Planning Assistance to States

Assabet River, Massachusetts
Sediment and Dam Removal Feasibility Study

DRAFT

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US Army Corps
of Engineers
New England District

Executive Summary

The purpose of this study is to provide planning assistance to the Massachusetts Department of Environmental Protection (DEP). DEP in conjunction with EPA and watershed stakeholders are investigating and implementing measures to improve water quality and the aquatic ecosystem of the Assabet River in order to meet its Class B water quality standard ("fishable and swimmable"). The study's role in this effort is to provide scientific and engineering information that will inform the decision making process.

For most of its length, the Assabet River suffers from the effects of severe eutrophication due to nutrient loadings (particularly phosphorus) from wastewater treatment facilities (WWTFs), nonpoint sources, and sediments. Nuisance aquatic vegetation impairs designated uses including recreation, aesthetics, and fish and wildlife habitat. Due to excessive vegetation dissolved oxygen concentrations can vary a great deal over the course of a day particularly during the summer months, threatening the survival of fish and other aquatic organisms in the river. It is also aesthetically objectionable to many who live near the river and/or use the river for fishing and boating and other forms of recreation. Effects are most evident behind the numerous impoundments along the river where nutrients settle out.

The DEP in 2004 prepared a "Total Maximum Daily Load for Phosphorus" (TMDL) for the river to address the eutrophication problem. The TMDL required implementation of measures to decrease phosphorus loading to the river and adopted an adaptive management approach in accordance with EPA approved procedures. The TMDL for the river can be viewed at http://www.state.ma.us/dep/brp/wm/tmdls.htm.

Phase 1 of the TMDL required that the four aging WWTFs discharging to the Assabet River decrease the total phosphorus in their effluent to 0.1 mg/l (April to October) and 1.0 mg/l (November to March). The 0.1 mg/l requirement resulted in the need to add new phosphorus removal technology at the same time as doing significant facility upgrades. These upgrade are currently being implemented and paid for by the communities that own or use the WWTFs.

Phase 2 of the TMDL required additional projects be implemented to continue to decrease total phosphorus loading to the river. The phosphorus TMDL indicated that to achieve water quality standards a 90 percent reduction in sediment phosphorus flux was needed in addition to decreasing the WWTFs effluent to 0.1 mg/l. Measures suggested to achieve the 90 percent sediment phosphorus flux reduction included dam removal and dredging. If these measures were

determined to be inadequate in achieving the desired reduction in phosphorus loading to the river then further decreases in discharges of phosphorus from the WWTFs would be required.

Given the inherent difficulty in predicting the impact of sediment flux under the water quality conditions present at the time the TMDL was developed, it is reasonable from a scientific standpoint to monitor the effectiveness of the present wastewater treatment facility (WWTFs) upgrades before selecting the appropriate option(s) for making the necessary sediment flux reductions and verifying the model predictions. EPA and DEP have developed a detailed monitoring plan for the river to assess conditions following the implementation of phosphorus discharge reductions.

The Corps "Planning Assistance to States" study provides information on dam removal and dredging to decrease sediment phosphorus flux and improve the aquatic habitat of the river. The Corps contracted with CDM to perform river analysis and modeling for the dam removal and dredging assessments.

Dredging analysis results prepared by CDM showed dredging alone would at best achieve only short-term (~ two to four years) reductions in sediment-phosphorus release. This was because the continuing phosphorus discharge from the WWTFs and non-point sources replenish the phosphorus cycling from the sediment. Future monitoring of the effectiveness of the WWTFs upgrades and the rivers response to this decreased loading is needed to assess and verify modeling predictions. Based on the modeling done for this study dredging alone is not considered a viable control measure.

An additional finding of the CDM analysis was that phosphorus discharge in the winter is an important part of the annual phosphorus budget in the Assabet River. This finding appears to indicate that lower winter limits on WWTFs discharge of phosphorus may contribute significantly to reducing sediment phosphorus flux and might be another control measure for DEP and stakeholders to consider to control phosphorus loading to the river. This winter load was previously recognized by DEP in the TMDL and monitoring was required. MassDEP will continue to use an adaptive management approach to evaluate results as measures to decrease phosphorus loading to the river are implemented.

There are six dams on the river that were considered for removal and these are:

- Aluminum City Dam, Northborough
- Allen Street Dam, Northborough
- Hudson Dam, Hudson
- Gleasondale Dam, Stow

- Ben Smith Dam, Maynard.
- Powdermill Dam, Acton

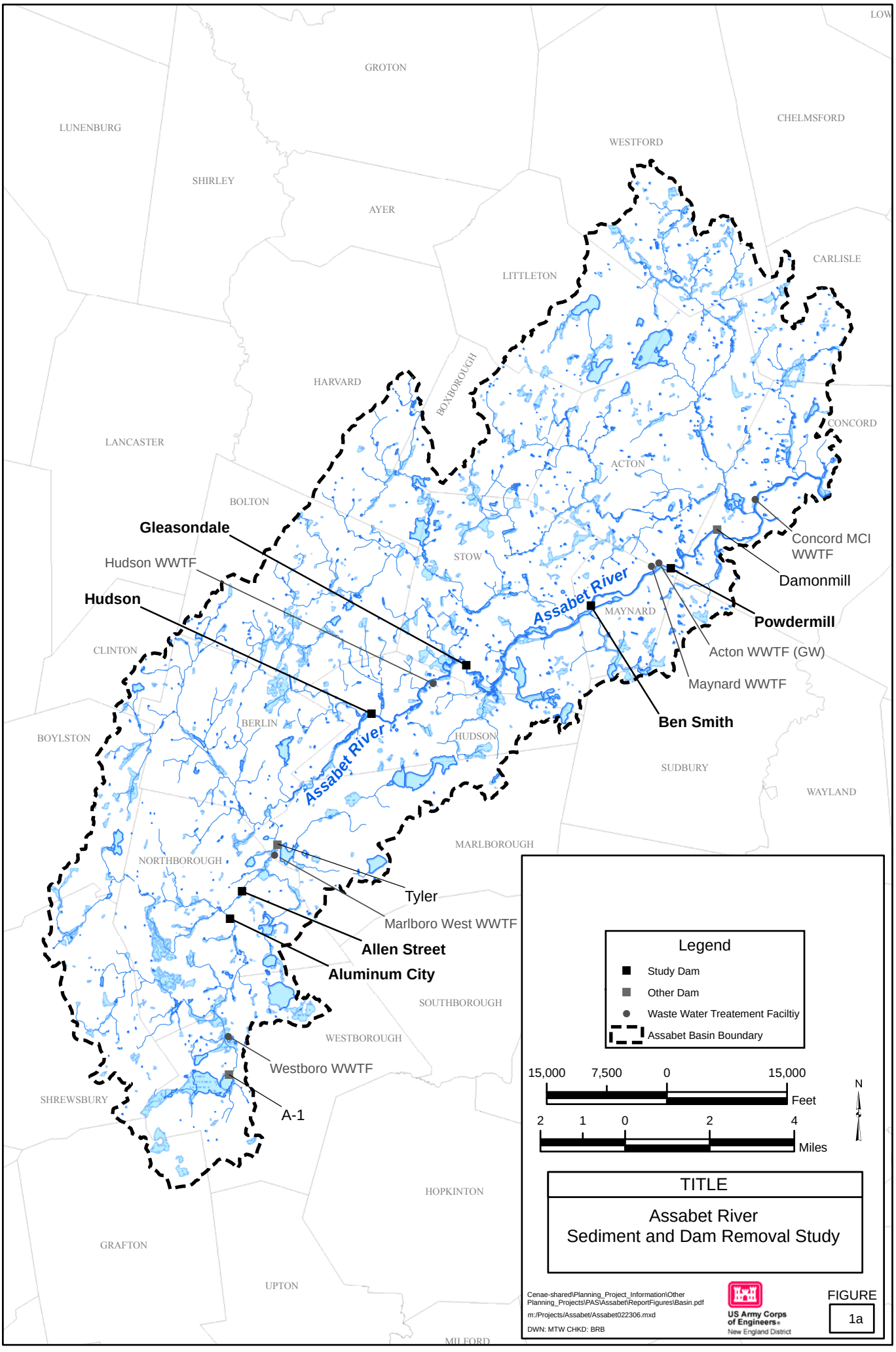
Dam removal analysis showed that dam removal plus the Phase 1 WWTFs improvements would almost meet the 90 percent goal, achieving an estimated 80 percent reduction of sediment phosphorus load. Dam removal will have benefits in the form of improved water quality and restored aquatic ecosystem. Removal of Ben Smith Dam would have the most benefit because it is the longest impounded river reach.

It was determined that dam removal project construction costs may range from $1 million (Aluminum City Dam) to about $13 million (Ben Smith Dam), with a significant portion of the dam removal cost associated with sediment management (dredging and disposal) to prevent excessive movement of sediment downstream.

Removing the dams will change the existing water levels in the river. Many of the wetlands along the Assabet River exist because of the water backed up by the dams. The largest changes in wetlands communities will occur for the Ben Smith, Gleasondale, and Hudson dam removal projects.

All of the dams have identified cultural resource value. Ben Smith, Gleasondale, Hudson, and Allen Street Dams are contributing elements to historic districts eligible for the National Register of Historic Places and removal would be an adverse impact and require further studies and documentation of the resources.

Dam removal is expected to benefit fluvial dependent and fluvial specialist target fish communities for the Assabet River. The U.S. Fish and Wildlife Service is working to restore the migratory corridor to the Sudbury, Assabet, and Concord Rivers to provide access for anadromous species such as alewife to historic breeding and nursery habitats. Dam removal on the Assabet would be consistent with these restoration plans.


GROTON
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LANCASTER
ACTON
BOLTON
STOW
MAYNARD
CLINTON
BERLIN
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WAYLAND
MARLBOROUGH
NORTHBOROUGH
SOUTHBOROUGH
WESTBOROUGH
SHREWSBURY
HOPKINTON
GRAFTON
UPTON
MILFORD
Assabet River
Assabet River
Gleasondale
Hudson WWTF
Hudson
Concord MCI WWTF
Damonmill
Powdermill
Acton WWTF (GW)
Maynard WWTF
Ben Smith
Tyler
Marlboro West WWTF
Allen Street
Aluminum City
Westboro WWTF
A-1
Legend
Study Dam
Other Dam
Waste Water Treatement Faciltiy
Assabet Basin Boundary
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TITLE
Assabet River
Sediment and Dam Removal Study
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DWN: MTW CHKD: BRB
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FIGURE
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