ENVIRONMENTAL ASSESSMENT

Carver Cotton Gin Dam Removal Project

East Bridgewater, Massachusetts

U.S. Fish & Wildlife Service
Partners for Fish and Wildlife Program
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301
Contact: Bill Bennett
william_bennett@fws.gov

This Environmental Assessment becomes a Federal document when evaluated and signed by the responsible Federal Official.

Date: 13 July 2017

Thomas R. Chapman
 Supervisor
New England Field Office
U.S. Fish and Wildlife Service
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1.0 INTRODUCTION

This Environmental Assessment (EA) addresses environmental impacts associated with the Carver Cotton Gin Dam Removal Project (Project) in East Bridgewater, Massachusetts. The Project’s goal is to restore natural stream processes, upstream and downstream fish passage, and improve public safety by removing an aging and obsolete dam. Currently, the Carver Cotton Gin Dam (Dam) blocks fish passage, impedes natural stream process, and is a potential threat to human safety. The Project is a partnership between the U.S. Fish and Wildlife Service (Service), the Massachusetts Division of Ecological Restoration (MA DER), the Town of East Bridgewater, the National Oceanic and Atmospheric Administration (NOAA), and The Nature Conservancy. Funding to support the Project is from the Disaster Relief Appropriations Act of 2013 (Hurricane Sandy), provided through the Department of the Interior to the National Fish and Wildlife Foundation and MA DER.

The Service is completing this EA consistent with the National Environmental Policy Act of 1969 (P.L. 91-190; 42 U.S.C. 4321 et seq.) to evaluate and display potential environmental impacts of the alternatives considered for the Proposed Action.

1.1 Background

The Dam is located on the Satucket River in East Bridgewater, Massachusetts (Figure 1). It is the first dam on the Satucket River, which is a tributary of the Matfield River. The Matfield River forms the Wild and Scenic Taunton River at its confluence with the Town River. Historical data indicates the first dam at this site dates back to the late seventeenth century to power a mill. The existing dam is believed to be extant from approximately the 1820s (PAL 2017).

The Dam (NATID # MA00350) consists of a concrete spillway (approximately 10 feet high and 45 feet long), masonry abutments and retaining walls, and a permanently open gate near the right abutment. The spillway is comprised of 4-inch-thick concrete slabs laid over a cobble rock fill. A 15-foot-long section of the spillway has failed and partially collapsed. The deteriorating and obsolete Dam is in an “Unsafe” condition and rated as a “Significant Hazard” by the Massachusetts Office of Dam Safety (MA ODS). In 2001, the MA ODS ordered that the flashboards be removed from the low level outlet and the impoundment permanently drained to reduce the potential of a catastrophic breach. Complete failure of the Dam would cause channel head-cutting and potential destabilization of the Route 106 bridge approximately 100 feet upstream of the Dam. The bridge is one of the most traveled thoroughfares in the Town, and is an important route between East Bridgewater, Brockton, and Plymouth.

The Dam impairs passage and habitat conditions for multiple fish species, including alewife (Alosa pseudoharengus), blueback herring (Alosa aestivalis), American eel (Anguilla rostrata), and sea lamprey (Petromyzon marinus). Removal of the Dam would reopen approximately 13 miles of riverine channel and access to nearly 124 acres of spawning and juvenile habitat in Robbins Pond.
MA DER determined the restoration of Satucket River to be a State Priority Project in 2014. Since that time, MA DER has provided lead project management services and has been working with the Service and other project partners to collect information, determine the feasibility of, perform modeling, and develop engineering designs to remove the Dam.

Figure 1. Map showing the location of the Carver Cotton Gin Dam Removal Project in East Bridgewater, Massachusetts.
1.2 Purpose and Need

The purpose of the proposed Project is to restore fish passage and natural ecological processes to Satucket River and eliminate risks to life and property associated with the existing obsolete Dam.

The Dam is a complete barrier to upstream fish passage and a partial obstruction for the American eel. Consequently, alewife and blueback herring, referred to collectively as river herring, have been extirpated from the upper watershed due to their inability to access historic spawning grounds. Both alewife and blueback herring are listed as Species of Concern by the NOAA National Marine Fisheries Service (NMFS) (NOAA NMFS 2009). Reestablishment of anadromous fish populations would also result in a healthier and more resilient ecosystem by increasing the watershed’s productivity and ability to support a greater diversity of species (Hall et al. 2012; Hall et al. 2011; Jardine et al. 2009).

Enhanced passage would benefit the American eel as well. The Dam is a barrier to elvers (young eels returning to rivers from their ocean spawning areas) and smaller-bodied eels and exposes those attempting to pass over the Dam to an increased risk of predation. Restoring passage will aid this declining species by allowing unimpeded passage past the Dam to important headwater habitats (Hitt et al. 2012).

The Dam is deteriorating and has several holes though the spillway. The MA ODS has designated the Dam to be in an “Unsafe” condition and rated as a “Significant Hazard.” A catastrophic failure of the Dam could cause destabilization of the upstream bridge on Route 106, a major thoroughfare between the communities of East Bridgewater, Brockton, and Plymouth. Such a failure of the Dam could put public safety at risk. Failure of the Dam could also damage downstream infrastructure.

2.0 ALTERNATIVES CONSIDERED

The Service and project partners considered a range of alternatives and their ability to meet the Project’s purpose and need. Environmental, social, economic, and cultural factors were considered in order to identify those alternatives that best met the Project’s objectives. Initially, three alternatives were considered for analysis, but one was identified as not feasible and therefore eliminated from further consideration.

2.1 Alternatives Eliminated From Further Consideration

Repair Dam and Build Fishway

The Dam is deteriorated and partially collapsed, making repair no longer an option. Consequently, a new dam and fishway would need to be constructed in the Dam’s place. Given the high cost of building a new dam to modern safety regulations, the dam owner has expressed no interest in rebuilding a dam at the site. Given these circumstances, this alternative was eliminated from further consideration.
2.2 Alternatives Receiving Further Consideration

Two alternatives received further in-depth analysis under this EA to evaluate their ability to meet the Project’s purpose and need. These two alternatives consist of the Proposed Action: Dam Removal and a No Action Alternative.

Alternative 1 - Proposed Action: Dam Removal

The Project as proposed would remove the entire vertical extent of the dam spillway between the existing floodwalls, except for a short section attached to both the river right and river left floodwalls. A 4-foot-wide section of the Dam on river right attached to the mill building foundation would be left and reinforced with steel anchors to provide support to the building foundation. A 3-foot section of the Dam on river left would also be retained to support the river floodwall. Because the wall on river left is failing just downstream of the Dam, large riprap stone would also be placed along an 80-foot section halfway up the wall’s vertical height at a 1.5:1 slope to provide additional support. The interstitial spaces within the riprap will be filled with soil and seeded with native vegetation.

Prior to removal of the Dam, scour protection will be placed underneath the Route 106 bridge to prevent migration of a headcut caused by removal of the Dam that might destabilize the bridge. Scour protection will consist of burying a 2.5-foot-thick angular riprap layer along the bridge footings. Fine and gravel material will be washed into the angular riprap to prevent any subsurface flow. Above the scour countermeasures, native river cobble and gravel will be overlain 12-18 inches thick to simulate natural riverbed conditions and allow for aquatic organism passage.

Following removal of the Dam, a 180-foot-long rock riffle will be constructed from the mill complex footbridge to the Route 106 bridge to prevent a headcut and enhance fish passage through the site. The riffle would have a 1.12 percent slope and backwater the bridge 6 inches in depth under low flow conditions. Backwatering the bridge minimizes water velocities and creates a resting pool for aquatic organisms swimming upstream. The riffle would be constructed of a dense matrix of native sand, gravel, cobble, and boulders designed to withstand the 100-year storm. A low flow channel will run the length of the riffle and have a resting pool in the middle for fish migrating.

Only 100 cubic yards of the approximately 1,320 cubic yards of impoundment sediment is expected to be released downstream. Approximately 430 cubic yards will be beneficially reused in the river channel for re-creation of the streambanks and construction of scour countermeasures. The remaining 790 cubic yards of additional sediment will either be reused during reconstruction of the river channel and banks or hauled offsite for beneficial reuse (likely as landfill cover or as clean fill). All waste such as concrete, asbestos, or other trash generated during the Project will be disposed of in a landfill licensed to accept the material.

Due to the industrial nature and archaeological sensitivity of the site, the Proposed Action has been designed to cause no disturbance in the adjacent upland. Actions taken under this alternative are limited to stabilizing the Route 106 bridge, removing the Dam, restoring fish
passage, and stabilizing all associated infrastructure within the limited footprint of the Project. Construction drawings for the Project are shown in Appendix A. Included on the drawings are specifications and information detailing the planned sequence of construction.

**Alternative 2 - A No Action Alternative**

Under the No Action alternative, no modifications would be made to the Carver Cotton Gin Dam. The Dam would continue to deteriorate and collapse, risking a catastrophic breach in the future. The Dam would continue to fragment the watershed, preventing upstream and downstream passage of fish and other aquatic organisms. The private dam owner would continue to bear the maintenance, inspection and liability costs and risks associated with the Dam.

### 2.3 Comparison of Alternatives

The ability of the two alternatives to meet the Project’s “Purpose and Need” are compared in Table 1. The Proposed Action Alternative 1 – Dam Removal meets each of the objectives of the Project, while Alternative 2 – No Action does not address any of them. The Environmental Consequences chapter of this EA provides a more detailed explanation of each of these topics.

<table>
<thead>
<tr>
<th>Project Objective</th>
<th>Alternative 1 – Dam Removal</th>
<th>Alternative 2 – No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Safety and Condition</td>
<td>Dam removal resolves hazards to the public, through removal of failing infrastructure.</td>
<td>Dam remains in place, leaving the existing threats to public safety and infrastructure unresolved.</td>
</tr>
<tr>
<td>Habitat Fragmentation</td>
<td>Stream connectivity is restored, allowing up- and downstream passage of aquatic organisms.</td>
<td>Dam continues to act as barrier to aquatic organism passage.</td>
</tr>
<tr>
<td>River Processes</td>
<td>Sediment transport, channel morphology, and hydrology restored.</td>
<td>Sediment transport, channel morphology, and hydrology continue to be disrupted by the Dam.</td>
</tr>
</tbody>
</table>

### 3.0 AFFECTED ENVIRONMENT

#### 3.1 Geology and Soils

The Satucket River watershed occurs in the Seaboard Lowlands section of the New England Physiographic Province. Seaboard Lowlands are characterized by upland glaciated ridges and hills that transition into level plains near the coast that were shaped during the Wisconsin glaciation (Flanagan et al. 1999). During this period, the Laurentide ice sheet expanded and contracted across New England, scouring and reshaping the land. With the ice sheet’s last retreat between 15,000 to 20,000 years ago, a thin layer of glacial till was left across the watershed, consisting of an unsorted, unstratified matrix of boulders, gravels, sands, some silts, and clays. Where no till was left due to steep slopes and irregular topography, bedrock outcrops occur.

Soils within the project area consist primarily of the Udorthents gravelly soils. Udorthents soils occur in areas that have had their soils removed or filled (Soil Survey Staff 2017). Soils within
the project area were modified to fill the floodplain to allow for building of the mill and associated industrial buildings.

3.2 Water Resources

3.2.1 River Morphology and Processes

The Dam historically impounded the Satucket River for approximately 1.3 miles. In 2001, the low-level outlet was permanently opened to drain the impoundment and prevent a catastrophic breach of the Dam. Opening of the outlet has allowed the River to passively form a natural channel as it eroded through the accumulated fine sediments within the former impoundment. The channel now appears to be stable with a natural riffle-pool sequence and sinuosity. The bankfull width is approximately 65 feet, with a typical wetted width of 20-30 feet.

3.2.2 Hydrology and Hydraulics

Gomez and Sullivan Engineers (GSE) conducted hydrologic and hydraulic analyses to understand the Satucket River’s full range of flows and the effects of the Dam. The analyses were conducted using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center River Analysis System (HEC-RAS). HEC-RAS allows the user to calculate flood elevations, velocities, and channel hydraulics for different storm events (GSE 2015).

Flows were calculated by prorating gage data from the Indian Head River USGS gage to the Satucket River based upon differences in watershed size. The prorated flows were then further refined based on flows measured in the Satucket River by GSE during several storm events. This information was then compared to the Federal Emergency Management Agency (FEMA) Satucket River Flood Insurance Study (FIS) completed in 2013 (Table 2).

<table>
<thead>
<tr>
<th>Storm Event</th>
<th>Discharge (cubic feet per second)</th>
<th>FEMA FIS 2013</th>
<th>GSE calculated flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-year</td>
<td>924</td>
<td>854</td>
<td></td>
</tr>
<tr>
<td>50-year</td>
<td>1,264</td>
<td>1,224</td>
<td></td>
</tr>
<tr>
<td>100-year</td>
<td>1,445</td>
<td>1,401</td>
<td></td>
</tr>
<tr>
<td>500-year</td>
<td>1,780</td>
<td>1,861</td>
<td></td>
</tr>
</tbody>
</table>

Water surface elevations were modeled in HEC-RAS based upon the discharges estimated from prorating flows from the Indian Head River. Outputs from the model indicate the dam spillway raises water surface elevations despite the low-level outlet being open under all storm conditions. During a 100-year flood, the Dam elevates the upstream water surface by over a foot for a mile-long reach of the River, with a smaller but substantial increase of several tenths of a foot carrying several miles upstream to the Washington Street Bridge in East Bridgewater (GSE 2015).
3.2.3 Water Quality

The Satucket River is listed as Class B waters, according to the 2013 Massachusetts Surface Water Standards (314 CMR 4). The classification is based on the most sensitive use of the water, which sets the minimum water quality criteria. Class B waters are described in the 2013 Massachusetts Surface Water Standards 314 CMR 4.05 as:

Class B - “These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment (“Treated Water Supply”). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value (2013).”

The most recent Massachusetts Department of Environmental Protection (MassDEP) assessment of the Satucket River identifies the waterbody as obtaining all designated uses (MassDEP 2012).

3.2.4 Sediment Quality

A due diligence review of potential sources of contamination in the watershed and project area was conducted through analysis of web-based data, MassDEP records, and an examination of current and historical land use practices. The results of the review indicate that minor releases of oil and/or hazardous materials have been reported to MassDEP in the upstream watershed over the past 20 years. A few of these releases have resulted in properties being designated with Activity and Use Limitations (AUL). AULs are properties where oil and hazardous materials have been released and now have prohibited uses designated by MassDEP after the cleanup. The majority of releases and all of the AUL sites have occurred in the headwaters of the Satucket watershed. Given the multiple impoundments, wetlands, and distance of these hazardous releases from the project site, it is not expected that any contaminants or contaminated sediments have entered the Dam impoundment or project area (MA DER 2016).

During the due diligence review, the Murray-Carver Landfill was identified as occurring on the project property immediately south and west of the project area. The former landfill was built in association with the Carver Cotton Gin Company, which manufactured cotton gins from 1842-1992. MassDEP and the U.S. Environmental Protection Agency investigated the site to determine if the landfill should be put on the National Priorities List (NPL) or require cleanup under the Massachusetts Contingency Plan (MCP). Sampling of the landfill in 1990 and 1993 as a part of this investigation identified the presence of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganic elements. At the close of the investigation, it was determined the site did not require listing as a NPL or any additional remedial actions under the MCP (MA DER 2016).
Based upon the information collected during the due diligence review, sampling was conducted to identify the presence of a broad suite of contaminants upstream of the dam impoundment, in the impoundment, and downstream of the Dam. In 2014, five sediment samples (one upstream of the historical impoundment, two immediately upstream of the Dam, and two downstream of the Dam) were collected for analysis. All samples were taken in naturally depositional areas and no unusual odor, color, or sheen was observed during collection of the samples.

Sediment samples were analyzed for heavy metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organo-chlorine pesticides, grain size, and total organic carbon. In general, sediment chemistry suggests the presence of only limited pollutant concentrations, which are all below the most stringent human health thresholds (SI/GW1) from the Massachusetts Contingency Plan (MCP). Therefore, risks from pollutant exposure in the restored floodplain are considered low. Sediment quality upstream, downstream, and within the impoundment are similar. One sample was found to exceed the Probable Effects Concentration (PEC) thresholds, according to the consensus-based sediment quality guidelines from MacDonald et al. (2000), which was for lead in one of the impoundment samples. When averaged with the second impoundment sample, the overall impoundment mean is below the PEC threshold and similar to upstream and downstream levels. For PAHs, all samples were below PEC criteria and the highest concentrations were found downstream of the project site and former impoundment. PCB and pesticide results were classified as “nondetect” and/or were below PEC reporting limits (MA DER 2016). For a more detailed account of the due diligence review, sediment sampling and results, see Appendix B.

At the request of MassDEP, a preliminary asbestos survey was performed at the Dam. The survey results indicate that asbestos containing materials (ACM) exist along the crest of the Cotton Gin Dam spillway. It is believed that ACM were used to stop water leakage through the seam between wooden weir boards and the Dam’s concrete spillway crest (MA DER 2016).

3.3 Riparian Floodplain and Wetlands

Carver Cotton Gin Dam historically impounded the Satucket River for approximately 1.3 miles, converting it from a riverine system to one associated with open water and lacustrine wetlands. In 2001, the low-level outlet at the Dam was permanently opened, converting those once inundated areas to riparian floodplain. The majority of this converted area is now dominated by reed canary grass (Phalaris arundinacea) with some purple loosestrife (Lythrum salicaria), woolgrass (Scirpus cyperinus), tussock-sedge (Carex stricta), and false nettle (Boehmeria cylinrica) scattered throughout (NEE 2014). Outside of these converted areas upstream of the Dam, the habitat is a mix of palustrine forest and upland forest.

Starting at the Route 106 bridge and running downstream through the project reach, the floodplain and riparian zone was filled in to facilitate the building of the Carver Cotton Gin Factory. No wetlands exist within this 700-foot reach. Downstream of this area, the River becomes more natural and sinuous with scrub-shrub and palustrine wetlands occurring within the riparian floodplain.
Table 3. Sediment sampling results for the Cotton Gin Dam Removal Project. Sample values are color coded to indicate values exceeding thresholds (e.g. Red MCP SI/GW1; Green TEC; and Blue PEC) (MA DER 2016).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Screening Benchmarks</th>
<th>Dam Impoundment Samples</th>
<th>Downstream Samples</th>
<th>Upstream Samples</th>
<th>Impoundment Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCP SI/GW1</td>
<td>TEC</td>
<td>PEC</td>
<td>MCP SI/GW1</td>
<td>TEC</td>
</tr>
<tr>
<td><strong>Metal</strong> (ppm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>20.0</td>
<td>3.75</td>
<td>3.0</td>
<td>20.0</td>
<td>3.75</td>
</tr>
<tr>
<td>Cadmium</td>
<td>15.0</td>
<td>3.65</td>
<td>3.0</td>
<td>15.0</td>
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<tr>
<td>Chromium (T0/4h)</td>
<td>100.0</td>
<td>45.0</td>
<td>45.0</td>
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<tr>
<td>Chromium (W)</td>
<td>1,000.0</td>
<td>3.0</td>
<td>3.0</td>
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<tr>
<td>Copper</td>
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<td>11.0</td>
<td>11.0</td>
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<td>Lead</td>
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<td>250.0</td>
<td>11.0</td>
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<td>Nickel</td>
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<td>Zinc</td>
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<td><strong>Organic (BET) g/g dry</strong></td>
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<td>Acreolenine</td>
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<td>Chrysene</td>
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<tr>
<td>Indeno[1,2,3-cd]pyrene</td>
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<td>700.0</td>
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<td>Phenanthrene</td>
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<td>12.0</td>
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<td>12.0</td>
</tr>
<tr>
<td><strong>Total PAHs (n=16)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Cotton Gin Dam Removal Project</td>
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<td>12.0</td>
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**Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Screening Benchmarks</th>
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<tbody>
<tr>
<td></td>
<td>MCP SI/GW1</td>
<td>TEC</td>
<td>PEC</td>
<td>MCP SI/GW1</td>
<td>TEC</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
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Environmental Assessment

Carver Cotton Gin Dam Removal Project
3.4 Biological Resources

3.4.1 Fish and Aquatic Species

The Massachusetts Division of Marine Fisheries (MA DMR) identifies the Satucket River as providing habitat for diadromous fish, including alewife, blueback herring, and American eel (Feeney 2017). River herring have been observed both in 2015 and 2017 trying to unsuccessfully gain passage past the Dam during the spring migration season. Alewife and blueback herring are identified as Species of Concern by NOAA NMFS due to declining populations. Recent assessments by MA DMR have determined that fish passage past the Dam could increase river herring populations substantially due to the large amount of spawning habitat available upstream (Reback et al. 2004).

3.4.2 Wildlife

A wide variety of mammals are expected to occur within the area, but site-specific surveys have not been conducted. Mammals that occur within southeastern Massachusetts and potentially within the project area include, but are not limited to the eastern chipmunk (Tamias striatus), gray squirrel (Sciurus carolinensis), Virginia opossum (Didelphis virginiana), woodchuck (Marmota monax), meadow jumping mouse (Zapus hudsonius), white-footed deermouse (Peromyscus leucopus), meadow vole (Microtus pennsylvanicus), eastern cottontail (Sylvilagus floridanus), northern short-tailed shrew (Blarina brevicauda), big brown bat (Eptesicus fuscus), little brown myotis (Myotis lucifugus), gray fox (Urocyon cinereoargenteus), striped skunk (Mephitis mephitis), raccoon (Procyon lotor), and white-tailed deer (Odocoileus virginianus) (MassWildlife, accessed on 4/19/16). A diversity of amphibians and reptiles is also likely to occupy the site’s wetlands and impoundment.

A wide array of migratory and resident birds common to mixed second-growth forests and wetlands are found within the region. Representative species include, but are not limited to American robin (Turdus migratorius), American crow (Corvus brachyrhynchos), black-capped chickadee (Parus atricapillus), tufted titmouse (Parus bicolor), house finch (Carpodacus mexicanus), northern cardinal (Cardinalis cardinalis), American goldfinch (Carduelis tristis), house sparrow (Passer domesticus), red-winged blackbird (Agelaius phoeniceus), Carolina wren (Thryothorus ludovicianus), swamp sparrow (Melospiza georgiana), catbird (Dumetella carolinensis), and potentially other more area-sensitive passerines that may use the larger tracts of adjacent forest. Potential waterbirds and waterfowl that could occur within the geographic area include American black duck (Anas rubripes), mallard (Anas platyrhynchos), Canada goose (Branta canadensis), great blue heron (Ardea herodias), American bittern (Botaurus lentiginosus), herring gull (Larus argentatus), greater black-backed gull (Larus marinus), and ring-billed gull (Larus delawarensis).

3.4.3 Threatened and Endangered Species

The Service performed an intra-agency section 7 evaluation, which identified the northern long-eared bat (Myotis septentrionalis) as potentially occurring within the project area. The northern long-eared bat is federally listed as a threatened species with a 4(d) rule under the Endangered
Species Act (50 CFR part 17). Although the northern long-eared bat may be present in the project area, there are no recent records confirming their presence. During the summer, northern long-eared bats roost singly or in colonies in forested habitat underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. During the evening, northern long-eared bats can be found foraging in a variety of forested and non-forested habitats, including wetlands. During winter, northern long-eared bats hibernate in caves and mines (hibernacula) with constant temperatures, high humidity, and no air currents. Factors affecting the species include modifications to bat hibernacula, disturbance of hibernating bats, and loss of forest habitat, including forest fragmentation.

The Massachusetts Natural Heritage and Endangered Species Program (MA NHESP) was consulted to identify if any State-listed or at-risk species may occur within the project area. According to that consultation, no at-risk or rare species occur within the project area.

3.5 Historic and Archaeological Resources

In consultation with the Massachusetts Historical Commission (MHC) and the East Bridgewater Historical Commission (EBHC), the Public Archaeology Laboratory (PAL), a cultural resources management firm of archaeologists and architectural/industrial historians, was contracted to complete a Phase I Cultural Resources Survey of the area. Identified during the survey was the Carver Cotton Gin Company factory complex (MHC #EBR.10), eligible for listing in the National Register of Historic Places under Criteria A and C at the local level as a historic district. The property is significant for its associations with the industrial and economic development of East Bridgewater during the nineteenth and twentieth centuries, and as a cohesive mill complex during 90 years of the development and manufacture of cotton processing technology. In addition, PAL identified the in-river reach immediately upstream and downstream of the Dam to be of high archaeological sensitivity due to the potential presence of cultural and historical resources below the river sediments (PAL 2017).

3.6 Public Health and Safety

The Massachusetts Office of Dam Safety has designated the Dam to be in an “Unsafe” condition and rated as a “Significant Hazard.” A 15-foot-long section of the spillway's downstream face has failed and partially collapsed at the east end, and the spillway appears to have been undermined by scour along its toe. A catastrophic failure of the Dam could cause destabilization of the upstream bridge on Route 106, a major thoroughfare between the communities of East Bridgewater, Brockton, and Plymouth. Such a failure of the Dam could put public safety at risk. Failure of the Dam could also damage downstream infrastructure.

3.7 Environmental Justice

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires Federal agencies to examine proposed actions to determine whether they will have disproportionately high and adverse human health or environmental effects on minority or low income populations. A map of environmental justice
areas published in 2010 by the Massachusetts Executive Office of Energy and Environmental Affairs indicates that no Environmental Justice populations are located in the Project’s vicinity (MASSGIS 2010).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Geology and Soils

*Alternative 1 – Dam Removal (Proposed Action)*

The Proposed Action will not have any effect on the existing geology or soil classification of the project area.

*Alternative 2 – No Action*

Under the No Action Alternative, there would be no change to the surrounding geology or soils of the project area.

4.2 Water Resources

4.2.1 River Morphology and Processes

*Alternative 1 – Dam Removal (Proposed Action)*

The Proposed Action would remove the entire vertical extent of the spillway, leaving a small section on each end attached to the floodwalls. The Proposed Action is not expected to have any long-term negative effects on riverine processes and is likely to have major beneficial effects by restoring the appropriate slope, natural riverbed substrate and sediment transport. A riffle composed of native round stone will be constructed in place of the Dam to hold the streamgrade and prevent a headcut from migrating upstream.

*Alternative 2 – No Action*

The No Action Alternative leaves the Dam and existing habitat conditions in place.

4.2.2 Hydrology and Hydraulics

*Alternative 1 – Dam Removal (Proposed Action)*

Under the Proposed Action, no short- or long-term adverse impacts are anticipated. GSE (2016) developed a HEC-RAS model (as described in Section 3.3.2) to compare river conditions with and without the Dam’s spillway in place. According to that analysis, water surface elevations and associated flooding would be lowered upstream of the Dam for all storm events (see Figure 2).
Figure 2. Comparison of water surface elevations with the Dam, with the Dam and low-level outlet open, and no Dam at bankfull (approximate recurrence interval of 2 years) and 100-year storm events (GSE 2016).

Alternative 2 – No Action

Under the No Action Alternative, the current water surface elevations and flooding along Satucket River would not change.

4.2.3 Water Quality

Alternative 1 – Dam Removal (Proposed Action)

Under the Proposed Action, water quality is not expected to change over the long term. Short-term increases in turbidity are expected during the removal of the Dam, installation of scour protection at the Route 106 bridge, and construction of the riffle. Only 100 cubic yards of the 1,320 cubic yards of impounded sediment behind the Dam is expected to be released during the Project. This increased turbidity has the potential to stress aquatic organisms downstream of the Dam, but is expected to be of a short duration. To minimize turbidity, construction work areas will be dewatered and work will occur when flows are predicted to be the lowest.

Alternative 2 – No Action

Under the No Action Alternative, water quality conditions would not change.
4.2.4 Sediment Quality

Alternative 1 – Dam Removal (Proposed Action)

Under the Proposed Action, no short- or long-term adverse impacts are anticipated. Approximately 1,320 cubic yards of sediment management is required as part of the Project. The majority of this material will be generated from the dam removal and riffle construction area; the proposed approach is to beneficially re-use the sediment onsite. Material will be placed in areas adjacent to the river channel to construct new streambanks, provide scour protection along the mill building and retaining walls, or be stockpiled on-site as clean fill for later use by the property owner. A small amount of mobile sediment (less than 100 cubic yards) is expected to mobilize and be transported downstream as the channel adjusts after dam removal. Given the small volume, low pollutant concentrations, and similarity to upstream and downstream areas, the proposed approach for this material is passive erosion and natural downstream redistribution (instream management).

A portion of the property south and west of the Project has been classified as a former landfill. Based upon sampling and consultation with MassDEP staff, no contaminants from the landfill are expected to affect the sediment and water quality within the dam impoundment or the section of river channel to be restored, since most of the former landfill lies downstream of the work area. No earth disturbing activities are proposed in the former landfill area. All earth disturbance activities are limited to the river channel and bank areas and avoid all areas with known underground storage tanks, which exist just south of the project site.

All known ACMs within the project area will be handled in accordance with the State and local requirements. No ACMs will be allowed to discharge downstream as part of the dam removal process. For additional information, see Appendix B, which includes the 401 Water Quality Certificate issued by MassDEP and a more detailed explanation of the Sediment Management Plan.

Alternative 2 – No Action

The No Action Alternative would result in no construction and therefore there would be no change to existing conditions.

4.3 Riparian Floodplain and Wetlands

Alternative 1 – Dam Removal (Proposed Action)

Under the Proposed Action, because the low-level outlet at the Dam has been opened since 2001, there are expected to be no changes to the riparian floodplain or wetlands. No short- or long-term adverse impacts are therefore expected under this alternative.
Alternative 2 – No Action

Under the No Action Alternative, there is expected to be no change to the riparian floodplain or wetlands. No short- or long-term impacts are predicted to happen to the wetlands under this alternative.

4.4 Biological Resources

4.4.1 Fish and Aquatic Species

Alternative 1 – Dam Removal (Proposed Action)

The Proposed Action is not predicted to have any long-term adverse effects on fisheries or other aquatic species. The proposed Project will have an overall positive ecological benefit on the aquatic community by restoring watershed connectivity. This would allow diadromous and resident fish to migrate past the Dam to historic spawning and rearing habitats that are currently inaccessible. Reestablishment of alewife and blueback herring populations would restore native fish that have been previously extirpated from the watershed.

It is expected that over the long term, the Proposed Action will increase the abundance, species richness, and diversity of the fish community within the watershed (Hogg et al. 2015; Burroughs et al. 2010). This will support a more productive aquatic ecosystem that is resilient to potential changes associated with climate change or other anthropogenic disturbances.

Alternative 2 – No Action

Under the No Action Alternative, the Dam will continue to impair river connectivity by preventing the movement of fish and other aquatic organisms. This will prevent the restoration of diadromous fish populations within the watershed.

4.4.2 Wildlife

Alternative 1 – Dam Removal (Proposed Action)

Proposed project activities will not have long-term adverse impacts to wildlife. Short-term impacts may arise from activity during the 1-to-2-month construction period, as wildlife such as birds and small mammals may avoid the immediate project area. The removal of the Dam is expected to have an overall positive long-term effect on wildlife populations in the watershed, as the return of diadromous fish would introduce marine-derived nutrients to the watershed, thereby enhancing the base of a rich food web. Increased fish populations associated with the reestablishment of river herring would also provide beneficial forage to resident wildlife species such as piscivorous birds and predatory terrestrial wildlife, such as river otter, mink and raccoon.
Alternative 2 – No Action

The No Action Alternative would not change current conditions and therefore have no impacts to existing wildlife populations.

4.4.3 Threatened, and Endangered Species

Alternative 1 – Dam Removal (Proposed Action)

An informal intra-Service section 7 consultation was completed with the Service’s New England Field Office’s Endangered Species Program. Based on information from this consultation, the Project was designed to minimize potential impacts to the northern long-eared bat by minimizing tree removal and cutting trees outside of the maternity season (June 1 – July 31). A streamlined consultation form under the 4(d) rule was submitted to the Service for their review as a part of this consultation (50 CFR part 17). Consultation with MA NHESP determined the Project is not likely to affect any State-listed or rare species.

Alternative 2 – No Action

Under this Alternative, the Dam will remain in place, which will continue to fragment the river corridor. There would be no adverse effects to federally or State-listed species from the No Action alternative.

4.5 Historic and Archaeological Resources

Alternative 1 – Dam Removal (Proposed Action)

The Proposed Action will cause an adverse effect to the National Register-eligible Carver Cotton Gin Company complex (PAL 2017). Expected impacts include the removal of the Carver Cotton Gin Dam (a contributing resource to the historic property) and 1920 fish ladder fragment; reinforcing the adjacent Blacksmith Shop and Hardening Building’s foundation with a concrete wall and steel anchors; adding riprap to the impoundment/forebay floor around the piers of the Carver Cotton Gin Company Blacksmith Shop and Hardening Building; adding an approximately 4-foot-high, 30-foot-long vegetated berm against the east river retaining wall; and disposing of sediment in the mill tailrace and in the mill headrace below the Blacksmith Shop and Hardening Building.

Pursuant to section 106 of the National Historic Preservation Act, a Memorandum of Agreement (MOA) between the Service and MHC will be completed that provides stipulations to mitigate the adverse effects of the Project. Stipulations have been developed in consultation with MHC, Massachusetts Bureau of Underwater Archaeological Resources (MA BUAR), EBHC, Mashpee Wampanoag, Wampanoag Tribe of Gay Head, and other project partners. A copy of the draft MOA and its stipulations are provided in Appendix C.
**Alternative 2 – No Action**

The No Action Alternative would cause no impacts to historic or archaeological resources.

### 4.6 Public Health and Safety

**Alternative 1 – Dam Removal (Proposed Action)**

Over the long term, the Project will improve safety for the public by eliminating a Dam considered to be in unsafe condition, as well as removal of a Dam designated by the Massachusetts Office of Dam Safety as a significant hazard. Failure of the Dam could destabilize the Route 106 public bridge and cause damage to downstream residences and infrastructure.

For a short duration, there will be an increase in vehicular traffic and operation of heavy construction equipment during the dismantling of the spillway. To mitigate any hazards during construction, the public will not be allowed to enter the work area. Trucks will be limited to the public roadways and the existing project access road, and therefore are not expected to cause any disproportionate direct, indirect, or cumulative adverse impacts associated with environmental health or safety risks to the public. The construction and impacts to traffic are expected to be of short duration lasting for approximately 1-2 months.

**Alternative 2 – No Action**

Under the No Action Alternative, the Dam will remain in place and continue to present a potential threat to downstream infrastructure should it fail.

### 4.7 Environmental Justice

**Alternative 1 – Dam Removal (Proposed Action)**

The Project is not expected to have any impacts to minority or low income populations adjacent to or near the Project pursuant to Executive Order No. 12898. There are no known populations that meet the Environmental Justice criteria (see Section 3.7) that are located in the immediate vicinity of the proposed Project.

**Alternative 2 – No Action**

Under the No Action Alternative, no impacts to Environmental Justice Zones would occur.

### 4.8 Cumulative Effects

A cumulative impact analysis considers the potential impact to the environment that may result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The lack of maintenance and use of the Dam has left it in a deteriorated condition that could lead to its catastrophic failure. If the Dam were to fail, there would be an uncontrolled release of water and sediment from the impoundment with high potential to damage upstream and downstream property and...
infrastructure, as well as potentially cause injury and/or loss of life. The Proposed Action would restore fish passage, riverine processes, and prevent a catastrophic dam failure. Following removal of the spillway, the private landowner will have no financial or legal obligation to maintain the Dam.

The proposed Project is expected to benefit the overall ecological health of the Satucket River watershed and when combined with other completed and proposed dam removals will contribute to improvements to the larger Taunton River watershed. Removal of the Dam would help enhance the abundance and diversity of aquatic species within the watershed. The direct effects of the proposed Project are not anticipated to add to any impacts from other actions in the area. Completion of the Project would contribute to community and interagency efforts to conserve and restore river herring and American eel. Therefore, no adverse cumulative impacts are expected as a result of this Project.

5.0 CONSULTATION AND COORDINATION

The following individuals, Federal, State, and local agencies, Tribes, and non-governmental organizations were consulted during the development of this EA:

- U.S. Fish and Wildlife Service, Northeast Region;
- The Nature Conservancy;
- National Oceanic and Atmospheric Administration;
- Massachusetts Department of Fish and Game, Division of Ecological Restoration;
- Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife;
- Massachusetts Department of Fish and Game, Division of Marine Fisheries;
- The Town of East Bridgewater, Massachusetts;
- East Bridgewater Historical Commission;
- Massachusetts Department of Transportation;
- U.S. Army Corps of Engineers;
- Massachusetts Department of Environmental Protection;
- Massachusetts Historical Commission;
- Private landowners adjacent to the Project Area;
- Gomez and Sullivan Engineers;
- Massachusetts Board of Underwater Archaeological Resources;
- Trout Unlimited;
- Public Archaeology Laboratory, Inc.;
- Old Colony Planning Council;
- Mass Audubon;
- Taunton River Watershed Alliance, Inc.;
- Mashpee Wampanoag Indian Tribal Council;
- Narragansett Indian Tribe; and
- Wampanoag Tribe of Gay Head (Aquinnah).
5.1 Required Permits and Approvals

In addition to this EA, the following permits and/or consultations are required by State and Federal agencies:

- 401 Water Quality Certification (MassDEP);
- Section 404 Clean Water Act General Permit (Habitat Restoration) (USACE);
- Environmental Notification Form (Massachusetts Executive Office of Energy and Environmental Affairs), and a decision under the Massachusetts Environmental Policy Act (MEPA);
- MA Wetlands Protection Act (MassDEP) and Order of Conditions (East Bridgewater Conservation Commission);
- MESA Project Review (MA NHESP);
- Chapter 91 Dredging Permit issued (MassDEP);
- Intra-Service Section 7 Consultation of the Endangered Species Act (Service);
- Chapter 253 Dam Alteration Permit from the Massachusetts Office of Dam Safety; and
- Section 106 of the National Historical Preservation Act Historical and Archeological Review (MHC and MA BUAR).

5.2 Public Involvement

Resource agencies, abutters, and other stakeholders have been involved throughout the feasibility and design planning stages of the Project. The Project has undergone local, State, and Federal permitting processes, associated with the permits listed in Section 5.1. Each permit process requires extensive environmental and planning agency advertisement, as well as ample public notice and involvement. Therefore, there have been existing and suitable opportunities for a wide variety of specialists, regulators, and the interested public to comment on the Project.

An informational public meeting was held in East Bridgewater on June 23, 2015 and March 8, 2016, with invitations sent to all adjacent landowners and other potentially interested parties. A public hearing was completed with an associated site visit to the Project on June 9, 2016 as part of the MEPA process. A public presentation was given to the East Bridgewater Conservation Commission on February 28, 2016, which was advertised in the local paper, and for which notifications were sent to all adjacent landowners and other interested parties. Information and public input gathered during these meetings were incorporated into the Project’s design and alternatives analysis.

6.0 REFERENCES


