US Army Corps of Engineers ®
New England District

Planning Assistance to States Assabet River Sediment and Dam Removal Feasibilty Study, Massachusetts

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General: For many years, the Assabet River has experienced water quality problems in the form of an overabundance of plant and algal growth. The Massachusetts Department of Environmental Protection (MADEP) has identified that in order to meet water quality standards and eliminate this problem a combination of significant reductions at wastewater treatment facilities discharging to the river and the elimination of sediment collected behind several dams will be needed if feasible and economical to do so. MADEP and the U.S. Environmental Protection Agency (EPA) have already ordered reductions at the wastewater facilities and this study is being conducted to evaluate the feasibility of reducing or removing the sediment or the dams themselves. If implemented these actions are designed to achieve water quality compliance and a sustainable and restored aquatic ecosystem. Water Quality goals are that the restored system must meet Massachusetts State Water Quality Standards for dissolved oxygen, acceptable levels of biomass production, and acceptable ambient phosphorus concentrations. Restoration goals are to improve aquatic habitat for riverine species.

Authority: This river assessment study is being conducted under the Corps Planning Assistance to States Program Authority.

Location of Project: The study extends from the A-1 Impoundment in Westborough to the confluence with the Concord River in Concord, Massachusetts, about 32 river miles. There are nine dams along the river. The focus of the study effort is on six of these dams and their impoundments. The study dams are Powdermill Dam, Acton; Ben Smith Dam, Maynard; Gleasondale Dam, Stowe; Hudson Dam, Hudson; Allen Street Dam, Northborough; and Aluminum City Dam, Northborough.

Background: The pollutant of concern is Phosphorus (P), which is causing excessive production of floating and rooted aquatic vegetation in the Assabet River. This results in Massachusetts Water Quality Standards violations for eutrophication and aesthetics. Phosphorus loadings originate from both point and non-point sources. The point sources include the wastewater treatment plants in Maynard, Hudson, Marlborough, and Westborough.

The EPA and MADEP have developed a Total Maximum Daily Load (TMDL) for phosphorus for the Assabet River. This TMDL requires a reduction in the discharge of P from the four wastewater treatment plants to 0.1 mg/L during the growing season and a 90% reduction of phosphorus sediment flux. The communities will be spending tens of millions of dollars in the next few years to meet the 0.1 mg/L limit.

In addition to wastewater treatment plant improvements, the P-flux from the sediment needs to be decreased. Without implementation of measures to decrease sediment P-flux, it is likely that communities will be required to achieve even lower P limits that are technically challenging and will add considerably to the already expensive wastewater treatment plant upgrades.

Sponsor: The study is being performed under a cost sharing agreement with MADEP. The MADEP has entered into a Memorandum of Understanding with the six Assabet River Consortium communities (Marlborough, Shrewsbury, Westborough, Northborough, Hudson, and Maynard) for the study. The MOU establishes a Study Coordination Team (SCT) made up of twelve members, six from the communities and six selected by MADEP including Organization for the Assabet River (OAR).

Project Status: The following summarizes the

main technical activities being conducted as part of the study.

Modeling Methodology: One of the first study tasks was to develop the modeling approach to assess water quality benefits and changes in water levels and flows for dam removal and dredging alternatives. It was also desired to include a model to provide information on potential sediment movement with dam removal.

The computer model HEC-RAS was selected to simulate river level and flows. HEC-6 was selected to investigate sediment movement. The existing HSPF prepared by ENSR was selected to model water quality. Changes to the HSPF model included more detail on dam and impoundment areas. In addition a spreadsheet model of P-flux was incorporated The modeling was completed in 2007.

Interim Existing Conditions Report: The Corps performed a review of existing conditions for the Assabet River and Impoundments pertinent to the potential dredging and dam removal scenarios. Existing studies and reports were reviewed and field visits conducted to gather information. Findings were presented in the January 2007 report provided to the SCT. Topics included general dam conditions, existing uses of the dams and impoundments, sediment quantity and quality, natural resources, cultural resources, and real estate information. This interim SCT report will be incorporated in the study draft report to be prepared in winter/spring 2008.

Sediment Release Rates: It was determined that additional data on sediment P-flux rates would be beneficial to the study. In the fall of 2006 work was performed by CDM and their sub-consultant Normandeau Associates, Inc., of Bedford, NH to collect sediment cores. 50 sediment cores were collected in late November and early December 2006. Release rates were measured in a controlled laboratory by EnviroSystems, Inc., of Hampton, NH, and included both aerobic and anaerobic measurements performed. The lab report was completed in January 2007. CDM reviewed the results and provided memo on findings in February 2007 to the SCT. These data demonstrated the dynamic nature of the P-flux in the river. The system appears to react quickly to the P-level in the water column. In general, laboratory tests provided negative values of P-flux for both aerobic and anaerobic conditions. Results were reflective of high water column P concentrations that currently occur in the river in the fall and winter months.

Modeling Information : Results of initial modeling set-up and simulations were presented at SCT study meetings in February and March 2007. Flows modeled include 10 and 100-year flows, 7Q10, and summer average flow. Modeling showed that dam removal decreases the 100-year flood elevations in the river and showed decreased water surface elevation for other flows levels modeled. Sediment modeling provided identification of possible areas of sediment transport if dams were to be removed and this information will be used in the assessment of the dam removals.

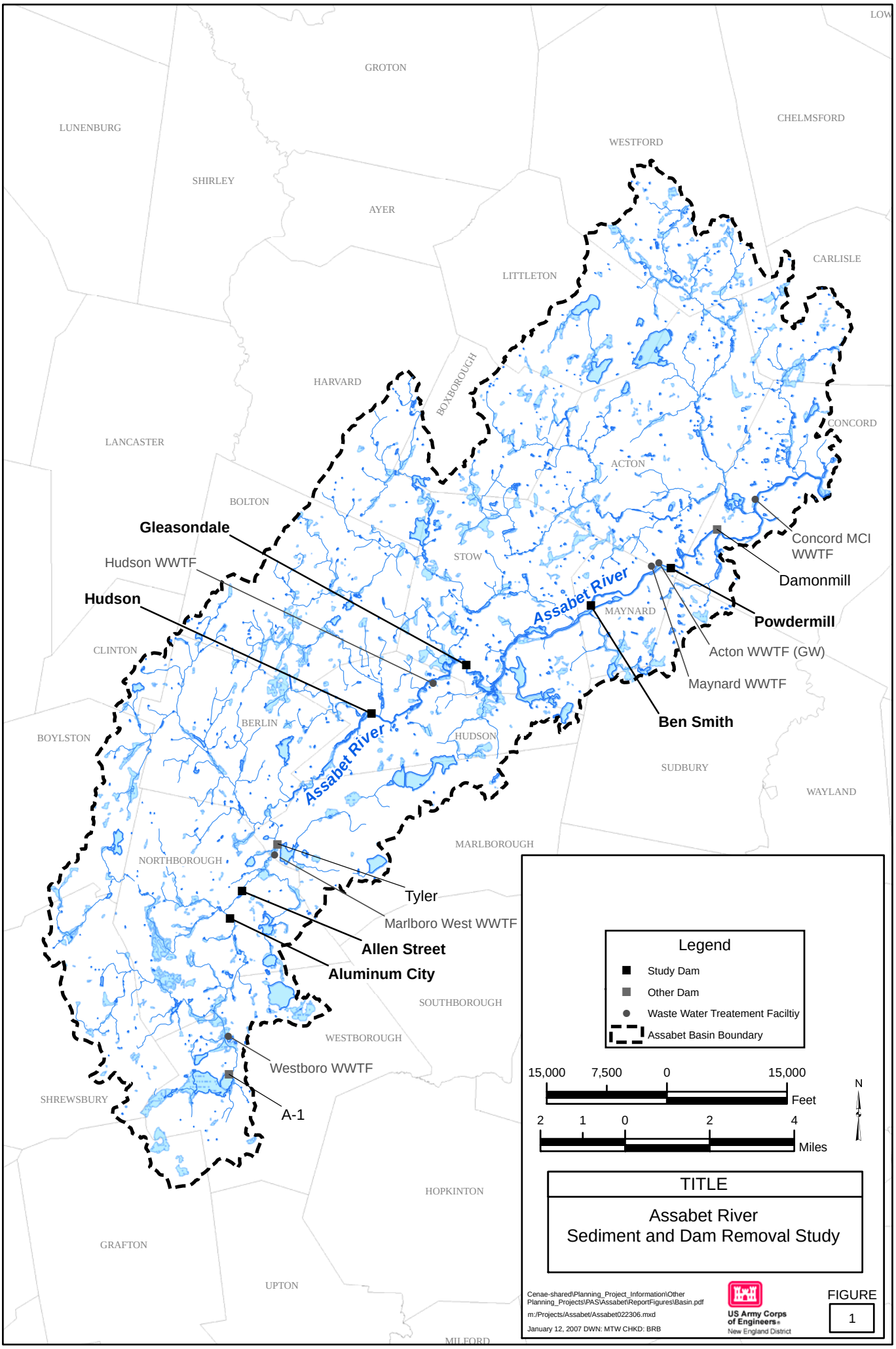
Water quality modeling results for alternatives including removing all dams and dredging showed that dredging generally was not beneficial to water quality over the long term. Dredging would improve P-flux initially, but after a few years P-flux levels returned to pre-dredging conditions. Dam removals did show long term P-flux reductions and water quality benefits when combined with reductions from the wastewater facilities.

On-going Study Tasks to Investigate the Feasibility of Dam Removal:

- Planning level engineering and cost estimates for dam removal. Conceptual depictions of dam removals.
- Preliminary sediment management plans associated with dam removals
- Planning level biological evaluations including wetlands and target fish communities in the Assabet River
- Cultural Resources considerations for dam removals
- Preparation of informational document that incorporates the results of modeling and the costs and benefits of dam removal.

NOTE: If dam removal is pursued by local interests important issues such as wetlands and fire protection would need to be adequately addressed.

Contact Person: The Corps New England District contact is Study Manager, Ms. Barbara Blumeris, at barbara.r.blumeris@usace.army.mil.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STOW
Gleasondale
Hudson WWTF
Hudson
Concord MCI WWTF
Damonmill
Powdermill
Assabet River
MAYNARD
Acton WWTF (GW)
Maynard WWTF
Ben Smith
CLINTON
BERLIN
BOYLSTON
HUDSON
SUDBURY
WAYLAND
MARLBOROUGH
NORTHBOROUGH
Tyler
Marlboro West WWTF
Allen Street
Aluminum City
SOUTHBOROUGH
WESTBOROUGH
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SHREWSBURY
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GRAFTON
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Other Dam
Waste Water Treatement Faciltiy
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TITLE
Assabet River
Sediment and Dam Removal Study
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1