RESPONSE

319 NONPOINT SOURCE POLLUTION GRANT PROGRAM

RFP # BRP 2003-02

SUBMITTED BY:

TOWN OF HARVARD
BARE HILL POND WATERSHED MANAGEMENT COMMITTEE

HARVARD, MA

June 2, 2003

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Administrative Summary

RESPONDENT - Town of Harvard -- Bare Hill Pond Watershed Management Committee
Bruce Leicher, Chair

Address – Town of Harvard
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Harvard, MA 01451

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PROJECT TITLE – Bare Hill Pond Noxious Aquatic Plant Reduction

WATERSHED(S)/SUBWATERSHED(S) SERVED BY THIS PROJECT – Nashua Basin, Bare Hill Pond Watershed, Clapp's Brook Subwatershed, Pond Road Inlet Subwatershed, Thurston's Brook Subwatershed, Bowers Brook Subwatershed, Sprague Swamp Subwatershed

PROJECT CATEGORY(IES) - see Section III. A response may encompass more than one project category.

- X **A. Implementation**
  - X Category 4A waters
  - ☐ Category 4C waters
  - ☐ Category 5 waters
  - ☐ NPS Action Strategy or Nonpoint Source Management Plan
  - ☐ EOEA Workplan
- ☐ **B. Demonstration**
- ☐ **C. Outreach and Education**
- ☐ **D. Technology Transfer**

AMOUNT OF FUNDING REQUESTED AND AMOUNT AND PERCENT OF MATCH FUNDING PROPOSED -

Federal Funds via DEP	$195,000	
Non-Federal Match	$134,850	41% of Total Budget
Total Project Budget	$329,850	

PROJECT SUMMARY/OBJECTIVES – Address the Water Quality Standards violations documented in the Bare Hill Pond TDML by: (1) reducing the existing biomass of noxious aquatic plants with the TDML-recommended actions of monitored winter drawdowns and harvesting; and by (2) reducing the current levels of NPS phosphorus pollution through education and outreach. This project also proposes the development of a DEP-approved permitting template and mobile/reusable equipment for pumped drawdowns that can be shared across the state for water bodies such as Bare Hill Pond that have downstream obstacles in the protected wetlands that preclude effective gravity drawdowns.

PRINCIPAL CONTACT -

Bruce Leicher, Chair, Bare Hill Pond Committee	(617) 444-2150	(617) 374-0074
Name and Title	Telephone	Facsimile

AUTHORIZED SIGNATORY -

Laurence M. Finnegan Chairman, Board of Selectmen, Town of Harvard

All respondents must complete, execute and return the **CONTRACTOR AUTHORIZED SIGNATURE VERIFICATION FORM** attached to this RFR (see Attachment A).

I. STATEMENT OF THE PROBLEM

Bare Hill Pond in Harvard, Massachusetts is a 321-acre, municipally managed pond in the Nashua Basin. The pond is moderately developed although it maintains the rural nature of the community due to largely forested environs. As described in the TMDL (DEP DWM TMDL Report MA81007-1999-001), the pond was originally 200 acres surrounded by pasturelands. In 1838, the pond was dammed bringing it to its present size. The damming of the pond, the prior surrounding agriculture uses and more recent residential development has brought it to its present day condition. Accelerated eutrophication and extensive prevalence of invasive aquatic plants seriously interfere with recreational uses and wildlife habitats. The Town sees the goals of the pond as:

1 – Maximizing recreational use, particularly swimming, canoeing, sailing, rowing, fishing and motorized boating
2 – Maintaining a diverse native community of plants and animals.
3 – Maintaining water quality suitable to recreational and habitat goals

Given the Town's goals and recognition that this is an extremely important natural resource of the community, the Bare Hill Pond Watershed Management Committee has been active over four decades in trying to maintain the quality of this resource. The TMDL, as well as 1998 and 2002 ENSR reports on the quality of the water and aquatic plant growth in the pond, find that the pond suffers from extensive growths of invasive plants such as variable milfoil, waterchestnuts, water lilies, fanwort, smartweed, and pondweed. The pond has elevated nutrient levels, particularly in terms of phosphorous concentrations and macrophyte growth. The excessive growth of invasive species has been due to shallow water depths, bottom sediment rich in nutrients from macrophyte growth and historical uses, and sustained nutrient enrichment from the pond's watershed.

The water quality of the pond and the data on the invasiveness of the plants has been documented since 1987. Four reports define the problem and provide a historical perspective for this project. The full reports and/or excerpts can be found attached to this proposal (Attachment A). They include the 1987 Whitman and Howard report, the 1998 ENSR report, the 2000 TMDL report, and the 2002 ENSR report. The 1998 findings show average total phosphorus concentration at the surface at 0.044 mg/l, and 2002 measurements show an extensive plant coverage with a significant portion of the pond between 25-75% sediment coverage, and some areas as high as 99% sediment coverage (see figure 3 in attached 2002 ENSR report).

The Town, through the Bare Hill Pond Watershed Committee, has overseen and conducted drawdowns, weed harvesting, manual weed pulls and application of herbicides over a forty-year period. During the 1990's, drawdowns and weed harvesting were sporadic, dependent upon the weather conditions (wet vs. dry year) and the functioning of the weed harvester. In addition, pond drawdowns are now permanently constrained to less than 4 feet by the downstream topology of the wetlands and constructed culverts, far less than the minimum 6 feet recommended in the assessments to be fully effective.

PROJECT GOALS

1 – Contain, control and ultimately reduce the level of invasive plant growth in the pond so that total plant coverage is reduced to the recommended level of 30% sediment coverage, as measured along existing transect points.
2 – Reduce the level of phosphorous in the pond from 0.044 mg/l towards the recommended goal of 0.030 mg/l

As a result of meeting these goals, we intend to start reversing the pond's current eutrophic state, so as to enhance the habitat areas for existing wildlife and maintain the desired recreational uses of the pond. The project will also deliver a sharable, transferable, and reusable pumping technology development to allow for an improved winter drawdown BMP.

TARGETED POLLUTANTS

The targeted pollutants are the existing invasive plants, particularly milfoil and water-chestnuts, and phosphorus which is present due to the buildup in the pond sediment (largely from invasive species decomposition) and the additional influx of nutrients through the watershed.

ESTIMATED QUANTITY OF POLLUTANTS TO BE REMOVED

Invasive weeds: Given the limited depth of gravity drawdowns, we will focus on weed reduction in the areas of the pond less than 4 feet in depth. Based on the existing transect measurement points as documented in Appendix A of the attached 2002 ENSR report, we intend to reduce the number of points having >25% sediment coverage from the current level of 24 out of 29 points (83%) to less than <9 points (<30%) by the end of this program. Development of the pumped drawdown technology will allow us to attack the invasive weeds in the deeper areas of the pond.

Phosphorous: Since the focus of this proposal is to address the influx of NPS phosphorous from pond abutters through education and outreach, our goal is to influence at least ½ of all abutters to voluntarily embrace septic and fertilizing BMPs as measured by repeated and quantifiable surveys. We will also continuously measure the level of resultant phosphorous abatement to better quantify the contribution of external phosphorous loading vs. internal recycling from sediments and decomposing plant material. This data will drive recommendations concerning formal town bylaw changes for watershed abutters and/or future proposals for selective silt removal from the pond.

PROJECT STRATEGY

1- Utilize gravity drawdowns, measuring the effectiveness and monitoring the impact of this method in combination with weed harvesting and manual weed pulls.
2- Develop the means to provide for a controlled incrementally deeper (four to eight foot) drawdown using a pumping system, based on the results of the four-foot gravity drawdowns.
3- Educate the abutters and town residents as to the impact of their activities on the level of nutrients in the pond, with specific recommendations for reducing external phosphorus loading.

MILESTONES - See attached milestone chart

ACTIVITIES -See attached Scope of Services

Note that there are no permitting issues, as all proposed harvesting, drawdown, and monitoring activities are currently approved under an existing and renewable Order of Conditions (DEP File No. 177-427).

PROJECT EVALUATION – ENVIRONMENTAL INDICATORS

The project will be measured through a program of environmental monitoring of the watershed. Based on the development of a QAPP, specific measures will be identified. For purposes of this proposal, at a minimum, the following will be included in the QAPP:

1- Annual measurement of invasive aquatic species growth at defined sites.
2- Annual measurement of the impact of the drawdown on downstream and contiguous wetlands at defined sites.
3- Water quality measurements to be taken periodically from defined locations in the pond and in the inputs and outputs to the pond at defined times each year
4- Annual measurement of impacts on mammalian species, reptiles and amphibians, and birds by conducting field surveys.
5- Survey of abutters on their knowledge and changes in attitude and habits regarding their activities that impact the watershed.

The techniques for the evaluation (excluding #5) are defined in the March 2002 ENSR Report and baseline evaluations were taken by ENSR as part of the application for the Order of Conditions for the existing four foot gravity drawdown. These techniques were further reviewed by the Conservation Commission in connection with the issuance of the Order of Conditions and modified to allow for volunteer participation in the monitoring efforts. This ensures that we have active on-going community participation prior to the award of the grant and the processes in place for the evaluation portion of the project.

OUTREACH-TECHNOLOGY TRANSFER

The existing Order of Conditions for the four-foot drawdown and for continuation of the project requires that the Bare Hill Pond Watershed Management Committee be actively involved in including the local community. A key element for stemming the eutrophication of the pond is to reduce, to the extent possible, all loading of nutrients into the pond. We intend to use the results of the monitoring to communicate with residents in the watershed about the impact of their activities and hope to engage them in the monitoring process. We intend to meet with the abutters and to provide them with literature and information on best management practices that can reduce nutrient loading. We also hope to educate the community at large through newspaper articles and school projects on the impact all residents make on the watershed regardless of where they live.

More importantly, we believe that this project will be one of the first drawdown projects that will be able to utilize the GEIR being issued this year as a basis and template for the use of drawdowns for invasive aquatic weed management. We also believe that the development of a template for a deeper pump-assisted drawdown using the GEIR as a jumping off point, will be of use to other ponds and lakes in the state contemplating such actions. We intend to make available our template to other watershed management groups to facilitate their efforts and to offer to use it in a workshop at the annual Congress of Lakes and Ponds (COLAP) meeting.

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Scope of Services

TASK/OBJECTIVE #_1_: Development of the QAPP

A baseline for water quality monitoring and for the monitoring of the level of invasive aquatic species is set forth in the 1998 ENSR Study of Bare Hill Pond. This baseline was used for further measurements in the March 2002 ENSR Study which formed the basis for the issuance of the Order of Conditions and monitoring to be conducted in connection with the existing drawdowns. The Order of Conditions further defined the protocols acceptable for monitoring by volunteers in addition to professionals. In order to ensure that the planned drawdowns and the educational and outreach activities have demonstrable effects and are measured consistently with federal standards, a professional consultant will be retained to develop a QAPP based on these monitoring obligations. The QAPP will ensure that we are able to properly document the benefits of the project and that environmental risks are properly addressed.

DELIVERABLES: QAPP for use in measuring the efficacy and environmental impact of the drawdowns and the educational and outreach activities that are performed in the course of the project.

ESTIMATED COST: $5,000 s.319 SHARE: $5,000 NON-FEDERAL MATCH SHARE: $0

TASK/OBJECTIVE #_2: Monitoring of the Pond Management Effectiveness and Impact

In accordance with the QAPP, a consultant and volunteers will be engaged to monitor the pond's aquatic weed proliferation, the downstream and contiguous wetlands, water quality and wildlife to comply with the Order of Conditions for the drawdown and to measure the efficacy and impact of the project, all as set forth in the QAPP. Consultant(s) will be selected and hired in accordance with the applicable subcontracting requirements for:

1) Conducting water quality monitoring in Bare Hill Pond, and in the downstream and contiguous wetlands to measure efficacy and environmental impact of drawdowns, weed harvesting and education and outreach in a replicable and reliable manner

2) Project management to oversee day to day activities of volunteers engaged in monitoring activities and compliance with Order of Conditions

3) Report writing on behalf of the grantee as noted under other tasks/objectives

DELIVERABLES: Report of the monitoring activities and quantifiable results measured against the project goals.

ESTIMATED COST: $71,400 s.319 SHARE: $66,000 NON-FEDERAL MATCH SHARE: $5,400

TASK/OBJECTIVE #_3 : Weed Harvesting and Manual Weed pulls

Town DPW personnel operate and maintain a Town-owned weed harvester. Annual maintenance is performed in April and May. With advice from our professional consultant, DPW personnel will operate the weed harvester beginning in June. Harvesting tactics will be coordinated with advice from our consultant to tailor activities to the timing of the invasive species life cycle to maximize its effectiveness. Waterchestnuts harvesting typically occurs prior to seed maturation in June and early July and manual weed pulls occur during this time frame to cover shorelines that are inaccessible to the harvester.

Weed harvesting of variable milfoil and other invasive species occurs during late July and August to ensure recreational access and with professional advice to enhance the effectiveness of the drawdown.

DELIVERABLES: Annual report of the areas of the pond covered by the harvester and the observed impact, including the number of harvested loads.

ESTIMATED COST: $67,500 s.319 SHARE: $0 NON-FEDERAL MATCH SHARE: $67,500

TASK/OBJECTIVE #_4: Gravity Drawdowns

Preparation of reports to the Conservation Commission as required by the Order of Conditions to perform annual gravity drawdowns. Town Department of Public Works (DPW) personnel will regulate the removal and placement of boards in the pond's dam and monitor the debris to assure proper water flow during the drawdown. Town residents will be notified of the initiation of the drawdown and refill to ensure public safety and to protect abutter's property. The pond will be monitored for water levels and rates of flow and rainfall activity in comparison to pond level. Surveys will be done of downstream wetlands to determine potential gravity flow rate.

DELIVERABLES: Annual report on the drawdown including the dates of drawdown, the level of the drawdown, and the observed effects of the drawdown. Survey of the downstream wetlands.

ESTIMATED COST: $16,050 s.319 SHARE: $0 NON-FEDERAL MATCH SHARE: $16,050

TASK/OBJECTIVE #_5: Education and Outreach

A series of local meetings and brochures/mailings will be made to residents in the Bare Hill Pond watershed to inform them of best management practices to reduce nutrient loading into the watershed. Recommendations will be made regarding natural plantings vs. lawn, reduction in fertilizer use, maintenance of septic systems, etc.

Work with the public schools to incorporate watershed management into biology and environmental course curriculums. 4th grade curriculum includes a series on the watershed and high school classes include biology and environmental science.

Publish articles and editorials in the local newspaper to generate public participation and awareness of how each person can contribute to reducing non-point source pollution and on the relationship of this pollution to the growth of invasive aquatic weeds in their local pond.

Initiate and repeat a quantifiable survey of abutters after the education to see if there is a change in attitude and activity.

DELIVERABLES: Accounting of meetings held, copies of brochures/mailings, copies of newspaper articles and survey results.

ESTIMATED COST: $9,000 s.319 SHARE: $6,000 NON-FEDERAL MATCH SHARE: $3,000

TASK/OBJECTIVE #_6: Mobile Pumping Station Design and Construction

Engineering design by a Consultant of a mobile pumping station and platform that can increase the depth of the drawdown beyond the four-foot gravity drawdown potential. This development will be based on the outcomes of the four-foot gravity drawdown. A deeper drawdown would expose a far greater acreage of the pond that is covered by invasive aquatic weeds. A pumping solution would allow for incremental annual increases in drawdown depth to ensure environmental protection through monitoring. Multiple ponds/lakes could share a mobile pumping station because once a lake has been stabilized, drawdown frequency is often not required on an annual basis.

DELIVERABLES: Reusable, transferable engineering design; a certified operational and mobile prototype; and an associated operations and maintenance plan

ESTIMATED COST: $105,000 s.319 SHARE: $77,000 NON-FEDERAL MATCH SHARE: $28,000

TASK/OBJECTIVE #_7: Delivery of a Reusable Permitting Template for Pumped Drawdowns

With a Consultant, develop a generic template for the permitting and operation of a mobile pumping station. Develop the template to be shared with other towns/ponds who plan to develop and implement pumped drawdowns. The template will be developed using the GEIR as its starting point.

DELIVERABLES: Web-based generic permitting termplate for posting on DEP and COLAP websites. Presentation of the results of the Project at the Annual COLAP meeting, and sharing of the template for permitting and operating the mobile pumping station

ESTIMATED COST: $28,000 s.319 SHARE: $23,000 NON-FEDERAL MATCH SHARE: $5,000

TASK/OBJECTIVE #_8: Project Management and Reporting

A consultant will be engaged to ensure that the project is properly managed and to help prepare reports with regard to the activities conducted under each task.

DELIVERABLES: Project Management timelines and assignments for each task; regular required reports describing activities conducted under each task.

ESTIMATED COST: $27,900 s.319 SHARE: $18,000 NON-FEDERAL MATCH SHARE: $9,900

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Project Budget

This budget is for response evaluation purposes. Use the whole dollar method. Indicate which items will be paid for by s.319 funds, and which will be paid for by the non-federal match. Attach additional pages as required..

Expense Items	s.319 Amount	Non-Federal Match	Total Amount
Salary - By Title and salary range Working Foreman $19.04/hr – $23.77/hr Equipment Operator/Mechanic $17.73/hr – $22.03/hr Truck Driver/Laborer $15.05/hr - $16.91/hr		$ 69,000	$ 69,000
Subcontractual Services	$191,000 MBE: $40,000 WBE: $20,000	$ 36,000	$227,000
Equipment and Supplies (including printing, mailing - should include cost for printing 25 copies, at a minimum, of the final project report)	$ 4,000	$ 6,000	$ 10,000
Travel (for mileage only @ 28 cents/mile)			
Other Volunteer services		$ 23,850	$ 23,850
Totals:	$195,000	$134,850	$329,850

SOURCE(S) OF NON-FEDERAL MATCH - List all sources of non-federal match funds and the amount of matching funds being contributed by each source. Letters of support from all organizations (on the organization's letterhead) identified as providing a portion of the non-federal match for the project **must be submitted with the response**. These letters must detail the match to be provided by the organization, and must be signed by an authorized signatory for the organization.

EEO/AA REQUIREMENTS - Identify all budget categories from which it is anticipated that the M/WBE participation goals will be met. Show the anticipated dollar amount of M/WBE participation in each budget category.