

**ENVIRONMENTAL ASSESSMENT**

**Pond Lily Dam Removal Project**

**New Haven, Connecticut**

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

28 MAY 2015  
Date

  
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## **1.0 INTRODUCTION**

### **1.1 Background**

The Pond Lily Dam is located on the West River in the City of New Haven, Connecticut, approximately 7 miles north of the confluence with New Haven Harbor and Long Island Sound. The 4-acre impoundment above the dam extends into the Town of Woodbridge near Wilbur Cross Parkway (Route 15). The Dam and surrounding land are owned by the New Haven Land Trust. Immediately west and southwest of the impoundment are Whalley Avenue and a heavily developed commercial area (Figure 1). East of the Dam and impoundment are wetlands, wooded uplands and residential apartment complexes.

The Pond Lily Dam was constructed in the late 1700s as a source of mechanical power for a grist mill. The grist mill was succeeded by a carriage factory (in use during the Civil War) and later converted to a paper factory. The site was still used by industry up to the 1970s. In the 1990s, the factory was demolished, and the present retail center located downstream of the Dam was constructed, with land set aside for a 14-acre open space parcel, now managed by the New Haven Land Trust. The Dam consists of an earthen berm and a 191-foot-long, 6-foot-high spillway over which water is conveyed to the downstream reaches of the West River.

Downstream of Pond Lily Dam, the Connecticut Fund for the Environment/Save the Sound (CFE/Save the Sound) recently completed the West River tide gate project that was funded with American Recovery and Reinvestment Act of 2009 (ARRA) funds. The Pond Lily Dam is now the first barrier to fish passage on the West River. The CFE/Save the Sound program, in partnership with the U.S. Fish and Wildlife Service (Service), the National Oceanic and Atmospheric Administration (NOAA), Restore America's Estuaries, Trout Unlimited, the National Resources Conservation Service, the New Haven Land Trust, the City of New Haven, and the Town of Woodbridge, proposes to remove approximately half the spillway of the Pond Lily Dam on the West River in New Haven, Connecticut. Project objectives include restoring free-flowing river habitat, enabling passage of target migratory fish, mitigating the danger of potential dam failure, and enhancing habitat and recreational use of the 14-acre Pond Lily Nature Preserve owned by the New Haven Land Trust. The majority of the funds for the construction phase of the project comes from Hurricane Sandy recovery funds (Hurricane Sandy Disaster Relief Appropriations Act of 2013), which are being administered by CFE/Save the Sound via a cooperative agreement with the Service.

### **1.2 Purpose and Need**

The purpose of the project is to re-establish passage of diadromous fish beyond this first migration barrier to historical upstream spawning and nursery areas in 2.6 miles of the river mainstem and in the 76-acre Konold's Pond located approximately a half-mile upstream of the Pond Lily impoundment. Additionally, the following project goals and objectives have been identified by local, State, and Federal project partners:

1. Restore the river habitats to a more natural environment, including enhancing the riparian habitat, restoring natural river flows that transport sediment to nourish marshes and beaches, decrease water temperatures and increase oxygen levels.
2. Reduce flood risks to downstream New Haven residents and businesses with additional flood storage created by the removal of the Pond Lily Dam.
3. Mitigate the liability associated with catastrophic failure of Pond Lily Dam via full or partial removal.
4. Promote recreational use of the Pond Lily Nature Preserve.

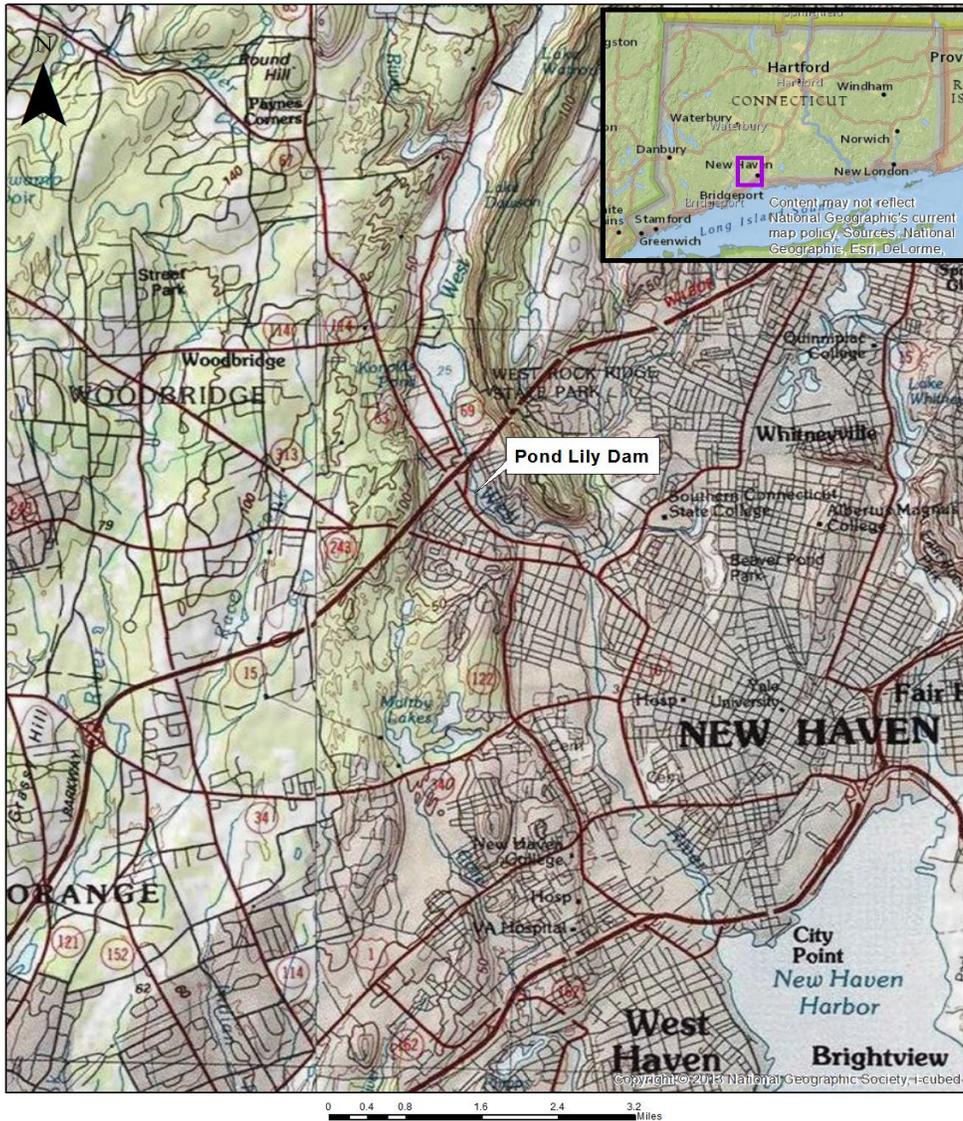


Figure 1. USGS Topographic Locus Map for Pond Lily Dam.

Pond Lily Dam, originally constructed in 1794, is obsolete and no longer serves its intended purpose of providing kinetic energy to run mills and generate power. The Dam is at risk of failure according to engineering and academic studies (Milone & MacBroom, Inc. 2011; Cardinal Engineering 2009; Yale School of Forestry and Environmental Studies 2009). The Dam has been identified as a class ‘B’ significant potential hazard dam with potential loss of life, minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc., and damage to or interruption of the use of service utilities, and damage to roadways and railroads and/or significant economic loss. The Dam is a barrier to migratory fish and other aquatic organisms, and disrupts natural river functions. Species that will benefit from this project include American shad, alewife and blueback herring (collectively called “river herring”), sea run brook trout, and American eel.

The Pond Lily Dam is a complete barrier to anadromous and resident fish passage and to other aquatic organisms. In 2001, the Connecticut Department of Energy and Environmental Protection (CT DEEP) installed an aluminum steepass fishway over Pond Lily Dam to create fish passage upstream of the Dam. To date, few fish have been reported passing through the fishway even when large schools of river herring were observed a few miles downstream of Pond Lily Dam in 2010. Moreover, the steepass fishway is designed for a few target species and does not restore aquatic organism passage or river function. This project will restore suitable migratory fish spawning and rearing habitats in both cold water riverine and pond environments.

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, numbers of American eel have also declined in Connecticut coastal streams. The species is 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 Federal as well as public interests.

Providing fish passage at the Dam is in accordance with a Federal and State interagency cooperative effort to restore anadromous fish to the northeastern U.S. Improved fish passage on the West River 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 Dam is an approximately 430-foot-long by 8-foot-high earthen berm with a 191-foot-long, 6-foot-high stone masonry spillway with a concrete cap that impounds approximately 4 acres of water. Much of the impoundment is filled with sediment. Over a period of two or three months, the construction contractor will 1) remove approximately 100 feet of the 191-foot dam spillway; 2) partially excavate impounded sediment; 3) restore a stream channel in its approximate historic location in the former impoundment;

4) install two riffle pools and one deeper pool to facilitate water management; and 5) revegetate the site with native wetland and riparian floodplain species. Excavated sediment will be reused on site and regraded to construct the banks and floodplain of the newly restored stream channel.

### **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, improve habitat and upstream water quality, and maintain the appropriate sediment transport regime under each alternative was evaluated. Public safety and impacts to riparian landowners were evaluated in the context of the structural integrity of the existing dam and the potential for breaching and flood hazard.

#### **3.1 No Action Alternative**

Under this alternative, no alterations to the Pond Lily Dam would be made. Additionally, no actions would be performed to restore the River to a more natural state or to restore free-flowing hydraulic conditions along the River. Under this alternative, the West River landscape upstream of the Dam would remain unchanged. The Pond Lily Dam would continue to block diadromous and other freshwater fish that could otherwise benefit from restoring river and riparian connectivity.

Pond Lily Dam is a run-of-the-river structure; the impoundment extends upstream for approximately 1,500 feet. The Dam offers no flood protection, therefore the no action alternative would neither help nor hinder flood control.

The specific rate of sediment entering the impoundment has not been assessed; however, the assumption can be made that the impoundment will continue to fill with sediment and the impoundment has reached or will eventually reach an equilibrium condition with respect to the amount of sediment entering and exiting the impoundment.

Perhaps the most compelling negative associated with no action is the current state of the spillway and earthen berm dam at Pond Lily. The spillway is in very poor condition and is continually degrading. If not substantially modified for fish passage, the Dam will need extensive and costly repairs and/or replacement. Under the no action alternative, the Dam will remain a threat to life and property in the event of a catastrophic dam failure. 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.

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 nuisance flooding and risk of dam failure. For these reasons, it was not considered further.

### **3.2 Alternative 1: Full Spillway Removal, no channel excavation or riparian enhancements**

This alternative assumes that the earthen embankment portions of the Dam would remain in place and that the removal would focus on the concrete spillway. Under this alternative, the full 191-foot-long concrete structure that comprises the Pond Lily spillway would be physically removed from the channel using heavy equipment. The physical removal of the spillway portion of the Pond Lily Dam is believed to be feasible. The entire dam structure currently serves no commercial purpose and, due to a lack of public access, recreational use of the impoundment is primarily limited to abutting landowners. Further, the Dam provides no flood protection. There is good physical access to both dam abutments (via private property), as well as to the downstream channel.

Under this alternative, no active excavation of sediments would be performed. The flow of the West River naturally would transport sediment downstream and create a channel through the sediments in the existing impoundment. It is anticipated that as the sediment immediately upstream of the Dam is transported downstream, a stable channel profile would be created. Additionally, the channel adjustments would establish a bankfull channel width and low flow channel geometry as the sediment is transported downstream. Given the ecological sensitivities in the West River and the urban nature of runoff and sediment quality, the uncontrolled downstream release of sediment is not recommended. The uncontrolled release of sediments downstream could smother and impair fish habitat and damage gills and other organs (MDEQ no date). Also, too much sediment released downstream can kill fish eggs, insect larvae, and other benthic invertebrates, which are important parts of a healthy ecosystem (MDEQ no date).

This alternative fulfills the goal of reduced flood impacts, and would permanently remove the risk of a catastrophic dam failure. Also, decreased water temperatures and increased oxygen would ensue from a free-flowing river, and thus some habitat improvement would accrue under this alternative. Fish passage would be improved with removal of the spillway. A new river channel would self-form. Due to the quality of the sediment within the impoundment and its potential impact to downstream habitat, this alternative is not currently deemed acceptable to regulators at the CT DEEP. Therefore, this alternative does not meet all of the project goals and objectives.

### **3.3 Alternative 2: Dam spillway removal with alternate channel locations**

Hydraulic analysis indicates that a channel width of approximately 100 feet at the Dam's spillway would achieve fish passage and channel restoration, but would not impound water under high flow conditions so that the remaining portions of the spillway would no longer act as a dam. Under this alternative, approximately 100 feet of the 191-foot spillway would be removed to full vertical extent. The remaining spillway sections would be partially removed to help stabilize the newly created stream banks and protect adjacent upland areas from erosion. Removing the full vertical extent and partial horizontal span of the Dam would achieve project goals of reducing flood impacts,

increasing resiliency to storms, and eliminating the risk of dam failure and subsequent impacts to life and property.

Under this alternative, sediments within the future channel between the Dam and the upstream bridge would be excavated to create fish-passable conditions concurrent with dam removal to prevent future erosion and downstream migration of sediment. The newly formed stream banks would be stabilized in place. This approach has been taken on many other dam removals, both in Connecticut and elsewhere, and is recommended at Pond Lily as well.

The proposed channel upstream of the Dam could be located on either the western or eastern edge of the current impoundment on the West River. For the eastern channel location, the disadvantages include the destruction of a heavily vegetated area, extensive sediment excavation, and minimal aesthetic value when viewed from the west. Public access would only be from the east side. If the new channel were located on the west side of the River, the berm along Whalley Avenue and earthen portion of the Dam would remain vulnerable to high river flows. Aesthetic value of the channel when viewed from the east side would be minimal, and public access would be possible from only the west side.

This alternative, with either a west or east channel location, meets most of the project goals and objectives, but does not have optimum channel construction for stabilizing sediments to prevent erosion, or for public access and aesthetics.

### **3.4 Preferred Alternative**

Under the preferred alternative, as in alternative 2, partial spillway removal and channel excavation would be completed. In this plan, the excavated channel would be located more centrally in the impoundment, following the approximate location of the original riverbed. This alternative maintains the heavily vegetated wetland area on the west bank of the River which will be preserved as a wetland enhancement area and nature preserve. An area would remain on the western bank of the channel for upland viewing/access and a possible recreational area. This would also serve to stabilize the berm on the western bank of the existing channel, which in its present state is vulnerable to erosion and a potential breach from high velocity river flows. Sediments would be managed onsite and vegetated, thus preventing the uncontrolled release of sediments downstream.

The preferred alternative fulfills all of the goals and objectives from section 1.2.

## **4.0 AFFECTED ENVIRONMENT**

### **4.1 General**

The West River watershed is 34.6 square miles in area covering land in the Towns of Prospect, Bethany, Hamden, and Woodbridge and the City of New Haven, Connecticut. The headwaters of the West River are located in Bethany just south of the border with Prospect.

The River flows south for approximately 18 miles from its headwaters and ends at the confluence with Long Island Sound at West Haven Harbor.

The project area is located in a developed, urban area of New Haven, and encompasses the dam structure, an impoundment that consists of approximately four acres of open water and wetlands, uplands on the east side, and a river channel at the base of the existing dam. The project site will be accessed through an apartment complex parking lot and upland and riparian forests located on the eastern side of the impoundment.

A brief description of the existing resource conditions is provided below, followed by a discussion of potential effects to each resource in section 5 of this document. A 2011 report, *Alternatives Analysis Pond Lily Dam Removal*, prepared by Milone & MacBroom, Inc., for the Town of Woodbridge, Connecticut, contains more detailed and extensive descriptions of resources such as wetlands, fish and wildlife, and sediments. Complete copies of the design plans are available for review at the office of the Connecticut Fund for the Environment/Save the Sound, and at the Town of Woodbridge Town Hall at 11 Meetinghouse Lane in Woodbridge.

## **4.2 Land Use and Topography**

According to data collected by the University of Connecticut Center for Land Use Education and Research, developed land in the watershed has increased by 182 acres (5.1 percent) between 1985 and 2006, indicating a likely associated increase in anthropogenic impacts on watershed lands and surface waterbodies, including the West River. Studies have shown that increased watershed development is correlated with negative impacts to water quality (Brabec *et al.* 2002; Schoonover *et al.* 2005; Tu *et al.* 2007). Although 46 percent of the land in the watershed is deciduous forest, most of this cover type is found north of Pond Lily in the rural areas surrounding the reservoirs. Approximately 32 percent of the land in the watershed is developed, and most of this land use type is located around the West River from the Pond Lily Dam south through the City of New Haven. The impoundment and adjacent wetlands and uplands have very low slopes, therefore the topography is relatively flat. The bathymetry (underwater topography) in the dam impoundment is also very flat, and lacks a typical river channel.

## **4.3 Water Quality**

Water quality in the West River, from just south of Lake Dawson reservoir to Konold's Pond, south to the Pond Lily impoundment and to the limit of tidal influence just south of the Blake Street Bridge in New Haven, is classified by the CTDEEP as class A waters. Designated uses of class A surface waters are: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply and other legitimate uses, including navigation. Discharges to these waters are restricted to discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges. The West River also receives discharges from the Combined Sewer Overflow system, which degrade water quality.

Fertilizers and pesticides applied to lawns and athletic fields, and oils and salts from roadways are common sources of non-point source pollution to waterbodies such as the West River and the Pond Lily impoundment, located in suburban and urban areas (Feehan *et al.* 2008). Impounded waters above a dam are slower-moving, shallower, and often have reduced oxygen and higher water temperatures than non-dammed reaches of a river.

#### **4.4 Surface Water and Hydrology**

The West River watershed has a total drainage area of 34.6 square miles, flowing from north to south from the Town of Prospect to Long Island Sound at the City of West Haven. The watershed area at the Pond Lily Dam is 16.6 square miles. The River is a free-flowing channel at its headwaters for the first mile until it reaches Lake Bethany, the first of three dammed water supply reservoirs managed by the South Central Connecticut Regional Water Authority. Lake Bethany is followed by Lake Watrous and Lake Dawson.

South of the Lake Dawson dam, the West River forms the western boundary of West Rock Ridge State Park for approximately a mile before flowing into Konold's Pond, a popular fishing pond for local residents. Konold's Pond was impounded by a dam that was largely removed, leaving only a spillway that remains as a fish passage barrier during low flow periods. As would be expected based on the high percentage of developed and managed land in the West River watershed south of the reservoirs, flow in the West River is managed to a great extent, and the floodplain and channel itself are impacted by many impoundments and bridges for the length of the River. Between Konold's Pond and the Pond Lily Dam, the river channel is continuously constrained by various flood control structures maintained by neighboring private land owners. The channel passes under five bridges before reaching the Pond Lily impoundment: the Bradley Street bridge, the Merritt Avenue bridge, the Route 15 bridge, the Pond Lily Avenue bridge, and the Regal Motel bridge.

Approximately one-half mile south of Konold's Pond, the West River enters the impoundment formed by the Pond Lily Dam. The River as it enters the Pond Lily impoundment has a sandy substrate. Within the wider impoundment, a distinct river channel is not apparent, though the historic river channel was determined through a series of sediment probes. The substrate in the impoundment consists of organic silt, muck and sandy muck. The dam is a run-of-river structure, meaning that the existing impoundment does not currently provide flood protection. Downstream of the Dam, the river channel parallels the Dam before continuing in a southerly direction.

The West River has a very flat slope through the project area and consequently will have low velocities under a wide range of flows. Even under extreme high flow events, velocities are predicted in the 3.0 to 5.0 feet per second (fps) range. During the spring fish migration season, velocities of around 2.0 fps are predicted.

## 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 or one percent chance of flooding in any given year. The Pond Lily Dam Removal Project is located within a FEMA-designated floodplain and floodway, mostly coincident at this location, FIRM FM09009C0428 Zone AE.

## 4.6 Sediment Chemistry

Results of sediment sampling and testing show that sediment in the impoundment contains lower concentrations of known contaminants than the downstream surficial sediment. All contaminant levels are below CTDEEP Remediation Standard Regulations for commercial/industrial zoned property. All sediment sampling documentation is included in Attachment K of the Connecticut 401 Water Quality Certification application, and described in detail in the 2011 report *Alternatives Analysis Pond Lily Dam Removal*.

## 4.7 Vegetation

The open water of the impoundment supports beds of submerged and floating aquatic plants consisting of spatterdock lily, white water lily, duckweed, and non-native Eurasian watermilfoil. The original impoundment upstream of the Dam was historically much larger, but over time, sediment has accumulated and partially filled in open water areas above the Dam. These sediment deposits now support a mix of emergent wetland vegetation.

Pond Lily has several large patches of Palustrine Emergent Marsh (PEM) located on both sides of the impoundment directly adjacent to open water. This wetland type includes those areas that support emergent and wet meadow plant species. Some shrubs may be intermixed among this vegetation type. Typically, PEM is found at water depths ranging from 1 inch to 2 feet. There are several large swaths of Palustrine Scrub Shrub (PSS) that border the PEMs on both the east and west sides of the impoundment. The PSS cover type includes those areas that support predominately thick shrubby vegetation with short trees (less than 20 feet in height) stunted by environmental conditions (i.e., waterlogged soils). Most of these cover types have hummocky topography with the high hummocks being vegetated with shrubs and herbaceous material and the pits with a combination muck and/or standing water. Palustrine forest (e.g., forested swamps and floodplains) includes those areas that support woody vegetation that is greater than 20 feet in height and an overstory canopy with at least 30 percent coverage. Palustrine forest is located on the eastern side of the impoundment, farther from open water than the emergent marsh and scrub shrub wetlands.

Upland forested areas, classified as a mixed hardwood forest, are found mainly on the east side of the Pond Lily impoundment, with a small patch on the northwest side. A berm that runs alongside Whalley Avenue supports an upland shrub/meadow cover type.

This cover type consists of areas that are maintained as meadow and lawn, and which have sporadic shrub clusters. Dense vines cover many of the trees and are choking them. Also, a patch of common reed (*Phragmites australis*) is growing on the berm. A complete list of plant species in the different habitat types is included in the technical report “Alternative Analysis Pond Lily Dam Removal” (Milone & MacBroom, Inc. 2011).

## **4.8 Wildlife and Fish Resources**

### **4.8.1 Wildlife**

Wildlife in the vicinity of the Pond Lily Dam and impoundment are species classified as generalists that can occur in close proximity to humans and are characteristic of developed areas.

Mammals identified in the area include white-tailed deer, eastern chipmunk, common raccoon, Virginia opossum, gray squirrel, striped skunk, groundhog, and a variety of other small rodents.

The site supports common bird species of the Northeastern U.S. such as Canada goose, mallard, American robin, common crow, woodpeckers (downy, red-bellied, and yellow-shafted flicker), European starling, common grackle, red-winged blackbird, catbird, house sparrow, Northern cardinal, black-capped chickadee, tufted titmouse, white-breasted nuthatch, song sparrow, American goldfinch, and blue jay.

The site supports typical reptile and amphibian species common to suburban areas such as painted turtle, snapping turtle, Eastern garter snake, green frog, American bullfrog, American toad, and red-backed salamander.

Standing water is present in many locations within the scrub shrub wetlands; however, given the shallowness of the standing water and the urbanized setting, no obligate vernal pool species were observed or expected to occur within the wetlands on site.

### **4.8.2 Fisheries and Essential Fish Habitat**

The West River and the Pond Lily impoundment support a variety of freshwater-dependent fish, including pumpkinseed, bluegill, largemouth bass, brown bullhead, white sucker, as well as diadromous species, including American eel, blueback herring, and American shad. An aluminum steepass fishway installed to restore access to upstream habitat for diadromous fish such as alewives, blueback herring, and sea lamprey is located at the dam site. Due to site limitations that prevent optimal attraction flows, the steepass fishway has passed significantly fewer fish than originally expected by the CT DEEP. The steepass fishway will be disassembled and returned to the CT DEEP for use on another barrier.

A former obstacle to fish in the West River had been the West River tide gates, 12 timber flap gates located approximately 3.8 miles downstream from Pond Lily Dam, which have been a partial barrier to fish passage since 1920. The West River Tide Gate Restoration Project, which CFE/Save the Sound completed in 2012, significantly mitigates this barrier with the installation of self-regulating tide gates that has improved fish passage in the lower tidal reach of the River.

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 area surrounding the Pond Lily Dam appears within a Connecticut Natural Diversity Data Base (NDDDB) polygon, indicating that one or more sensitive species have been identified in the general area. A March 4, 2015 query of the U.S. Fish and Wildlife Service 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.

#### **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 of 1966, as amended (CFR 800). In 2011, Raber Associates, an archeological consultant, was contracted to perform a Phase 1A (Reconnaissance Level) Cultural Resources Survey. This work included background research, site interpretation, archeological assessment and field inspection of the project area. Following completion of its investigation, Raber Associates issued a July 2013 report entitled *Historical and Archaeological Assessment for Proposed Pond Lily Dam Removal on West River, New Haven, Connecticut*. (Copies of this report are available upon request.)

Pond Lily Dam was built in 1794 to power a gristmill immediately downstream of the Dam. The mill operated until 1844, when it was replaced by a factory that produced carriage springs and axles. The factory was destroyed by fire in 1856; it was rebuilt and continued to operate as a metal manufacturing plant until about 1879 when a new owner turned the site into a paper mill. The Pond Lily Paper Mill operated until 1896; the plant then became a textile dyeing mill, which continued until the 1970s. The extensive mill property and dam lay dormant until 1996, when a developer demolished the mill to build the Whalley Avenue shopping center, which currently occupies the site.

For prehistoric and Native American peoples, the gentle, well-drained slopes along the West River may have provided seasonal opportunities for hunting and fishing, or other temporary and semi-permanent activities. Sixteen pre-Contact American archaeological sites near the River and Konold's Pond are listed in files of the Connecticut State Archaeologist. Areas east of the impoundment, where access paths may be constructed for the Project, are Branford silt loam soils that are typical soils for holding sensitive Native American materials.

#### **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, the 2014 list of distressed municipalities includes the City of New Haven. Criteria for this list include high rates of unemployment and poverty, among others. Also, according to the 2010 census, the City has 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 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 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.

## **5.0 ENVIRONMENTAL CONSEQUENCES**

### **5.1 General**

The proposed partial removal of the Pond Lily Dam, including the excavation, regrading and planting of sediments, will not have any long-term adverse effects on the existing environment of the West River. 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, as well as flood mitigation for the residents of the City of New Haven, 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. The passage of anadromous fish following partial removal of the Dam will provide additional recreational benefits through improved aesthetics and fishing opportunities.

### **5.2 Land Use and Topography**

Land use is not expected to change under the proposed project. The immediate vicinity of the Dam and impoundment is a highly developed urban area with little opportunity for additional development. The topography of the impoundment will be permanently altered in order to restore more natural river flows. The proposed channel will be excavated in the approximate location of the historic river channel that was present before construction of the dams. The new channel geometry is designed to provide adequate flow depth, which in turn will provide a cooler and more oxygenated riverine environment. During higher flow events, flow is designed to spill from the main channel onto the floodplain, slowing velocities and allowing for minor attenuation of flood flows. The excavated sediments will be placed and graded on the newly exposed impoundment sediments following dewatering and dam removal. The sediments will be stabilized on site with wetland and riparian plantings, and slopes will remain relatively flat.

### **5.3 Water Quality**

Under the no action alternative, water quality in the impoundment will continue to be impaired since shallow, slow-moving waters behind low-head dams such as Pond Lily often experience greater fluctuations in dissolved oxygen levels and pH values compared to free-flowing river sections (Santucci *et al.* 2005). Such degraded habitat quality negatively impacts fish and macroinvertebrates (Santucci *et al.* 2005). Under the preferred alternative, impacts to water quality from the partial removal of the Dam and excavation of a river channel will be minimal and of short duration. Construction will take place during low flow conditions in the summer months. The Dam will be notched to allow lowering of the water level in the impoundment. The flow from the notch will be slow and therefore sediments will remain largely above 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. 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 partial dam removal and channel excavation. Impounded waters behind a dam are slow-moving, shallow, and often have higher water temperatures and lower oxygen levels than more swiftly moving waters. The water level will be lowered about six feet after completion of the Project. The water temperatures should be lower and oxygen levels higher with the predicted increased flow rates in the re-established historic river channel. Therefore, the only long-term impacts to water quality in the project reach will be beneficial.

#### **5.4 Surface Water and Hydrology**

No changes to surface waters and hydrology is expected under the no action alternative. For the proposed project, the partial 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. The new channel geometry was designed to provide hydrologic connections to support proposed ecological communities (i.e., adjacent wetland community types) to develop appropriate velocities and flow depths for fish passage, and to protect adjacent infrastructure. The final channel width will vary from 50 to 60 feet wide and will generally flow three feet deep during the statistical 2-year flow event. Flow velocities downstream of the project area will 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, both nuisance flooding and major flood events will continue for businesses and residential properties in the vicinity of the impoundment and West River downstream of the impoundment. Flood zones will remain unchanged. Removal of the Dam will not increase the 100-year flood elevation or the 100-year frequency flood level, as the Project will lower the water surface elevation by approximately 4-6 feet at the location of the Dam and the center of the impoundment. The Pond Lily Dam is a run-of-river dam with no drawdown capabilities; there will be no floodplain storage loss after its removal. With the lowering of the water surface elevation, the Project will provide some flood relief to Whalley Avenue and businesses along the impoundment. The removal of the spillway will reduce some nuisance flooding, but will have little impact on major flood events. The proposed project activities will not increase water surface elevations or flow velocities downstream of the existing dam location.

## **5.6 Sediment Chemistry**

Based on the sediment testing completed to date, the material to be excavated is suitable for beneficial reuse as a regulated material in compliance with a valid and written effective authorization or permit issued by the Commissioner of the CT DEEP.

## **5.7 Vegetation**

Excavated sediment will be reused on site to protect the remaining berm and to reconstruct and regrade the banks and floodplain of the newly restored stream channel. Fill will be placed and graded largely in areas of former open water that will become bare, exposed sediment following dam removal and draining of the existing impoundment. The site will be revegetated with native wetland and riparian floodplain species. Some wetland types, over time, may experience long-term changes in wetland vegetation types due to the lowered water levels in the project area. The loss of acreage of some palustrine open water is mitigated by the creation of a self-sustaining free-flowing stream habitat condition. The Connecticut 401 Water Quality Certification application describes in more detail the existing and proposed acreages of open water and wetland habitat types, and is a public document available upon request.

## **5.8 Wildlife and Fish Resources**

### **5.8.1 Wildlife**

Proposed project activities will have no long-term adverse impacts to wildlife in the project vicinity. Short-term impacts may arise from construction activity for the two-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, the existing Dam will continue to impede the natural movement of resident riverine fish, migratory fish and other resident aquatic species. With the preferred alternative, there may be short-term adverse impacts to fish during impoundment dewatering. Overall, the proposed project will have a long-term positive effect upon the fisheries of the West River. The removal of Pond Lily Dam will allow the passage of anadromous fish to their historical habitat upstream from the Dam in the West River watershed. The proposed channel will provide a fish-passable reach for migrating species, including catadromous ones. Channel depths during the migratory season are generally deeper than a foot and as deep as 2.5 feet at some locations. The low channel velocities through the project reach will create a zone of passage that should not be challenging to any of the target species. The concave channel geometry design will concentrate flow and increase water depths in the summer and fall, optimizing conditions for out-migrating juveniles. The design creates an easily passable reach that will allow the migrating alewife and herring access to upstream ponds for spawning.

With the previously completed replacement of old timber tide gates with self-regulating ones in 2012, the Pond Lily Dam Removal Project will build on and extend the benefits of the tide gate project. Together, the two projects represent enormous potential for improved fish passage on this portion of the West River.

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

## **5.9 Threatened and Endangered Species**

In May 2011, a request was made to the Connecticut Department of Environmental Protection through the formal NDDDB review process. In accordance with a letter received from the State of Connecticut Inland Fisheries Division on July 1, 2011, no negative impacts to State-listed species are anticipated to result from planned activities at Pond Lily. A second request was made on April 12, 2013 during the time of state permit review. A response dated April 19, 2013 indicates there will be no negative impacts to State-listed species. No federally listed species or critical habitats for federally listed species occur within the project area.

## **5.10 Historical and Archaeological Resources**

Under the no action alternative, the Pond Lily Dam will remain in place, and will continue to be a class 'B' significant potential hazard dam that is in imminent danger of failing, and a serious liability to the dam owner. Given the poor condition of the Dam, and the lack of resources and need to repair the obsolete structure, the Dam is likely to fail in the near future according to engineers' assessments. In the event of dam failure, partial loss of the spillway will certainly occur, which is an adverse effect to a historical resource. Under the no action alternative, no archival photodocumentation, sketch plans or report on the Dam and its components will be undertaken.

Under the preferred alternative, the Dam will be documented as recommended by the Connecticut State Historic Preservation Office (CT SHPO). In a May 2014 letter, the CT SHPO concurred with the Phase 1A Report's finding that the Pond Lily Dam is eligible for the National Register of Historic Places, and that the proposed project would have an adverse effect to historic properties (Raber Associates 2013). However, the CT SHPO did not object to the Project, but did concur with the Report's recommended mitigation measures.

The recommended mitigation measures included the following:

- monitoring during dewatering and construction to document spillway components with photographs, sketch plans, and elevations, as appropriate;

- a report, including narrative text, a detailed site map, detailed sketch plan, and prints of digital images;
- an archaeological site form for the spillway;
- the ground surface of unpaved areas that may be used for construction staging shall be covered with geotextile fabric and gravel to avoid impacts to intact soils; and
- a brief history and description of the Pond Lily Dam, including project information, photographs and maps, shall be submitted to the Society for Industrial Archeology New England Chapters Newsletter for publication.

These recommendations were incorporated into an August 2014 Memorandum of Agreement (see Appendix C) among cooperating Federal agencies (including the U.S. Fish and Wildlife Service), the CT SHPO, and the Connecticut Fund for the Environment.

### **5.11 Socio-economic and Environmental Justice**

The proposed project is not expected to pose impacts upon any minority or low income populations adjacent to or in the vicinity of the project pursuant to Executive Order No. 12898. The Project involves removal of the Pond Lily Dam to restore fish passage and anadromous fish access to historical upstream spawning habitat. This will benefit the ecosystem and have a positive effect upon the fisheries. It will also provide benefits to the recreational angling community in general, including any anglers who may be using the River for subsistence fishing. The Project will enhance the aesthetic, educational, and recreational opportunities in a low-income area.

### **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. Standard construction access and safety requirements will be incorporated into the conditions of the construction contract. 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 and temporary.

### **5.13 Air Quality**

Under the no action alternative, there will be no changes to the existing air quality. The proposed project will have no long-term impacts on air quality. Construction of the proposed project 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.

#### **5.14 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 the West River include the lack of maintenance on the obsolete Pond Lily Dam, as well as past development within the 100-year flood elevation, and a history of increasing development within the watershed. Pond Lily Dam is in poor condition, and is in danger of failing. If the Dam fails, there will be an uncontrolled release of water and sediment from the impoundment, an event with high potential for damage to downstream property and infrastructure (roads, bridges, utilities, etc.), and for injury and loss of life. The proposed partial dam removal and channel excavation are activities intended to restore fish passage, improve riparian habitats, and prevent such a catastrophic dam failure. The contracted engineering firm has affirmed that partial spillway removal would not require any long-term operations or maintenance of the remnant dam structure.

Impacts to water quality, now and in the foreseeable future, may be the result of runoff from roads and lawns, which may become more prevalent with increasing development. However, the proposed project activities will not add to any of these potential adverse effects.

This Project is expected to benefit the overall ecological health of the West River by restoring anadromous fish passage to areas upstream of the Pond Lily Dam. The proposed project builds on a previous project to restore access to tidal marsh and estuarine habitats in the downstream reaches of the West River. In 2012, old timber flap gates were replaced with self-regulating ones that allow natural tidal and river flows during most conditions. These two projects together not only will benefit the anadromous fish populations themselves, but also provide forage for other predator species which utilize river herring and shad as a food source in the Long Island Sound estuary, as well as in the marine environment.

Positive cumulative impacts will ensue from the improved habitat and opportunities for local use of the nature preserve following dam removal. The Pond Lily Dam is located within the 12.8-acre Pond Lily Nature Preserve, which is owned by the New Haven Land Trust (NHLT). The NHLT is a supporter of this project and is dedicated to ensuring that anyone in New Haven is within walking distance of a natural preserve. The NHLT plans to use this project as a means to work with the neighboring McConaughy Terrace apartment complex. With over 200 apartments managed by the New Haven Public Housing Authority, this complex is home to more than 300 people. The NHLT wants to develop a closer relationship between the community residents and the Pond Lily Nature Preserve, engaging them and introducing young people to the outdoors.

The NHLT has also engaged Solar Youth, a New Haven non-profit organization dedicated to providing opportunities for young people through environmental exploration, leadership, and community service. Solar Youth will act as stewards of the Preserve after the site is restored. Solar Youth intends to maintain trails and interpretive signage and use the Preserve as an outdoor classroom for its students. Solar Youth is seeking funding from the National Fish and Wildlife Foundation to support the stewardship activities of their 9- to- 13-year-old youth core at the Pond Lily Nature Preserve.

The direct effects of this Project are not anticipated to add to any impacts from other actions in the area. Therefore, no adverse cumulative impacts are projected as a result of this Project.

## **6.0 ACTIONS TAKEN TO MINIMIZE IMPACTS**

Removal of the Pond Lily Dam spillway on the West River will take place during the summer low flow season outside of the times of any existing anadromous fisheries downstream migration. Construction windows and time restrictions noted in the 401 Water Quality Certification and other permits will be followed in order to minimize any impacts to existing and/or migrating fish species. 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 CONSULTATION, COORDINATION, AND COMPLIANCE**

### **7.1 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:

- City of New Haven;
- U.S. Fish and Wildlife Service, Region 5;
- U.S. Department of Agriculture, Natural Resource Conservation Service;
- U.S. Army Corps of Engineers;
- National Oceanographic and Atmospheric Administration, Restoration Center;
- Town of Woodbridge;
- Connecticut Department of Energy and Environmental Protection, Inland Fisheries;
- Connecticut Department of Energy and Environmental Protection, Inland Waters;
- Connecticut State Historic Preservation Office;
- Milone & MacBroom, Inc.;
- Stantec, Inc.;
- Mohegan Tribal Officer;
- Mashantucket Pequot Tribal Officer;
- Raber Associates, Inc.; and
- New Haven Land Trust (dam owner).

## **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 under the Permits section above. 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 unavoidable short-term impacts.

There have been numerous public and municipal stakeholder meetings, including presentations to the Town of Woodbridge Board of Selectmen, West River Flood Mitigation Committee, the New Haven City Plan Commission and the Ward 27 Aldermanic public meeting. An additional public meeting for the Project was held at the Mitchell Library during the design stage of the Project in November 2011. The meeting was well attended by local residents and community groups, with approximately 40 people in attendance. Public notice for the Project was printed in the New Haven Independent and in Spanish in La Voz, in accordance with Connecticut regulation. No comments were received from the public.

## **7.3 Required Permits and Approvals**

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

- 401 Water Quality Certification (CT DEEP);
- Dam Safety Permit (CT DEEP); and
- Programmatic General Permit (U.S. Army Corps of Engineers).

The New Haven City Plan Commission conducted a Site Plan Review for a Development Permit, and approved the dam removal project.

## 8.0 REFERENCES

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Appendix A: Project location photographs

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**Pond Lily Dam Spillway, Pond, and Fishway looking Northeast.**

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**Pond Lily Dam Spillway looking East.**

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