ENVIRONMENTAL ASSESSMENT

White Rock Dam Removal Project

Westerly, Rhode Island, and Stonington, Connecticut

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In Partnership With:

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

17 July 2015
Date

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Purpose and Need	1
2.0	PROJECT DESCRIPTION	4
3.0	ALTERNATIVES	6
3.1	No Action Alternative	6
3.2	Alternative 1	7
3.3	Alternative 2	7
3.4	Alternative 3, the Preferred Alternative	8
4.0	AFFECTED ENVIRONMENT	8
4.1	General	8
4.2	Water Quality	9
4.3	Hydrology and Flood Zones	10
4.4	Sediment Chemistry and Management	11
4.5	Freshwater Wetlands and Vegetative Communities	12
4.6	Wildlife and Fish Resources	14
4.7	Threatened and Endangered Species	15
4.8	Historical and Archaeological Resources	16
4.9	Air Quality	17
4.10	Recreation and Public Safety	18
5.0	ENVIRONMENTAL CONSEQUENCES	18
5.1	General	18
5.2	Water Quality	18
5.3	Hydrology and Flood Zones	19
5.4	Sediment Chemistry and Management	20
5.5	Freshwater Wetlands and Vegetative Communities	20
5.6	Wildlife and Fish Resources	21
5.7	Threatened and Endangered Species	22
5.8	Historical and Archaeological Resources	23
5.9	Air Quality	23
5.10	Recreation and Public Safety	24
5.11	Cumulative Effects	24
6.0	AGENCY COORDINATION, PUBLIC INVOLVEMENT, & PERMITS	25
6.1	Consultation and Coordination	25
6.2	Public Involvement	25
6.3	Required Permits and Approvals	26
7.0	REFERENCES	27

LIST OF FIGURES

Figure 1 USGS Topographic Locus Map for White Rock Dam
Figure 2 Aerial view of White Rock Dam removal project site

APPENDICES

Appendix A Project Area Photographs
Appendix B Memorandum of Agreement between the United States Fish and Wildlife Service and the Rhode Island Historical Preservation and Heritage Commission
Appendix C Intra-Service Section 7 Biological Evaluation prepared by U.S. Fish and Wildlife Service

1.0 INTRODUCTION

1.1 Background

Since the late 1700s, the Pawcatuck River has been physically and ecologically altered as a result of human activity, including the installation of several dams that have elevated water surface elevations along certain sections of the River and modified the natural habitat of several migratory and resident fishes. One of these many dams, the White Rock Dam, spans the Pawcatuck River from Stonington, Connecticut to Westerly, Rhode Island, and is located approximately 7 miles from the mouth of the River (Figure 1).

The Dam site splits the Pawcatuck River into a remnant millrace (power canal), which now serves as a bypass channel carrying normal river flows, and what used to be the natural channel of the River (Figure 2). Currently, the natural river channel immediately downstream of the Dam is watered only by leakage through the Dam, spill through the defunct low-level outlet gate, occasional overtopping flood flows, and backwatering from the lower section of the River. Immediately west and southwest of the Dam, on the Connecticut side, are a number of commercial businesses and buildings. East of the Dam and impoundment in Rhode Island are wetlands, wooded uplands, and a sand and gravel mining business. Between the natural river channel downstream of the Dam, and the bypass channel is an undeveloped, wooded island.

The Dam was rebuilt in 1940 at the same location where at least two successive dams had been erected in the 1800s. Historically, the Dam and associated millrace were constructed as a source of power for the White Rock Mill that is located approximately 0.4 mile downstream of the Dam site. However, the Dam now is considered obsolete, as the mill has not used the Dam and the River for power in many decades, but instead relies on modern electric infrastructure. As a run-of-river structure, the Dam offers little flood water storage and contributes to elevated water levels upstream of the structure and to local flooding. This privately owned Dam is the first impediment to fish passage in the Pawcatuck River following the breach of the Stillman Dam downstream.

The U.S. Fish and Wildlife Service (Service), in partnership with The Nature Conservancy (TNC) and other Federal, State and local partners, is proposing to restore fish passage and to mitigate future flood impacts through removal of the White Rock Dam on the Pawcatuck River. Funding for the project comes from Hurricane Sandy recovery funds (Disaster Relief Appropriations Act of 2013), which are being administered by The Nature Conservancy via a cooperative agreement with the Service.

1.2 Purpose and Need

One of the main goals of the project is the reduction of flooding risk and increased coastal resiliency for local communities. The second major goal is to re-establish passage of anadromous fishes (those that migrate from salt to fresh water to spawn) beyond this first migration barrier to upstream spawning and nursery areas in the River mainstem and its tributaries. Additionally, the following project goals and objectives have been identified by local, State, and Federal project partners:

1. restore riverine habitats to a more natural environment, including restoration of natural river flows that transport sediment to nourish marshes and beaches, decrease water temperatures and increase oxygen levels;
2. mitigate the liability associated with ongoing maintenance and potential Dam failure; and
3. maintain recreational use of the Pawcatuck River.

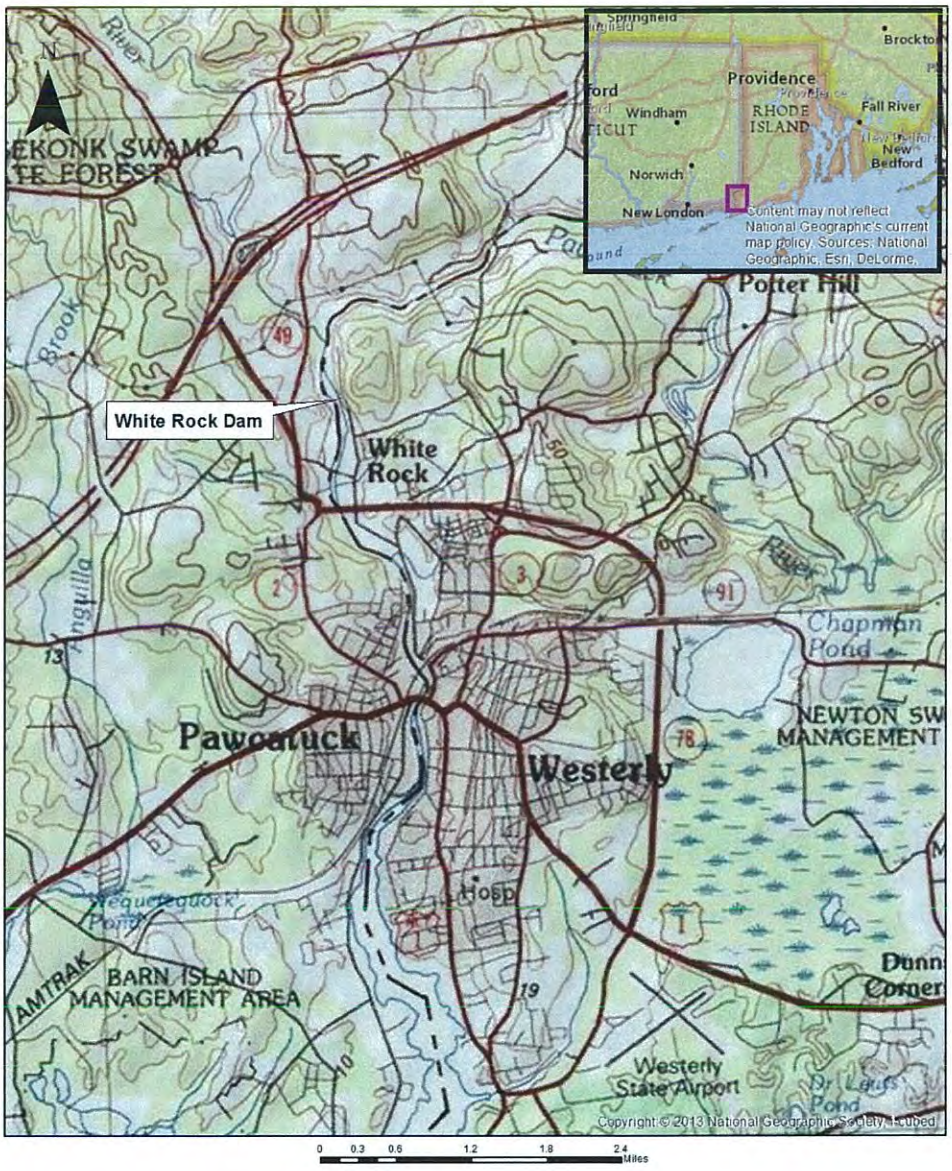

Figure 1. USGS Topographic Locus Map for White Rock Dam.

The Dam is a barrier to migratory fish and other aquatic organisms, and disrupts natural river functions. The Pawcatuck River holds great potential for restoration of anadromous species (Erkan 2002). The Rhode Island Department of Environmental Management (RIDEM) ranks Pawcatuck River fish restoration as high priority on their annual prioritized list of fish passage projects for the State (Edwards 2012). Consistent with the proposed designation of the Pawcatuck River as a Wild and Scenic River by the U.S. National Park Service, project goals include restoration of a free-flowing, natural river system. Species that will benefit from this project include migratory alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) (collectively called "river herring"), American shad (*Alosa sapidissima*), sea-run trout, and American eel (*Anguilla rostrata*), as well as numerous resident fish, and other aquatic organisms.

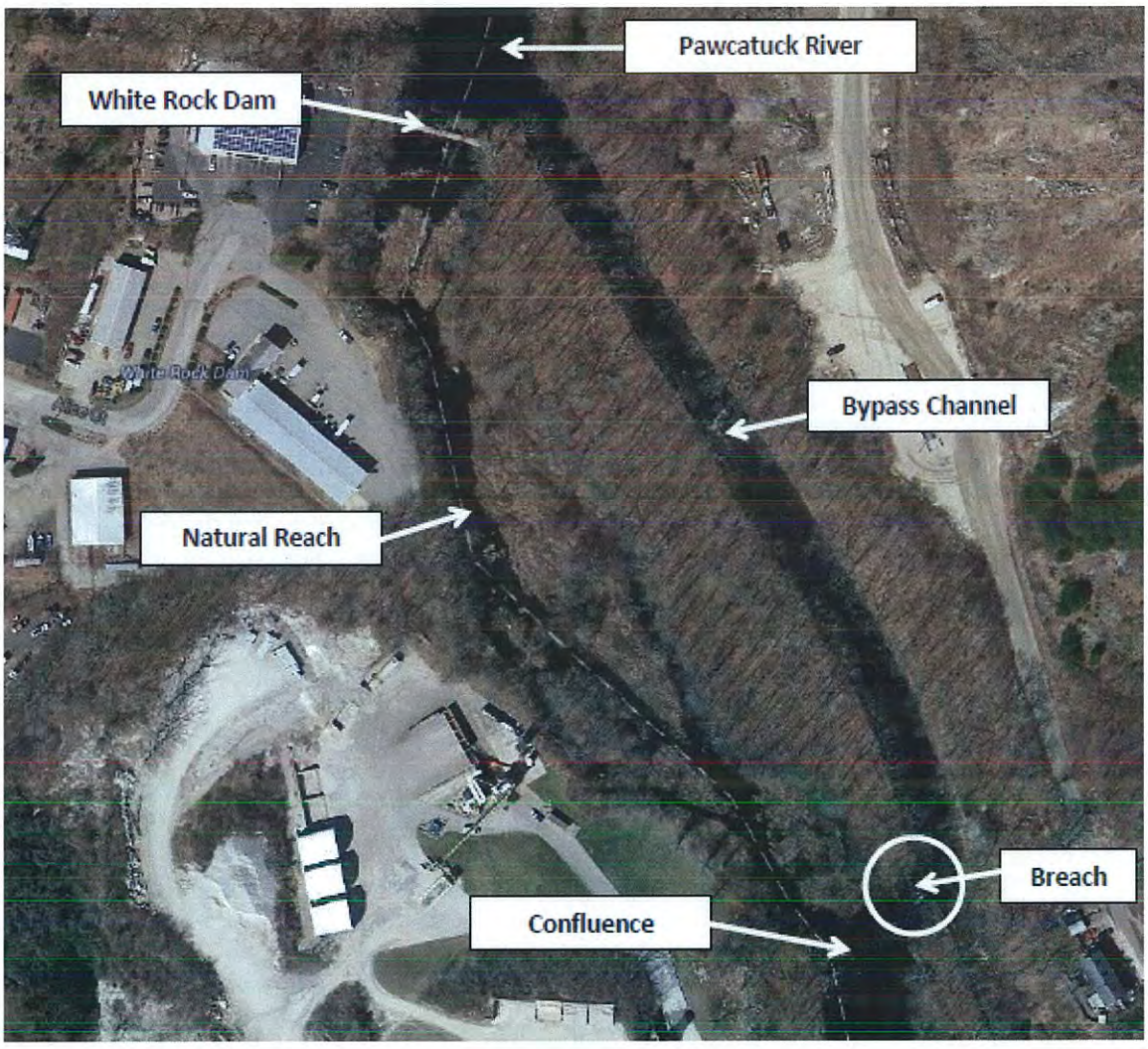

Figure 2. Aerial view of White Rock Dam removal project site layout. The dashed line through the length of the Pawcatuck River main river channel (natural reach) indicates the boundary between Stonington, Connecticut, on the west, and Westerly, Rhode Island, on the east.

As part of an interagency collaboration project, the Service's Fish Passage Engineering Group, the U.S. Army Corps of Engineers (USACE), and the RIDEM conducted an evaluation of fish passage within the Lower Pawcatuck River, including the White Rock Dam (Sojkowski et al. 2014). Based on this assessment of water flow velocities at the White Rock Dam and the bypass, suitable fish passage is not achieved within the bypass channel. The combination of the bypass channel's length, narrower channel relative to the upstream river channel, and vertical stone sides creates excessive flow velocities during the springtime spawning runs for migratory fish, creating conditions that exceed the swimming capabilities of all but a small minority of fish, and thus prohibits most fish passage upstream.

This project will build upon and complement other completed or planned fish passage improvements in the Pawcatuck River. The Pawcatuck River fish passage evaluation report (Sojkowski et al. 2014) included recommendations to improve fish ladder efficiency at the Potter Hill Dam, located immediately upstream of the White Rock Dam. Upstream of Potter Hill Dam is the Bradford Mill Dam. Partial funding for dam removal or other fish passage improvement at the Bradford Dam is available from the Hurricane Sandy funds that TNC is administering. Between 2010 and 2013, the Lower Shannock Falls Dam, the Horseshoe Falls Dam, and the Kenyon Mill Dam, all located upstream of the White Rock, Potter Hill and Bradford Mill dams, either have been removed or modified to improve fish passage. These three projects have opened up approximately 10 stream miles of spawning and nursery habitat.

A portion of Hurricane Sandy recovery funds was awarded to 31 projects that will restore and protect natural habitats and local communities, and improve resiliency to future storm and flooding events. The Service, with project partners, selected a number of older, obsolete dams for removal. One of the primary benefits of removing these dams, including the White Rock Dam, is a decreased risk of flooding and hence increased public safety and protection of property.

Following the catastrophic flooding of March 2010 in Rhode Island, including the towns surrounding the Pawcatuck River, the USACE conducted a Flood Risk Management Study to identify areas most significantly affected by flooding caused by the Pawcatuck River, and to subsequently identify modifications that could reduce or mitigate flooding impacts. One of the principal elements of the study was to evaluate lowering of base flood elevations along the River through removal of dams that are no longer serving their intended purpose and do not provide flood benefits through storage of flood flows. In the case of the White Rock Dam, it was noted in the USACE's December 2011 Section 905(b) Flood Damage Reduction Reconnaissance Study that removal of this dam would reduce flood levels upstream and may significantly improve the environment through water quality and habitat connectivity benefits. Therefore, the Service and project partners concluded that, in addition to the restoration of migratory fish passage, removal of the White Rock Dam would reduce flooding and associated impacts.

2.0 PROJECT DESCRIPTION: THE PROPOSED ACTION

The White Rock Dam spillway is constructed of concrete with a length of approximately 108 feet and a structural height of approximately 6 feet. Site access will be established through the clearing of vegetation and the River will be protected by the installation of erosion and

sedimentation perimeter controls. Woody vegetation will be cleared from the primary access route in Westerly, Rhode Island proposed through the quarry, owned by Cherenzia Excavation, located off of White Rock Road. Secondary access for construction vehicles and equipment will be gained via three separate corridors within the boundaries of Wescon Corporation of Connecticut's property located river right in Stonington, Connecticut. A temporary cofferdam will be placed upstream of the Dam to ensure that all water flows through the bypass channel and to allow construction work in the historical main river channel to take place in dewatered conditions. The entire Dam, left and right training walls, low-level outlet structure, adjacent sediment, and any uncovered legacy dams (older, wooden frame dams previously built at the same site) will be removed.

If the project consisted of only Dam removal, a significant volume of water would still flow through the bypass channel, thereby creating a braided channel pattern where neither the main river reach nor the bypass channel would provide optimum fish passage conditions. Therefore, an integral part of this project is to prevent flows in the bypass channel (except in extreme high flows) by construction of a permanent earthen berm or cofferdam at the upstream end. Including this feature in the plans allows for optimum fish passage to be designed for a fully restored main river channel. This permanent, scour-resistant feature will be constructed of excavated in-river sediment and soil-filled, vegetated stone armor. An impermeable liner sandwiched between geotextile fabric layers will be buried below the stone armor on the upstream side of the barrier to minimize leakage through this structure and to provide long-term protection. The elevation of the proposed berm is designed to allow flood flows above a specified elevation to overtop the berm and flow through the bypass channel and down to rejoin the natural channel at the existing confluence. This design feature will help reduce flooding downstream of the existing Dam location, prevent increases in base flood elevation between the former dam site and the confluence, and limit vegetative growth in the former mill headrace (bypass channel). The construction of this barrier will result in the placement of approximately 1,665 cubic yards of stone and excavated in-river sediment in the bypass channel between El. 7.0 (NAVD88) and El. 16.5 (NAVD88).

River sediment will be removed from upstream of the Dam spillway (within the natural river channel), as well as in specific portions of the natural river channel downstream of the Dam, to create a stable channel configuration as recommended by the project's geomorphic and hydrologic/hydraulic analysis. Also, sediment excavation downstream of the Dam is necessary to avoid increases of 100-year base flood elevations within the restored river channel between the Dam and the confluence with the bypass. Sediment to be excavated as part of in-river channel improvements will be relocated on-site to designated locations within the canal raceway (for re-use in the creation of the proposed upstream fish passage berm/barrier) and along the banks of the natural river channel (for re-use as soil fill within the voids of stone slope protection measures and as backfill used in the construction of the engineered log jams). Excess sediment that cannot be re-used will be transported to Cherenzia Excavation's quarry adjacent to the project site in Westerly.

Log jams and tree revetments constructed of large woody debris will be constructed along the right downstream river channel to provide slope protection and natural habitat within the river channel. Log jam structures will be constructed of anchored root wads of rot-resistant trees (tree

trunks with limbs removed and root fan intact) and boulders arranged in a stacked crib arrangement. Root wads will be driven into the channel bed and riverbank where possible for further anchorage and stability of the log jam structures. These structures will be infilled with smaller woody debris, cobbles and sediment from river excavation, and seeded in areas above the normal water surface to promote establishment of wetland vegetation. Anchoring boulders will be placed within and adjacent to the log jam matrix to buttress the log jam assembly, and steel cables tied to driven ground anchors will further stabilize the assembly from movement during higher flood flows.

Tree revetments will be constructed between log jams. These will be constructed of whole rot-resistant trees laid down along the toe of riverbank slope and anchored with steel cables tied to driven ground anchors and/or anchored to boulders. During the review period for this Environmental Assessment (EA), a complete set of project design plans may be accessed online at: http://tinyurl.com/pyuejv9 (accessed July 2015).

3.0 ALTERNATIVES

An alternatives analysis was performed to determine the most feasible and prudent means of achieving the defined project goals. A number of alternative Dam removal concepts were considered, including: 1) the removal of the Dam with no downstream channel excavation or barriers installed in the bypass channel; 2) the removal of the Dam with downstream channel excavation and a downstream barrier installed in the bypass channel; and 3) the removal of the Dam with downstream channel excavation and a partial barrier installed at the upstream end of the bypass channel to prohibit overtopping flows in the migratory season (except during maximum operating conditions). The principal project constraints identified and utilized to select the most appropriate Dam removal alternative were the ability of target species to successfully pass the restored section of the River and the condition that there would be no increase in 100-year base flood elevations (BFE) downstream of the removed Dam.

3.1 No Action Alternative

Under this alternative, no alterations to the White Rock Dam, the bypass channel, and the river sediments and embankments would take place. No actions would be performed to restore the River to a more natural state or to restore free-flowing hydraulic conditions along the River. The White Rock Dam, combined with the excessive flow velocities in the bypass channel, would continue to block anadromous and catadromous (species that migrate from fresh to salt water to spawn e.g., American eel) fishes and other freshwater fish that could otherwise benefit from restoring and optimizing the natural river channel for fish passage.

White Rock Dam is a run-of-the-river structure, meaning it provides no storage of flood waters. Risk of downstream flooding to surrounding properties and the community at large will remain unchanged. The Dam owner will remain liable for ongoing maintenance as well as any impacts from a dam breach or catastrophic failure.

This alternative does not meet the basic project goals and objectives. It would not restore natural river conditions, improve water quality, restore passage of target species, improve riparian habitat, or reduce flooding and risk of dam failure. For these reasons, it was not considered further.

3.2 Alternative 1: Dam Removal with No Downstream Sediment Excavation or Barriers Installed in the Bypass Channel

This alternative consists of complete Dam removal including the right and left concrete training wall abutments and aggraded sediment directly above and adjacent to the Dam. Removal of the Dam would restore river flow to the natural channel. However, some flow would still go down the bypass channel creating a braided channel pattern where neither the main stem channel nor the bypass channel would provide optimum fish passage. Additionally, 100-year base flood elevations would increase within the section of the River between the Dam location and the confluence with the bypass channel.

Although this alternative would provide some improvements to river connectivity, flood reduction, natural sediment transport, and water quality, it does not meet the main project goals of restored fish passage and flood elevation reduction (both upstream and downstream of the Dam). Additionally, flow split between the natural and bypass channels may not provide adequate depths for recreational boaters in either channel.

3.3 Alternative 2: Dam Removal with Downstream Channel Excavation and Downstream Barrier Installed in the Bypass Channel

This alternative consists of complete Dam removal, including the concrete training walls and aggraded sediment directly abutting the Dam, downstream channel excavation, and construction of a barrier in the downstream end of the bypass channel. Removal of the Dam and downstream channel excavation will reduce 100-year BFEs upstream of the Dam by as much as 2.6 feet and BFEs downstream of the Dam by as much as 0.5 feet. Therefore, no increase in BFEs is proposed under this alternative.

Under this alternative, the natural river channel downstream of the removed Dam would also be suitable for fish passage during minimum operating conditions. However, resting areas would be required during normal and maximum operating conditions. It appears that the existing braided sections of the natural river channel could remain (to some capacity) and be improved upon to function as resting locations for the target species.

Under this alternative scenario, the removal of the Dam, coupled with the proposed downstream channel improvements, would also result in the elimination of flow introduced into the bypass channel during minimum and normal operating condition flows during the fish passage season. This will avoid the concern of attraction flows from the bypass channel throughout the duration of much of the fish passage season. However, flows will run through the bypass channel during maximum operating conditions flows. As a result, a fish passage barrier would need to be installed adjacent to the downstream end of the bypass channel to prevent fish from entering the bypass channel. This downstream fish passage barrier (which would likely consist of a stone

weir) could represent an impediment/hazard to recreational use of the bypass channel, and could also require periodic inspections and/or maintenance to ensure it remains configured to adequately prevent entrance by migrating fish.

Under this alternative, fish passage under some flow conditions would be restored for the main river channel, and the goals of flood reduction upstream and downstream of the Dam location would be met. The natural river channel downstream of the removed Dam would be suitable for fish passage during only minimum operating conditions. The weir barrier would require periodic inspection and maintenance. This alternative would relieve the Dam owner of future liability; however, an agency or private landowner would have to assume responsibility and liability for the new weir. Therefore, this alternative only partially meets the project goals.

3.4 Alternative 3, the Preferred Alternative: Dam Removal with Downstream Channel Excavation and Upstream Partial Barrier Installed in the Bypass Channel

Under the preferred alternative, as in alternative 2, complete Dam removal, including training walls and aggraded upstream sediment, and downstream channel excavation would be completed. In addition, a permanent earthen berm is proposed for the upstream end of the bypass channel. An upstream barrier in the bypass channel would eliminate flows through the bypass channel that could potentially result in false attraction flows and confusion for migrating fish during the spring passage season. The proposed rock and earthen berm would be a permanent structure with minimal or no expected maintenance. Recreational boaters paddling downstream would easily be able to see the barrier at the upstream end of the former raceway and proceed through the restored, natural river reach.

Under this scenario, removal of the Dam coupled with downstream channel excavation would reduce 100-year BFEs upstream of the Dam by as much as 2.4 feet and BFEs downstream of the Dam by as much as 0.8 feet. In order to prevent flow into the bypass channel during the fish passage season, the earthen barrier must be constructed to an elevation of 16.5 feet (NAVD88). River flows occurring during the 2-year and greater storms, however, will overtop the berm and flow through the bypass channel. Allowing flood flows above a certain water surface elevation to pass through the former raceway prevents BFE increases in the natural river channel between the Dam location and the confluence with the bypass channel. Therefore, no increase in BFEs would result under this alternative.

This alternative restores optimum fish passage and riverine processes, improves water quality, maintains recreational use of this section of the River, and eliminates the liability of dam ownership. Therefore, this preferred alternative fulfills all of the goals from section 1.2 and represents the Proposed Action as outlined in section 2 of this EA.

4.0 AFFECTED ENVIRONMENT

4.1 General

The Pawcatuck River watershed encompasses a total area of approximately 317 square miles: 260 square miles in Rhode Island and 57 square miles in Connecticut. This watershed is the

largest watershed in Rhode Island, draining nearly one third of the State. The River, which is largely undeveloped upstream of the White Rock Dam, is actively used for boating, fishing, and passive recreation. The freshwater drainage basin encompasses rural uplands, woodlands, forests, wetlands, and small towns that were once thriving mill villages. The Dam is located approximately 7 miles upstream from the mouth of the Pawcatuck River. South of the Dam, rural land use gives way to the urban center of Westerly, Rhode Island and to the tidal and saltwater parts of the watershed where the River eventually discharges into Little Narragansett Bay.

Descriptions of the existing resource conditions are provided below, followed by a discussion of potential impacts to each resource in section 5 of this EA. A technical report (Fuss & O'Neill, Inc. 2014) and the technical narrative for the RIDEM Application to Alter Freshwater Wetlands (Fuss & O'Neill, Inc. 2015) contain more detailed and extensive descriptions of resources.

4.2 Water Quality

The Pawcatuck River, within the project limits, has a water quality classification of B as listed within the *RIDEM's State of Rhode Island and Providence Plantations 2012 Integrated Water Quality Monitoring and Assessment Report, Section 305(b) State of the State's Waters Report, Section 303(d) List of Impaired Waters* (August 2012), and the Connecticut Department of Energy and Environmental Protection's (CTDEEP) *CT Pawcatuck River Watershed Bacteria TMDL* (May 5, 2014). This water classification indicates that these waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. They are suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. They have good aesthetic value. Rhode Island's *State of the State's Waters Report* stated that this section of the Pawcatuck River within the project limits has an impairment to fish and wildlife associated with iron, lead, and non-native aquatic plants and an impairment to primary and secondary contact recreation due to enterococci bacteria.

Water quality in the Pawcatuck River watershed has steadily improved over the past decade as more stringent pollutant discharge regulations were adopted. In addition, the development of new technology allows for better treatment of wastewater prior to its discharge. The tea-brown coloration of the water is often mistaken for water pollution but actually is a natural product of the breakdown of leaves and organic material from the heavily wooded regions of the watershed.

Recent studies conducted by several University of Rhode Island researcher teams, in cooperation with the RIDEM, have shown that the water in both the River and the estuary is generally of high quality, and provides healthy habitat for a wide variety of plants and animals. Although concentrations of metals, such as lead, copper, zinc, and nickel, have decreased over the past decade in waters entering the estuary from the Pawcatuck River, iron and lead are still present and considered impairments to water quality.

Nutrients, such as nitrogen and phosphorus, are abundant in the River and estuary. Runoff from fertilized agricultural and residential areas, sewage treatment facilities, and septic systems add nutrients to rivers, streams, and groundwater throughout the watershed. A heavy growth of "fouling" organisms on the blades of eelgrass in Little Narragansett Bay has been suggested to be the result of excess nitrogen in the estuary, but further study is required to determine if the level

of nutrients in the river and estuary is affecting aquatic life. Nitrogen and phosphorus were not listed as impairments to the River within the project limits. Data indicate that bacteria levels in these waters exceed the State's enterococci bacteria standards, which are established to be protective of swimming and other recreational uses, such as canoeing and kayaking. Potential sources of indicator bacteria in the Pawcatuck River include point and non-point sources, such as stormwater runoff, agricultural activity, failing septic systems, nuisance wildlife/pets, and illicit discharges to the waterbody.

Impoundments, such as the one created by the Dam, increase summer water temperatures significantly by creating larger, slower moving water surface areas exposed to sun and warm summer air. Warmer temperatures decrease the dissolved oxygen content of the water both in the impoundment and for some distance downstream of the Dam.

4.3 Hydrology and Flood Zones

This River is located within the Lower Pawcatuck River watershed, which is part of the largest river basin in Rhode Island. The Pawcatuck River and its major tributary, the Wood River, drain most of southwestern Rhode Island into Little Narragansett Bay. Within the project limits, several tributaries converge with the Pawcatuck River. These tributaries originate to the west and north of the River and include the Shunock River and two unnamed streams, depicted on USGS topographic maps, and two additional streams that are visible on aerial photographs and that were observed in the field. Water depth within the subject portion of the River varies between 2 and 10 feet, with its width averaging approximately 120 feet.

The Dam impounds flow (during base flow conditions) for approximately 16,820 feet upriver to a location that is approximately 860 feet downstream of the Potter Hill Dam. The majority of flow conveyed by the River passes primarily through the bypass channel during base flow/dry-weather conditions as well as during some flood events. This is primarily because the crest of the Dam's spillway is set at an average elevation of El. 17.6 feet (NAVD88), whereas the most restrictive channel bottom elevation in the bypass channel occurs at elevation El. 13.0 (NAVD88). Thus, the 55-to-60-foot-wide bypass channel can accept approximately 4.6 feet of flow before the Dam is overtopped and flow is discharged to the natural river channel downstream of the Dam.

Based on pre-dam removal hydraulic/hydrologic modeling results, flow does not overtop the Dam's spillway during base flow conditions or normal river flows experienced during the spring months. The only flow introduced into the section of the natural river channel immediately downstream of the Dam (during these flow conditions) is by leakage through the Dam's low-flow outlet and the 24-inch diameter culvert that hydraulically connects the bypass channel with the natural river channel. The Dam's spillway is overtopped only during higher flows experienced within the River during the spring months (referred to as "maximum operating flow conditions") and flood events equivalent to, or greater than, the 2-year recurrence interval flood.

There are approximately nine private wells located along the River within the project's area of potential hydraulic effects. Due to potential impacts to private wells, site investigations and owner interviews were conducted to determine the potential for impacts to wells with Dam removal and subsequent lowering of the artificially elevated water table in the area.

Flood zones are geographic areas defined by the Federal Emergency Management Agency (FEMA), reflecting the severity or type of flooding in the area. The government definition of a floodplain, or high flood risk zone, is an area which has at least a one in one hundred or one percent chance of flooding in any given year. The White Rock Dam Removal Project is located within a FEMA-designated floodplain and floodway, mostly coincident at this location.

4.4 Sediment Chemistry and Management

The character of sediment at the White Rock Dam is a key element when considering its handling, disposal and/or potential re-use subsequent to Dam removal. Specific concerns included mobilization of potential pollutants, increased downstream suspended sediment loads and turbidity, and sediment deposition that buries valuable downstream habitat. Sediment data collection was focused on those sediments with the greatest potential to be mobilized as a result of future removal of the Dam. Three representative sediment samples were submitted to a local Connecticut laboratory for analyses. Since the River's reach within the project area encompasses jurisdictional areas in both Rhode Island and Connecticut, river sediment must be managed in accordance with respective criteria for the RIDEM and the CT DEEP regulatory programs. These parameters were selected based on pre-permitting consultations with the CT DEEP and the RIDEM regulatory/permitting staff:

- Priority Pollutant 13 Metals by USEPA 6010/7471;
- Semi-volatile Organic Compounds (SVOC) by USEPA Method 8270;
- Polychlorinated Biphenyls (PCBs) by USEPA Method 8082;
- Pesticides by USEPA Method 8081; and
- Cyanide by USEPA Method 9014.

Two of the samples submitted for laboratory analysis were collected upstream of the Dam and one was collected from soft sediment in a vegetated channel island approximately 100 feet downstream of the Dam. While pollutant criteria for sediment have not been formally adopted in regulations for dredging projects, comparative assessments have been made with respect to direct exposure criteria for soils as contained in the CT DEEP Remediation Standard Regulations (RSRs) and the RIDEM Remediation Regulations.

Results of sediment sampling and testing show that pesticides, PCBs, and cyanide were not detected in the three sediment samples. Several metals, two VOC, and seven SVOC were detected, but all were below the CT DEEP and the RIDEM Residential Direct Exposure Criteria (R-DEC), the CT DEEP GA Pollutant Mobility Criteria (GA-PMC) and the RIDEM GA Leachability Criteria (GA-LC).

4.5 Freshwater Wetlands and Vegetative Communities

This section of the EA presents a brief description of wetland and upland habitat types within the project area. More extensive descriptions of wetland types and species identified within each wetland delineated for the proposed action can be found in the technical report *Application to Alter Freshwater Wetlands: White Rock Dam Removal* (Fuss & O'Neill, Inc. 2014).

4.5.1 Aquatic/Riverine

Aquatic and riverine habitats of the project area consist of the Pawcatuck River watercourse, including the impoundment, the downstream natural reach, and the bypass channel waters, as well as several ponds (classified as Palustrine Unconsolidated Bottom wetlands) located inland from the River. The Pawcatuck River is designated on the USGS Topographic Map as a blue-line perennial stream, and therefore would be classified as a "River" in Rhode Island and a "Watercourse" in Connecticut. That portion of the River within the project limits would be classified as a Riverine Lower Perennial Unconsolidated Bottom wetland using the Cowardin et al. (1979) classification system. Streambed substrate varies with respect to location, but typically consists of cobble-gravel and sand with pockets of accumulated organics and/or muck. Substrate within the bypass channel consisted of more cobble-gravel.

A sparse coverage of submersed vegetation is present within the channel, primarily consisting of wild celery (*Vallisneria americana*), naiad (*Najas gracillima*), and common waterweed (*Elodea canadensis*). Common duckweed (*Lemna minor*), a tiny, floating aquatic plant, also is prevalent throughout much of the area that was evaluated. A few small areas of pickerelweed (*Pontederia cordata*) intermixed with American bur-reed (*Sparganium americanum*), and chairmaker's bulrush (*Schoenoplectus americanus*) are also present within the channel along the western bank from the Dam upstream to the confluence with the Shunock River. Vegetation along the western embankment and within a portion of the river channel downstream of the Dam includes species such as musclewood (*Carpinus caroliniana*), pussy willow (*Salix discolor*), fox grape (*Vitis labrusca*), reed canary grass (*Phalaris arundinacea*), silky dogwood (*Cornus amomum)*, and winterberry (*Ilex verticillata*).

4.5.2 Wetland

Approximately 23 wetland areas are located along the stretch of the Pawcatuck River within the limits of this project that may potentially be impacted by changes in base condition water surface elevations resulting from the removal of the Dam. These wetlands consist of forested wetlands, scrub-shrub swamps, emergent wetlands, and palustrine unconsolidated bottom ponds.

The majority of the wetlands identified within the assessed project limits are classified as forested wetlands (n=14) and scrub-shrub wetlands (n=5). An emergent wetland complex was also delineated immediately downstream of White Rock Dam, and several ponds (classified as Palustrine Unconsolidated Bottom wetlands) located inland from the River were identified also. Most of the wetlands are located immediately adjacent to the river channel and coincide with the 100-year floodplain.

Although the majority of the wetlands have a seasonally flooded/saturated water regime driven by a combination of groundwater and surface water inflows, it is likely that the hydrologic regime of the identified wetlands is at least partially influenced by the surface water elevation of the River, particularly upstream of the Dam where many wetlands are associated with flood plain soils. The hydrology of these wetlands is partially supported by the artificial impoundment created by the Dam, and the wetlands have evolved to their current state since the Dam's construction.

The palustrine forested wetlands generally shared a similar vegetative composition. Vegetative communities consist of species such as red maple (*Acer rubrum*), tupelo (*Nyssa sylvatica*), sweet pepperbush (*Clethra alnifolia*), spicebush (*Lindera benzoin*), winterberry, arrowwood (*Viburnum dentatum*), royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis),* silky dogwood, poison ivy (*Toxicodendron radicans*), and fox grape. The majority of these wetlands have a mature overstory canopy with at least 30 percent coverage and dense shrub and herbaceous layers.

An emergent wetland is present within the channel downstream of the Dam. This area is primarily dominated by grasses and persistent emergent vegetation, including reed canary grass, water willow (*Decodon verticillatus*), purple loosestrife (*Lythrum salicaria*), smartweeds (*Polygonum* spp.), and broad-leaved cat-tail (*Typha latifolia*). Common shrubs found within this wetland include buttonbush (*Cephalanthus occidentalis*), speckled alder (*Alnus incana*), pussy willow, silky dogwood, spicebush, sweet pepperbush, and winterberry.

Five scrub-shrub wetlands were identified within the riparian corridor along the River. These wetlands were generally similar in terms of plant composition and hydrologic conditions. The water regime of these wetlands varies between semi-permanently and seasonally flooded, depending on proximity to the River, with the hydrology being driven by a combination of groundwater discharge, surface water runoff, and periodic flooding from the River. Three of the wetlands are scrub-shrub wetlands intermixed with emergent wetland. These wetlands are dominated by silky dogwood in association with species such as pussy willow, winterberry, spicebush, fox grape, speckled alder, broadleaved scat-tail, purple loosestrife, red maple, royal fern, swamp dock, purple loosestrife, and reed canary grass within seasonally flooded/saturated areas.

A portion of one delineated wetland appears to function as a special aquatic site (i.e., vernal pool). This area is a clearly defined depression with indicators of prolonged flooding, including water marks on vegetation approximately 15 inches high, stained leaves, and buttressed roots.

4.5.3 Upland

Upland habitats within the evaluated project limits are varied and consist of industrial/commercial development downstream of the Dam and to the west, a gravel pit upstream and east of the Dam, and a variety of forested and early successional areas. Some residential development is present upstream of the Dam along Route 49 and Boombridge Road. Extensive forested areas intermixed with agricultural fields are present along portions of the

River upstream of the Dam. In addition, an extensive shrubland habitat is present north of the River near Boombridge Road.

The majority of upland habitats along the River consist of mature deciduous forest with a dense overstory canopy and a sparse to moderately dense understory. Areas within the vicinity of the industrial/commercial land, abandoned agricultural fields (i.e., shrubland), and other disturbed areas have less structural diversity and more even-aged vegetation. Some of these areas have a dense understory with many invasive plant species (e.g., multiflora rose, oriental bittersweet, burning bush [*Euonymus alatus*]).

Common vegetation observed within upland areas along the River include red oak (*Quercus rubra*), black oak (*Quercus velutina*), black birch (*Betula lenta*), American beech (*Fagus grandifolia*), arrow-wood (*Viburnum dentatum*), sweet pepperbush, red maple, common greenbrier (*Smilax rotundifolia*), mountain laurel (*Kalmia latifolia*), striped wintergreen (*Chimaphila maculata*), Pennsylvania sedge (*Carex pensylvanica*), bracken fern (*Pteridium aquilinum*), witch hazel (*Hamamelis virginiana*), hickory (*Carya* spp.), and ground pine (*Lycopodium obscurum*).

4.6 Wildlife and Fish Resources

This section of the EA presents a brief description of fish and wildlife identified within the project area. More in-depth descriptions of wildlife resources, including discussion of the functions and values of the different habitat types for wildlife, can be found in the technical narrative *Application to Alter Freshwater Wetlands: White Rock Dam Removal* (Fuss & O'Neill, Inc. 2014).

4.6.1 Wildlife

Wildlife habitat which could be used by game or non-game species is abundant along the evaluated reach of the River. The majority of this area is undeveloped and capable of providing habitat for a variety of wildlife species. Such habitats include the open water and bed of the River (fish, waterfowl, waders, shellfish, invertebrates), riverine aquatic bed/non-persistent emergent wetland (fish, waterfowl, invertebrates), vegetated and undercut embankments (passerines, mink, river otter, belted kingfisher, small mammals), and the various wetland and upland habitats.

A total of three amphibian, one reptile, ten bird, one bivalve, and five mammal species were observed directly or identified by other indicators such as scat, tracks, trails, dens, or vocalizations over the course of two site visits. The full list of wildlife species detected and those that were predicted to occur at the site based on published range maps and habitat preferences can be found in the technical narrative (Fuss & O'Neill, Inc. 2014).

Additionally, a recent survey of mussels in the project area found only two abundant beds of eastern elliptio (*Elliptio complanata*), a freshwater mussel species. The beds were immediately upstream of the Dam spillway and bypass canal, in coarse material that is slated to be removed during construction. A few mussels were located in the natural reach immediately upstream of

the confluence with the bypass canal. No mussels were seen in the bypass channel or downstream of the confluence of the natural reach and the bypass canal.

4.6.2 Fisheries and Essential Fish Habitat

The anadromous species of major concern (the "target species" for restoration) on the River include the American shad, alewife, and blueback herring. Other diadromous fishes in this system include rainbow smelt (*Osmerus mordax*), sea-run brown trout (*Salmo trutta*), as well as the American eel (USFWS 1991).

According to a 2006 feasibility study conducted for the Wood Pawcatuck Watershed Association (WPWA), it is believed that the Pawcatuck River was of regional importance to diadromous (both anadromous and catadromous fishes) fisheries, including Atlantic salmon and American shad (Milone & MacBroom, Inc. 2007). The system may have also supported a strong brook trout population.

Since the bypass channel passes the normal flows of the Pawcatuck River, it was assumed that migrating fish could swim upstream through this channel. However, a recent study of fish passage that measured flow velocities in the channel and compared these to swimming abilities of the target species determined that the vast majority of species, including most individuals of the target species, could not sustain burst speeds through the ~1,200-foot length of the long channel (Sojkowski et al. 2014). Therefore, the channel acts as almost a complete barrier to migrating fish, preventing them from reaching spawning habitat upstream. The 6-foot-high Dam is an obvious barrier for migrating fish.

The 1996 amendments to the Magnuson-Stevens Fishery Conservation Management Act strengthen the ability of the National Marine Fisheries Service and the New England Fishery Management Council to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. This habitat is termed "essential fish habitat," and is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

4.7 Threatened and Endangered Species

A May 19, 2015 query of the Service's online Information, Planning, and Conservation system produced a report indicating that there are no federally listed endangered, threatened, proposed, or candidate species, or critical habitats, in the project area. At the State level, three rare species were identified as potentially occurring within areas that may be affected by project activities.

The sparkling jewelwing dragonfly (*Calopteryx dimidiata*), a species listed as threatened in Connecticut, has been documented both above and below the White Rock Dam, and is known to occur along portions of the Shunock River, a small tributary to the Pawcatuck River located just upstream of the Dam and the impoundment. The species is associated with sluggish, vegetated streams with sandy bottoms, or rivers with little canopy cover. The adults are in flight in June

and July. The larvae (young) are completely aquatic and are often found on vegetation along the water's edge.

The eastern pearlshell (*Margaritifera margaritifera*), a species of freshwater mussel, is listed as a special concern species in Connecticut and as a State-endangered species in Rhode Island (RIDEM 2006; Nedeau and Victoria n.d.). This species has been identified within the subject reach of the Pawcatuck River (Raithel and Hartenstine 2006) and also within the Shunock River (Eastern Connecticut Environmental Review Team 2008), and was observed during the field visits for the current evaluation. Raithel and Hartenstine (2006) detected the eastern pearlshell in mixed assemblages of freshwater mussels in better riffle areas of the lower Pawcatuck River at Potter Hill and White Rock. However, a more recent (June 2015) underwater survey of the project area found no eastern pearlshell mussels, only eastern elliptio, which is not a State or Federal listed species.

Information from the RIDEM indicates that the State-endangered eastern spadefoot toad (*Scaphiopus holbrookii*) occurs within the vicinity of Boombridge Road upstream of the White Rock Dam.

The proposed project is located within the range of the federally threatened northern long-eared bat (*Myotis septentrionalis*) (NLEB). In the summer, these bats roost, forage, and raise pups in mixed stands of trees of greater than 3 inches DBH that have cracks, cavities, or loose bark. An emergence and acoustic survey conducted at the location of the proposed access road in the forest, and in the Cherenzia gravel driveway, detected five calls from three species. At dusk, no bats were observed leaving the trees in the area. No calls were confirmed from the forest survey. In the driveway area, the presence of the big brown bat (*Eptesicus fuscus*) was confirmed, and two additional tree bat species may be present, but no *Myotis* were detected. There have been no prior bat surveys at this site, but bat acoustic monitoring surveys have been conducted in nearby towns since 2010. Thirteen surveys have been conducted on route A2, which runs from Hopkinton, Rhode Island north to Coventry, Rhode Island. This route starts approximately 5 miles from the White Rock project site and runs to ~23 miles away from the site. Of the 13 surveys, NLEBs have been detected once in 2010 and once in 2014. On the B route, which runs from Charlestown, Rhode Island to West Greenwich, Rhode Island (10-22 miles from the White Rock Dam site), NLEB calls were recorded once in 2013 out of a total of 14 surveys.

The project site is within a small forested island among old mill buildings, a large gravel pit and other development in the northern portion of the Town of Westerly. Directly upstream along the River are larger tracts of unbroken forest that could provide suitable habitat for bats.

4.8 Historical and Archaeological Resources

Identification and Description of Historic Properties

The Rhode Island Historical Preservation & Heritage Commission (RIHPHC) reviewed and approved a map of the Area of Potential Effect (APE) developed by project partners and the consulting engineer. The APE associated with this undertaking includes the White Rock Dam and former mill headrace as resources of the White Rock Historic District, which is considered

eligible for listing in the National Register of Historic Places according to the RIHPHC, and information the RIHPHC provided to the Service.

Dam and hydropower infrastructure: The existing dam consists of a 108-foot-long, 6-foot-high concrete ogee spillway built in 1940. The Dam is intact with some sediment deposition noted immediately upstream. A low level gate is present on the eastern (river left) side of the spillway. Remnants of the gate structure remain, but the gate is inoperable in an open position. Significant debris accumulation occurs periodically to block this opening, limiting the capacity of this low level conveyance to discharge flows. Based on a field inspection and a review of historical dam construction documentation, it appears that there may be one or more legacy dams just upstream of the current Dam's spillway. As documented within the Annual Report of the Commission of Dams and Reservoirs, January 1889, the White Rock Dam previously consisted of wooden frame cribbing filled with stone and abundantly backed with earth extending far into the headpond and covering another older stone dam that once existed and was likely built in the 1840s. It is unclear how much of the existing dams were removed prior to the reconstruction of the Dam in 1940 and installation of the current concrete ogee spillway.

The headrace in its current configuration is believed to have been built concurrent with expansion of the mill building circa 1879 when records indicate that the headrace was widened as part of the improvements to install a larger water power system at that time. The headrace within the APE is approximately 1,200 feet long and 55 feet wide, and is constructed of bedrock, boulder, and cobble substrate. Approximately 40 percent of the headrace length (~480 linear feet), at the upstream end, has walls constructed of dry laid fieldstone, whereas the lower 60 percent (~720 linear feet) lacks these walls. The channel streambed is composed of a coarse substrate of cobbles and gravel along the entire length. The headrace now discharges all flow to the main stem of the River through a breach in the western bank of the canal.

Section 106 Consultation

In addition to consulting with the RIHPHC, coordination efforts also have included consultation with the Connecticut State Historic Preservation Office (CTSHPO), federally recognized Tribes, the Advisory Council on Historic Preservation, and the general public through a number of opportunities outlined in section 6.2 of this document. The majority of the proposed activities and associated historical resources of the project are located in the State of Rhode Island and, therefore, the CTSHPO has elected consulting party status and has deferred to the RIHPHC for the section 106 review. Several months after invitation to consult letters were sent, the Service has received no responses from Tribal nations.

4.9 Air Quality

Ambient air quality is protected by Federal and State regulations. The Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants, and air quality standards for each state cannot be less stringent than the NAAQS. The NAAQS determined by the EPA set the concentration limits that determine the attainment status for each criteria pollutant.

In New England, EPA has designated all areas in the three southernmost states (Connecticut, Massachusetts, and Rhode Island), as well as coastal sections of New Hampshire and Maine, as non-attainment.

4.10 Recreation and Public Safety

A secondary goal of this project is to increase accessibility and safety for recreational paddlers, and to restore the overall recreational value of the River for all user groups. Recreational canoeists and kayakers frequent the Pawcatuck River, including the area between the Potter Hill Dam upstream, and the White Rock Dam and bypass channel. The bypass channel, with its higher velocity flows, appeals to local whitewater kayakers during the high flow season particularly.

However, the Dam presents some dangers and limitations for the average paddler. The Dam presents a safety hazard to boaters, especially during high flows when water rushes over the spillway and through the low-level outlet structure. Boaters traveling downstream who are not skilled enough to navigate the fast-moving water and rapids in the bypass channel must portage around the Dam and possibly through the natural channel (due to inadequate flow, narrow channels from sediment deposits and shallow depths) until reaching the bypass channel's confluence with the natural channel. Similarly, upstream paddlers who might otherwise be able to paddle through the project area under certain flow conditions, presently cannot due to inadequate widths and/or depths in the natural channel and presence of the Dam, and high velocities in the bypass channel, thus requiring portaging through some or all of the project's reach.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 General

The proposed removal of the White Rock Dam will not have any long-term adverse effects on the existing environment of the Pawcatuck River. Dam removal will provide fish passage to sections of the River upstream from the existing Dam. The project is expected to have a positive effect on the river ecology, as well as provide flood mitigation and elimination of the threat of catastrophic dam failure. Benefits to river ecology include the cooling of the river waters, the restoration of natural sediment and nutrient transport, the restoration of healthy oxygen levels, and the improved connectivity for migratory and local organisms.

5.2 Water Quality

Under the No Action Alternative, no short- or long-term impacts to water quality in the Pawcatuck River would occur. However, water quality may continue to be impaired, particularly during summer months, by low oxygen and warm temperatures due to the shallow water depths in the impoundment.

Under the Proposed Action, the impacts to water quality from the removal of the Dam and excavation of some sediment, stone and vegetation will be minimal and of short duration. Construction will take place during low flow conditions in the summer months. Appropriate sediment control measures, as shown on the project plans and described in the 401 Water Quality Certification, will be used to minimize any mobilization of sediments downstream. It is likely that some sediment will be transported downstream via passive means, but these volumes are expected to be negligible.

Water quality is expected to improve with the Dam removal and limited excavation. The target fish species for this project, as well as local resident species, have very restrictive temperature requirements for survival, growth and reproduction. Impounded waters behind a dam are slow-moving, shallow, and often have higher water temperatures, lower oxygen levels and greater fluctuations in pH than more swiftly moving waters (Santucci et al. 2005). As a result, it is anticipated that the removal of the Dam will help to reduce thermal loading and associated water quality problems as far upstream as the Potter Hill Dam. Therefore, the only long-term impacts to water quality in the project reach are expected to be beneficial.

5.3 Hydrology and Flood Zones

Under the No Action Alternative, there will be no change to hydrology or predicted flooding regimes. Flood zones will remain unchanged. The Pawcatuck River will continue to experience annual flooding with damage occurring along the river (Sojkowski et al. 2014). The Dam impounds a large volume of water, which if released in an uncontrolled manner, would present a hazard to persons, properties and infrastructure directly downstream of the Dam. Without significant upkeep and maintenance in the future, the Dam will over time deteriorate and potentially catastrophically fail, possibly resulting in ecological harm and damage to downstream properties and infrastructure.

Under the Proposed Action, the Dam removal, sediment excavation, and barrier placement in the man-made bypass channel will restore the River to a more free-flowing riverine system. Long-term impacts include the lowering of surface water elevation by Dam removal and subsequent draining of the man-made impoundment. Reductions of base and flood flow elevations were confirmed by engineers at Fuss & O'Neill, Inc. through modeling of flows before and after Dam removal. Following Dam removal, water surface elevations under average flow conditions will decrease by approximately 2 feet at the existing Dam location, while flood elevations for the 2-year frequency flood will decrease by approximately 3 feet. These reductions in water elevations decrease rapidly with distance upstream towards the Potter hill Dam.

Removal of the Dam and installation of a fish passage barrier at the upstream end of the bypass channel will result in more flow being conveyed through the natural river channel downstream of the Dam during dry- and wet-weather conditions compared to existing conditions. This restoration of river flows to the natural channel would potentially subject properties along the banks of the River to additional flooding (i.e., properties along Alice Court and Elmata Avenue such as Shoreline Stone, Livery Limited, and the Wescon Corporation). To increase the natural river channel's conveyance capacity such that there will be no increase in overbank flood elevations for the 10-, 25-, 50-, 100-, and 500-year recurrence interval flood events, a number of

in-river channel improvements are proposed. These improvements include the complete removal of the Dam, any older, legacy dams, and sediment upstream of the existing Dam. Downstream of the Dam, sediment, stone and some vegetation will be removed at limited, select locations in the river channel. Therefore, long-term impacts to surface waters and hydrology are predicted to be beneficial for the ecosystem.

As noted above, removal of the Dam will result in the lowering in water surface elevations upstream of the Dam during dry weather, base flow, and wet weather conditions. As a result, base condition and floodplain river widths upstream of the former Dam will be reduced. River channel bank areas that were previously inundated by impounded water during dry-weather conditions will be exposed palustrine unconsolidated bottom habitat that may become vegetated floodplain or other wetland types. These areas of the former impoundment will become available for flood conveyance and/or storage purposes. Removal of the Dam will avoid the hazards and potential harmful effects that failure of the Dam present, in addition to the reductions of 100-year flood elevations for residents and properties upstream of the Dam. Therefore, long-term impacts of the Dam removal on the hydrology and flood profiles are expected to be beneficial.

Based on modeling and site reconnaissance, it is expected that two privately owned wells within the area of potential effect will be impacted by the Dam removal and lower base water levels. TNC will take proactive measures to mitigate potential effects from the project by replacing these wells.

5.4 Sediment Chemistry and Management

Under the No Action Alternative, there will be no change to sediments within the project area. Long-term impacts to sediment include the removal of some accumulated sediment upstream of the Dam, and in limited areas of excavation downstream of the Dam. Based on the sediment testing, the material to be excavated is suitable for beneficial reuse as a regulated material in compliance with a valid and written authorization or permit issued by the Commissioner of the CT DEEP, and RIDEM. The planned re-use of excavated sediment as either for the proposed berm in the bypass channel or as clean fill/recycled material for the Cherenzia gravel business are beneficial uses of these sediments and the impacts, therefore, are neutral to positive.

5.5 Freshwater Wetlands and Vegetative Communities

Under the No Action Alternative, sediment may continue to accumulate immediately upstream and downstream of the Dam, and very shallow open water areas may transition to emergent wetlands over long periods of time. In the short-term, no changes in vegetation or wetlands are expected.

Under the Proposed Action, limited direct impacts to wetlands and uplands will occur. An access road from the clearing on the gravel/excavation business, river left side, to the River's edge, will be cut through secondary growth forest and riparian forest, and gravel placed down for trucks to pass over. Following completion of the project, the temporary roadway will be restored by removal of the gravel and then seeding the road bed. Approximately 22,300 square feet of

sediment will be placed in the upstream end of the bypass channel, impacting ~410 linear feet of man-made riverine habitat. Approximately 104,800 square feet of sediment will be removed from the River, both upstream and downstream of the Dam, including some emergent wetland. However, impacts to vegetated wetlands have been minimized to the greatest extent practicable for this project, and additional riverine habitat will be created by the sediment removal.

Changes in water levels following Dam removal will drive transitions in wetland cover types. Some submerged wetlands (palustrine unconsolidated bottom) will become exposed and may transition to emergent wetland or scrub-shrub wetland. Existing emergent wetland may transition to scrub-shrub wetland or to floodplain forest and upland riparian border vegetation. All of these are ecologically valuable wetland or temporarily flooded upland types associated with riverine systems. Of the 96 acres of adjoining wetlands from Potter Hill Dam to the White Rock Dam project site, an estimated ten percent will transition from forested wetlands to upland forest. The remaining 90 percent will still be wetland habitat types.

Once the Dam removal has been completed, water elevations lowered and sediments drained, the existing seed bank contained within the impoundment sediments is expected to germinate and establish a community of native flora. The contractor will also seed the new earthen berm and plant live stakes in certain areas. Staff of TNC will monitor the project area to identify and remove any invasive plants.

While removal of the Dam will result in some alterations to wetlands and hence wildlife habitat, the net benefits of the proposed habitat restoration project to the target species and river system as a whole far outweigh any such impacts. Although the dominant vegetation and associated classifications of some wetlands will change in response to changes in river surface water elevations, the actual loss of wetland habitat is minimal and primarily confined to the riverine environment, which is expected to revert to wetland habitat dominated by emergent plants, scrub-shrub habitat and flood tolerate tree species. Overall, there will be long-term net benefits from improved habitat quality, restoration of fish passage, and expected gains in biodiversity.

5.6 Wildlife and Fish Resources

5.6.1 Wildlife

Under the No Action Alternative, wildlife diversity or populations are not expected to change. Under the Proposed Action, project activities will not have long-term adverse impacts to wildlife in the project vicinity. Short-term impacts may arise from construction activity for the 2- or 3-month project period. Disturbances are expected to include increased noise, human presence, substrate disturbances/turbidity occurring from in-water work, vegetative disturbances, temporary fill associated with the access road, and the installation of channel bank stabilization.

The noted activities could temporarily displace resident and transient wildlife that currently utilize the affected habitats or reduce the availability and attractiveness of habitats for some species, particularly wildlife that are sensitive to disturbances or have specific habitat requirements (e.g., fish). During construction, displaced species are expected to relocate and/or use adjacent habitats, given the continuity of the project area with similar habitat types. Short-

term impacts to wildlife are expected to cease upon completion of the project and restoration and stabilization of disturbed areas. Wildlife usage is expected to return to pre-project levels.

Prior to construction, a salvage operation for eastern elliptio and any other mussels seen in the targeted locations where mussel beds were found will be conducted. Mussels will be relocated to suitable habitat identified in the lower Shunock River, which is outside of the project boundary and area of potential effects.

5.6.2 Fisheries and Essential Fish Habitat

Under the No Action Alternative, the existing Dam will continue to impede the natural movement of resident riverine fish, migratory fish, and other resident aquatic species. With the Proposed Action, there may be short-term adverse impacts to fish during construction when the area just upstream of the Dam to the natural reach downstream of the Dam is dewatered. These impacts will be mitigated with the capture and relocation of the individuals to upstream habitat.

Because dams fragment aquatic habitat, many species that depend on flowing water, such as brook trout, river herring, and American shad have suffered dramatic population declines, in part due to the loss of flowing water and riverine habitat caused by dams and the loss of access to upstream spawning habitat. The removal of this Dam will vastly improve connectivity to upstream and downstream river lengths, significantly expanding the area and quality of land under water for fisheries habitat. Therefore, the Proposed Action will have long-term positive effects upon the fisheries and fish habitat of the Pawcatuck River.

The Pawcatuck River above the head of tide, where the White Rock Dam and impoundment are located, is not designated Essential Fish Habitat. Although there are important habitats for anadromous fish in the Pawcatuck River, including above the existing Dam, the Magnuson-Stevens Fishery Conservation Management Act only applies to marine and estuarine waters.

5.7 Threatened and Endangered Species

Under the No Action Alternative, no changes to threatened and endangered species are expected.

In a November 14, 2014 Natural Diversity Database inquiry response letter, the CT DEEP stated that the proposed project is not expected to have a significant impact on the sparkling jewelwing damselfly, and may in fact create new habitat for this insect. The CT DEEP also indicated that the eastern pearlshell mussel would be affected as a result of excavation activities and temporary dewatering of sections of the river channel where access or work is required. As a result of this finding, TNC and the CT DEEP collaborated to develop a monitoring and protection plan to evaluate the presence of eastern pearlshell mussels within areas that will be affected by project activities in coordination with the contractor's sequence of water control and construction schedules. Prior to work occurring in respective locations, the CT DEEP and TNC staff will review affected areas and relocate mussels to avoid/minimize impacts to these animals. Following an underwater snorkeling survey of project areas, no eastern pearlshell mussels were found. The eastern elliptio mussels identified during the survey will be relocated prior to construction.

While the RIDEM indicated that the State-endangered eastern spadefoot (*Scaphiopus holbrookii*) occurs within the vicinity of Boombridge Road upstream of the subject Dam, changes in hydrologic conditions in this area are not expected to have any impact to this animal species, given its specific habitat. This species uses arid to semi-arid areas, such as fields, farmland, dunes and woodlands with sandy or loose soils. Whereas this animal is noted to breed in temporary bodies of water (e.g., vernal pools, flooded fields and forested wetlands), changes in hydrology at this portion of the River are minor and will not have a significant impact on the availability of such breeding habitats, which are sustained principally by local (upland) drainage patterns and microtopographic features in this area.

Given that there was no evidence of bats utilizing the proposed cut area and that the area to be cut is very small, involving only a few trees of a suitable size for supporting roosting bats, this work is not expected to have any adverse effects to the reproductive success or survival of NLEBs. Following an intra-service section 7 Endangered Species Act review, Service biologists determined that the proposed activity is not likely to adversely affect the NLEB.

5.8 Historical and Archaeological Resources

Under the No Action Alternative, the White Rock Dam will remain in place, and the headrace will remain open and will continue to pass the bulk of river flows. Under the No Action Alternative, no archival photodocumentation, sketch plans or report on the Dam and its components, or on the headrace, will be undertaken.

The Service, in consultation with the RIHPHC, has determined that the Proposed Action will cause an adverse effect to properties of the White Rock Historic District. Adverse effects consist of 1) removal of the White Rock Dam, including the low-level outlet and left and right training walls, and 2) preventing river water from flowing into a stone-lined, former mill headrace by construction of a permanent earthen berm. The RIHPHC has requested mitigation in the form of Rhode Island Historical Resources Archive (RIHRA) documentation of the Dam and headrace.

A draft Memorandum of Agreement (MOA) (see Appendix C) between the Service and the RIHPHC, with the CT SHPO and TNC as consulting parties, has been reviewed and approved by all signatories. The MOA stipulates that archival quality photographs to document the White Rock Dam and headrace, as well as a written narrative of the design and history of the structures, will be completed as mitigation for the adverse impacts to historical properties. Our project partner and administrator, TNC in Rhode Island, has retained Public Archaeological Laboratories to conduct these mitigation measures.

5.9 Air Quality

Under the No Action Alternative, there will be no changes to the existing air quality. The Proposed Action will have no long-term impacts on air quality. Project construction may cause a temporary reduction in local ambient air quality because of emissions generated by construction equipment. Equipment operating on the construction site will emit pollutants that contribute to temporary and localized increased levels of criteria pollutants such as carbon monoxide, nitrogen

oxides, and ozone. The emissions from construction vehicles and related equipment should have an insignificant impact to local air quality. No changes in local or regional air quality are likely to occur with the construction and operation of the proposed project.

5.10 Recreation and Public Safety

Under the No Action Alternative, no changes to recreational use or public safety will occur.

Under the Proposed Action, short-term impacts will consist of a temporary need for paddlers to portage around the active construction site. A boater safety boom will be installed upstream of the temporary cofferdams to be constructed upgradient of the project site, with signage directing boaters to a designated portage take-out location on river-left, upstream of the temporary construction access bridge across the raceway/bypass channel's inlet. Portaging boaters will be directed by barricades/signage to either an optional put-in location within the raceway/bypass channel immediately downstream of the temporary construction access bridge, or continue along an existing footpath adjacent to the east side of the raceway/bypass channel to a pooling area at the downstream end of the raceway/bypass channel where flows discharge through the breach to the natural river channel, where they can put-in. Similarly, boaters paddling upstream from below the project site will be directed by signage to a take-out location at the raceway/bypass channel breach, where they can portage on the existing footpath along the raceway/bypass channel, and put-in upstream of the temporary construction access bridge at the inlet to the raceway/bypass channel, to continue paddling upriver.

Construction access will take place on river left and right sides from privately held commercial properties where there is no public access. Nonetheless, during construction, appropriate signs and barricades will be erected for public safety.

Overall, the project will enhance the recreational use of the River by restoration of a natural, free-flowing river system, and improve public safety through removal of an obsolete dam. The natural river channel will provide recreational boating opportunities to all proficiency levels, including novice boaters and families boating with children, while the bypass channel will continue to be available during higher flows for more advanced kayaking enthusiasts.

5.11 Cumulative Effects

No adverse cumulative impacts are projected as a result of the Proposed Action. However, long-term beneficial, cumulative effects are expected. The Pawcatuck River watershed has been the subject of a program to restore runs of migratory fish for over 30 years. Partners include the RIDEM, the Service, CTDEEP, WPWA, and TNC, among others, and millions of dollars have been spent. Just recently, considerable funds have been expended to make three upstream dams passable to fish. The White Rock Dam is the first obstacle to these migratory species in the watershed. Research studies have recently shed light on the negative impact that the Dam and the excessive flow velocities in the bypass channel have on the ability of fish to access critical upstream habitat. The removal of the White Rock Dam will build upon and enhance the fish passage improvements already completed, and those still planned for the Potter Hill and Bradford Mill dams.

6.0 AGENCY COORDINATION, PUBLIC INVOLVEMENT AND PERMITS

6.1 Consultation and Coordination

Representatives of the following Federal, State, and local agencies, Tribes, and project team members were consulted during project planning and the development of this EA:

- The Nature Conservancy, Rhode Island;
- The Nature Conservancy, Connecticut;
- Town of Stonington, Connecticut;
- Town of Westerly, Rhode Island;
- U.S. Fish and Wildlife Service, Region 5;
- U.S. Army Corps of Engineers;
- National Oceanographic and Atmospheric Administration, Restoration Center;
- Rhode Island Department of Environmental Management;
- Connecticut Department of Energy and Environmental Protection, Inland Fisheries;
- Connecticut Department of Energy and Environmental Protection, Inland Waters;
- Connecticut State Historic Preservation Office;
- Rhode Island Historical Preservation and Heritage Commission;
- Narragansett Tribal Historic Preservation Officer;
- Mohegan Tribal Historic Preservation Officer;
- Mashantucket Pequot Tribal Historic Preservation Officer;
- Wood Pawcatuck Watershed Association;
- Rhode Island Canoe and Kayak Association;
- Public Archaeology Laboratory;
- Fuss and O'Neill, Inc.;
- Griswold Textile (Dam owner); and
- private land owners.

6.2 Public Involvement

Support for this project has been gained through a number of outreach efforts by project partners with community stakeholders and recreational users. Letters of support for the project have been received from the Westerly Land Trust, the Hopkinton Land Trust and the Wood-Pawcatuck Watershed Association. A number of additional outreach efforts have been undertaken by the project partners through meetings with the owners of the Dam and other property owners upon which work will occur or may otherwise be affected during the project's construction phase.

TNC met with the leadership of the Rhode Island Canoe and Kayak Association on October 27, 2014 to discuss both temporary and permanent alterations from the Dam removal project that are expected to affect recreational boating. On November 29, 2014, TNC and WPWA held an information workshop open to all interested paddlers in Rhode Island and Connecticut who boat on the River, to communicate plans for the project, address questions and understand concerns such that these viewpoints can be considered and addressed, where possible, in the project's development. These meetings were effective venues to communicate benefits to paddlers of all

abilities that will result from removal of the Dam, by removing the hazard of induction into the low-level outlet and flows plunging over the crest of the Dam during high water conditions, as well the need to portage the Dam and bypass channel during upstream excursions.

On December 3, 2014, a public workshop was held by TNC in Westerly, Rhode Island to provide an overview of the project background, proposed alterations, and the project's ecological and flood risk reduction benefits. Invitations to this workshop were mailed to property owners abutting the River from the Dam area up to Potter Hill Dam, posted in municipal offices in Westerly and Hopkinton, Rhode Island, and Stonington and North Stonington, Connecticut, and published in local and regional newspapers.

6.3 Required Permits and Approvals

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

- Section 401 Water Quality Certification (CT DEEP);
- Section 401 Water Quality Certifications (RIDEM);
- Wetlands Regulations review (RIDEM);
- Dam Safety review (CT DEEP); and
- Programmatic General Permit (USACE).

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Appendix A: Project photographs

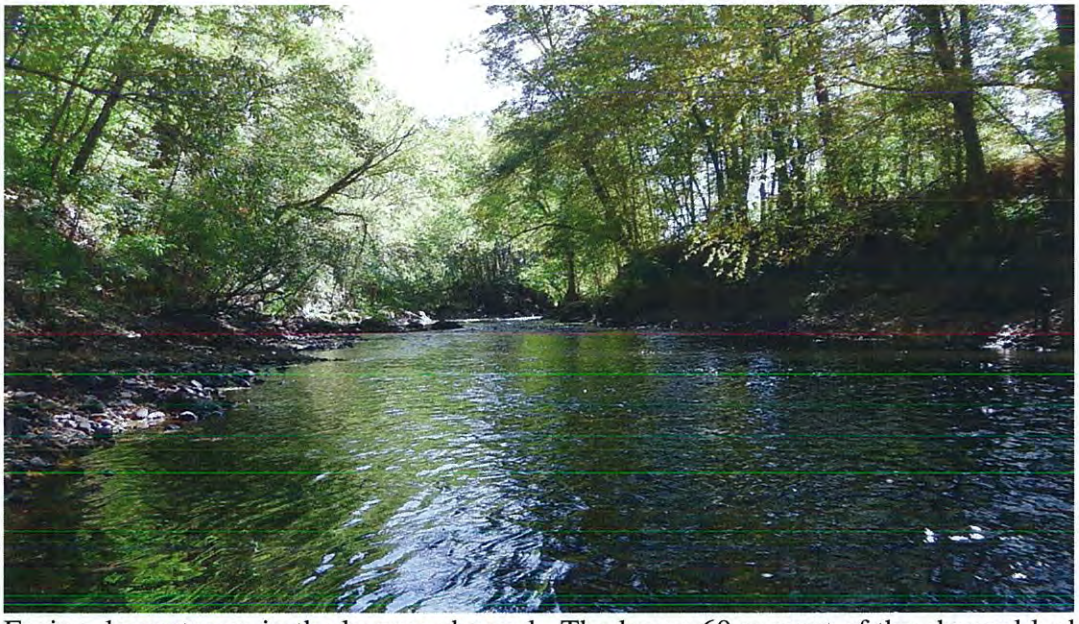
Top of White Rock Dam facing downstream (south) from river right. Behind the Dam, accumulated sediment supports some vegetation.

Pawcatuck River channel looking upstream at White Rock Dam.

View from above the Dam facing the left concrete training wall and low level outlet structure (photo center), and entrance to the bypass channel (photo far left), Westerly, Rhode Island.

Right training wall, river right, Stonington, Connecticut, to be removed.

View facing downstream in the bypass channel, Westerly, Rhode Island. The northern 40 percent of the channel is lined with stone walls.



Facing downstream in the bypass channel. The lower 60 percent of the channel lacks the stone walls.

Appendix B: Memorandum of Agreement between the United States Fish and Wildlife Service and the Rhode Island Historical Preservation and Heritage Commission Regarding Removal of the White Rock Dam on the Pawcatuck River in Stonington, Connecticut and Westerly, Rhode Island

MEMORANDUM OF AGREEMENT BETWEEN THE U.S. FISH AND WILDLIFE SERVICE AND THE RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

PURSUANT TO 36 CFR 800.6(c) AND 33 CFR 325, APPENDIX C
REGARDING THE WHITE ROCK DAM REMOVAL PROJECT,
WESTERLY, RHODE ISLAND, AND STONINGTON, CONNECTICUT

WHEREAS, U.S. Fish and Wildlife Service (USFWS), as lead Federal agency, is providing funding and technical assistance for the White Rock Dam Removal Project (Project) that involves the removal of an obsolete dam on the Pawcatuck River, restoration of free flowing riverine habitat and diadromous fish movement, and reduction of local flooding; and

WHEREAS, The Nature Conservancy in Rhode Island (TNC RI), the Project proponent, is acting as program administrator for the Project based on design and regulatory permitting plans entitled "Lower Pawcatuck River Restoration" prepared by Fuss & O'Neill, Inc.; and

WHEREAS, the Project will be accomplished using Federal funds provided by the USFWS from the Disaster Relief Appropriations Act of 2013 through the Department of the Interior; and

WHEREAS, the Project requires Federal regulatory authorization from the United States Army Corps of Engineers; and

WHEREAS, the USFWS has determined that the Project will have an adverse effect on the White Rock Dam and its associated power canal headrace, which have been determined as eligible for listing in the National Register of Historic Places as resources of the White Rock Historic District; and

WHEREAS, the USFWS has consulted with the Rhode Island Historical Preservation and Heritage Commission (RIHPHC) and with the Connecticut State Historical Preservation Office (CTSHPO) pursuant to applicable regulations found in 36 CFR Part 800, and 33 CFR Part 325, Appendix C, implementing Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470f) and has provided the documentation required by 36 C.F.R. 800.11 to them; and

WHEREAS, the majority of the proposed activities and associated historical resources of the Project are located in the State of Rhode Island, the CTSHPO has elected consulting party status and has deferred to the RIHPHC for the Section 106 review; and

WHEREAS, the USFWS has solicited input from Tribal interests (Narragansett Tribal Historic Preservation Officer, Mashantucket Pequot Tribal Historic Preservation Officer, and Mohegan Tribal Preservation Officer) to participate in this Section 106 consultation process, but has received no responses; and

WHEREAS, TNC RI, on behalf of the USFWS, has coordinated with and solicited input from local and regional communities potentially interested in historic resources to participate in the Section 106 and National Environmental Policy Act consultation processes; and

WHEREAS, in accordance with the regulations implemented in Section 106 of the NHPA, the USFWS has invited the Advisory Council on Historic Preservation (ACHP) to participate in the consultation process; and

NOW THEREFORE, the USFWS and the RIHPHC agree that the Project shall be implemented with the following stipulations in order to take into account the effects of the Project on historic properties:

STIPULATIONS

The USFWS shall insure that the following measures are carried out in consultation with the RIHPHC:

1. The USFWS, through TNC RI and their archaeological consultant, shall prepare documentation of the White Rock Dam and the White Rock Mill Headrace prior to any demolition or construction. The documentation shall consist of archival quality photographs (RIHPHC to specify quantity and view points) and written narrative of the design and history of the structures. Archival quality documentation shall be provided to the Rhode Island Historical Society, the Westerly Historical Society and to the CTSHPO. A non-archival quality copy of documentation shall be submitted to the RIHPHC.

2. Unidentified Historic Properties

   TNC RI and their archaeological consultant will ensure that if previously unidentified historic properties are discovered which may be affected by the Project, they will notify the USFWS and the RIHPHC. The USFWS and the RIHPHC will apply the National Register criteria and eligibility, and consult pursuant to 36 CFR 800.4.

3. Dispute Resolution

   a. Should any signatory to this MOA object within thirty (30) days to any actions proposed or carried out pursuant to this MOA, the USFWS shall consult with the RIHPHC to resolve the objection. If the USFWS determines that the objection cannot be resolved, the USFWS shall forward all documentation relevant to the dispute to the ACHP. Within thirty (30) days after receipt of all pertinent documentation, the ACHP will either:
      i. provide the USFWS with recommendations which the USFWS will take into account in reaching a final decision regarding the dispute; or
      ii. notify the USFWS that it will comment pursuant to 36 CFR 800.6(b), and proceed to comment. Any recommendations or comment provided by the ACHP will be understood to pertain only to the subject of the dispute; the

USFWS responsibility to carry out all actions under the MOA that are not subject of the dispute will remain unchanged.

b. If, at any time during the implementation of the measures stipulated in this MOA, an objection should be raised by an interested member of the public or consulting parties, the USFWS will consult with the other parties to this MOA to determine the appropriate response.

4. Duration

This MOA will expire if its terms are not carried out within three (3) years from the date of its execution. Prior to such time, the USFWS may consult with the other signatories to reconsider the terms of this MOA and amend it in accordance with Stipulation 5 below.

5. Amendments

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

6. Termination

a. If any signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other parties to attempt to develop an amendment in accordance with Stipulation 5 above. If, within thirty (30) days (or another time period agreed to by all signatories), an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.
b. In the event the MOA is terminated, the USFWS will either execute an MOA with signatories pursuant to 36 CFR 800.6 (c) or request the comments of the ACHP under 36 CFR 800.7 (a).

Execution of this MOA by the USFWS and the RIHPHC, and its subsequent filing with the ACHP, and implementation of its terms evidences that the USFWS has afforded the ACHP an opportunity to comment on the White Rock Dam Removal Project, and that the USFWS has taken into account the effects of the Project on historic properties.

UNITED STATES FISH AND WILDLIFE SERVICE

By: _____ Date: 29 June 2015

Thomas R. Chapman
Supervisor, New England Field Office

RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

By: _____ Date: 7/7/2015
Edward F. Sanderson
Executive Director, Deputy State Historic Preservation Officer

CONSULTING PARTY SIGNATORIES:

CONNECTICUT STATE HISTORIC PRESERVATION OFFICE

By: _____ Date: 7/13/15
Daniel T. Forrest
State Historic Preservation Officer

THE NATURE CONSERVANCY, RHODE ISLAND

By: _____ Date: 7/13/15
Scott Comings
Associate State Director

Appendix C: Intra-Service Section 7 Biological Evaluation Prepared by U.S. Fish and Wildlife Service

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Lori Benoit, Rhode Island Field Office, Charlestown, RI.

Telephone Number: 401-364-9124 ext. 41

Date: July 9, 2015

I. Service Program and Proposed Activity: Ecological Services, Coastal Program proposes to support the Nature Conservancy, Rhode Island Chapter (TNC RI) in a Hurricane-Sandy funded dam removal and flood reduction coastal resiliency project. Approximately 0.36 acres of second growth forest will be cleared to create a temporary access road for construction vehicle access to the White Rock Dam, the headrace, and the impoundment. The work is expected to begin on July 27, 2015, pending regulatory approval, and to continue for several weeks.

II. Pertinent Species Within the Area: None known to occur in the area, although habitat may be suitable for the federally threatened northern long-eared bat (*Myotis septentrionals*; NLEB). The proposed project is located within the range of the NLEB. An IPaC Trust Resource Report generated on May 19, 2015 identified no endangered or threatened species in the project area, and also no critical habitats.

III. Station Name and Action: Southern New England – NY Bight Coastal Program working with The Nature Conservancy, Rhode Island Chapter. Funding of the White Rock Dam Removal Project through the Disaster Relief Appropriations Act of 2013 and Technical Assistance provided by the Service's Coastal Program.

IV. Location: White Rock Dam, river left forested wetlands and uplands, Westerly, RI
Lat- 41° 24'21.29N. Long – 71° 50'36.10W. Property owned by Cherenzia Excavation, Inc.

V. Determination of Effects

A. Explanation of effects of action on species and critical habitats listed in II
Construction activities in the forest will include the clearing of trees and underbrush to create a temporary access road of approximate dimensions 25 feet wide by 160 feet long (~5,100 square feet). Also, construction will include the clearing of grasses and scattered shrubs and trees on an additional five small areas for slope work for training wall removal, to stabilize a storm drain outlet, to create some fish resting areas, to install tree revetments/log jams, and for access at the down-stream limit of excavation. The total area of clearing for all six locations is conservatively estimated to be 0.36 acres.

On July 6, 2015, Costal Program staff conducted a habitat survey during daylight hours, and a 45 minute acoustic survey starting at dusk, of the proposed road area. Trees were identified and visually inspected for suitable NLEB roost sites. Three large silver maple trees at the water's edge had no visible holes or breaks in the bark. A large, gnarled and damaged (lightning strike?)

red maple tree had a dead limb, and cracks in the one or more limbs that could provide suitable roost cavities. Two mature shagbark hickories that are likely to be removed for road construction could have suitable roost sites in the peeling bark. Another Carya spp. (hickory – likely pignut) does not have peeling bark and looked intact. Additional shagbark hickories were close by but were deemed to be outside of the proposed road and so would not be removed. All other trees identified were seedlings and saplings of hickory, cherry, oak, and birch, all with a diameter at breast height (DBH) less than three inches. The shrub layer consisted of mostly invasive species such as Asiatic bittersweet, multiflora rose, Japanese barberry, and autumn olive. The herbaceous layer consisted almost entirely of poison ivy, Virginia creeper, and young shoots of Asiatic bittersweet. No bats were observed leaving the trees from within the proposed cut area during the acoustic survey from 8:45 pm – 9:30 pm. It was a clear and warm night with no wind. Five bat echolocation calls (likely from three individuals) were recorded with an ANABAT recorder during the 45 minute survey. Staff at Rhode Island Department of Environmental Management will analyze the calls to determine the species.

There have been no prior bat surveys at this site that we are aware of, but bat acoustic monitoring surveys have been conducted in nearby towns since 2010. Thirteen surveys have been conducted on route A2, which runs from Hopkinton, RI north to Coventry, RI. This route starts approximately 5 miles from the White Rock project site and runs to ~23 miles away from the site. Of the 13 surveys, NLEB have been detected once in 2010 and once in 2014. On the B route, which runs from Charlestown, RI to W. Greenwich, RI (10-22 miles from the White Rock dam site) NLEB calls were recorded once in 2013 out of a total of 14 surveys.

The project site is within a small forested island among old mill buildings, a large gravel pit and other development in the northern portion of the town of Westerly. Directly upstream along the river are larger tracts of unbroken forest that could provide suitable habitat for bats.

Given that there was no evidence of bats utilizing the proposed cut area and that the area to be cut is very small, involving only a few trees that are of a size suitable to support roosting bats, this work is not expected to have any adverse effects to the reproductive success or survival of northern long-eared bats.

B. Explanations of actions to be implemented to reduce adverse effects.

The total area to be disturbed is less than one half acre and so this small of an area at the southern fringe of a much larger contiguous forest is not likely to impact the reproduction or survival of the NLEB. This clearing will not begin until July 27, 2015, a late enough date in the summer for pups to be volant in the unlikely event one of the trees to be removed was used as a nursery. The original design was for a longer road (~ 250 feet), but this was changed to a shorter, more direct route of only 160 feet, thus limiting impacts to the forest.

VI. Effect Determination and Response Requested

A. Listed Species Determination: Not likely to adversely effect

A. Response Requested: None required

VII. Reviewing Ecological Services Office Evaluation

A. Concurrence: Concur

B. Formal Consultation Required: No

C. Conference Required: No

D. Nonconcurrence : N/A

Remarks: This consultation was reviewed by Susi vonOettingen, Endangered Species Specialist, of the New England Field Office. SWO

Lori Benoit, Fish and Wildlife Biologist
Originating Official

July 9, 2015
Date

Thomas R. Chapman, Supervisor
New England Field Office
Reviewing Official

10 July 15
Date