ENVIRONMENTAL ASSESSMENT

Aquatic Connectivity and Coastal Resiliency Project: Hyde Pond Dam and Whitford Brook Stonington and Groton, Connecticut

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In Partnership With:

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Date

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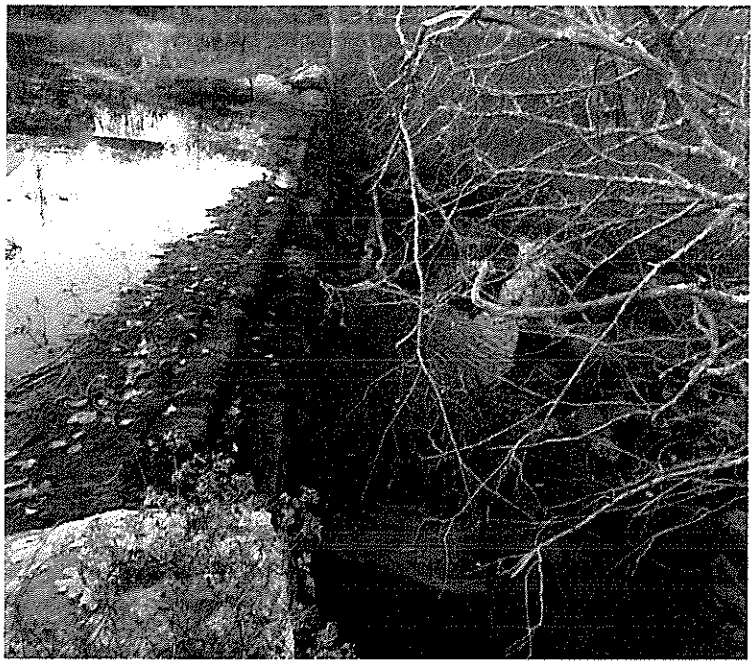

U.S. Fish and Wildlife Service
Southern New England-New York Bight Coastal Program
Charlestown, Rhode Island

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1.0 INTRODUCTION

1.1 Background

Hyde Pond Dam is located on Whitford Brook, the primary inflowing tributary of the Mystic River, in the towns of Groton, Ledyard, and Stonington in New London County, Connecticut (Figure 1). The existing, privately owned structure is an earthen embankment with a concrete-capped, 4.8-foot-high masonry spillway and dry-laid fieldstone retaining wall with a total length of 200 linear feet. Built in the early nineteenth century and originally used to power a mill, it has not been operational for several decades. The Dam impounds approximately 12 acres of open water and wetlands.

Whitford Brook supports populations of sea run brown trout, alewife, blueback herring, American eel, and sea lamprey. To support passage of these species, the Connecticut Department of Energy and Environmental Protection (CT DEEP) previously installed a structural fishway at the Hyde Pond Dam. However, the fishway does not effectively pass fish above the Dam (see section 1.2 for a discussion of fishway limitations).

The U.S. Fish and Wildlife Service (Service), as lead Federal agency, and its project partners, the Connecticut Fund for the Environment Inc./Save the Sound (CFE/Save the Sound), the CT DEEP's Inland Fisheries Division and the Office of Long Island Sound Programs, the Town of Groton, and private landowners, are proposing to restore fish passage, stream habitat, water quality, and mitigate future flood impacts through removal of the Hyde Pond Dam. As the project administrator, CFE/Save the Sound is managing the project activities and funds. Funding for the design and construction of the project comes from Hurricane Sandy recovery funds (Disaster Relief Appropriations Act of 2013), and from the National Fish and Wildlife Foundation Long Island Sound Futures Fund.

1.2 Purpose and Need

The purpose of the project is to mitigate flooding and possible dam failure, reestablish passage of anadromous fish beyond this first migration barrier to 4.1miles of stream, and increase functions and values associated with perennial stream and riverine habitat. This ecological restoration project is intended to restore river habitats to a more natural environment, including enhancing the riparian habitat, restoring natural river flows that transport sediment to nourish marshes and beaches, improve water quality, and restore natural movement of migratory and resident fishes. Removal of the Dam in the Long Island Sound watershed would mitigate a potential flood hazard and increase downstream resiliency in the face of climate change. In March 2010, Whitford Brook and the Mystic River flooded their banks and caused damage to roads, bridges, and property in Stonington and Groton. Removing the Dam and reconnecting the River to its flood plain should provide additional flood storage capacity for the watershed, reducing the threat of such flooding and property damage in the future.

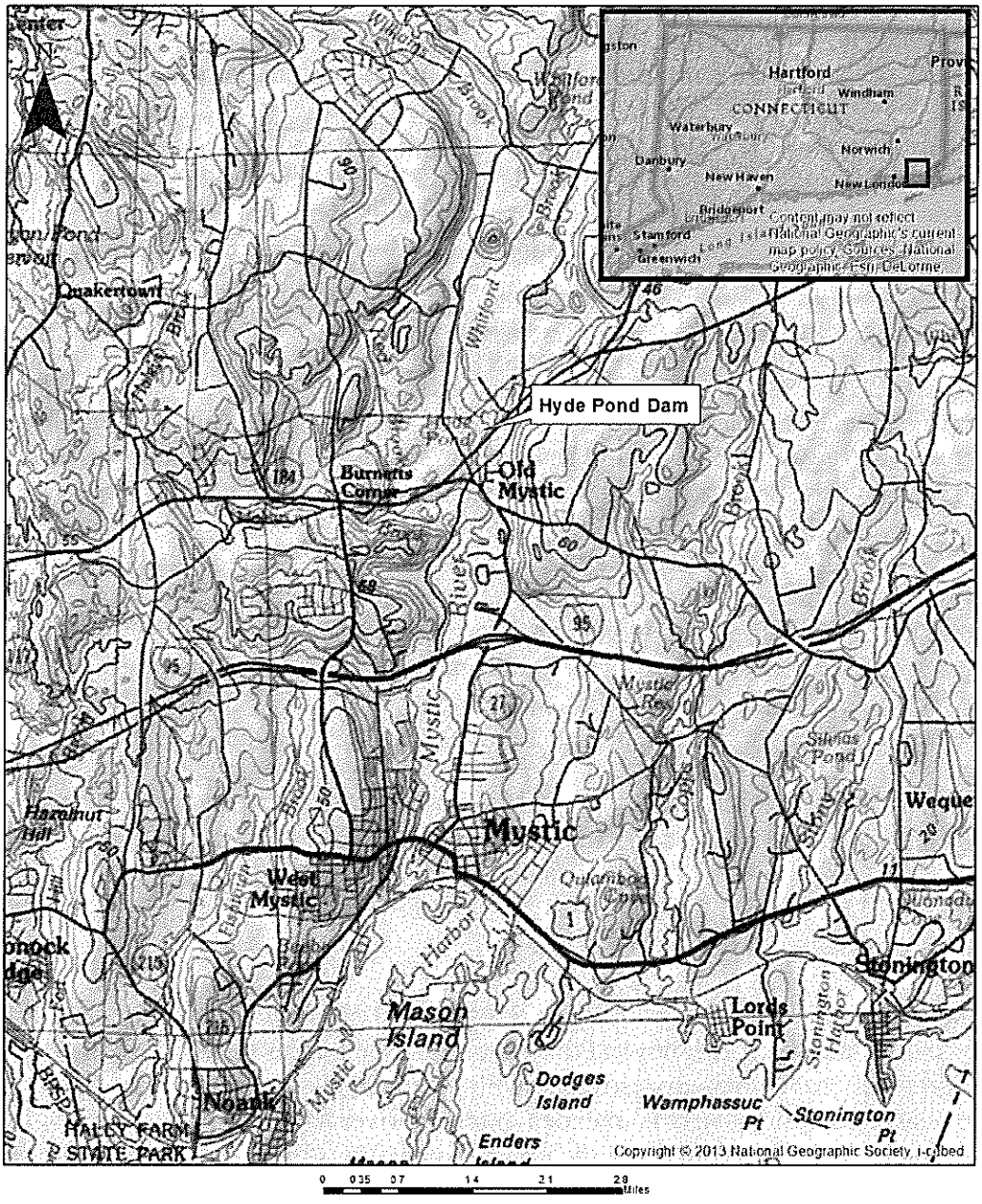

Figure 1. Topographic location map for Hyde Pond Dam.

The Hyde Pond Dam is a barrier to anadromous and resident fish passage and to movement of other aquatic organisms. The deterioration of the Dam has been ongoing for many decades but is occurring more rapidly in recent years due to seepage through the spillway and scour over the earthen berm. High flows that exceed the capacity of the

spillway are actively head-cutting through earthen material on the river embankment. The owner of the Dam is financially and legally responsible for all maintenance and repair of the Dam, and also has legal liability in the event of its failure.

In 2000, the CT DEEP installed a second steeppass fishway section to extend an existing steeppass fish ladder in order to improve fish passage over the Dam. Currently, however, the fishway is highly compromised by active beavers that routinely dam the fishway exit. Furthermore, water seepage through the Dam is diverting much needed flow away from the fishway, thereby reducing water depths at the fishway and impairing fish passage conditions in the structure.

Populations of alewife and blueback herring (river herring) have declined in the past 20 years and the CT DEEP has prohibited the taking of anadromous river herring in all Connecticut waters (fresh and salt) since 2002. Over the same period, the abundance of American eel also has declined in Connecticut coastal streams. American eel are currently being considered by the Service for listing under the Federal Endangered Species Act. The proposed project will help to increase access to spawning and juvenile habitats for these Federal Trust species, and therefore, the project encompasses both Federal and public interests.

Providing fish passage at the Dam is in accordance with an interagency cooperative effort to restore anadromous fish to the Northeast. Providing fish passage on Whitford Brook, a tributary to the Mystic River estuary, supports the goal of enhancing anadromous fish populations in Connecticut, Long Island Sound, and the Atlantic Coast, and would support the resource objectives of other Federal, State, and local natural resource agencies.

2.0 PROJECT DESCRIPTION

The Proposed Action entails full depth and partial width removal of the spillway, as well as the creation of a pilot channel via limited excavation of impounded sediment, including sand and cobbles that were deposited just above the Dam during original construction, as well as more mobile portions. The earthen embankments will be graded and stabilized in place. Excavated sediment will be reused on site for stabilization of the river-left channel bank to prevent erosion to the foundation of an auto shop building located adjacent to the impoundment. No excavation will occur within native streambed material. The plans also include the complete removal of the existing fish ladder, which will be returned to the CT DEEP for use at another site. The construction site will be accessed from private lands on and adjacent to 33 New London Turnpike and disturbance to these uplands, that likely consist of fill material associated with the construction of New London Turnpike, will be minimal. Removal of the Dam will restore fish passage and access to 4.1 miles of stream for river herring, sea run brown trout, and sea lamprey, and will improve passage for American eel.

All dredge material will be placed on top of existing impounded sediments in shallow water in the vicinity of sediment sample #2, which is adjacent to the auto shop building.

Existing sediments in the vicinity of sample #2 will not be disturbed, but will be buried with excavated material from areas with lower concentrations of contaminants and will be stabilized to prevent any erosion and mobilization downstream. As such, sediments with elevated concentrations of certain PAHs (discussed in sections 4.6 and 5.6 of this document) would be buried under approximately 1–4 feet of sediment, graded at stable slopes (i.e., 4H:1V) from the edge of the building. Burial of this area will effectively sequester the contaminated sediments from the aquatic environment. The majority of the former impoundment will remain a vegetated floodplain wetland with extremely limited potential for direct human exposure and with no potential for residential development.

The proposed pilot channel will extend approximately 150 linear feet upstream from the Dam. Boulders, cobbles and gravel near the base of the fishway and in the Dam will be reused as stable substrate for a created channel through the existing spillway and for bank stabilization adjacent to the sediment storage area. To ensure long-term stability of the placed sediment and sustainable sequestration of the contaminated soils, additional stone will be imported to serve as bank stabilization along with a filter berm to hold placed sediment along the created channel. After placement and final grading, the sediment will be seeded. All formerly impounded areas outside of the limit of disturbance will be allowed to revegetate naturally. Channel dimensions were developed by combining field measurements of upstream and downstream reaches, consulting regional hydraulic geometry curves, and applying hydraulic modeling to assess channel capacity and stability; the proposed pilot channel is 30 feet wide by 2 feet deep.

3.0 ALTERNATIVES

An alternatives analysis was performed to determine the most feasible and prudent means of achieving the defined project goals and objectives. The ability to provide fish passage, and to improve habitat and upstream water quality, and to minimize the likelihood of dam failure and impacts to adjacent landowners was evaluated under each alternative.

3.1 Alternative 1: No Action Alternative

Under this alternative, no alterations to the existing Dam will take place. Existing conditions at the Dam, which is in poor condition, include seepage through the spillway and head-cutting through the earthen embankments. The Dam will continue to deteriorate over time and is in danger of breaching or full catastrophic failure. No actions would be performed to restore the stream to a more natural, sustainable state or to restore free-flowing hydraulic conditions along the watercourse. If a decision is made for no action, the Dam owner will be responsible for repairing the Dam at their own expense. Up to now, the Dam owner has not maintained the Dam to regulatory standards. Any extensive repairs will likely require that the Dam be brought into compliance with the latest dam safety requirements for capacity and safety, which could add substantially to the costs of repair. As the structure will remain in place and under regulation, the owner will be responsible for maintenance and repair into the future and will retain the legal liability in the event of its failure. No funding sources exist to pay for dam maintenance or to aid private dam owners in covering such expenses.

Under this alternative, the existing fishway at the Dam would remain in place. The function of the fishway to pass fish above the existing Dam is highly compromised by active beavers that routinely dam the fishway entrance. Also, water seepage through the Dam diverts much needed flow away from the fishway, thereby reducing water depths and impairing fish passage conditions at the entrance to the fish ladder. Therefore, the fishway has very limited functionality, and is serving only as a temporary measure to slow the decline of the riverine fish community. Furthermore, as the Dam continues to deteriorate in the future, more and more water will be passing through the Dam or a breach in the Dam, lowering the water level in the pond to the point where the fishway is totally inoperable at all times. All fish passage will cease. In the event of complete dam failure, the largest stones currently comprising the structure would collapse, remain at the base of the former Dam, and become a barrier to fish passage.

A natural resource inventory (Pawlak 2013) of the site identified a broad suite of common, native species and acknowledged the support of multiple wetland functions and values. However, the inventory report describes moderate-to-high degradation by human activity to the wildlife habitat function due to the Dam and sediment accumulation, and that pond finfish habitat is supported but impaired, due to the low water depth and lack of open water. Under the No Action Alternative, these impairments would persist, and open water will continue to decline as sediment continues to accumulate. In the case of dam failure, water levels will be lower and existing wetlands would transition to other wetland types or to upland riparian habitat, restoring the riverine corridor to conditions similar to pre-dam conditions, including improved water quality. However, dam failure would create a complete barrier to fish passage due to lower water levels that would expose the fish ladder entrance and exit, while the dam remnants would block passage through the natural channel.

The Dam is obsolete and no longer provides any useful or economic benefit, as the former mill associated with the Dam is no longer in existence. For these reasons, the Dam owner does not support the No Action Alternative. This alternative does not meet the basic project goals and objectives. It would not restore natural river conditions, improve upstream water quality, allow for the 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 2: Full spillway removal, passive channel recovery

Under this alternative, the spillway of the Dam would be removed but no sediment would be excavated to create a stream channel. The existing fish ladder would be removed. This alternative would fully relieve the Dam owner's obligation of repair, ongoing maintenance, or any other associated responsibilities required by law, remove any legal liability associated with structural failure, and deregulate the structure in accordance with Connecticut dam safety regulations. For these reasons, the Dam owner prefers full dam removal (Alternatives 2 or 3). In addition, due to grant funding sources available for dam removal to expand fish passage, the costs associated with assessment, design, permitting, and construction do not fall on the Dam owner.

Regarding wetland functions and values, the full removal would result in the conversion from pond and lake finfish habitat, which is currently supported but impaired, to free-flowing stream habitat resembling pre-dam conditions. Most importantly, the removal would restore much needed passage of all species of fish, inclusive of all age groups and size classes. Daily movements and annual migrations would be fully restored without need for routine maintenance and monitoring of the existing fishway structure. The fishway structures can be removed intact and reused by the CT DEEP at another dam.

The passive reestablishment of the stream channel under this alternative entails allowing impounded sediment to migrate downstream through natural erosion. Initial estimates of the total volume of sediment and dam material prone to transport over time range up to approximately 2,200 cubic yards, including approximately 400 cubic yards of material associated with the spillway and dam embankments. This approach cuts the cost of construction substantially and avoids the inherent uncertainty with the creation of a stream channel that must match equilibrium dimension, pattern and profile. However, while most sediment falls within acceptable ranges for ecological sediment quality guidelines, sediment from one area within the impoundment has comparatively higher concentrations of multiple contaminants, and three other samples exceed the human health criteria limit for one contaminant. These sediments would not be controlled and may be exposed and transported downstream. The volume of sediment may present a concern to the CT DEEP with regard to sediment deposition in the stream channel, on private property, and at road crossing structures. Deposition in the channel may bury or fill habitat features in downstream reaches, albeit temporarily, as the sediment pulse migrates downstream. Deposition in the channel and at road crossing structures could result in reduced channel capacity and increased flood elevations. Therefore, the CT DEEP has requested that some sediments be retained above the Dam and not be allowed to migrate downstream.

The restoration of the wetland plant community in the impoundment following full removal would likely follow a positive and predictable trajectory. The four native tree species, twelve native shrub species, and 22 native herbaceous species, identified in the natural resource inventory, likely have established a robust seed base in the area. These native species would become established on newly exposed sediment, and would stabilize the vast majority of this sediment. Three common nonnative invasive species have also been identified on site; however, given the dense coverage of native vegetation, it is highly unlikely that a monoculture of invasive species would become established. To ensure establishment of desirable native species, the restoration designs will also include a planting plan for specified areas, and a monitoring and invasive plant control plan administered by the Service (Appendix B).

Under this alternative, habitat may be improved for the State-listed banded sunfish (see sections 4.9 and 5.9 of this document for discussion of this resource and project impacts). Dam removal and reversion to a single-threaded channel with pool habitat features are compatible with the banded sunfish and may be a more conducive condition than the diminishing open water habitat. To protect individual sunfish during the construction, the CT DEEP has proposed to participate in a fish salvage operation during the impoundment

dewatering period. In accordance with recommendations by the Inland Fisheries Division, salvaged individuals would be relocated to desirable habitat within adjacent reaches upstream.

A business, Seaport Auto LLC, which abuts the impoundment, has expressed concern about the impact of this project on its property. Project partners have committed to working with the landowner to consider and, within reason, accommodate these concerns. In particular, the foundation of this building currently abuts the impoundment and this project cannot compromise the structural integrity of the building. Full dam removal with passive channel recovery could allow for a channel to form potentially near, or meander toward, this building and cause erosion at its base. This risk renders the passive recovery alternative undesirable to this landowner and places undue liability upon the design engineer, Princeton Hydro.

Based on this analysis, alternative 2 does not meet all of the project goals and objectives discussed in section 1.2 of this document.

3.3 Alternative 3: Full spillway removal and pilot channel creation

This alternative involves the full depth and partial width removal of the spillway, as in Alternative 2, but also entails the creation of a pilot stream channel via excavation of a portion of impounded sediment. Boulders and cobbles near the base of the fishway and from the Dam will be reused as instream habitat features and to stabilize the left bank of the proposed recreated channel. To ensure long term stability of the placed sediment and sustainable sequestration of the contaminated soils, additional stone would be imported to serve as bank stabilization along with a filter berm to hold placed sediment along the created channel.

Sediment Management Options
Sediment excavation for a pilot channel and the proposed placement of sediment in the area adjacent to the auto shop business are for three beneficial purposes: (1) to bury the area containing comparatively higher sediment contaminant concentrations with relatively cleaner sediment; (2) to provide additional protection to the adjacent building from the flow of Whitford Brook, particularly during storm and flood events; and (3) to prevent excessive sediment, especially medium-grained material, from damaging fish habitat downstream. The pilot channel would extend approximately 150 linear feet upstream of the existing Hyde Pond Dam location. Additional erosion of the sediments above the proposed pilot channel will occur over time. Natural channel reformation will allow some finer sediment to flush downstream. The proposed, limited sediment excavation and retention within the former impoundment, would substantially reduce any concerns about downstream impacts to habitat or channel capacity. All placed sediments would be graded and seeded to stabilize them in place and to create beneficial riparian wetland and upland naturalized habitats. The Service and project partners are in agreement that the net benefits to biological, aquatic resources, and increased coastal resiliency, far outweigh the impacts to the existing small area of man-made wetlands and watercourses. In their existing condition, these shallow waters are filling in with

sediment and likely offer low functions and values due to low oxygen, increased temperatures and wide swings in pH (Santucci et al. 2005). Regardless of placement of sediments, these wetlands will be altered in response to lowered water surface elevations associated with either dam removal or uncontrolled dam failure.

For dam removals where impounded sediment cannot be released downstream, it is common practice to dewater and regrade sediment within the former man-made impoundment to create a variety of riverine and vegetated wetland habitats transitioning to upland habitats. Numerous examples of this approach exist for permitted, completed projects within the State of Connecticut.

However, in order to fully minimize impacts to any wetlands, alternatives to placing the excess sediment below ordinary high water were evaluated. Upland disposal around the impoundment was considered. The project administrator contacted abutting private landowners and the Town of Groton, which owns open space on the north side of the project area, to request placement of sediments on their property. All property owners rejected this request. It was later determined that due to sediment chemistry results, the sediments are not suitable for placement on adjacent uplands. Therefore, upland disposal at an approved landfill was investigated. The cost for hauling and disposal as landfill cover is estimated to be approximately $151,600. Additional funds for this option are not currently available and the project would have to be tabled for at least the current construction season (2015) while the project administrator and partners seek to raise this funding. The DOI Hurricane Sandy funds must be spent within two years of the execution of the cooperative agreement between the Service and the project administrator. Therefore, additional delays to this project have a high probability of halting the project altogether, leaving the No Action Alternative as the only remaining alternative. Given the poor and deteriorating condition of Hyde Pond Dam, the No Action Alternative could have significant negative impacts to biological, physical and human environments.

State-listed Banded Sunfish Impacts and Management
Active excavation of sediment and creation of a single-threaded channel will also serve to create habitat more suitable to banded sunfish immediately during construction as opposed to allowing for its passive formation as in Alternative 2. Likewise, to protect individual sunfish during the construction, the CT DEEP's Inland Fisheries Division plans to carry out a fish salvage operation during two drawdown periods currently proposed in the construction sequence. The salvaged individuals would be relocated to desirable habitat within adjacent reaches upstream.

Consideration of other benefits
In addition to previously discussed key benefits, Alternative 3 provides all the remaining benefits of Alternative 2. Alternative 3 also would deregulate the structure in accordance with Connecticut dam safety regulations, fully relieve the Dam owner's obligation to repair and maintain the Dam, and remove any risk and legal liability associated with structural failure. Grant funding sources are available for this alternative.

Alternative 3 can be adapted to retain the dam stones on site, retain the field stone face, photo-document the Dam's structure during deconstruction, and avoid disturbance to other potentially valuable lands.

The native plant community discussed above and documented in the natural resource inventory would provide the same benefits associated with Alternative 2: stabilization of the majority of impounded sediment, provision of a robust seed bank, and early and rapid establishment over newly exposed substrate. To ensure establishment of desirable native species, the accompanying proposed design includes a planting plan with a broad pallet of native species, and a monitoring and invasive species control plan administered by the Service (Appendix B).

Alternative 3 would increase functions and values associated with perennial stream and riverine habitat. The aquatic and wetland habitat degradation associated with the Dam and impounded sediment would be mitigated, as would the impaired finfish community associated with the pond. Species expected to benefit from a free-flowing stream are sea run brown trout, alewife, blueback herring, American eel, and lamprey, among others. Water quality parameters such as dissolved oxygen and temperature will improve, and benefits to aquatic resources are expected to include an increase in biodiversity.

Based on this analysis, Alternative 3 meets all of the project goals and objectives discussed in section 1.2 of this document. Alternative 3, with excavated sediments retained within the former impoundment and creation of a pilot channel, constitutes the Proposed Action, as described in section 2.0 of this document.

4.0 AFFECTED ENVIRONMENT

4.1 General

The project area encompasses Hyde Pond from its inlet where Whitford Brook is a free-flowing watercourse, to several hundred feet below the Hyde Pond Dam. The Hyde Pond wetland system is bordered to the northeast by a large campground, to the east by industrial buildings, to the south by an auto repair shop and Route 184, and to the west by single-family residences and agricultural land.

A brief description of the existing resource conditions is provided below, followed by a discussion of potential effects to each resource in section 5.0 of this document. Technical reports, prepared by expert consultants for the project administrator, CFE/Save the Sound, contain more extensive descriptions of resources such as wetlands, fish and wildlife, and sediments.

4.2 Land Use and Topography

According to 2006 data collected by the University of Connecticut Center for Land Use Education and Research, slightly more than 70 percent of the land cover in the Whitford Brook watershed is undeveloped lands consisting of deciduous, coniferous and wetland forests. Another 8.7 percent of land cover is agricultural fields, while turf and other

grasses cover 6.1 percent of land surface. Only 8.3 percent of the watershed consists of developed lands.

The Hyde Pond impoundment and Whitford Brook, north to Long Pond, lie in a north-south-oriented valley formed by many small, undeveloped hills, some steep, on the east and west sides. The topography of Hyde Pond, the adjacent wetlands, and the campground and low-density residential areas are characterized by low slopes, and are relatively flat. The elevation of the auto shop's gravel parking lot is approximately 10 feet higher than the impoundment. Immediately upstream of the Dam, the ~12-acre Hyde Pond impoundment is a complex of wetland vegetation and shallow open water areas, with depths fluctuating with water levels. The impounded area is generally shallow, with an average depth of approximately 2.2 feet based on field surveys. The pond bottom is generally covered with up to 4 feet of organic muck and silt, with few distinguishable layers or soil horizons. The quantity of sediment decreases with distance from the Dam upstream. Below the sediment is a hard bottom layer of coarse mineral sediment and likely pre-dam streambed. Boulders within the impoundment area suggest pre-dam banklines and the initial pond shoreline.

4.3 Water Quality

A CT DEEP map of water quality indicates that the Hyde Pond wetland system has Class B water quality. Designated uses of class B surface waters are habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply. Discharges to these waters are restricted to discharges from those allowed for class AA, A and SA waters (discharges from public or private drinking water treatment systems, dredging activity and dredge material dewatering operations, including the discharge of dredged or fill material and clean water discharges), as well as from cooling water discharges, discharges from municipal and industrial wastewater treatment systems and other discharges subject to the provisions of section 22a-430 of the Connecticut General Statutes.

Impounded waters above dams are slower-moving, shallower, and often have reduced oxygen and higher water temperatures than non-dammed reaches of a river (Santucci et al. 2005). Similar conditions likely exist within the Hyde Pond impoundment, especially during summer months when stream flows are lower and air temperatures warmer.

4.4 Surface Water and Hydrology

Whitford Brook, which flows through Hyde Pond, is a tributary to the Mystic River. The Mystic River is located south of the project area (Figure 1). The head of tide is approximately 3,000 linear feet downstream of the Dam. Immediately downstream of the Hyde Pond Dam, the watercourse channel has a moderate gradient, and contains cobbles. A large instream cobble and gravel bar has formed downstream of the Dam, in an area where the channel has widened substantially. Upstream of Hyde Pond, Whitford Brook is a very low gradient channel that contains mostly sand substrate, and is flanked by riparian trees and shrubs.

4.5 Flood Zones

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 (i.e., one percent) chance of flooding in any given year. The Hyde Pond Dam Removal Project is located within a FEMA-designated floodplain and floodway.

4.6 Sediment Chemistry and Dynamics

A total of twelve (12) samples were isolated for laboratory analysis. Two (2) composite samples were collected from the downstream receiving body – the head of the tidal estuary of the Mystic River. One (1) composite sediment sample was collected from the Mystic River tributary at the Campground Road crossing. The remaining nine (9) samples were collected from the impoundment. The risk of human exposure to contaminants in these sediments is low at this site under existing and proposed conditions, as the site will remain an active floodplain with no potential for development and intensive human use. Despite the unlikely occurrence of human exposure, lab results were compared to the Connecticut Direct Exposure Criteria. The vast majority of contaminants were either not detected or detected well below corresponding human health criteria, with a few exceptions. Polycyclic Aromatic Hydrocarbons (PAHs) registered higher concentrations relative to the human health criteria. Specifically, sample #2, from the impoundment closest to the auto repair shop, and #7, from the Hyde Pond tributary Lamphere's Brook, contained concentrations of 3 PAHs that were nearly two to four times the criteria. In addition, samples #3T, #5, and #6T from Hyde Pond contained concentrations of one PAH slightly above the criteria.

PAHs, a class of compounds generally occurring as complex mixtures, are known contaminants that commonly occur in fine sediments (fine sand, silt, clay) in river systems (Buha and Lah 2011). Sources of PAHs in the environment are both natural and man-made. Some PAHs are manufactured for research or for the production of dyes, plastics and pesticides. PAHs occurring in the environment likely come from sealcoated pavements (Watts et al. 2010; Pavlowsky 2013) and the by-product of incomplete combustion from sources such as wildfires, trash burning, wood-burning stoves, furnaces, industrial emissions, energy production (i.e., coal burning), and motor vehicle engines (Buha and Lah 2011). PAHs enter freshwater bodies by atmospheric deposition or stormwater runoff and then bind preferentially to fine grain sizes, which settle out of suspension in backwater areas and accumulate in impoundments like Hyde Pond. If sediment deposition conditions remain stable, contaminant concentrations may gradually increase over time. PAHs are a concern because they are persistent in the environment for long periods of time. Common modes of human exposure include breathing polluted air, eating grilled meats, and smoking (Buha and Lah 2011). Less common sources include coming in contact with heavy oils, coal tar, roofing tar or creosote. Research suggests that inhalation and skin contact may be associated with cancer in humans.

Sample #2 may have elevated levels of contaminants due to legacy industrial contamination adjacent to Hyde Pond; however, elevated concentrations of similar contaminants at sample #7, where there are no commercial buildings adjacent to the brook, suggest that a similar suite of contaminants have been generated by upstream sources as well.

All sediment sampling documentation is included in Attachment K of the CT 401 Water Quality Certification application, and described in detail in the 2014 technical memo from Princeton Hydro, LLC: *Sediment Characterization, Alternatives Analysis, and Sediment Management Plan, Hyde Pond Dam Removal, Whitford Brook.*

Man-made dams create shallow, slow-moving water conditions that allow sediments, which would normally flow downstream, to settle out of the water column and accumulate above the dam. Sediments have continued to accumulate in the Hyde Pond impoundment over the years, causing reductions in water depths and changes to the relative amounts of open water and vegetated wetland (Princeton Hydro LLC 2014). Sediment accumulation behind a dam starves the downstream coastline of needed sediments and leads to loss of valuable habitats such as tidal marshes and flats (Mariotti and Fagherazzi 2013, Silliman et al. 2009). These impacts may be compounded due to sea level rise. Such conditions and impacts are likely occurring in the Whitford Brook – Mystic River system due to the Hyde Pond Dam and other dams on the River.

4.7 Vegetation and Wetlands

The impoundment is a complex mosaic of open water and approximately 50 small wetland islands ranging from several acres to a few square feet. Areas of wetland and open water vary widely based on the water level in the impoundment; the impoundment area was approximately 8.4 acres at the time of survey, including approximately 5.1 acres of open water and 3.3 acres of island wetlands. Additionally, there are approximately 7.5 acres of wetlands surrounding the impoundment. Elevations of these wetland complexes suggest that they are not solely a product of the Dam and impounded water, but that they have other hydrologic connections, such as groundwater, Lamphere's Brook, and an unnamed stream.

Open water (palustrine unconsolidated bottom) habitat constitutes only a small portion of this wetland system. The majority of this wetland system consists of palustrine scrub-shrub and palustrine deciduous wooded swamp habitats. Archived aerial photographs show that the character of this wetland system has changed dramatically over time. A 1934 aerial photograph shows a large open water body in this area. However, by 1990 the amount of open water habitat had shrunk dramatically, and this habitat change has continued to the present. The cause of this change is the steady accumulation of sediments in this artificial impoundment, reducing its depth, which has allowed shrubs and emergent vegetation to become established in the shallow waters. The rate of accumulation observed from aerial photos from 1992 to 2005 suggests that open water habitat will be eliminated within the next 15 years if the Dam remains in place and in need of repair.

Currently, the palustrine scrub-shrub community is dominated by water willow, while the palustrine emergent community supports bur-reed, pickerelweed, and arrow arum, among other species. The palustrine forested habitat is dominated by red maple in the overstory, with few scattered Atlantic white cedar trees in the canopy.

A robust wetland functions and values assessment for the Proposed Action was completed as part of the engineering design memo dated March 31, 2015. The assessment (Table 3 of the memo) is attached here as Appendix C.

4.8 Wildlife and Fish Resources

4.8.1 Wildlife

A total of four amphibian, two reptile, 38 avian and two mammal species were observed or were predicted to occur at the site based on published range maps and habitat preferences. The full list of wildlife species can be found in the technical memo by Connecticut Ecosystems LLC (Pawlak 2013) regarding the wetlands, vegetation, and wildlife of the proposed project site.

4.8.2 Fisheries and Essential Fish Habitat

This project targets the restoration of diadromous fish stocks that are of regional and national significance. The National Oceanic and Atmospheric Administration and the National Marine Fisheries Service have documented the decline of both river herring and American eel, precipitating petitions to list these species under the Endangered Species Act. Regionally, these trust species are prey for important target species, including bluefish and striped bass, and a wide range of birds, other fish and marine mammals. River herring provide critical forage to these and other important target species along coastal river mouths and tidal reaches during the spring herring run and when the juvenile herring return to Long Island Sound in the early fall.

It is expected that a warmwater finfish community occurs in the shallow open water habitat of this wetland system, although it was not inventoried. Given the very shallow water depths in the impoundment, this habitat would be impaired during summer months due to lower dissolved oxygen and higher temperatures. River herring and sea run brown trout are migratory species that would use the impoundment as a pass-through to spawning habitat, if access were provided.

There is an aluminum steeppass fishway currently installed at the Dam that was designed for anadromous fish to migrate above Hyde Pond Dam. Due to limitations of the site preventing optimal attraction flows, including periodic blockage by beaver activities, the steeppass fishway has passed significantly fewer fish than originally expected by the CT DEEP. Upon removal of the Dam, the steeppass fishway will be removed and returned to the CT DEEP for use on another dam.

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."

4.9 Threatened and Endangered Species

The CT DEEP Natural Diversity Database Map shows listed species records throughout the Whitford Brook drainage system. One of these records is for banded sunfish (*Enneacanthus obesus*), which occur in Hyde Pond and are listed as a Species of Special Concern for the State of Connecticut. Banded sunfish are found in freshwater, slow-moving streams and ponds of the coastal plain where they nest around vegetation rather than in sand or gravel bottoms (Hammerson 2004).

An April 7, 2015 query of the Service's online Information, Planning, and Conservation (IPaC) system produced a report indicating that there are no federally listed threatened or endangered species, or critical habitats, in the project area. However, effective May, 4, 2015, the northern long-eared bat (*Myotis septentrionalis*) (NLEB) was federally listed as a threatened species under the Endangered Species Act (80 FR 17974). A July 20, 2015 query of the IPaC produced a report showing that NLEBs may be present in the project area. During the summer, NLEBs roost singly or in colonies in forested habitat underneath bark, in cavities or in crevices of both live trees and snags (dead trees). During the evening, NLEBs can be found foraging in a variety of forested and non-forested habitats, including wetlands. During winter, NLEBs hibernate in caves and mines (hibernacula) with constant temperatures, high humidity, and no air currents. Factors affecting the species include modifications to bat hibernacula, disturbance of hibernating bats, and loss of forest habitat including forest fragmentation. There are no known recent records confirming their presence in the project area. Following an on-site survey of trees to be removed at the project site, an Intra-Service Section 7 Biological Evaluation (Appendix D) was prepared by the Service. A Service endangered species biologist reviewed the information and concurred with the finding of "no effect" on NLEB.

4.10 Historical and Archaeological Resources

Projects receiving Federal funding and permitting are required to undergo a review for compliance with section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (CFR 800). Project partners consulted with the Connecticut State Historic Preservation Office (SHPO) on the proposed project. The SHPO noted that the Dam is an important surviving component of a nineteenth century mill. Two Federally-Recognized Tribes, The Mashantucket Pequot Tribal Nation and The Mohegan Tribe, were invited to consult on the project. Tribal Historic Preservation Officers (THPO) from each Tribe requested and reviewed draft design plans. The towns of Groton and Stonington and three local historical societies were also invited to consult on the project

under section 106 of the NHPA. In 2014, Raber Associates, an archeological consultant, was contracted to perform a cultural resources survey of the project area. This work included background research, site interpretation, archeological assessment and field inspection of the project area. On May 21, 2015, Raber Associates issued a preliminary summary of its findings (see Appendix E).

4.11 Socio-economic Conditions and Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires Federal agencies to examine proposed actions to determine whether they will have disproportionately high and adverse human health or environmental effects on minority or low income populations.

According to the State of Connecticut Department of Economic and Community Development, none of the towns (Stonington, Groton, and Ledyard) where the proposed project activities and impacts will take place are on the 2014 list of distressed municipalities. Also, according to the 2010 census, the area does not have a high proportion of minority populations.

4.12 Protection of Children

Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks," seeks to protect children from disproportionately incurring environmental health risks or safety risks that might arise as a result of Federal policies, programs, activities and standards. Environmental health risks and safety risks include risks to health and safety attributable to products or substances that a child is likely to come in contact with or ingest.

4.13 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 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 non-attainment, as well as coastal sections of New Hampshire and Maine.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 General

The proposed removal of the Hyde Pond Dam, including the excavation, regrading and planting of sediments, will not have any long-term adverse effects on the existing environment. It 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. The passage of anadromous fish following removal of the Dam will help to sustain and restore already depleted migratory fish populations in Long Island Sound and its tributaries.

5.2 Land Use and Topography

Land use will not change in the project area or surrounding areas as a result of this project or with the No Action Alternative. Land use changes in the watershed will continue to be driven by other factors such as topography and economic factors. Under the No Action Alternative, the topography and bathymetry will not be manually altered. Under the Proposed Action, the topography and bathymetry of the impoundment will be permanently altered in order to restore more natural river flows. The new channel's location and geometry is designed to provide adequate flow depth, and to prevent the stream channel from meandering close to the building's foundation, which may occur under alternative 2. The excavated sediments from stream channel excavation will be placed and graded near the building's foundation toward the former impoundment. The sediments will be stabilized on site with native plantings. The long-term impacts consist of a stream channel that is conducive to fish passage and which is located away from the adjacent building's foundation. Therefore, long-term impacts will be beneficial.

5.3 Water Quality

Under the No Action Alternative, no short-term impacts to water quality in Whitford Brook would occur, though adverse long-term impacts may occur . However, water quality would continue to be impaired, particularly during summer months, by low oxygen and warm temperatures due to the shallow water depths in the impoundment. Sediments would continue to deposit in the impoundment, leading to even shallower water depths and an increasingly impaired condition. Warm waters and low oxygen can cause physiological stress and even death to fish, fish eggs and invertebrates.

Under the Proposed Action, the impacts to water quality from the removal of the Dam and excavation of a river channel will be minimal and of short duration. Construction will take place during the time period authorized for unconfined stream work (June 1 – Sept. 30), which corresponds with low flow conditions. Three weir boards in a low-level outlet structure will be removed to allow lowering of the water level in the impoundment prior to the dam removal. The flow from the low-level outlet will be slow and therefore sediments will remain largely upstream of the Dam. Overall, the dewatering process is designed to avoid mobilizing impounded sediments and no dredge material is intended to be discharged downstream of the current impoundment. During construction, appropriate sediment control measures, as shown on the project plans and described in the (pending) 401 Water Quality Certificate, 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. Once the Dam is removed, natural erosion of fine, impounded sediments will occur as stream channel recreation takes place, extending upstream from the created pilot channel.

Water quality in the former impoundment is expected to improve with dam removal and channel excavation. Impounded waters behind a dam are slow-moving, shallow, and often have higher water temperatures, lower oxygen levels, and wide swings in pH compared to more swiftly moving waters (Santucci et al. 2005). Dams can degrade water quality also by elevating water temperatures for miles downstream of the dam (Saila 2005). The water temperatures should be lower and oxygen levels higher with increased flow rates and depth in the reestablished stream channel. Therefore, the long-term impacts to water quality in the project reach will be beneficial.

5.4 Surface Water and Hydrology

Under the No Action Alternative, water surface elevations and hydrology would remain unchanged, since the Dam will remain in place. Fish passage would not be restored, and the goal of river connectivity would not be met. The threat of dam failure would persist due to the poor condition of the Dam. Dam failure would result in the uncontrolled release of waters and sediment downstream.

Under the Proposed Action, the dam removal and excavation of a defined river 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. Any exposed sediments in the impoundment are expected to be colonized rapidly by wetland plants similar to the existing wetland areas, and areas at slightly higher elevations may transition to floodplain forest. The new proposed channel has been designed to develop appropriate velocities and flow depths for fish passage, and to protect adjacent infrastructure. Flow velocities downstream of the project area would not change. Therefore, long-term impacts to surface waters and hydrology are predicted to be beneficial for the ecosystem.

5.5 Flood Zones

Under the No Action Alternative, flood levels and frequency will not be changed. Under the Proposed Action, removal of the Dam will not increase the 100-year flood elevation or the 100-year frequency flood level. The water elevation will be lowered by approximately 5 feet at the Dam, a change that diminishes upstream from the Dam to zero feet at the upper extent of the impoundment.

The proposed project activities will not increase water surface elevations or flow velocities downstream of the existing dam location. Dam removal will lower water elevations and decrease the likelihood of flood impacts to the abutting commercial building and other abutting and downstream properties and infrastructure during major storms. Under the Proposed Action, therefore, long-term beneficial environmental consequences include mitigating flood damage and saving tax dollars in emergency response.

5.6 Sediment Chemistry and Dynamics

Under the No Action Alternative, no mechanical movement of sediments will take place. The sediments with elevated contaminants near the auto shop will remain at that location in the existing impoundment, unless high flows erode and wash some sediment downstream. Sediment sampling and analysis indicates that a subset of laboratory-analyzed contaminants exist at concentrations above corresponding Probable Effects Concentrations and/or Levels. These contaminants and the concentrations detected at this site, however, are not generally out of the norm for fine sediments analyzed in nearby locations in industrialized Connecticut.

The proposed project activities include placement of dredge material from areas with lower concentrations of contaminants to areas with elevated concentrations. Specifically, dredged sediment from channel excavation will be placed on top of existing impounded sediments in the vicinity of sample #2, adjacent to the auto shop. Existing sediments in the vicinity of sample #2 will not be disturbed and instead will be buried with cleaner, excavated material and will be stabilized to preclude erosion and mobilization. Therefore, prevention of any effects from exposed or mobilized sediments with elevated concentrations of certain PAHs consists of burying them with approximately 1–4 feet of sediment, graded at stable slopes (i.e., 4H:1V) from the edge of the building. Burial of this area will effectively sequester the sediments from the aquatic environment. The site will remain a vegetated wetland/floodplain with extremely limited potential for direct human exposure and with no potential for residential development. No work in the area of sediment sample #7, which also had elevated PAHs, is proposed. Therefore, the proposed action will have net beneficial effects, through sequestration of contaminants, and will have no short- or long-term significant impacts due to the proposed manipulation of sediments.

Removing the Hyde Pond Dam will increase natural sediment transport in this riverine system, which will contribute to coastal marsh and beach development, adding further resiliency in the coastal environment. Therefore, restoration of natural sediment transport dynamics in Whitford Brook and the Mystic River are expected to have long-term, highly beneficial effects for riverine and coastal ecology and habitats.

5.7 Vegetation and Wetlands

Under the No Action Alternative, sediment will continue to accumulate above the Dam, and more 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, changes in water levels will drive transitions in wetland cover types. Some submerged lands will become exposed and will 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.

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. A multi-year monitoring and invasive species control plan will be enacted to identify and remove any invasive plants in the sediment placement area, and in areas of newly exposed sediment. Post-construction, the sediment placement area will be seeded with an herbaceous cover crop (winter rye and seeds from local, native species collected by the New England Wildflower Society) to stabilize sediments as they consolidate. In the first spring season following construction, the sediment placement area will be sown with a mix of seeds for native trees, shrubs and herbs, and the banks of the riparian enhancement area near the pilot channel planted with native trees and live stakes (see Appendix B, Vegetation Monitoring and Invasive Species Control Plan).

Overall, the net loss of wetlands and open water has been minimized to the extent practicable. There will be no direct impacts to vegetated wetlands; the total direct impacts to waters will be 0.286 acres for the placement of bank stabilization near the pilot channel, boulder placement for habitat, and sediment placement associated with the riparian buffer between the bank stabilization and the foundation of the building. Secondary, permanent impacts to vegetated wetlands include the loss of 1.874 acres of existing wetlands around the fringe of the existing pond that likely will revert to upland due to lower water levels following dam removal. Secondary impacts to open water consist of 0.117 acre of open water to be dredged and converted to free-flowing stream channel.

The 13 wetland functions and values identified by the U.S. Army Corps of Engineers Highway Methodology are described individually in Appendix C (Table 3 excerpted from the memo from Princeton Hydro to Save the Sound, dated March 31, 2015). Each function or value is described under existing conditions, the anticipated proposed conditions, and a net change is assessed. In summary, of the 13 functions and values, six are anticipated to have a net increase, two are anticipated to have a net decrease, and five are anticipated to have no net change. As the wetland is an artificial feature that is subject to ongoing decline from infilling, or potentially to sudden water and sediment release from dam failure, the functions and values of this system are expected to change even if the Proposed Action is not completed. If the Dam fails, the predicted changes in functions and values (most beneficial) described in the assessment are expected to occur. The described wetland system is not sustainable as it is reliant on a functioning dam. This project will result in the restoration of a naturalized channel, a close approximation to the natural, pre-dam, free-flowing stream, with fish movement and migration, and a sustainable riparian wetland floodplain. These improvements are understood to offset any losses in functions and values, particularly since they are associated with the restoration of a sustainable system very similar to the pre-dam condition.

Overall, there will be long-term net benefits from improved habitat quality, restoration of fish passage, and expected gains in biodiversity. The Connecticut Programmatic General Permit (U.S. Army Corps of Engineers section 404 Clean Water Act permit) application

and supplemental response to comment materials describe in more detail the existing and proposed acreages of open water, wetland and riparian forested habitat types.

5.8 Wildlife and Fish Resources

5.8.1 Wildlife

Under the No Action Alternative, wildlife diversity or populations are not expected to change. Proposed 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-month project period, as wildlife such as birds and small mammals may avoid the immediate construction area.

5.8.2 Fisheries and Essential Fish Habitat

Under the No Action Alternative, fish populations will continue to be negatively impacted by the Dam acting as a barrier to migration, by the low water quality in the impoundment, and by the limitations of the existing fish ladder. Under the Proposed Action, there may be short-term adverse impacts to fish during impoundment dewatering. This impact will be mitigated by the capture of fish from the impoundment prior to and during dewatering and relocating them to unimpacted reaches of the upstream River. The focus of these efforts will be the banded sunfish, but any fish species captured will be moved as well. Overall, the proposed project will have a long-term positive effect upon the fisheries of the Mystic River and Whitford Brook. The removal of the Hyde Pond Dam would restore much needed passage of all species of fish, inclusive of all age groups and size classes. Specifically, removal of the Dam and stream channel enhancements will restore fish passage and access to 4.1 miles of stream for river herring and sea run brown trout and improve passage for American eel. Daily movements and annual migrations would be fully restored without need for routine maintenance and monitoring of the existing fishway structure. The proposed channel will provide a fish-passable reach for migrating species, including catadromous American eel.

The project area, including the Hyde Pond Dam and the stream reach immediately downstream of Whitford Brook, is located above the upper limit of tidal influence, and thus is not designated Essential Fish Habitat. Although there are important habitats for anadromous fish in Whitford Brook, including above the existing Dam, the Magnuson-Stevens Fishery Conservation Management Act only applies to tidal, estuarine regions.

5.9 Threatened and Endangered Species

Under the No Action Alternative, no short-term changes to the habitat of the banded sunfish are likely to occur. Long-term impacts may occur from the continued infilling of the impoundment, and in the event of dam failure. Banded sunfish require water depths of at least 2 feet, a condition that may be increasingly scarce in the impoundment with ongoing sedimentation. If the Dam fails unexpectedly, waters and sediments above the Dam will be released downstream. Any banded sunfish in the impoundment during such

an event may be swept downstream towards brackish and salt waters, which would be lethal, or stranded either in the sediment pulse downstream, or in the sediments in the impoundment after it drained.

Under the Proposed Action, the CT DEEP Inland Fisheries Division will manage a fish salvage operation during the controlled dewatering of the impoundment. The State-listed banded sunfish and any other fish captured will be relocated to suitable habitat in other reaches of the stream. The Inland Fisheries Division believes that banded sunfish will persist on site and throughout Whitford Brook so long as the channel stays at least 2 feet deep in areas upstream of the saltwater wedge. With the creation of the pilot stream channel, water depths will be greater than 2 feet. Therefore, long-term impacts of the Proposed Action are expected to be neutral to beneficial.

5.10 Historical and Archaeological Resources

Under the No Action Alternative, the Hyde Pond Dam will remain in place, but will continue to degrade. Given the poor condition of the Dam, and the lack of resources and need to repair the obsolete structure, the Dam will eventually fail. In the event of dam failure, partial loss of the spillway will certainly occur, which is an adverse effect to an historical resource. Under the No Action Alternative, no documentation such as archival photo documentation, sketch plans or report on the Dam and its components will be undertaken.

The long-term effect of this project is the removal of a dam that may be eligible for listing in the National Register of Historic Properties. The Dam has been identified as a potentially valuable historic resource by the Connecticut State Historic Preservation Office (SHPO). In a February 25, 2015 letter, the SHPO recommended that the Dam and its related historic components be documented to meet State-level documentation standards. Additional recommendations included the *in situ* preservation of as much of the Dam and its related elements as possible, and the submission of a brief history and description of the Dam to the Society for Industrial Archeology New England Chapter's Newsletter. Raber Associates will conduct the construction monitoring, dam documentation, documentation report and will submit an article to the Newsletter.

Several measures have been incorporated into the proposed design to mitigate disturbance to valuable historic and archaeological resources. First, the proposed design involves retaining the stones on site proximal to their original location alongside and potentially within the restored channel. (These stones are large boulders that were left behind by glaciers, and are therefore not prone to transport downstream.) Second, while the adjacent earthen abutments will be regraded to comply with dam safety regulations, the field stone face(s) will be retained in place as much as practicable. Third, the ground surface of unpaved areas that may be used for construction access will be covered with geotextile fabric and gravel to avoid impacts to intact soils that may harbor as yet unidentified artifacts.

5.11 Socio-economic and Environmental Justice

The No Action Alternative will have no impact on low income or minority populations. The site of the Proposed Action is not located in an area of low income or of high minority populations. Therefore, the project will not impact low income or minority populations.

5.12 Protection of Children

EO 13045 requires Federal agencies to examine proposed actions to determine whether they will have disproportionately high human health or safety risks on children. During the construction phase of the proposed project, heavy construction equipment and vehicles will be transported to the site. The access points to the construction site are located on private property where commercial businesses are situated at the impoundment and across the street on a State highway. There are no schools or public facilities at or nearby the project site where children would be. These trucks will be limited to the public roadways and the existing project access road (right of way), and therefore are not expected to cause any disproportionate direct, indirect or cumulative impact to children associated with environmental health or safety risks. Construction itself is expected to last for approximately two months; therefore, this increased traffic will be for a short duration.

5.13 Air Quality

Under the No Action Alternative, there will be no change to the local air quality as no construction vehicles will be operating in the project area. 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 long-term changes in local or regional air quality are likely to occur due to the construction and operation of construction vehicles in the project area.

5.14 Cumulative Effects

Cumulative impacts are those resulting from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. The past and current activities in Whitford Brook include the lack of maintenance on the obsolete Hyde Pond Dam. The Dam is in danger of failing; there is an ongoing breach in the river left side of the Dam. The proposed dam removal and channel excavation are activities intended to restore fish passage, improve riparian habitats, and prevent such an uncontrolled dam failure and release of sediments downstream. The Dam is the first of four barriers on Whitford Brook, and the removal of the Dam will open up 4.1 miles of stream habitat for migratory fish and other aquatic organisms. Future projects to remove the three upstream barriers will

create a beneficial cumulative effect, as more habitat, in addition to that opened by the Proposed Action, will be available to migratory fish.

Water quality will improve with restoration of a free-flowing stream. One hot spot of sediments with elevated PAHs will be capped with cleaner sediments, thus sequestering them from the human and aquatic environment.

No adverse cumulative impacts are anticipated as a result of this project. Cumulative impacts are expected to be positive.

6.0 SUMMARY OF ACTIONS TO BE TAKEN TO MINIMIZE IMPACTS

Removal of the Hyde Pond Dam spillway on Whitford Brook will take place during the summer low flow season outside of the times of any existing anadromous fisheries upstream or downstream migration. Construction windows and time restrictions noted in the (pending) 401 Water Quality Certificate and other permits will be followed in order to minimize any impacts to existing and/or migrating fish species. During the dewatering process, banded sunfish, a species of special concern in Connecticut, will be caught within the impoundment and relocated to other suitable habitat within Whitford Brook. This activity will be carried out by the Inland Fisheries Division of the CT DEEP. During construction, flows will be diverted around the actual site, and proper erosion control measures will be utilized. This will minimize any potential water quality impacts to the River from sediment runoff. It is anticipated that downstream flows will not be altered either during or after construction.

7.0 AGENCY COORDINATION, PUBLIC INVOLVEMENT AND PERMITS

7.1 Agency 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 Environmental Assessment:

- Town of Stonington;
- Town of Groton;
- Town of Ledyard
- U.S. Fish and Wildlife Service, Region 5;
- U.S. Army Corps of Engineers;
- Connecticut Department of Energy and Environmental Protection, Inland Fisheries Division;
- Connecticut Department of Energy and Environmental Protection, Inland Waters;
- Connecticut State Historic Preservation Office;
- Princeton Hydro, Inc.;
- Mohegan Tribal Officer;
- Mashantucket Pequot Tribal Officer;
- Raber Associates, Inc.; and
- private landowners.

7.2 Public Involvement

Resource agencies, abutters, and other stakeholders have been extensively involved throughout the feasibility and conceptual design planning stages of the project. The project is undergoing local, State, and Federal permitting processes, as described in section 7.3 of this document. Each permit process requires extensive environmental and planning agency circulation, as well as ample public notice and involvement. Therefore, there are existing and suitable opportunities for a wide variety of specialists, regulators, and residents to comment on and condition the project's potential short-term impacts.

Public meetings were held with interested government agencies and non-profit groups, including the CT DEEP Inland Fisheries Division, the Dam Safety Division, the Inland Water Resources Division, the Office of Long Island Sound Programs, the Connecticut State Historic Preservation Office, and the U.S. Army Corps of Engineers on December 12, 2014 and May 29, 2015. A meeting with the private owner of the Dam was held in October 2013. Public meetings with abutters of the project site were held on October 31, 2013, May 8, 2014, and December 12, 2014, with additional phone calls between CFE and the abutters occurring at regular intervals. A meeting with the Inland Wetland officers was held at the Groton and Stonington Commission on May 10, 2014, when the Notice of Intent for the project was presented. A public notice was issued in The New London Day on April 1, 2015, coinciding with State and Federal permit submissions. Several articles about the project have appeared in the New London Day and the Westerly Sun, including "Mystic, Pawcatuck river projects get federal funding" on October 25, 2013, and "River herring returning to state waterways" on April 27, 2014. A website about the project, hosted by the Service, can be found at http://www.fws.gov/hurricane/sandy/projects/HydePondDam.html (accessed August 2015).

7.3 Required Permits and Approvals

The proposed project has been evaluated for consistency with applicable Federal, State, and local laws, regulations, and programs. In addition to this Environmental Assessment, the following permits and/or consultations are also required by local, State and Federal agencies:

- 401 Water Quality Certification (CT DEEP);
- Dam Safety Permit (CT DEEP);
- Connecticut Programmatic General Permit (U.S. Army Corps of Engineers);
- Administrative Site Plan Permit (Town of Groton); and
- State Historic Preservation Office consultation.

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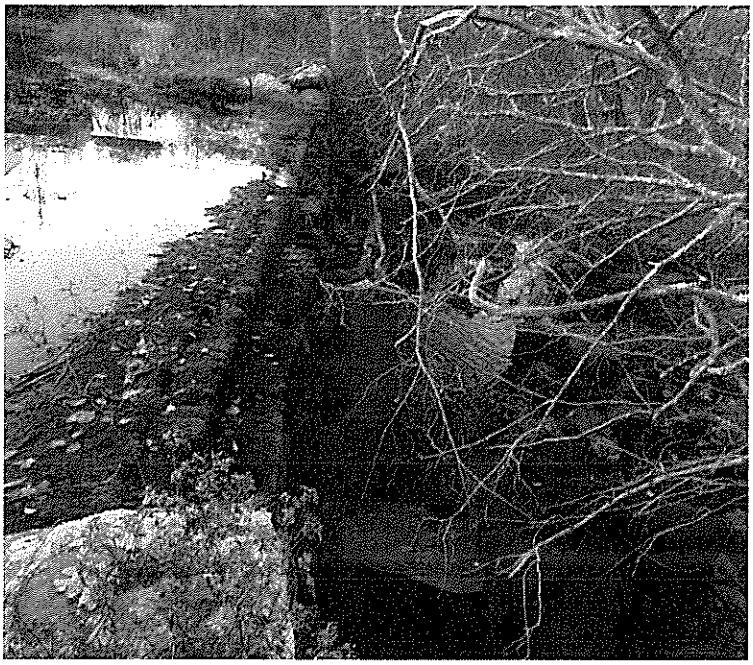
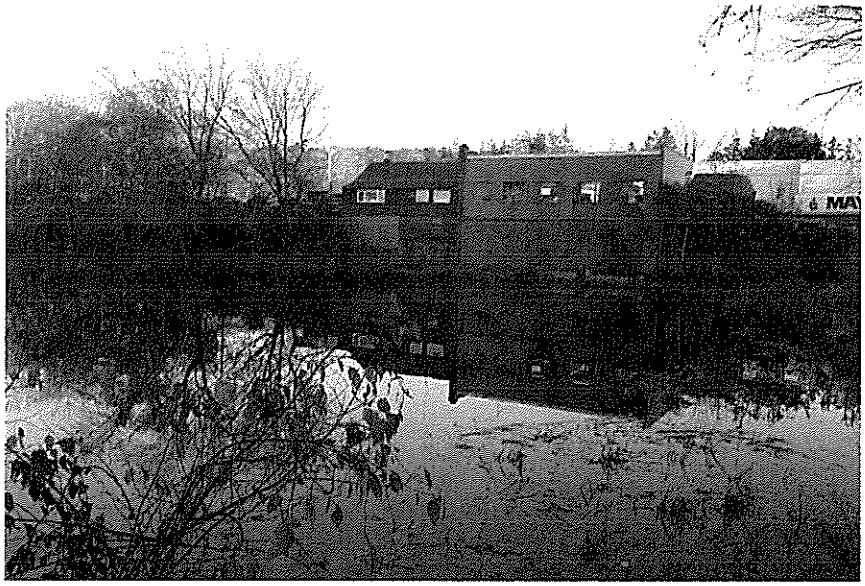
Appendix A: Project Site Photographs

Hyde Pond Dam, river right, facing south, side view.



Hyde Pond Dam, river right, facing south, top view.

Fish ladder at Hyde Pond Dam



Auto repair building on New London Turnpike, river left, south side of impoundment.