associates) would be utilized in completing ENF documents. Notice of the ENF is published in the Environmental Monitor (a Massachusetts Executive Office of Environmental Affairs publication) and local newspapers. Copies are sent to local Town boards, to state agencies, and to the regional planning agency. A public comment period of twenty (20) days follows this publication. Ordinarily, this phase of the review process also includes a site visit conducted by the MEPA staff.

MEPA then will review the ENF and will determine whether or not a full Environmental Impact Report (EIR) is required or whether a Certificate can be issued following review of ENF documents and comments submitted regarding the information contained therein. The review period for an ENF lasts thirty (30) days, but may be extended by the Secretary of Environmental Affairs.

This project may exceed one of the thresholds for a mandatory Environmental Impact Report (EIR); also, it is within the authority of the Secretary of Environmental Affairs to include other issues in his requested "scope." Generally, an Environmental Impact Report includes expanded information regarding the environmental issues addressed in the ENF and other issues raised during the public comment period. There is a provision in the MEPA regulations to request a single EIR be accepted. We would recommend making this request. Usually a draft report (DEIR) is prepared and is followed by a thirty-day comment period. The Secretary of Environmental Affairs then decides either that DEIR is adequate and can be considered a Final Environmental Impact Report (FEIR) or that substantive issues remain to be addressed. In the latter case an augmented report is required. If an FEIR is required, a new scoping letter is issued, and the report preparation and comment and review process is repeated. Occasionally, even a third report is required (Supplemental Final Environmental Impact Report or SFEIR) before a Certificate is issued. If the request for a Single EIR is accepted, the process can be shortened considerably.

Massachusetts Endangered Species Act (MESA) – Conservation Permit
The 2000-2001 Atlas of the Natural Heritage & Endangered Species Program (NHESP), MA Division of Fisheries & Wildlife, identifies an area on Bowers Brook downstream from the pond as a priority habitat of rare species and an

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estimated habitat of rare wildlife. Usually, notification of NHESP occurs as part of the Notice of Intent Process (please see Permitting - Harvard Conservation Commission). Earlier notification is recommended. The relationship of this project to the Massachusetts Endangered Species Act regulations (MESA) is significant to its general feasibility. Pursuant to MESA, a "take" of a state-protected species is requires a Conservation Permit. A "take" is defined as "to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt nesting, breeding, feeding or other migratory activity..." (321 CMR 10.02).

Other regulatory filings

Army Corp of Engineers - 404 Permit

The New England District of the U.S. Army Corp of Engineers has issued a Programmatic General Permit that expedites review of minimal impact work in coastal and inland waters and wetlands within the Commonwealth of Massachusetts. When local or state approvals are required, they must be obtained prior to requesting the general permit. In the case of this project, these local and state approvals include: Order of Conditions under the Massachusetts Wetlands Protection Act (MGL c. 131 Section 40); and a Waterways License, i.e. a permit under MGL c. 91 (also defined in 310 CMR 9.05) from the MA DEP. In addition to the permits included in the General Permit, individual permits from the Corp may be required for excavation and/or dredging if certain thresholds are exceeded. A table provided by the Corp is included in the appendices of this report.

Chapter 91 - Waterways Permit

Since Bare Hill Pond is a Great Pond and dredging will be proposed, a Chapter 91 Waterway Permit will be required. This application is filed after the Conservation Commission has issued a valid Order of Conditions and a MEPA filing has been completed.

NPDES

This filing consists of a confirmation that the site is able to meet the federal and Massachusetts criteria for storm water management. This filing requires the applicant to confirm, to both the Commonwealth of Massachusetts and to the Federal Government that no pollution be recharged to surface waters. They require that the potential for any spills or contaminants will be addressed prior to entering the stream and thereby possibly polluting any waters or other regulated areas.

Cost Estimate

This firm has contacted a number of companies who have expertise in the areas outlined above. At this stage, the actual procedures and materials to be used for excavating, dredging, culvert replacement and permitting required have not been established. Also, the resulting environmental impacts and mitigating measures of the project will not be determined until the studies have been completed. Thus it is impossible to generate a definitive cost estimate for the studies and construction based on the level of information available. However we have made an effort to provide the Committee with a "Ball Park" estimate based on the level of information available.

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We asked each company we contacted for costs estimates. We were unable to obtain written estimates from all companies, but rather received verbal estimates. We estimated the permitting costs and time frames based other comparable projects worked on by this firm. These numbers should be used for reference only. More definitive estimates can be generated at a later date if the Committee wants to pursue this method of weed removal. Multiple estimates for the same task should be obtained if the Committee is going request funding from state and local agencies.

The following are estimates based on the limited information available at this time:

Studies and Permitting

R.W. Gillespie and Associates, Inc.

Consulting Geotechnical and Environmental Specialists
Dam and culvert geotechnical study.

Estimated \$10,150.00 to \$10,750.00. See enclosed proposal.

Note: This does not include and evaluation of the Depot Road culvert.
Additional fees should be anticipated.

D'Amore Associates, Inc.

Environmental and Ground Water Consulting
Evaluate the hydrological effects on area from drawdown.
Verbal "ball park" estimate based on phone conversations

Estimated cost of \$7,000.00 (may be revised)

Note: This does not include any costs associated with mitigating measures
for persons who may experience adverse impacts to their wells.

OxBow Associates, Inc.

Biological/wildlife study

A verbal estimate was received from Brian Butler, principal of the company. Due to presence of Blandings turtles in the area the project may receive considerable scrutiny from Natural Heritage. It is always difficult to anticipate the level of involvement of Natural Heritage or what they will require for studies. A drawdown of the pond of 6 feet may alter the groundwater levels in the wetland and adversely impact species in the wetland.

Estimated cost \$25,000 to \$30,000

David E. Ross Associates, Inc.

Preparation of plans, (based on input from consultants), preparation of filing applications, representation at meetings, site walks for Planning Board filing, Conservation Commission Notice of Intent, Natural Heritage filing, MEPA ENF filing, Chapter 91 Waterway Permit application, Army Corp and Water Quality Certificate applications (if necessary).

Estimated cost \$50,000.00

ESTIMATED TOTAL

\$92,150.00 to \$95,750.00

Construction Related

R.W. Gillespie and Associates, Inc.

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- It is not clear at this time, before further study of potential impacts and discussion with permitting agencies, what will be the extent of the permits required. This will become known after the site investigations are completed by the consulting specialists and the dialogue is opened with permitting agencies. At this time it appears that the project may take 18 to 24 months to obtain all permits. There is no guarantee that permits will be issued by the permit granting authorities.
- The potential costs of the anticipated project as it appears at this time could be in the vicinity of \$1,200,000.00 to \$1,500,00.00
- Additionally, we would like to note that this report does not include any evaluation of the efficacy of the proposed plan. It is our recommendation that the Committee solicit one or more additional opinions from limnologists, including an opinion from a Massachusetts Department of Environmental Management (DEM) staff limnologist, to evaluate the overall concept of weed control through short-term draw down. It may be beneficial to contact other towns who have completed this procedure and discuss the results of the process.

Enclosed:

Plan: Profile by David E. Ross Associates, Inc., dated November 2000.

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