

Section 2

Physical Characteristics of the Site

2.1 Ownership

The Poor Farm Pond Dam is owned by the City and managed by the Department of Public Works and Parks. The dam is a tax levy dam and is supported by funding from general property taxes. The State identification number is 3-14-271-15 and the National Identification Number is MA02339.

2.2 Physical Characteristics of the Site

2.2.1 Dam Impoundment

The upstream impoundment is relatively small and generally very shallow at the normal pond level which is equivalent to the spillway weir elevation. The normal area of the impoundment is about 2.82 acres. The deepest water depth at normal pool level is estimated to be about four feet. Photographs 1 and 2 in Appendix A show the impoundment area. The general topography surrounding the pond is generally flat, transitioning to slopes that are heavily vegetated. It is anticipated that partial or complete removal of the dam resulting in a reduction in the water surface area of the pond would have a small or minor effect on the erosion of the exposed pond sediments and on the stability of the surrounding transition slopes up to higher ground elevations. However, precautionary measures to minimize erosion potential of the exposed surfaces should be considered and are discussed in more detail in Section 7.4.2.

2.2.2 River and Stream Characteristics

Upstream of the dam is Poor Farm Brook, a 3.6-mile perennial stream, which has its headwaters in the northern part of Worcester and West Boylston. The upstream watershed is approximately 3.7 square miles and adjacent land use consists of a mixture of residential and commercial lots along with some undeveloped land. Photographs 3 and 4 in Appendix A show Poor Farm Brook upstream of the impoundment area.

The stream reach downstream of the dam is unnamed and flows through conservation land owned by the City of Worcester; an area that surrounds a municipal well field. Both the City and the Town of Shrewsbury have drinking water supply wells in this area. Immediately downstream of the dam, the brook is relatively steep with a slope of approximately 0.01 feet per foot with a substrate consisting of cobbles and boulders (see Photographs 5 and 6 in Appendix A). The unnamed brook flows through a forested riverine system for approximately 200 feet, meadow/wetland systems and additional forested riverine areas before discharging to Lake Quinsigamond, a total of approximately 2,000 feet downstream of the dam.

2.2.3 Photography

Photographs of the dam and dam site are included in Appendix A.

2.2.4 Geology

The topography and the varying elevations of an area are determined by the geology. The surficial materials of Central Massachusetts are deposits of the last two glacials (the most recent being the Wisconsin glacier) that covered the area in the Pleistocene ice age. Glacial deposits are divided into

glacial till that was laid down directly by the glacier forming drumlins and glacial stratified deposits that were laid down by meltwater in valleys and low lying areas. The Worcester North surficial geology map shows that the predominant soil type around most of the impoundment upstream of the Poor Farm Dam is categorized as Glacial Stratified Deposits laid down by glacial meltwater in the form of Coarse Deposits, which includes variations of Gravels and Sands (See Figure 2-1). This explains the characteristic gravel pits in the area. Sand deposits consist mainly of very coarse to fine sand. Particle size distribution of these deposits range from 0.125 mm for the fine sand up to boulders size materials. Although not mapped, it is possible that bedrock may be beneath the dam spillway or that boulders may be present. The steep slope along the westerly side of the pond is mapped as artificial fill placed there for construction of Plantation Street and the industrial properties. Additional fill areas are mapped upstream of the impoundment along Clinton Street (Route 70).

Just north of the impoundment, on the north side of Clinton Street (Route 70) is a long crescent-shaped deposit of Floodplain Alluvium, which is a post-glacial deposit. This area appears to be relatively level in elevation ranging, from about 392 feet at the Clinton Street culvert to about 397 feet further north and slightly higher at the Northeast Cutoff. The culvert at Clinton Street is about 10 feet higher in elevation than the spillway at the dam. It would appear that the deposition of the yellow alluvial sands, silts, and gravel slowed and settled within this area.

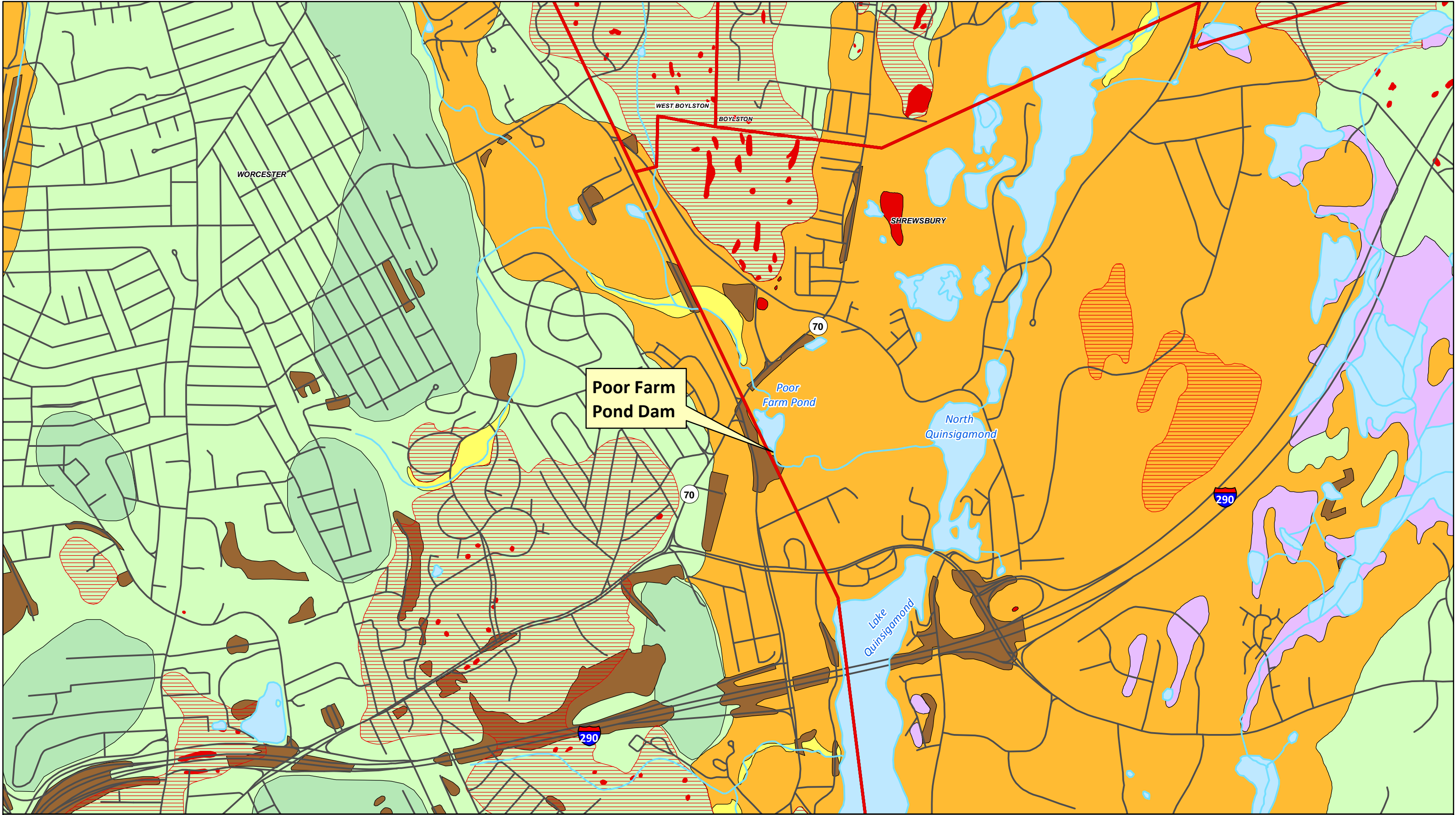
2.2.5 Soils and Topography

The drainage characteristics of soils are derived from the surficial parent material. The topography of the land adjacent to the impoundment and the dam consists of steep slopes. The woodland hillside east of the impoundment is mapped as Hinckley sandy loam, 25 to 35 percent slope. The area west of the impoundment is mapped as Udorthents, consisting of urban fill brought in during construction of Plantation Street and associated commercial and industrial areas. The areas downstream of the dam are mapped as Walpole fine sandy loam (0 to 3 percent) and Saco silt loam (0 to 3 percent) in the downstream wetland system.

Adjacent to Poor Farm Brook, north of Clinton Street, is a low-lying wetland area also mapped as Saco silt loam. Further upstream in the Great Brook Valley area, soils consists of Walpole fine sandy loam (0 to 3 percent slope) with adjacent woodlands mapped as Merrimac sandy loam (3 to 8 percent slope). Upstream residential areas are mapped as urban land. The wetland system south of Clark Street and the Clark Street Elementary School consists of Agawam fine sandy loam, 3 to 8 percent slope. Figure 2-2 shows Natural Resources Conservation Service Soil Codes.

2.2.6 Bathymetry

A bathymetric survey was completed for Poor Farm Pond by Surveying and Mapping Consultants Inc. (SMC Inc.), of Braintree, Massachusetts. The survey was performed in May 2013 utilizing Real Time Kinematic (RTK) Differential Global Positioning System (DGPS) and land-based total station equipment. The bathymetric survey plan utilized survey data and landside/shoreline features from a provided site plan. The bathymetric survey (Figure 2-3) shows the top of the sediment layer from a high elevation of 384.2 ft (NGVD29) at the southeastern end of the impoundment to 383.0 ft (NGVD29) within the lowest part of the impoundment. The spillway that determines water level is at an elevation of 384.2 ft (NGVD29). The survey data obtained is on the National Geodetic Vertical Datum of 1929 (NGVD29) with the horizontal datum on the Massachusetts State Plane Coordinate System (NAD83).



Date: June 2013



Legend

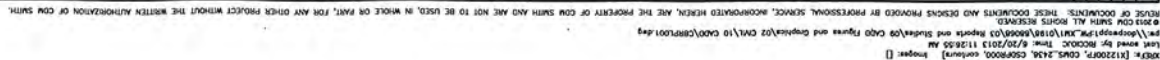
- | | |
|--------------------------------------|---------------|
| Abundant Outcrop and Shallow Bedrock | Town Boundary |
| Bedrock Outcrop | Town Boundary |
| Artificial Fill | Rivers |
| Alluvium | Roads |
| Thick Till | Water Bodies |
| Thin Till | |
| Coarse | |

Worcester, Massachusetts
Poor Farm Pond Dam Removal Feasibility Study



0 250 500 1,000 1,500 2,000
Feet

Figure 2-1
Surficial Geology



REV. NO.	DATE	DRWN	CHKD

EXISTING CONDITIONS
WITH CONTOURS INCLUDING BATHYMETRY
PLAN

PROJECT NO. 0198-80048
FILE NAME: CBRP0001.DWG
SHEET NO. 2-3

330% SUBMITTAL - NOT FOR CONSTRUCTION

2.3 Dam Characteristics

Poor Farm Pond Dam is an earthen dam about 110 feet long and about 16 feet high. The dam was constructed across the original stream bed between two natural higher banks known as the natural abutments. The easterly portion, or left side, of the dam consists of an earthen embankment about 70 feet long. The upstream and downstream slopes of the embankment are graded approximately at 2 horizontal to 1 vertical (2H:1V). Most of the length of upstream slope is partly supported by a concrete retaining wall. The westerly portion or right side of the dam consists of a concrete and masonry spillway structure approximately 34 feet wide. The structure is positioned between the fill of the left embankment and the 6 feet of transition fill in contact with the westerly or right natural abutment. The crest of the dam is a 14-foot-wide level walking path consisting of a dirt-covered concrete bridge over the spillway and the top of the left embankment, forming the connection between the two natural abutments. The crest of the dam and the side slopes are vegetated with tall grass and brush.

The approach spillway consists of a concrete apron as the floor of the 16-foot-wide broad-crested weir section with two concrete abutments at each side. Downstream of the weir, a granite block stone crest transitions to the downstream discharge apron made with grouted riprap. The concrete abutments were constructed with stoplog slots that were used to hold stoplogs for regulating the level of the pond above the weir level. Concrete training walls form the upstream approach to the spillway from the two concrete abutments toward the downstream discharge area that is beyond the broad-crested weir. The right wall transitions to a stone masonry wall downstream of the crest. A concrete bridge spans over the spillway and is supported by the two concrete training walls.

2.3.1 Past Dam Inspection Reports

Dam inspection reports on file with the Department of Conservation and Recreation Office of Dam Safety are listed below. The current dam condition is listed as Poor with significant stability issues on the retaining walls downstream of the spillway.

- Poor Farm Pond Dam, Poor and Unsafe Condition Dam Follow-up Inspection Form, September 12, 2008, CDM Smith.
- Poor Farm Pond Dam Phase I Inspection/Evaluation Report, January 5, 2007, Pare Corporation.
- Poor Farm Pond Dam Inspection Report, February 1, 1973, MADPW.

2.3.2 Dam Classification

Poor Farm Pond Dam has a structural height of about 16 feet and a maximum storage capacity of less than 50 acre-feet. Therefore, in accordance with the DCR Office of Dam Safety classification, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002, Poor Farm Pond Dam is an intermediate size structure.

Poor Farm Pond Dam is located about 2,000 feet upstream of the north end of Lake Quinsigamond. The steeply sloping stream between the dam and Lake Quinsigamond meanders through a thick wooded and vegetated area. There is no development downstream of the dam or immediately surrounding the dam. In 2008, an assessment was made that failure of the dam would cause little to no property damage and loss of life is not expected. Therefore, the DCR Office of Dam Safety approved the City's request and reclassified Poor Farm Pond Dam from a significant to a low hazard potential dam in 2009.