

**Stockbridge Bowl Management Project Final Report
Project # 09-02/319**

March 2009 – June 2012

Conducted by the Town of Stockbridge
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PREPARED FOR:

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF RESOURCE PROTECTION

AND

US ENVIRONMENTAL PROTECTION AGENCY
REGION 1

MASS.EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
Kenneth Kimmell, Commissioner

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DIVISION OF MUNICIPAL SERVICES
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MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

SECTION 319 NPS PROJECT 09-02/319

A. Project Snapshot

Project Number and Title: # 09-02/319, *Stockbridge Bowl Management Project*

A1. Project start date: *March 2009*

A2. Date closed: *June 2012*

A3. Basin and HUC 12 subwatershed: *Housatonic / Hop Brook to Williams River HUC12 011000050107*

A4. Segment and/or waterbody number(s): *MA21105_2008*

A5. Status of waterbody (Category 5, etc.): *Category 4C*

A6. Priority Pollutant(s) targeted: *Exotic aquatic plants*

A7. Estimated Annual Pollutant removal (quantity, not percentage)

N:

P:

Sediment:

Bacteria:

Other: *Exotic aquatic plants, most specifically Eurasian water milfoil. The outlet diversion pipe will expose to winter drawdown and freezing conditions an additional 36.9 acres of aquatic plant species habitat. AutoCAD was used to calculate the acreage of exposed area. Additionally, the harvesting program removed an estimated 1,442.5 cubic yards (cy) of aquatic plants during the three summer seasons of 2009-11. Town staff recorded that they removed 144.25 loads of plants during this time, with each load consisting of approximately 10 cy.*

A8. BMPs installed, number and type: *One 48" lake outlet diversion pipe, which will pass the average condition flow of the Stockbridge Bowl outlet channel, the purpose of which is to gain an additional two feet of winter drawdown to control exotic aquatic plant growth.*

B. Descriptive Project Summary

PROJECT TITLE: Stockbridge Bowl Management Project
PROJECT NUMBER: # 09-02/319
NPS CATEGORY: Implementation
INVESTIGATOR: Jane Peirce
LOCATION: Stockbridge, MA 01262
TARGETED POLLUTANTS: Exotic aquatic plants

Stockbridge Bowl, a Great Pond with an area of 366 acres, was listed as a 4c water body impaired by Exotic Species on the 303(d) 2008 Integrated List of Waters. The shallow shoreline and accumulation of sediment in the lower lake provide the perfect growth medium for exotic aquatic plants, primarily Eurasian water milfoil (*M. spicatum*). Three gas lines were laid across the floor of the outlet channel, creating an in-lake berm and impeding outflow. This caused an accumulation of sediment deposits upstream of the berm and restricted the level of winter drawdown that could be achieved. Lake management consultants have recommended that a diversion pipe be installed underneath the gas lines berm to restore flow, limit further sedimentation in the outlet channel, and allow an increased drawdown level of two feet.

The first objective of the s319 project is to install a diversion pipe under the gas pipelines which currently obstruct the channel and inhibit winter drawdown. The 2-foot increase in drawdown level caused by the outlet diversion pipe is expected to expose an additional 36.9 acres of Land Under Water, thus controlling aquatic plant growth in this zone. The second objective is to identify sites that are potential sediment-contributors and to begin to address priority locations. The third goal of this project is to increase local stakeholders' understanding and involvement in exotic aquatic species management and nonpoint source pollution mitigation. Matching funds for the project were drawn from a mix of sources, including funds from the Town, SBA, Community Preservation Act and the Tennessee Gas Pipeline. The Town and SBA were jointly responsible for implementation of this project and shared in fiscal and reporting responsibilities.

The scope of work completed for the project included these tasks:

1. Develop a QAPP for BMPs installed
2. Design and construct the diversion pipe
3. Continue the aquatic plant harvesting program
4. Identify potential NPS contributions within the watershed
5. Design a NPS BMP
6. Develop O&M Plans for the diversion pipe and BMP
7. Conduct public outreach and education
8. Reporting and project oversight

PROJECT COST: \$ 820,949

FUNDING: \$ 244,143 (30%) by the US EPA
\$ 576,806 (70%) by Town of Stockbridge and Stockbridge Bowl Assoc.

DURATION: 2009 – 2012

C. Project Finances

The first three budget columns represent the original contract budget. The fourth column represents actual final project totals.

<u>Expense Item</u>	319 Budget Amount	Match Budget	Total Budget	Actual Budget
Salaries				
Town of Stockbridge				
Procurement Officer (\$25-\$28/hr)	\$ 0	\$ 2,000	\$ 2,000	\$ 0
Administration (\$28-\$32/hr)	\$ 0	\$ 4,000	\$ 4,000	\$ 0
Harvesting staff (\$19 - \$22/hr)	\$ 0	\$ 36,000	\$ 36,000	\$21,443
Clerk of the Works*				\$42,510
Stockbridge Bowl Association (\$25/hr)	\$ 0	\$ 13,000	\$ 13,000	\$ 0
<i>Subtotal Salaries</i>	\$	\$ 55,000	\$ 55,000	\$ 63,953
Subcontractual				
ENSR				
Engineering, permitting, construction oversight	\$ 13,000	\$ 21,000	\$ 34,000	\$ 79,114
BMP design	\$ 4,500	\$ 4,500	\$ 9,000	\$ 8,400
Construction contractor(s)	\$105,000	\$155,000	\$260,000	\$491,420
Town Counsel	\$ 0	\$ 2,000	\$ 2,000	\$ 15,982
BRPC^	\$ 10,000	\$ 30,000	\$ 40,000	\$ 30,503
Project admin., NPS Survey, outreach				
Tenn Gas*	\$ 0	\$ 0	\$ 0	\$ 15,269
<i>Subtotal Subcontractual</i>	\$132,500	\$212,500	\$345,000	\$640,688
Materials and Supplies				
BMP materials	\$111,000	\$157,000	\$268,000	\$111,000
Copying, postage, misc. office	\$ 2,000	\$ 2,000	\$ 4,000	\$ 683
Harvester program direct costs^	\$ 0	\$ 34,000	\$ 34,000	\$ 4,625
<i>Subtotal Materials, Supplies</i>	\$113,000	\$193,000	\$306,000	\$116,308
Totals	\$245,500	\$460,500	\$706,000	\$820,949
Percent	35%	65 %	100%	116%

* Note: Clerk of the Works and Tennessee Gas Company were not original budget items

^ Note: \$4,625 in harvester direct costs and \$4,744 in BRPC costs were inadvertently left out of match totals in financial submittals to DEP; thus the total budget figure given here is greater than those submitted to DEP by approximately \$9,369.

One budget amendment occurred during the life of the project. During final engineering of Task 2, the diversion pipe, it was discovered that the construction cost for installing the pipe would likely reach \$894,000, which was more than double earlier cost estimates. This significant cost increase put Task 2 construction in jeopardy. To bring additional funds to the diversion pipe component of the project, the Town requested and subsequently received permission to amend the scope of work and budget for Task 5. The amendment maintained the design of a BMP to address a NPS site on the lake, but removed the requirement to construct the BMP. The budget for the design of the Task 5 BMP remained at \$9,000, but the budget items for Construction Contractors and BMP Materials (totaling \$216,000) were dedicated solely to construction of the Task 2 outlet diversion pipe.

D. BMP Summary

1. Type of BMP: Outlet diversion pipe
2. Date of implementation: Winter 2011 – Spring 2012
3. Size of treatment area: 36.9 acres.
4. Area land use: the diversion pipe was installed in LUW in the lake outlet. Land use along the shoreline of the outlet is a mix of: forest, medium density residential development (1/4 – 1/2 acre lots), low density residential (1/2 – 1 acre lots), very low density residential (>1-acre lots) and powerline/utility, as categorized by MassGIS.
5. Pollutant load removed: Exotic aquatic plants
6. Method of pollutant load removal determination:
 AutoCAD: 3-dimensional surface was created in AutoCAD, and 1-foot contours were interpolated to create the area calculations. See Appendix A for contour map utilized. Calculations assumed that before the diversion pipe was installed the maximum achievable drawdown level for the lake was two feet, and that after the diversion pipe the maximum achievable drawdown will be four feet (61.7 – 24.8 = 36.9 acres new exposed area). These calculations include the areas for Stockbridge Bowl and the outlet.

Depth in feet	Area (Acres)	Difference in Area (Acres)	Land Under Water Area Exposed (Acres) by Increased Drawdown
0	380.5		
1	369.2	11.3	11.3
2	355.7	13.5	24.8
3	340.7	15.0	39.8
4	318.9	21.9	61.7
5	301.8	17.0	78.7
6	291.6	10.2	88.9

The estimations in this report were determined using the appropriate estimation model(s) and applied according to the procedures prescribed for the model. To the best of my knowledge these are reasonable estimates using appropriate methods. Documentation is kept on file by the Town of Stockbridge and the Berkshire Regional Planning Commission and is available for review by DEP / EPA.

Jorja-Ann P. Marsden

Jorja-Ann Marsden,
 Town Administrator,
 Town of Stockbridge

E. Lessons Learned

Landowner Permission -- Critical

The original engineering design for the outlet diversion pipe called for the pipe to be installed underneath an upland area in the outlet channel. This location would reduce in-lake construction and wetland resource impacts. The landowner was a member of the SBA and had given verbal approval to commence with design of the diversion pipe underneath his land in 2008. Engineering continued through mid-2009 while the Town of Stockbridge and the SBA continued legal negotiation for a permanent easement on the pipe corridor. However, the negotiations stalled and the Town and SBA were forced to look for a new location for the diversion pipe.

After considerable time and re-engineering, project partners relocated the diversion pipe into the middle of the outlet channel in late-2009. A new access road needed to be designed, approaching the outlet channel from the east, rather than from the west as previously designed. To add to the complexity, the new access road would be crossing the Tennessee Gas pipelines, requiring special design and materials to allow heavy equipment to cross the pipelines without damaging them. Now the project not only required Tennessee Gas's approval for construction of the diversion pipe underneath the gas lines, but it also required gas company approval and easements for construction of the access road over the pipelines. After several months of site plan submittals, negotiations and conditioning of work plans, Tennessee Gas finally approved the construction plans in mid-November 2010. The project promptly went out to bid in late November and a contractor was chosen, but construction was not able to commence until the following winter (2011-12).

The landowner problem significantly increased engineering and legal fees, and the new access way made negotiations with Tennessee more complex and lengthy. However, once the gas company finally approved the construction specifications, the project moved smoothly forward. In fact, Tennessee Gas provided staff to be on sight during any time that work was conducted near their pipelines at no cost to the Town, providing the project with more than \$15,000 in additional local match. These three factors allowed construction to proceed on time and on budget: 1) the gas company's cooperation during construction, 2) the contractor's experience and willingness to meet challenges, and 3) a relatively mild winter with little snow.

Clerk of the Works – Very Beneficial

The Town of Stockbridge hired a Clerk of the Works to oversee the completion of the Town Offices Building rehabilitation and construction of a major water works project. The Town extended the Clerk's contract so that he could also oversee the Stockbridge Bowl construction project. The presence of this experienced Clerk kept the construction project on time and worked with the contractor to contain work changes and costs. The Clerk acted not only as the Town's agent in dealing with the contractor and his staff, but also acted as a liaison between town officials, the out-of-town engineering firm and the Tennessee Gas Company. Although the cost of retaining the Clerk cost the town approximately \$42,000, he worked diligently to keep change work order costs to a minimum, approving only \$19,000 in work change costs out of more than \$205,000 in work change order proposals. The Clerk's Project Closeout Report can be found in Appendix B.

F. Harvester Report

The Town of Stockbridge runs a harvester program in Stockbridge Bowl each summer season. Town staff run the harvester and record the number of loads of weeds that are removed each day. Town staff estimate that each full load of weeds is approximately 10 cubic yards of plant material. A total of 144.25 loads of weeds were removed during the years 2009-2011, for a total of 1,442.5 cubic yards of weeds that were removed during that time period.

Season	Total Number of Loads of Aquatic Weeds Removed for Season	Total Cubic Yards (cy) of Weeds Removed for Season, where 1 Load = 10 cy
2009	43.75	437.5
2010	59.00	590.0
2011	41.50	415.0
	<i>Total cubic yards of weeds removed 2009-2011</i>	<i>1,442.5</i>

G. Outreach

Berkshire Regional Planning Commission (BRPC) served as the outreach coordinator for the project, developing outreach materials, conducting presentations and overseeing field work conducted as part of the Watershed Survey Report. Materials are found in Appendix F. A bulleted list of activities and materials include:

- Public presentation on NPS and information booth at Stockbridge Bowl Day festivity, August 2010. Handouts: Rainy Day Survey, Stockbridge Bowl NPS brochure, After the Storm
- SBA Newsletter articles 2012, 2012
- Massachusetts Buffer Manuals provided to SBA, town hall, town library
- NPS presentation to SBA Board of Directors 2012, including handouts listed above
- Local participation in field work and input for Watershed Survey Report
- Lakefront property owner survey, with explanatory tips on reverse side
- Direct NPS outreach to town DPW and Parks and Recreation as part of Town Beach BMP
- Local newspaper article on project, including EPA/DEP funding acknowledgement
- NPS website update to include environmental and NPS information, with links to other useful websites

APPENDIX A. Quality Assurance and Project Evaluation

The Stockbridge Outlet Diversion Pipe construction is covered under the Massachusetts DEP's 319 Programmatic Quality Assurance Project Plan, approved by US EPA on March 16, 2006. Exotic aquatic plants are the targeted pollutant for this project. Ryan Lizewski, PE, of AECOM, created a 3-dimensional surface in AutoCAD, and interpolated 1-foot contours to recreate the lake floor and achieve area calculations. His calculations assumed that before the diversion pipe was installed the maximum achievable drawdown level for the lake was two feet, and that after the diversion pipe the maximum achievable drawdown will be four feet (61.7 – 24.8 = 36.9 acres new exposed area). These calculations include the areas for Stockbridge Bowl and the outlet.



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6	291.6	10.2	88.9

APPENDIX B: Diversion pipe materials:

- Construction plans and specs
- Final “as-built” drawings
- Engineer’s certificate
- Photodocumentation of site
- Project Closeout Report

APPENDIX C: Watershed Survey Report

APPENDIX D: Town Beach BMP Design Report and Site Plans

APPENDIX E: O&M Plan for diversion pipe

APPENDIX F: Public Outreach materials:

- Landowner survey and results
- Newsletter articles
- Materials offered at presentations and outreach activities
- Ecological section on the Stockbridge Bowl Association website (Note: to be completed autumn 2012)