

# Section 1

## Introduction

### 1.1 Background and Purpose

In 2013, the City of Worcester, Massachusetts (the City) began the process of developing a feasibility study to look at possible options for the removal of the Poor Farm Pond Dam (PFPD). The dam is owned by the City of Worcester and is located in the Town of Shrewsbury (Town) on the Worcester-Shrewsbury municipal boundary.

The City is interested in removing the dam since it serves no purpose. The removal of the dam will eliminate potential liability and costs associated with ownership of the dam. Removal of the dam will also restore natural fluvial processes and improve riparian habitat in the dam impoundment and the adjacent reaches of the brook.

### 1.2 Project Scope

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) awarded a \$138,300 grant to the City to conduct a feasibility study of the removal of the Poor Farm Pond Dam. The grant is part of the Sustainable Water Management Initiative (SWMI) program, which is an EEA effort to maintain healthy rivers and streams and improve degraded water resources. The SWMI grant program is aimed at assisting water suppliers with planning projects for specific watersheds, developing implementation projects to improve ecological conditions, and managing projects aimed at reducing the demand for water within a municipality or watershed.

This feasibility study will provide a detailed evaluation of those aspects of dam removal that will lead to a better definition of the feasibility of removal as well as the overall cost. At the conclusion of the study, the City of Worcester will have a more detailed understanding of the potential project benefits, costs, and funding availability for implementation.

The overall scope of this project includes the following:

- Site reconnaissance and review of background data

Under this task, an evaluation of potential infrastructure that could be impacted by dam removal is conducted. This includes a review of available information on the dam and includes a review of archival reports and utilities crossing through or downstream of the dam. It also includes a review of potential stability issues in and around the dam.

- Evaluation of habitat for state-listed rare or endangered species, cultural resources, and resource areas

Under this task, an evaluation of the dam impoundment, land immediately adjacent to the impoundment, and land immediately downstream to ascertain if it is within priority or

estimated habitat for state-listed rare or endangered species. This evaluation was based on maps published by the Massachusetts Natural Heritage & Endangered Species Program and the Historic Register and looked for the presence of cultural resources that could be affected by the dam removal.

- Evaluation of topographic data; sediment characterization with transport and mobility studies

Survey data including LiDAR (Light Detection and Ranging), which was supplemented by a land and bathymetry field survey was used in this feasibility study.

The quantity and characteristics of the sediments upstream of the dam were reviewed. Information on current and past upstream land uses were reviewed from past reports.

Sediment samples were obtained upstream of the dam and analyzed for heavy metals and organic constituents for comparison to sediment screening standards available from Massachusetts Department of Environmental Protection (MassDEP) for landfill reuse and sediment dredging. Samples were analyzed for VOCs, SVOCs, Pesticides, PCBs, Primary Pollutant Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc), Conductivity, TPH, PAH, EPH, volatile solids (%), % water, and grain size analysis (ASTM D422).

Finally, transport capabilities and potential mobility of sediments were assessed upstream and downstream of the dam. Appropriate sediment management options were recommended.

- Hydrologic and hydraulics analyses

Hydrologic and hydraulics analyses were conducted for the Poor Farm Brook watershed. This included the dam, impoundment and surrounding areas to predict water surface and velocity profiles for both existing and post-removal conditions. Options for site stabilization and stream channel restoration were included.

- Alternatives analysis and cost evaluation

An analysis was performed that identified alternatives for deconstruction and removal of the dam, including affected upstream and downstream areas and potential areas requiring restoration or reclamation. Structural stabilization requirements were also identified. Cost estimates were developed that include permitting, engineering, design and construction for each alternative.

- Community interests/concerns workshop

A community workshop was held with the City, Town and various stakeholders and interested parties to present the preliminary assessment and inquire about potential community interests and concerns with removal of the dam.

## 1.3 Project Description and History

### 1.3.1 Project Description

The City owns 29 dams in and around Worcester and adjacent communities. Some of the dams are no longer in use or are no longer used for their intended purpose. These dams require continuous maintenance and in some cases, upgrading so as to not present a public safety hazard, as a failure could cause the sudden release of water in addition to affecting river flows and fish passage. Such dams have been identified by the City as candidates for removal in order to restore natural processes to local rivers, improve public safety, and relieve the City of the liability and the economic burden of construction and maintenance work.

### 1.3.2 Project History

According to the City website and the Worcester Historical Museum archives, the City of Worcester bought the Jennison Tavern on Lincoln Street from Samuel Jennison's widow, Rebecca Jennison, in 1818 for an almshouse. Known as the Home Farm, this piece of land once spanned 600 acres, along Boston Post Road on the Worcester-Shrewsbury line, extending from the present Clark Street School past Lincoln Street to the former Jamesbury plant site and across Mountain Street. In 1853, when Worcester began to deal with welfare and social issues, a main brick building was constructed. A service center, heating plant, and shops were constructed in 1902, with additional buildings constructed early 1930s.

In 1807, the Commonwealth of Massachusetts developed a public welfare program for those impoverished residents who had no traceable hometown. Because Americans feared pauperism, the agricultural exchange program under public welfare moved poor residents out of the City to the Home Farm. Program participants labored on the farm in exchange for housing and food.

While the exact date is unknown, the Home Farm Pond Dam (later called Poor Farm Pond Dam) was built in the late 1800s as a way to provide irrigation for the farm.

In 1872, Worcester set up a Garbage Collection Department and the Home Farm became a piggery as an economical way of getting rid of garbage. This was a common way for municipalities to deal with their garbage at that time; however, Worcester was exceptional because it relied solely on pigs for disposal of garbage until 1932. The piggery expanded and became a major operation. At one time more than 8,500 pigs roamed the Home Farm, and the breeding pens produced more than 1,000 piglets annually. The overwhelming stench and the contamination of the northern end of Lake Quinsigamond from pollution carried downstream by Home Farm Brook led to the piggery becoming a state scandal. The City built an incinerator in 1932 and the piggery at Home Farm closed. The Home Farm continued operating as a dairy herd until 1952 and as a vegetable farm under the name Brookside Home until 1953 when most of it was destroyed by a tornado.

Over the years, dams in the Commonwealth received little attention until 2002 when major revisions were made to the Dam Safety Statute, MGL Chapter 253 §§ 44-50. These revisions established more stringent responsibilities for both public and private dam owners relative to registration, inspection, and maintenance of dams to ensure that they are kept good operating condition. In 2005, the Dam Safety Regulations (302 CMR 10.00-10.16) were amended to reflect the 2002 statutory changes.

Minor revisions to the regulations were also made in 2009. The Department of Conservation and Recreation (DCR) is responsible for enforcing the dam safety program and regulations through its Office of Dam Safety (ODS).

The Poor Farm Pond Dam has a height of 16 feet and impounds a maximum volume of less than 50 acre-feet, and is therefore an Intermediate-size dam according to the criteria established in the Dam Safety Regulations. The dam was previously assigned a Significant Hazard potential classification because no assessment had been made of the potential impacts of failure of the dam. In November 2008, the City submitted an application to the ODS to change the hazard classification of the dam from significant to low based on an assessment that the loss-of-life and property damage potential resulting from failure of Poor Farm Pond Dam would be very slight. In April 2009 this request was approved. As a result of that approval, the regularly scheduled Phase 1 dam safety inspections were adjusted to a 10-year cycle.

### 1.3.3 Project Location

The City of Worcester is located in central Massachusetts, as shown on Figure 1-1. The City is bordered by the communities of Holden, West Boylston, Shrewsbury, Grafton, Millbury, Auburn, Leicester and Paxton. Worcester is the second largest city in New England, and is located approximately 40 miles west of Boston and 38 miles east of Springfield.

**Figure 1-1**  
**Site Vicinity**



The planning area for the PFPD, shown on Figure 1-2 encompasses the area immediately upstream of the dam to Route 70 and the area immediately downstream of the dam, extending to Lake Quinsigamond.

The PFPD (State Dam ID No. 3-14-271-15, NID No. MA02339) is located on the Poor Farm Brook and is tributary to Lake Quinsigamond. The upstream area of the dam (to Route 70) within the wetland delineation is approximately 7.75 acres. The dam structure is owned by the City of Worcester, but is located in the Town of Shrewsbury. It is located at 42°18'04"N, 71°45'42"W, approximately 3.4 miles northeast of downtown. Figure 1-2 shows the site of the dam and the adjacent area from Route 70 to Lake Quinsigamond and includes the municipal boundary between Worcester and Shrewsbury. The existing site conditions are shown on Figures 1-3 and 1-4.

## 1.4 Regulatory Requirements

Environmental permitting requirements for this project will include local, state, and federal regulatory coordination and permits. It is recommended that pre-application coordination with the Shrewsbury Conservation Commission and other local, state, and federal environmental regulatory agencies be scheduled after completion of the Conceptual Design to ensure that all regulatory requirements are addressed and to facilitate the permit approval process. Under the proposed revisions to the Massachusetts Wetlands Protection Act (310 CMR 10.00)(MWPA) dam removal projects would qualify for a General Permit for Ecological Restoration provided they meet the eligibility criteria set forth in the regulations. A proposed revision to the 401 Water Quality Certification Regulations (314 CMR 9.03(8)) exempts an ecological restoration project eligible for a general permit from the requirement to apply for a 401 Water Quality Certification (WQC), provided the project does not require an individual 404 permit from the U.S. Army Corps of Engineers. The Poor Farm Pond Dam removal project is anticipated to require authorization under Category 2 of the General Permit from the Army Corps of Engineers, and as such would not require a 401 WQC if the proposed regulatory changes are implemented. Furthermore, if the project is authorized by a general permit it would be exempt from the environmental review process under the Massachusetts Environmental Policy Act (MEPA).

Approval from the Office of Dam Safety (ODS) is also required under 302 CMR 10.09, which requires that any person(s) who proposes to construct, repair, materially alter, breach or remove a dam, must file with the Commissioner and obtain a Chapter 253 Dam Safety Permit.

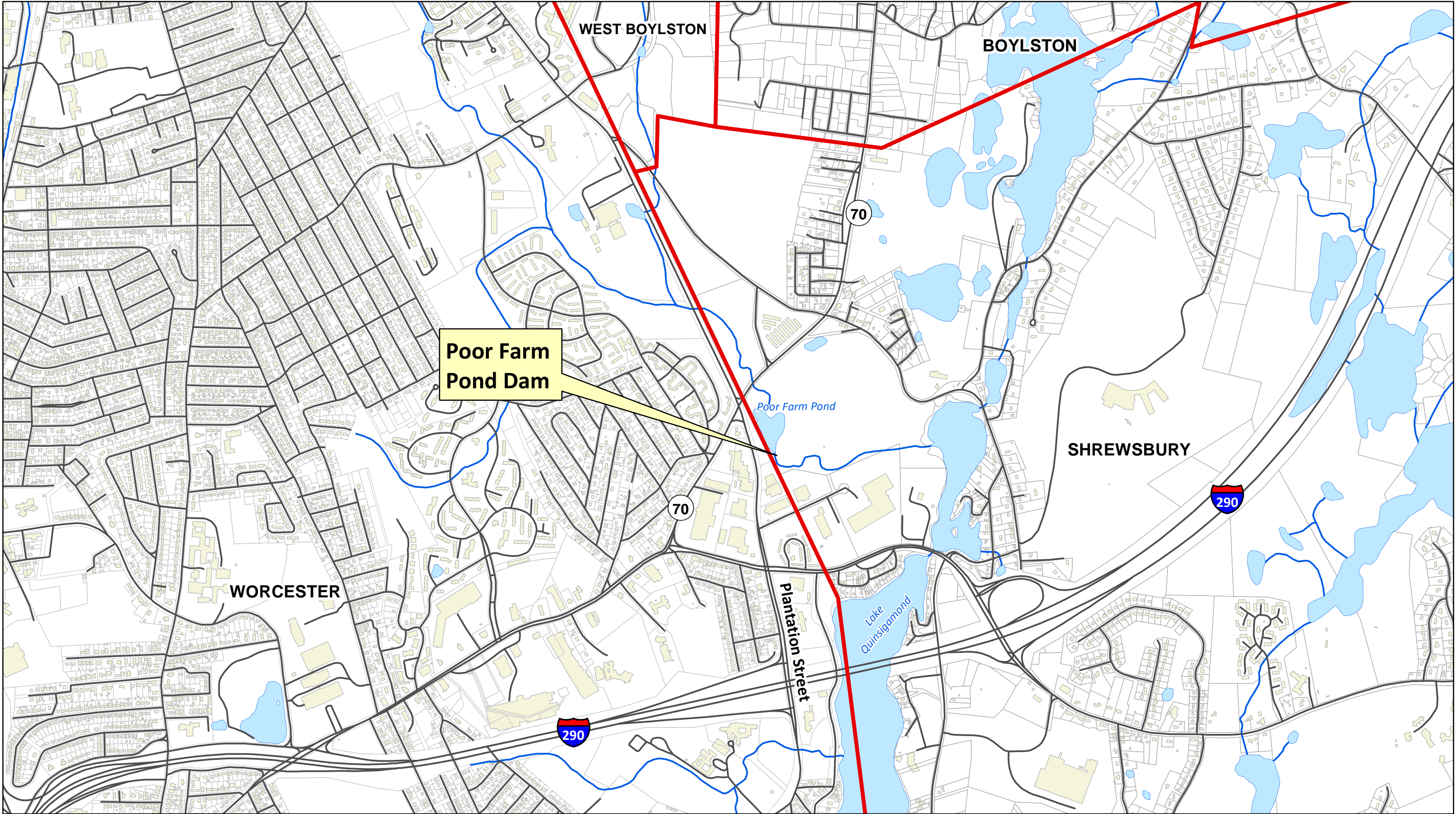
### 1.4.1 Poor Farm Pond Dam Removal and SWMI Framework

Shrewsbury's six groundwater withdrawal sources are located in two subbasins of the Blackstone River – Subbasin 23002<sup>1</sup> and Subbasin 23008<sup>2</sup>. Within the context of the November 2012 SWMI Framework, both subbasins are categorized as Biological Category 5 (BC5) and Groundwater Withdrawal Level 5 (GWL5). These subbasins have August withdrawals that exceed the August natural median flow by more than 55%, resulting in the GWL5 designation. Both subbasins contain Coldwater Fisheries; in addition, Poor Farm Brook (Subbasin 23007) is also a Coldwater Fishery.

<sup>1</sup> Home Farm Wellfield (3 wells) and Lambert Wellfield (2 wells)

<sup>2</sup> Sewell Well





Date: June 2013

Basemap

- Water Bodies
- Buildings
- Parcels
- Town Boundary
- Rivers
- Roads



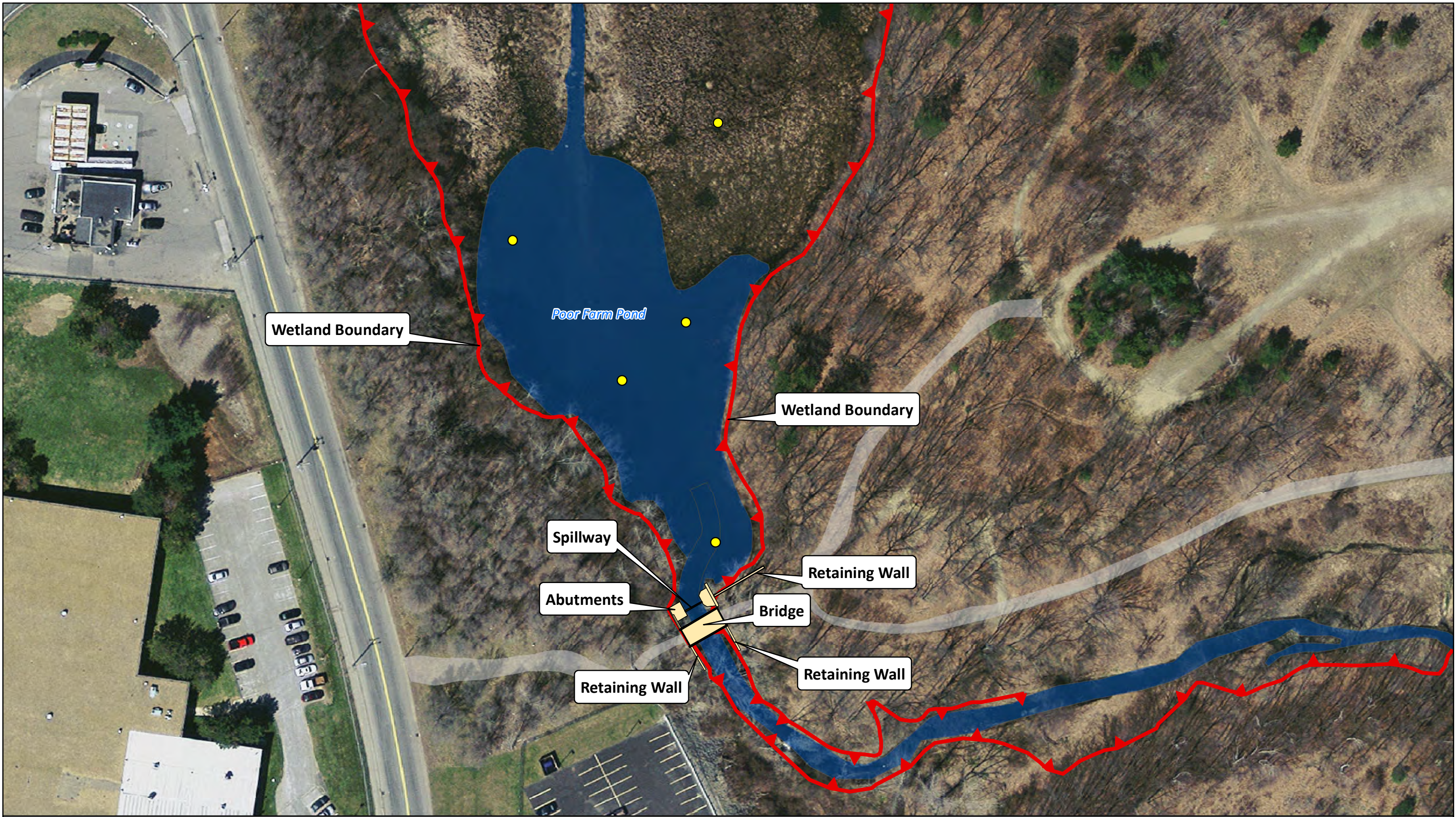
Worcester, Massachusetts  
Poor Farm Pond Dam Removal Feasibility Study



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Feet

Figure 1-2  
Study Area



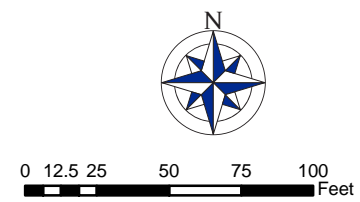


Date: June 2013

|                    |        |
|--------------------|--------|
| ● Sediment Samples | ■ Road |
| ■ Bridge & Dam     | ■ Pond |
| ■ Spillway         |        |
| ▲ Wetland Boundary |        |

**CDM Smith**

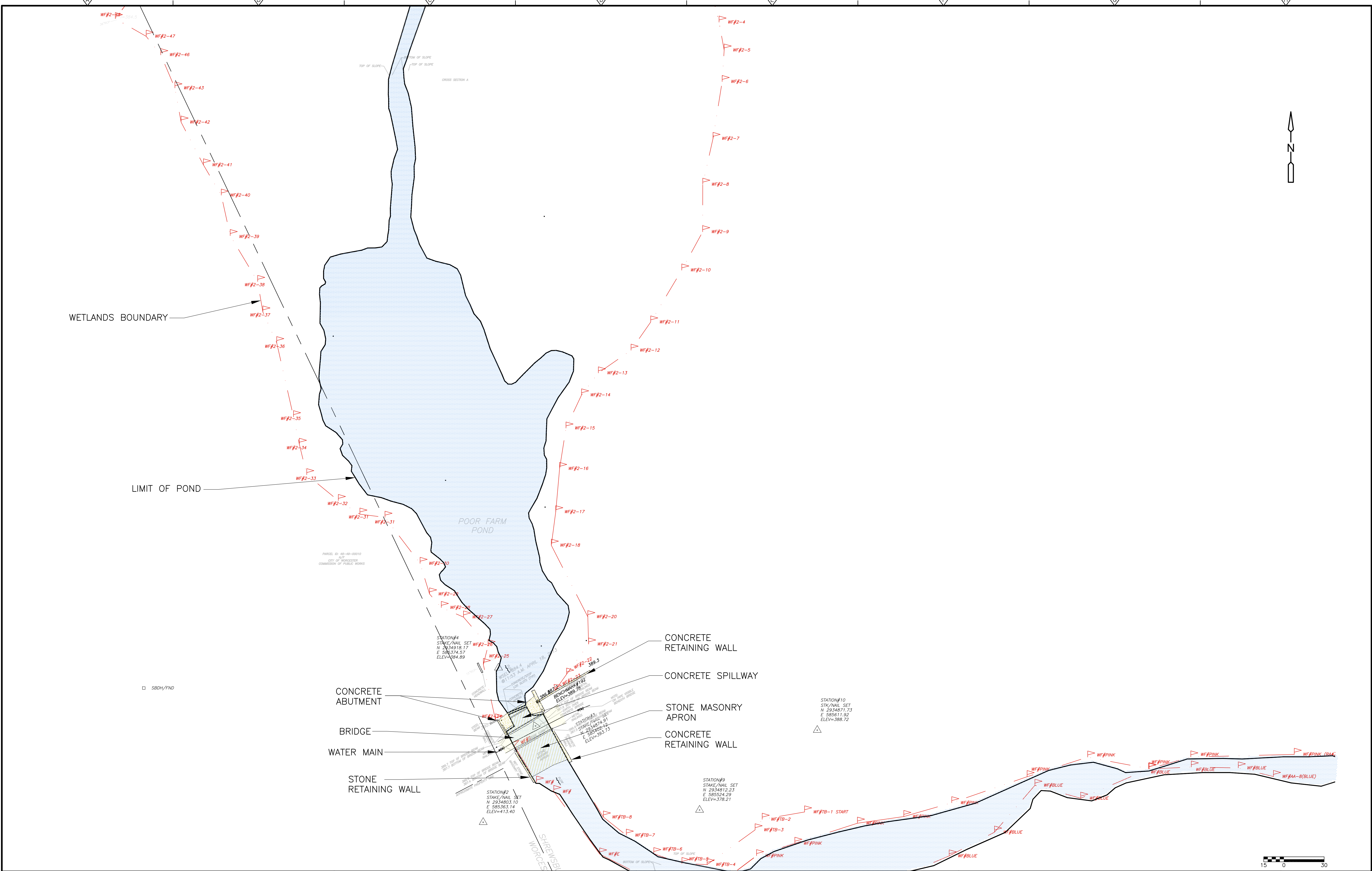
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**Poor Farm Pond Dam Removal Feasibility Study**



**Figure 1-3**  
**Existing Conditions**



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|          |      |      |      |         | DESIGNED BY: J. RICCIO | <div>CDM<br/>Smith</div> <div>50 Hampshire Street<br/>Cambridge, MA 02139<br/>Tel: (617) 452-6000</div> | CITY OF WORCESTER, MA<br>DEPARTMENT OF PUBLIC WORKS AND PARKS<br>POOR FARM POND DAM REMOVAL<br>FEASIBILITY STUDY | EXISTING CONDITIONS<br>PLAN | PROJECT NO. 0198-88068<br>FILE NAME: CBRPL001.DWG<br>SHEET NO.<br>1-4 |
|          |      |      |      |         | DRAWN BY: J. RICCIO    |   |  |                             |   |
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A preliminary WMA Permit Review Tier evaluation was recently conducted as part of the Town of Shrewsbury's participation in the MassDEP SWMI Pilot Project Phase 1. The Town may be seeking increased water withdrawal levels in the future, with a current maximum authorized withdrawal of 3.91 mgd and future demand projection of 5.28 mgd. According to the Phase I draft report, an additional withdrawal request would result in a Water Management Act Tier 3/GWL5 review. With a quality natural resource in the subbasin (Coldwater Fishery Resource), Shrewsbury would be required to implement mitigation and offset measures commensurate with the impact of their increased withdrawal.

Although there are 16 dams located in the Town of Shrewsbury, only three are located upstream of the Town's groundwater wells. Of these three, only Poor Farm Brook/Pond has adequate flow and storage to provide flow offset credit mitigation benefits. Under the SWMI Framework, removal of a dam or other flow barrier provides offset/mitigation in the category of habitat improvement.

Removal of the Poor Farm Pond Dam would benefit the City of Worcester, Town of Shrewsbury and the aquatic health of Poor Farm Brook by providing improvements in habitat and instream flow. The habitat improvement credit would be the same for both the partial and full dam removal alternatives.

## 1.5 Existing Data

Existing data used for this feasibility study includes previous inspection reports, supporting sketches, drawings, topographic and locus maps, photographs, and the 2008 Hazard Change Application. Information on the permitting process, including Massachusetts Executive Office of Energy and Environmental Affairs dam removal guidance (December 2007), and applicable federal, state, and local regulations were used during this assessment.

## 1.6 Data Collected Specifically for this Study

Data collected for this study include site photographs, physical and chemical sampling information for soils and sediment upstream of the dam, and other detailed site-specific information necessary to fully assess the existing conditions of the dam site, upstream and downstream of the spillway, and all areas that could be affected by the dam removal process.

The stability of the dam impoundment was based on dam safety inspection reports. Other information including river and stream characteristics, local topography, bathymetry, rare and sensitive species, historical and archaeological resources, and local utilities were also gathered for this report. A detailed assessment to characterize the sediment and soils was completed to develop a sediment transport model of current and future conditions, following dam removal.



## 1.7 Organization of this Feasibility Study

This report is divided into an Executive Summary and ten sections. The sections are as follows:

- Section 1 Introduction
- Section 2 Physical Characteristics of the Site
- Section 3 Existing Resources
- Section 4 Hazardous Waste Sites and Characterization of Sediment / Soils
- Section 5 Hydrology and Hydraulic Analysis
- Section 6 Sediment Transport Model and Evaluation
- Section 7 Alternatives
- Section 8 Environmental Permitting Requirements
- Section 9 Costs
- Section 10 Preferred Alternative

The appendices contain backup analyses, figures, laboratory data, and other documentation.