US Army Corps
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New England District

Environmental Assessment and Draft Finding of No Significant Impact

Operations and Maintenance Action to Address Poor Water Quality and Sedimentation Accumulation Northfield Brook Lake Thomaston, Connecticut

Northfield Brook Lake
Thomaston, Connecticut

January 2015

DRAFT FINDING OF NO SIGNIFICANT IMPACT

Operations and Maintenance Action to Address Poor Water Quality and Sedimentation Accumulation Northfield Brook Lake, Thomaston, Connecticut

The U.S. Army Corps of Engineers (USACE) conducted an Environmental Assessment (EA) of potential effects associated with implementing a maintenance action at Northfield Brook Dam in Thomaston, Connecticut. The federal flood control project has consistent problems with water quality and sediment accumulation within the lake. The lake is on the Connecticut Impaired Waters List because it exceeds the water quality standards for recreational uses from elevated levels of *Escherichia coli* (E. coli) from non-point and unknown source pollution. The sediment trapped behind the dam starves downstream aquatic habitats of needed naturally occurring sediment deposition and increases downstream erosion of the river channel. USACE has historically needed to drain the lake to remove accumulated sediment. The EA and this Finding of No Significant Impact is conducted pursuant to USACE implementing regulations (33 Code of Federal Regulations 230).

Proposed Action. USACE is proposing to alleviate the continual negative water quality conditions and address the ongoing sediment management conditions within the reservoir area of the Northfield Brook Dam.

Alternatives. The preferred alternative to accomplish the Proposed Action is *Alternative 1, River Restoration*, which would eliminate the permanent eight-acre lake behind the dam, restore the Northfield Brook to its original channel, establish a riparian bufferzone, and create additional recreational opportunities in the area that was the location of the permanent pool behind the dam. The project would thereafter be operated in a run-of-the-river mode during non-flood operations. Alternatives considered but not selected include: *Alternative 2, Mechanical/ Dredging Alternative* which would involve the temporary dewatering of the lake and mechanically removing (dredging) accumulated sediment before returning the pool to its current level. This alternative is not a long-term solution. *The No Action Alternative* is a requirement of the Council on Environmental Quality regulations that serves as the baseline against which the impacts of the alternatives are evaluated and is included in the EA.

Methods to Drawdown the Reservoir. There are two reasonable methods to drawdown the reservoir. The High Rain Event (Inflow) Drawdown and the Low Outflow Option. The USACE preferred option is the High Rain Event (Inflow) Drawdown. One other drawdown method was considered but rejected because of its impractical implementation: the Multi-season Drawdown Option.

Affected Resources. Impacts to aquatic resources and the limited in-stream vegetation would be confined to the reservoir pool area and within the limits of the river banks immediately downstream of the dam. Minimal and short-term impacts to benthic and macroinvertebrates and fish will occur during reservoir dewatering and for short distance downstream of the dam. Benthic organisms within the existing reservoir area will be lost except for those that remain in the riverine habitat after drawdown. Organisms in the river channel that may be displaced with the dewatering of the pool will be replaced by recolonization of species from upstream areas. The primary impacts to biological resources would be during the final stages of the reservoir pool drawdown when increases in steam velocities would increase concentrations of suspended sediment and induce invertebrate drift and potentially reduce fish feeding for a short period until turbidity settles out of the water column. Loose sediment would be deposited on downstream fisheries habitats. Impacts to fish during dewatering of the reservoir could include mortality of some species; however the selected method to dewater the reservoir is expected to minimize the loss of fish species. Associated with the elimination of the reservoir would include the permanent loss of warm water fisheries habitat associated with the artificial impoundment. This loss would be in the current reservoir basin and does not represent a significant adverse impact to fisheries populations or habitats. The action

would result in a benefit to the aquatic health of Northfield Brook with restoration of bufferzones, restoration of warmwater and coldwater fisheries habitat, and elimination of an impaired waterbody.

Under the Council on Environmental Quality ("CEQ") NEPA regulations, "NEPA significance" is a concept dependent on context and intensity (40 C.F.R. § 1508.27). When considering a site-specific action like the conversion of the Northfield Brook Dam to a dry-bed reservoir, significance is measured by the impacts felt at a local scale, as opposed to a regional or nationwide context. The CEQ regulations identify a number of factors to measure the intensity of impact. Review of the NEPA "intensity" factors reveals that the proposed action would not result in a significant impact to the human environment.

Impacts on public health or safety: The project is expected to result in a net benefit to public health by eliminating a non-natural lake which is listed as an impaired waterbody. It will eliminate an underwater drop off hazard near the beach.

Unique characteristics: There are no unique characteristics in this waterbody that would be affected by eliminating the reservoir pool and restoring the Northfield Brook in the reservoir area.

Controversy: The proposed project is not controversial. Federal, State, and local resource agencies are in support of the USACE Proposed Action.

Uncertain impacts: The impacts of the proposed project are not uncertain; they are readily understood based on past maintenance experiences at this project and other USACE flood control projects.

Precedent for future actions: The proposed project is a maintenance action that changes the non-flood storage function at the flood control dam in response to site-specific water quality and sediment management issues. It will not establish a precedent for future actions.

Cumulative significance: The Proposed Action is expected to have a positive impact within the watershed when implemented. It has support from Federal, State, and local resource agencies.

Historic resources: The project will have no known negative impacts on any pre-contact archaeological sites recorded by the State of Connecticut.

Endangered species: The project will have no significant impacts to Federal or affected state-listed species of concern, rare or endangered species.

Potential violation of state or federal law: This action will not violate federal or state laws.

Measures to minimize adverse environmental effects of the action are discussed in Section 4.0, Mitigation, of the EA.

Based on my review and evaluation of the environmental effects as presented in the Environmental Assessment, I have determined that the conversion of the eight-acre Northfield Brook Lake Flood Control Project to a run-of-the-river project, and restoration of the Northfield Brook within the reservoir area to address the water quality and sediment accumulation conditions facing the management of the Federal Flood Control Project is not a major Federal action significantly affecting the quality of the human environment. This Federal action, therefore, is exempt from requirements to prepare an Environmental Impact Statement.

Date: _____

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Christopher J. Barron
Colonel, Corps of Engineers
District Engineer

ENVIRONMENTAL ASSESSMENT

LEAD AGENCY: New England District, U.S. Army Corps of Engineers (USACE)

TITLE OF PROPOSED ACTION: Environmental Assessment for the Operations and Maintenance Action Operations and Maintenance Action to Address Poor Water Quality and Sedimentation Accumulation Northfield Brook Lake, Thomaston, Connecticut

AFFECTED JURISDICTIONS: Thomaston, CT and surrounding communities

PREPARED BY: New England District, U.S. Army Corps of Engineers

APPROVED BY: Approval by Colonel Christopher J. Barron is pending.

ABSTRACT: As part of the comprehensive plan for flood control in the Naugatuck Valley, the Northfield Brook Dam aids in the reduction of flood flows in the downstream communities along the Naugatuck River, while providing recreation opportunities for the public. The lake at the Northfield Brook Lake Flood Control Project has experienced years of poor water quality and increasing sedimentation buildup behind the dam. The environmental assessment (EA) addresses the potential environmental, socioeconomic, and cultural impacts of alternatives to alleviate these conditions.

USACE has recommended as a preferred plan the conversion of the Northfield Brook Lake Flood Control Project to eliminating the permanent the eight-acre lake and restoring the reservoir area to a natural stream course. The elimination of the stored water behind the dam would eliminate a designated impaired waterbody and support efforts to improve water quality within the Northfield Brook ecosystem. The action would improve sediment management and allow a more natural run-of-the-river sediment transport. It would eliminate the long term need to remove sediment accumulation which requires temporarily dewatering the reservoir pool to dredge accumulated sediment, and the action would reduce costs associated with management of adverse aquatic conditions at the project. The project would continue to operate for its authorized purposes of flood control and recreation.

Minor short-term impacts to the downstream aquatic habitats may occur with the drawdown of the reservoir by sediment being transported and deposited downstream; however these impacts would be offset by the method used to empty the reservoir and the habitat is expected to recover quickly. The loss of an artificial lake habitat having poor water quality would be offset by restoring the area behind the dam, including the stream flow through the flood storage area to a riparian-riverine system. The action is supported by resource agencies in the State of Connecticut.

Based on the analyses described in this EA it has been determined that implementation of the Proposed Action and the Preferred Alternative would not have a significant impact on the quality of the natural or the human environment. An environmental impact statement is not required and a Finding of No Significant Impact (FONSI) will be published in accordance with the *National Environmental Policy Act*.

REVIEW PERIOD: A Notice of Availability (NOA) has been published in the *Republican-American*, in Waterbury, CT on January 30, 2015 which announces the beginning of the 30-day public review period. In the NOA, interested parties will be invited to review and comment on the EA and Draft FONSI, and will be informed that the EA and Draft FONSI will be available at the Thomaston Public Library, 248 Main Street, Thomaston, CT. The NEPA document can also be downloaded from the New England District website at: <www.nae.usace.army.mil/Missions/ProjectsTopics/NorthfieldBrookDamConversion.aspx> Reviewers are invited to submit comments on the EA and Draft FONSI during the 30-day public comment period via mail, fax, or email to the following: *Mr. Kirk E Bargerhuff, Environmental Resources Section, USACE-NAE-EP-VE, 696 Virginia Road, Concord, MA O1742. Phone: 978.318.8029. e-mail Kirk.E.Bargerhuff@usace.army.mil*

EXECUTIVE SUMMARY

Operations and Maintenance Action
Northfield Brook Lake Flood Control Project, Thomaston, Connecticut
Conversion of the Northfield Brook Lake Flood Control Project to a Run-of-the-River Project and Restoring the Northfield Brook

ES.1 Introduction

The environmental assessment (EA) evaluates the potential environmental effects associated with the U.S. Army Corps of Engineers New England District's (USACE) Proposed Action at the Northfield Brook Lake federal flood control project (Project) in Thomaston, Connecticut. The action would aid the USACE in its resource management of the facility and restore health to the Northfield Brook aquatic ecosystem by eliminating the impounded water within the reservoir area that is classified as an impaired waterbody. The action would improve sediment management in the reservoir area by allowing a more natural run-of-the-river sediment transport and increase and maintain the overall storage capability by eliminating the long term needs to remove sediment accumulation. The action will also provide better access to recreational opportunities and minimize the maintenance costs associated with management of aquatic conditions within the federal flood control facility.

This EA was developed in accordance with the *National Environmental Policy Act* (NEPA) (42 U.S.C. § 4321 et seq.); implementing regulations issued by the President's Council on Environmental Quality (CEQ), 40 *Code of Federal Regulations* (CFR) Parts 1500-1508; and *Procedures for Implementing NEPA*, 33 CFR 230.

The proposed action would eliminate the existing permanent reservoir. This would change the current water management at the USACE flood control dam which affects the existing environmental resources management primarily by eliminating the artificial lake created by the dam and restoring the riverine system. Federal Regulations (33 CFR Part 230.7) identifies USACE actions that normally require an Environmental Assessment but not necessarily an EIS to include changes in environmental impacts which were not considered in the project EIS or EA, including, for example, changes in pool level operations. The proposed action occurs within the framework of this authorization for this Civil Works project.

ES.2 Background/Setting

The Northfield Brook Lake (Project) is a Federal multi-purpose dam authorized for flood control, recreation, and fish and wildlife habitat. It is located on Northfield Brook, within the Naugatuck River Basin, Connecticut, operated by the Operations Division of the New England District, U.S. Army Corps of Engineers. It is part of the overall Congressionally-authorized flood control plan for the Naugatuck Valley. It lies within the boundaries of Thomaston and Litchfield, with the actual dam located about 1.3 miles upstream from its confluence with the Naugatuck River, in the town of Thomaston, Litchfield County. The total acreage of the reservoir and project lands is about 235 acres, including 208 acres that are owned by the Federal government and 27 acres held in flowage easement. The project became operational in 1965 and operates to lower flood stages and protect the downstream communities along the Naugatuck River including the towns of Thomaston, Watertown, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby. In 1967, recreational facilities were constructed and the project currently provides opportunities for hiking, picnicking, fishing, swimming, and boating.

ES.3 Need and Purpose for the Proposed Action

The Northfield Brook Lake Federal Flood Control Project has consistent problems with water quality and sedimentation within the lake. The USACE's water quality monitoring data shows an increasing and steady decline in the water quality. The lake is on the Connecticut Impaired Waters List because it exceeds the water quality standards for recreational uses from elevated levels of *Escherichia coli* (E. coli) that occur from non-point and unknown source pollution. The sedimentation trapped behind the dam starves downstream aquatic habitats of needed naturally occurring sediment deposition and increases downstream erosion of the river channel. USACE monitoring has observed a large increase in the amount of gravel and sand resulting in accelerated eutrophication of the waterbody. The overall decline is evidenced in the negative environmental conditions and the general aesthetics of the public swimming beach, and the increasing shallow aquatic habitat present within the conservation pool area. The ongoing degraded water quality conditions within the reservoir have required the long-term closures of the recreational swimming beach, often during the summer season when recreational use is at its highest. The water quality conditions within the reservoir creates potential health concerns because of the increasing potential of waterborne illnesses caused by high bacteria levels that exceed the State of Connecticut standards, and increasing incidents of cyanobacteria blooms.

The USACE has the need to address the ongoing sediment buildup and the poor water quality conditions within the reservoir area in a manner that will: (1) eliminate the impaired status of the impounded water within the reservoir area, (2) improve sediment management of the area behind the dam and allow a more natural run-of-the-river sediment transport, (3) increase the overall storage capability by eliminating the long term needs to remove sediment accumulation, (4) provide recreational opportunities, and (5) minimize the maintenance costs associated with management of adverse aquatic conditions within the federal flood control project.

The purpose of the action is to restore the health to the Northfield Brook aquatic ecosystem and aid the USACE in its ongoing management of the project. The alternatives under consideration can achieve this purpose.

ES.4 Proposed Action and Alternatives

The proposed action is an operational and maintenance action that will alleviate the negative water quality conditions and ongoing sediment accumulation within the reservoir area of the Northfield Brook Dam. The recommended method (preferred alternative) to accomplish this is by eliminating the artificial lake that is listed as an impaired waterbody, eliminate the long term need to remove accumulated sediment, create and provide access to improved recreational opportunities, and minimize the maintenance costs associated with management of adverse aquatic conditions within the federal flood control project. The action would also restore about 1,200 feet of riverbank to a riparian ecosystem and restore lost fisheries habitats.

The preferred alternative and other alternatives to accomplish this are discussed in greater detail in Section 2.3, Alternatives Considered for the Proposed Action. The EA evaluates three alternatives to complete the action: Alternative 1, *River Restoration Alternative*, Alternative 2, *Mechanical/Dredging Alternative* and Alternative 3, the *No Action Alternative.*

Alternative 1, River Restoration, is the USACE's Preferred Alternative to alleviate the poor water quality and on-going sedimentation issues. This alternative involves the permanent dewatering of the

impoundment behind the dam and changing the long-term operation of the facility by maintaining an open sluice gate for a run of the river facility. Outflow velocities would be regulated by the service gate located within the concrete outlet conduit. The flood control facility would continue to operate in its authorized capacity, absent a permanent reservoir.

The action considered eliminates the eight-acre impoundment behind the dam and restores the river within the dewatered reservoir basin. Northfield Brook would return to a natural meandering channel and, with support from the Connecticut Inland Fisheries Division, USACE would restore about 1,200 feet of the river by creating instream fisheries habitat, stabilizing the banks, and creating a riparian buffer zone along. Additional recreational space will be created where possible within this area. The Northfield Brook Dam will be operated as a run-of-the-river facility during non-flood operations. Once completed, the impaired status of the lake would be eliminated and sediment would be allowed to pass through the dam in a more natural run-of-the-river transport.

Alternative 2, Mechanical/Dredging Alternative involves the temporary dewatering of the lake and mechanically removing accumulated sediment. On completion of the sediment removal the lake would be allowed to refill and the project would continue to operate with a lake behind the dam. This alternative would temporarily address the poor water quality conditions, but it is not a long-term solution and the lake would continue to act as a sediment trap. The lake conditions would deteriorate and the water quality conditions and sediment accumulation would continue to be an ongoing resource and recreational issue.

Alternative 3, No Action Alternative is a requirement of the Council on Environmental Quality regulations that requires analysis of the No Action Alternative in an EA to serve as the baseline against which the impacts of the proposed action and various alternatives are evaluated. Accordingly, the No Action Alternative is evaluated in the EA. If no action is taken USACE will continue to operate the dam in its existing framework. This will not alleviate the project from its ongoing water quality conditions and require USACE to remove sediment accumulation behind the dam. This alternative was not selected to achieve the goals of the proposed action.

ES.5 Reservoir Drawdown Options

To minimize downstream impacts associated with dewatering the eight-acre reservoir, two methods were considered for drawdown.

- *High Rain Event (Inflow) Drawdown Option*
- *Low Outflow Option*

These two options are considered the only practical methods for drawdown of this particular reservoir, and are similar in nature in that during the dewatering process the outflow will be adjusted to be slightly higher than the inflow. Generally, one targets a high rain event when the watershed is experiencing naturally turbid conditions to empty the reservoir and the other is not dependent on the high rain event.

The *high rain event (inflow) drawdown option* would drawdown the reservoir during a season of year where cooler temperatures exist and a one-time release can be timed with a forecasted high rain event. This is the USACE preferred method to drawdown the reservoir for this proposed action. This option would be implemented over a period of several days as water received from the watershed and the water

that is stored is released during flood operations which has outflow rates higher than normal. The release would continue until the area behind the dam is drained of water and the Northfield Brook has re-established itself into a meandering stream channel. This method allows the reservoir to drain, and allows the outflow to erode a portion of the sediments existing behind the dam through a natural process that feeds sediment starved aquatic habitats downstream. Sediment transport is expected to mimic previous experiences in dewatering the Northfield Brook reservoir with sediment transported during the release deposited to the outer limits of the stream channel in locations that are currently experiencing undercutting. Fish and other aquatic invertebrates are expected to have a higher chance of survivability during this process as opposed to a slower moving release. This method could have temporary adverse impacts to downstream fish habitat and aquatic vegetation but is expected to recover within a short period as the watershed stabilizes and returns to an ecosystem that receives a more natural sediment transport. USACE used this process for the 1999 maintenance dredging that required dewatering of the pool to remove about 4,500 cubic yards of a mixture of sediment fill material consisting silt and gravel.

The *low outflow option* opens the outer (sluice) gate on the weir to allow a constant, reduced outflow rate controlled by the flood control gate within the outflow conduit. Coordination with the USACE Reservoir Control Center would provide outflow guidance but because of the existing flood control capacities of the gates the operation would require significant staffing and manual adjustments to control the drawdown over a longer slow moving period than compared to a high rain event drawdown. This method would need to be accomplished over a period of several days or weeks and initiated when seasonal temperatures are cooler and yet there remains enough growing season remaining to aid in establishing vegetation on the banks. When the river flowing through the reservoir area re-establishes a river channel, the outer sluice gate would be maintained open at a predetermined height and the inside gate would remain set at the level directed by USACE Reservoir Control Center.

ES.6 Environmental Consequences

Table ES-1 summarizes the expected consequences of the Preferred Alternative, Alternative 2, and the No Action Alternative. Descriptions of the potential consequences are further outlined following the table.

Table ES-1
Summary of Potential Environmental and Socioeconomic Consequences

	Environmental and Socioeconomic Consequences		
	No Action	**Alternative 1-** *River Restoration* Preferred Alternative	**Alternative 2** *Mechanical/Dredging Alternative*
Land Use and Recreation Areas	No Change from Baseline Conditions.	Minor short and long-term Impacts. Temporary loss of water-based recreation. Long-term beneficial use as the land uses for the dewatered reservoir area would be changed from open water to open water and multi-use/recreation.	Minor short-term impacts to existing water-based recreation during dredging and until reservoir is refilled.
Geology and Soils	No Change from Baseline Conditions.	No Impacts.	No Impacts.
Biological Resources (Vegetation)	No Change from Baseline Conditions.	Minor long-term benefit from the increase in riparian vegetation with restoration of a 100-foot wide bufferzone along the riverbanks.	No change in conditions. The reservoir will be refilled once the mechanical dredging removes the sediment accumulation behind the dam and this has not impact to vegetation.

	No Action	Alternative 1- *River Restoration* Preferred Alternative	Alternative 2 *Mechanical/Dredging Alternative*
Biological Resources (Fish and Wildlife)	No Change from Baseline Conditions.	Fish: Minor long-term impact with the loss of lake habitat. Minor short-term impact to habitats from temporary increases in sedimentation and turbidity during the latter-half of the drawdown. Long term benefit to native species in the downstream reaches of the watershed due to decreased temperatures and increased oxygenation. Wildlife: Long-term beneficial impacts. Increases available wildlife corridors along the Northfield Brook.	Fish: Minor short-term impact. Potential for adverse impact during drawdown to be minimized by drawdown methodology. Minor short-term impact from temporary increases in sedimentation and turbidity during the latter-half of the drawdown. Wildlife: No Impact
Biological Resources (Endangered and Threatened Species)	No Change from Baseline Conditions.	No Impacts.	No Impacts.
Wetlands and Vernal Pools	None Present.	Long-term positive impact with restoration of reservoir basin to riparian/riverine may create additional conditions to develop wetlands.	No Impacts.
Water Resources	Major adverse impact. The lake remains on CT Impaired Waters list. Recreation opportunities adversely impacted. Long-term loss of flood storage capacity.	Long-term beneficial impact to water quality in the Northfield Brook watershed by alleviating the increasing sediment accumulations and water quality problems. Conversion to riverine habitat alleviates the impaired status of the waterbody. Minor short-term impact for short distance downstream during dewatering of the dam from temporary increases in water turbidity that are expected to settle quickly. Restores a free flowing Northfield Brook when not under flood control operations.	Minor short-term impact from temporary loss of reservoir for maintenance. Minor short-term impact from increased turbidity in water column. This alternative will not alleviate the impaired status of the lake.
Sediment Management	Increased sediment deposition behind dam. Loss of flood storage capacity.	Major long-term beneficial impact by allowing a run-of-the-river sediment transport through the dam. Major volumes of sediment deposition will not occur.	Major long-term impact from the ongoing sediment deposition in a slow moving, lake environment that would require dredging to remove. The dam and lake will continue to be a source for sediment deposition and accumulation preventing downstream migration.
Historic and Archaeological Resources	No Change from Baseline Conditions.	No Impacts.	No Impacts.
Socioeconomic Resources	No Change from Baseline Conditions.	No Impacts.	No Impacts.
Aesthetic and Visual Resources	No Change from Baseline Conditions.	Moderate long-term impact reduced to minor by river restoration , restoration of the reservoir area with riparian bufferzone, and recreational fields.	Minor short-term while mechanical dredging occurs and reservoir is refilled.
Air Quality	No Change from Baseline Conditions.	No Change from Baseline Condition.	No Change from Baseline Condition.
Cumulative Effects	Loss of Recreational Opportunities and flood storage	No Significant Impact.	No Significant Impact.

capacity.

For the proposed action, nine resource categories were characterized and evaluated for potential impacts if Alternative 1, *River Restoration Alternative* (Preferred Alternative) or Alternative 2, *Mechanical/Dredging Alternative*, were implemented. Three resources that are normally evaluated in an EA - transportation, utilities, and noise – were determined not to have an impact if the proposed action were implemented. These are not considered in the EA. The Project would continue to experience the current problems if the No Action Alternative were implemented. Significance criteria were developed for the affected resource categories. These resource categories and the potential for adverse impacts are qualitative in nature. As a result of the impact analysis, there were no potential impacts that were classified as being significant to warrant the preparation of an environmental impact statement.

The expected results of the proposed action would have short-term impacts to aquatic habitats from temporary increases of sediment loads into the water column and the eventual deposition of sediment onto fisheries habitat that exist immediately downstream. The long-term impacts would be beneficial and result in re-establishing a flow regime closer to the original stream structure and restore the aquatic habitat to a natural riparian/riverine system after several decades of an artificial reservoir condition. The action would result in beneficial impacts to river temperatures and oxygen levels for the Northfield Brook, and indirectly the Naugatuck River system, facilitate a more natural sediment transport, and restore habitat and downstream migration for fisheries, while allowing USACE to continue to provide flood storage capabilities and recreational opportunities.

The potential impacts from implementing the proposed action that have been identified for each resource area are summarized below. The impacts from the drawdown of the reservoir are the same for Alternatives 1 and 2 unless otherwise stated.

Land Use and Recreation Areas

The Northfield Brook Dam and Lake is one of seven reservoirs that comprise the U.S. Army Corps of Engineers flood protection plan for the Naugatuck River Basin. Five dams are operated by the USACE and 2 dams are operated by the State of Connecticut. The proposed action would not conflict with the land use plans or interfere with activities on adjacent properties, nor alter the land use management objectives. The federal lands would continue to function for flood control and offer recreation opportunities. The land use designations for the reservoir area would be changed from open water to open water and multi-use/recreation. Impacts to land use and recreation areas are not significant.

Geology and Soils

The proposed action would have no long-term impact to the geology or soils within the federal flood control project. A portion of the sedimentation that has accumulated behind the dam will move downstream during the drawdown of the reservoir and be re-deposited along sediment starved undercut river banks. The topography within the reservoir, once drawn down, will be contoured, as necessary, and require stabilization to avoid long-term erosion.

USACE will implement a sediment and erosion control plan as part of the required General Construction Permit to minimize potential adverse impacts from erosion during restoration of the Northfield Brook within the reservoir area. Successful revegetation would minimize the potential for increased soil erosion along the banks within the affected area. If selected under Alternative 2, *Mechanical/Dredging Removal*,

the sediment deposition would be removed and the lake would be returned to its existing level. Impacts to geology and soils from the proposed action would not be significant.

Vegetation

The proposed action would not adversely impact vegetation in the federal flood control facility. The reservoir area will be barren and require replanting. The overall restoration plan for the reservoir area will include a 100 foot riparian bufferzone along Northfield Brook. USACE will use vegetation plantings and natural vegetation as a component of the restoration plan. Establishing the riparian buffer zone will result in a net beneficial impact to vegetation that supports wildlife resources within the Project. Under Alternative 2, this benefit would not be realized.

Biological Resources (Fish and Wildlife)

The proposed action would create long-term beneficial impacts for wildlife by increasing the available wildlife corridors along the Northfield Brook. Wildlife species that use the river for food, shelter, drinking water, or migration will benefit from the increased water quality and expanded riparian habitat in the reservoir area.

Dewatering the existing eight-acre lake would impact fish resources by the loss of warmwater habitat, by the temporary increase in sedimentation and turbidity during the latter-half of the drawdown, loss of existing cover, and the potential entrainment of fish. These impacts are temporary and will be offset by the restoration of about 1,200 feet of the Northfield Brook to river habitat, and the creation of a 100-feet-wide bufferzone along the banks of the waterway. The restoration will create riffle and pools areas in the river and additional wildlife and fisheries cover. The restoration of the reservoir basin to a river will eliminate of a section of the Northfield Brook that is designated as an impaired waterbody. The restoration plan will involve the CT DEEP Fisheries Division and also other local stakeholders.

The greatest potential for impact to fisheries with the preferred alternative is the short-term, direct impacts associated with increased sedimentation and turbidity. The *High Rain Event (Inflow) Drawdown Option,* which is the preference to dewater the reservoir under *Alternative 1, River Restoration,* would result in an estimated downstream transport of between 3,000 and 5,000 cubic yards of fines, sand and gravel to sediment starved banks. This alternative would be implemented during a predicted high rain event which typically results in turbid conditions within the watershed because of flood conditions. Temporary increases in suspended sediments and turbidity could result in temporary increased mortality and stress for downstream resident fishes. The full release of the water behind the dam timed to occur during a high rain event will affect the downstream river reaches in the same manner as is routine for flood control operations. An increase in sediment concentration is expected to occur when the lake drops to the lower limits which could increase invertebrate drift and reduce fish feeding for a short period until turbidity settles out of the water column. Overall, the impact of using the *High Rain Event (Inflow) Drawdown Option* on benthic and macroinvertebrates and fish is expected to be short-term and not significant. Selecting the *Low Outflow Option* could increase the potential for adverse impact to fisheries by increasing the potential for entrapment of fish in a shallower, slower moving outflow from the reservoir. Increased mortality of fisheries could be realized and observed during this timeline.

The long-term impacts associated with the permanent dewatering of the eight-acre lake and restoration of the waterbody will alter the current fish populations and recreational fishing experiences but result in a net benefit to the water quality and aquatic resources within the Northfield Brook watershed.

Recreational fishing opportunities will be altered with the loss of the warmwater fisheries habitat associated with loss of the lake. Loss of this artificial habitat would not have a notable impact on fisheries associated with the Northfield Brook Lake. Trout would benefit from restoring the river system because the action would reduce summer stream temperatures and the water course above dam would change from lentic (lake-like) to a lotic (riverine) environment within the former lake area.

There are no Federally-listed species in the Project and therefore, the proposed action and preferred alternative would not impact Federally listed species. State-listed species occurring in the Project would not see a significant reduction in available supporting habitats and the action is not expected to have adverse impacts to these species.

Wetlands and Vernal Pools

There would be no adverse impact to wetlands or vernal pools. There are none in the project area.

Restoration of about 1,200 feet of the Northfield Brook within the reservoir basin could result in topographical conditions that favor the creation of new wetland areas adjacent to Northfield Brook. For the restoration plan, USACE will evaluate and incorporate, where practical, opportunities for creation of new wetlands during consultation with State and local resource agencies, in addition to the creation of the 100 feet wide bufferzone adjacent to the river.

Water Resources

Long-term impacts to water resources from implementing the proposed action would result in a beneficial impact to water quality in the Northfield Brook watershed by alleviating the increasing sediment accumulations and water quality problems experienced in the Northfield Brook Lake. The permanent conversion to a dry-bed reservoir would eliminate the artificial impoundment and return the Northfield Brook to a more natural meandering flowing riverine system – a length of about 1,200 feet - within the Federal project. The presence of the old mill dam ensures the aquatic resources and wetlands upstream of the Northfield Brook dam would not experience an adverse impact if the lake were eliminated.

Hydrology of the downstream sections of the Northfield Brook would not be significantly altered. The dam would continue to remain unregulated in periods where the USACE is not directly implementing flood control operations that are in accordance with the Outflow Guidance for the Northfield Brook Dam. The topographical features of the perennial and intermittent streams that feed into the reservoir basin will continue to flow unimpeded and the drop in a lake level would not result in a change in aquatic conditions to these waterbodies; and they are expected to contribute to the development of a healthy riparian system along the restored Northfield Brook within the former lake bed.

The greatest potential impact on surface water from implementing the preferred alternative could result from the short-term adverse impacts experienced by the suspension of sediments or by erosion of accumulated sediments. The extent of the impact would depend on the sediment loads, stream velocity, turbulence, streambank composition, and sediment particle size. Sediment transported downstream could temporarily have adverse affects on fisheries habitat but these are expected to recover and provide better health to downstream habitats within the riverine ecosystem.

Northfield Brook Lake has chronic problems with elevated bacteria counts after rainstorms and excessive sedimentation, and occasional problems with nuisance algal blooms and low DO levels. These water

quality problems have been mostly caused by upstream non-point sources, but geese use of the project waters may also contribute to the problem. The State of Connecticut lists the Northfield Brook Lake impaired for it designated use for recreation because of elevated *Escherichia coli* from non-point sources (Connecticut Department of Environmental Protection, 2011). Eliminating the reservoir would allow water to freely flow through the dam and eliminate a primary contributor to the impaired status of the waterbody.

Sediment Management

Sediment deposition in the reservoir area consist of coarse, medium, and fine sands, and gravel. Implementing the proposed action will result in the reduction in volumes of accumulated sediment behind the dam. USACE considers this to be a beneficial improvement for the operation of the flood control project and to the Northfield Brook ecosystem. Eliminating the lake and converting to a run-of-the-river facility will allow greater transport of sediment through the dam and to downstream habitats instead of build-up and entrapment behind the dam, which affects the water quality. Accumulation of sediment may still occur during periods of flood events and the dam's operations for flood control, however, these impacts will be minor and project operations and maintenance efforts will proactively address sediment accumulation.

Consideration of the accumulated sediment behind the dam was reviewed in the EA. Current estimates are that about 12,000 cubic yards of sediment accumulation in the reservoir. Once the drawn down is completed, depending on the river's path within the original channel, USACE will evaluate the best method to restore the banks and create a bufferzone. Estimates on the volume of sediment that may need to be either removed or contoured in upland areas range from 3,481 cubic yards to 8,925 cubic yards depending on the preferred slopes of the waterbody banks. The estimate of potential downstream transport of sand and gravel is between 3,000 and 5,000 cubic yards. USACE will consult with the Connecticut Division of Inland Fisheries and jointly prepare a fisheries and stream restoration plan to ensure successful stabilization of banks and restoration of instream habitats. If Alternative 2 is selected, USACE will dredge about 8,000 to 12,000 cy of accumulated sediment and then return the reservoir to an eight-acre lake.

Section 404 (b)(1) of the Clean Water Act . The USACE evaluated, under Section 404 (b) (1) of the Clean Water Act, the potential discharge of sediments during the proposed dewatering of the dam (see EA Appendix C). Results from sediment sampling (April 2014) showed generally low concentrations indicative of background conditions of metals, PCB's, pesticides, volatile and semi-volatile organics, and total organic carbon. Most were below detectible limits. Three samples indicated PAHs that were slightly above the CT residential direct contact criteria and well below levels established for industrial/commercial sites.

These results appear to be consistent with previous sampling efforts in 2003, which showed generally low concentrations indicative of background conditions of metals, PCB's, pesticides, volatile and semi-volatile organics, and total organic carbon. Most were below detectible limits, with one station indicating a slightly higher level of PAHs. While the potential for temporary adverse affects on benthic organisms may be possible, USACE believes the impacts would be negligible, given the limited levels of contaminants and the downstream transport and deposition. No substances were in high enough concentrations to necessitate the USACE to conduct additional testing of sediments or take additional actions, nor did the results identify potential interference with the operations of the Northfield Brook Lake

project or its waters. Based on existing data and historical uses, the potential for downstream migration of contaminated sediments is considered negligible.

The *High Rain Event (Inflow) Drawdown Option* could see more sediment volumes initially transported downstream which could have a short-term adverse impact to downstream aquatic resources. This type of method is frequently used by agencies during dam decommissioning. The erosion of accumulated sediment from within the reservoir area could likely be greater than the *Low Outflow Option.* Regardless of the drawdown option, the bulk of any sediment transport would be greatest when the water levels begin to reach their lowest points in the reservoir.

The *High Rain Event (Inflow) Drawdown Option* is expected to require less sediment to be removed or re-contoured within the reservoir area as part of the mitigation for re-establishing the riverine system, and therefore, require less in-stream work during the mitigation/restoration. In comparison to the *High Rain Event (Inflow) Drawdown Option*, USACE believes that using the *Low Outflow Option* would require additional measures to be taken to remove and dispose of the material. These options would contribute to more in-stream work and mechanical contouring of the stream to achieve the goals of the stream restoration. Given the flashy nature of the watershed, a flood event occurring during the restoration period of the waterbody and river banks could risk new erosion of sediment that has not yet been stabilized by mitigation efforts. Reducing the length of time required to re-contour and stabilize the riverbanks is considered important to reduce the potential for adverse instream impacts from flood and rain induced erosion.

Northfield Brook is impaired for recreational use because of excessive *E. coli* concentrations. There are no identified point sources of pollution within the watershed or known historical events to introduce pollutants into the riverbed. The causes of the impairment are not known, however non-point source pollution from agricultural operations and densely developed neighborhoods with failing stormwater management structures are the potential contributors (Northwest Conservation District, 2009).

Historic and Archaeological Resources

The proposed plan of converting operation of Northfield Brook Lake from an eight-acre artificial impounded lake to a dry-bed reservoir and run-of-the-river flood storage project is not expected to impact significant historic properties. The action would restore the original Northfield Brook channel behind the dam, create a riparian buffer zone, and create additional recreational lands. Erosion control along the banks of the newly restored Northfield Brook should be implemented to minimize soil impacts. A walkover of the restored Northfield Brook should be conducted to evaluate bank erosion and to identify archaeological resources that may have been located beneath the present conservation pool. Identified sites should be recorded and impacts from bank stabilization and reconfiguration of the channel minimized.

Newly identified sites, if present, should be maintained and managed in accordance with the guidance in the Northfield Brook Lake HPMP and in compliance with Section 110 of the NHPA as amended. The Connecticut State Historic Preservation Officer (SHPO) is expected to concur with this determination.

Socioeconomic Resources

Implementing the proposed action or any of the alternatives would not adversely affect the region or local economic development, demographics, housing, quality of life, environmental justice, and protection of

children. USACE will continue to operate the facility in accordance with the Congressionally-authorized purposes for the project by providing flood protection and recreational opportunities. There are no expected changes to these resources with the proposed action. No present or reasonably foreseeable actions within or adjacent to the proposed project areas were identified.

Aesthetic and Visual Resources

The proposed action would cause short-term visual impacts within the reservoir from being dewatered and also from the USACE efforts to restore the Northfield Brook and establish a bufferzone and recreation areas. Once vegetation has been re-established, project operations would not see any significant impact to aesthetic and visual resources. Overall, impacts to aesthetics and visual resources would not be significant.

Air Quality

There are no significant impacts to air quality as a result of the proposed action. A Record of Non-Applicability to show compliance with the requirements of the Clean Air Act, including supporting determinations is included in the EA, Appendix B.

ES.7 Mitigation

Measures to mitigate the impacts of dewatering the existing lake and restoring the Northfield Brook within the reservoir area include: stabilizing the reservoir bed and streambanks with vegetation and limited stone armoring, restoring the aquatic habitat of the Northfield Brook, creating a bufferzone adjacent to the waterbody, and ensuring successful revegetation within the remainder of the basin. The reservoir is to be dewatered at a time of year to minimize to the extent practical the impact of downstream sediment transport and the impacts of temporary increased turbidity. Each of the mitigation measures will be consistent with the dam's authorized purpose of flood storage and recreation. To restore the Northfield Brook, USACE will work directly with the Connecticut Division of Inland Fisheries and consult with the Thomaston Conservation Commission to develop a restoration plan the enhances aquatic habitats and bordering vegetation.

Federal actions that have over one acre of ground disturbance, regardless of their location, are required to obtain a General Construction permit from the U.S. EPA. Prior to implementing the restoration of the dewatered reservoir area the USACE would obtain a NPDES permit because the effort would involve construction equipment affecting an area greater than 1 acre. Stormwater discharges from construction activities (such as grading, excavating, and stockpiling) that disturb one or more acres are regulated under the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Construction General Permit requires implementation of activities to control soil erosion during construction. Erosion control during construction activities could include the use of hay bales and silt fencing, as appropriate, to prevent the movement of soils into low-lying areas, revegetation, and top soil management.

ES.8 Findings and Conclusions

Direct, indirect, and cumulative impacts of Alternative 1, Alternative 2, and the No Action Alternative have been considered. Alternative 1 is the Preferred Alternative because it allows the USACE to change the project operations in a manner that alleviates the negative water quality conditions associated with the impoundment. It creates beneficial sediment management by eliminating the permanent 8-acre lake allowing sediment to flow freely through the reservoir instead of becoming trapped by the reservoir. The Preferred Alternatives allows USACE to restore the Northfield Brook behind the dam and creates a

vegetative buffer zone and recreation area. USACE is proposing to continue operating the facility as a run-of-the-river facility during non-flood operations, without maintaining a permanent lake.

No significant long-term impacts would occur, and the proposed action would result in a net benefit to water quality and aquatic habitats in the Northfield Brook watershed. Temporary short-term impacts associated with the dewatering of the dam would occur, and USACE's preferred method is to allow for a one-time dewatering at the time of a high rain event to move sediment downstream to feed currently starved areas of the river downstream; and with an increased outflow velocity to maximum the potential for successfully moving aquatic invertebrates downstream instead of potentially risking aquatic losses within the reservoir associated with a slower releases as described in the EA. The issuance of a Finding of No Significant Impact is warranted, and preparation of an environmental impact statement is not required. Implementation of the No Action Alternative is not feasible because the Northfield Brook Lake would continue to deteriorate and the sedimentation would continue to accumulate thereby adding to overall negative water quality conditions within the watershed and reduce the USACE ability to store water volumes during flood events.

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ENVIRONMENTAL ASSESSMENT

1.0 NEED, PURPOSE, SCOPE

1.1 INTRODUCTION

The Northfield Brook Lake (Project) is a Federal multi-purpose dam authorized for flood control, water supply, recreation, and fish and wildlife habitat. It is located on Northfield Brook, within the Naugatuck River Basin, Connecticut, operated by the Operations Division of the New England District, U.S. Army Corps of Engineers (USACE/Corps), and is part of the overall Congressionally-authorized flood control plan for the Naugatuck Valley. It lies within the boundaries of Thomaston and Litchfield, with the actual dam located about 1.3 miles upstream from its confluence with the Naugatuck River, in the town of Thomaston, Litchfield County (see figure 1). The total acreage of the reservoir and project lands is about 235 acres, including 208 acres that are owned by the Federal government and 27 acres held in flowage easement. The project became operational in 1965 and operates to lower flood stages and protect the downstream communities along the Naugatuck River including the towns of Thomaston, Watertown, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby. In 1967, recreational facilities were constructed and the project currently provides opportunities for hiking, picnicking, fishing, swimming, and boating.

FIGURE 1
Reservoir area at Northfield Brook Lake Flood Control Facility

Northfield Brook Lake has a small permanent eight acre conservation pool (reservoir) that covers about 1,200 feet of the original stream channel. Water depths in the reservoir vary, generally increasing in depth from surface level where the Northfield Brook passes over a historic old mill pond dam to a depth of about 22 feet at the base of the dam. Water passes over an established weir dropping into the outlet conduit. The project can store up to 792 million gallons of water for flood control purposes with the flood storage area of the project covering about 67 acres and extending 1.25 miles upstream. This is equivalent to 8 inches of water covering the brook's drainage area of 5.7 square miles.

1.2 PROBLEM DESCRIPTION

1.2.1 NEED FOR THE PROPOSED ACTION

Rainfall, snowmelt, and upstream river channel erosion provide a continuous supply of sediment that is transported by Northfield Brook into the reservoir at Northfield Brook Dam. The slower velocities become a sediment trap that reduces the storage capacity, increase downstream erosion of the river channel, and starves downstream aquatic habitats of needed naturally occurring sediment deposition. The sedimentation trapped behind the dam contributes to poor water quality, reduced flood storage capacity, and requires periodic maintenance to remove accumulated sediment. The periodic maintenance requires draining the reservoir to accommodate mechanical removal. When the volumes of trapped sediments behind the dam affect the flood control mission, the USACE must periodically move forward with sediment removal.

The Northfield Brook Lake is on the Connecticut Impaired Waters List because it exceeds the water quality standards for recreational uses from elevated levels of *Escherichia coli* from non-point and unknown source pollution. The New England District water quality monitoring program data has shown that in the past 10 to 15 years there is an increasing and steady decline in the water quality at Northfield Brook Lake. There has been a dramatic increase in the amount of siltation resulting in accelerated eutrophication of the waterbody. This decline is evidenced in the negative environmental condition and the general aesthetics of the public swimming beach, and the increasing shallow aquatic habitat present within the conservation pool area.

These ongoing degraded water quality conditions within the reservoir at Northfield Brook Lake have required the USACE to implement long-term closures of the recreational swimming beach, often during the summer season when recreational use is at its highest. The water quality conditions within the conservation pool creates potential health concerns because of the increasing potential of waterborne illnesses caused by high bacteria levels that exceed the State of Connecticut standards, and increasing incidents of cyanobacteria blooms.

The USACE has the need to address the ongoing sediment buildup and the poor water quality conditions within the reservoir area in a manner that will: (1) eliminate the impaired status of the impounded water within the reservoir area, (2) improve sediment management of the area behind the dam and allow a more natural run-of-the-river sediment transport, (3) increase the overall storage capability by eliminating the long term needs to remove sediment accumulation, (4) provide access to recreational opportunities, and (5) minimize the maintenance costs associated with management of adverse aquatic conditions within the federal flood control project.

1.2.2 PURPOSE OF THE PROPOSED ACTION

The purpose for the proposed action is to alleviate the negative water quality conditions and ongoing sediment accumulation within the reservoir area of the Northfield Brook Dam. This action will aid the USACE in its water resources management of the flood control project. The expected result is to ensure

the long-term restoration of health to the Northfield Brook aquatic ecosystem by eliminating the long-term poor water quality conditions in the lake and reducing sediment management accumulations that are consistently present within the Northfield Brook Lake.

1.3 SCOPE

This EA has been developed in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations issued by the President's Council on Environmental Quality (CEQ) and the Army.[1] Its purpose is to inform decision makers and the public of the likely environmental consequences of the proposed action and alternatives.

This EA identifies, documents, and evaluates environmental effects of converting the Northfield Brook Lake to a run-of-the-river reservoir by eliminating the existing eight-acre permanent conservation pool and restoring the waterbody to a natural riparian/riverine habitat. An interdisciplinary team of environmental scientists/biologists, operations mangers, engineers, and archaeologists has analyzed the proposed action and alternatives in light of existing conditions and has identified relevant beneficial and adverse environmental effects associated with the action. The proposed action and alternatives, including the no action alternative, are described in Section 2.0. The Existing Conditions, considered to be the "baseline" conditions, are the described in Section 3.0, Affected Environment and Environmental Consequences. The expected effects of the proposed action, also described in Section 3.0, are presented immediately following the description of baseline conditions for each environmental resource addressed in the EA. Section 4.0 also addresses the potential for cumulative effects, and Section 4.0 addresses mitigations.

1.4 PUBLIC INVOLVEMENT

The USACE invites public participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the proposed action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision making process.

Public participation opportunities with respect to this EA and decision making on the proposed action are guided by 33 Code of Federal Regulations Part 230. Upon completion, the EA will be made available to the public for 30 days, along with a draft Finding of No Significant Impact (FONSI). At the end of the 30-day public review period, the U.S. Army Corps of Engineers will consider any comments submitted by individuals, agencies, or organizations on the proposed action, the EA, or draft FONSI. As appropriate, USACE may then execute the FONSI and proceed with implementation of the proposed action. If it is determined prior to issuance of a final FONSI that implementation of the proposed action would result in significant impacts, the USACE will publish in the *Federal Register* a notice of intent to prepare an Environmental Impact Statement, commit to mitigation actions sufficient to reduce impacts below significance levels, or not take the action.

[1] Council on Environmental Quality *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 *Code of Federal Regulations* (CFR) Parts 1500–1508, and *Procedures for Implementing NEPA*, 33 CFR Part 230.

Throughout this process, the public may obtain information on the status and progress of the proposed action and the EA through the New England District Public Affairs Office by calling Mr. Tim Dugan at (978) 318-8264.

1.5 REGULATORY FRAMEWORK

Federal Regulations (33 CFR Part 230.7) identifies Corps actions that normally require an Environmental Assessment but not necessarily an EIS to include changes in environmental impacts which were not considered in the project EIS or EA, including, for example, changes in pool level operations. The proposed action occurs within the framework of this authorization for this Civil Works project.

A decision on whether to proceed with the proposed action rests on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, the USACE is guided by relevant statutes (and their implementing regulations) and Executive Orders that establish standards and provide guidance on environmental and natural resources management and planning. These include the Fish and Wildlife Coordination Act, Clean Air Act, Clean Water Act, Noise Control Act, Endangered Species Act, National Historic Preservation Act, Archaeological Resources Protection Act, Resource Conservation and Recovery Act, and Toxic Substances Control Act. Executive Orders bearing on the proposed action include EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), EO 12088 (*Federal Compliance with Pollution Control Standards*), EO 12580 (*Superfund Implementation*), EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*),EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*), EO 13101 (*Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*), EO 13123 (*Greening the Government Through Efficient Energy Management*), EO 13148 (*Greening the Government Through Leadership in Environmental Management*), EO 13175 (*Consultation and Coordination with Indian Tribal Governments*), and EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*). These authorities are addressed in various sections throughout this EA when relevant to particular environmental resources and conditions. The full text of the laws, regulations, and EOs is available on the Defense Environmental Network & Information Exchange Web site at http://www.denix.osd.mil.

In accordance with the USACE Regulatory Guidance Letter No. 05-04, dated 19 August 2005, the activity received an evaluation to ensure compliance with Section 404 of the Clean Water Act. The Clean Water Act evaluation applies to the releases of water and water-carried sediment that may result in the transportation, reduction, or elimination of bottom sediment accumulations from or through the dam. The Clean Water Act Section 404 evaluation is included in Appendix C of this EA.

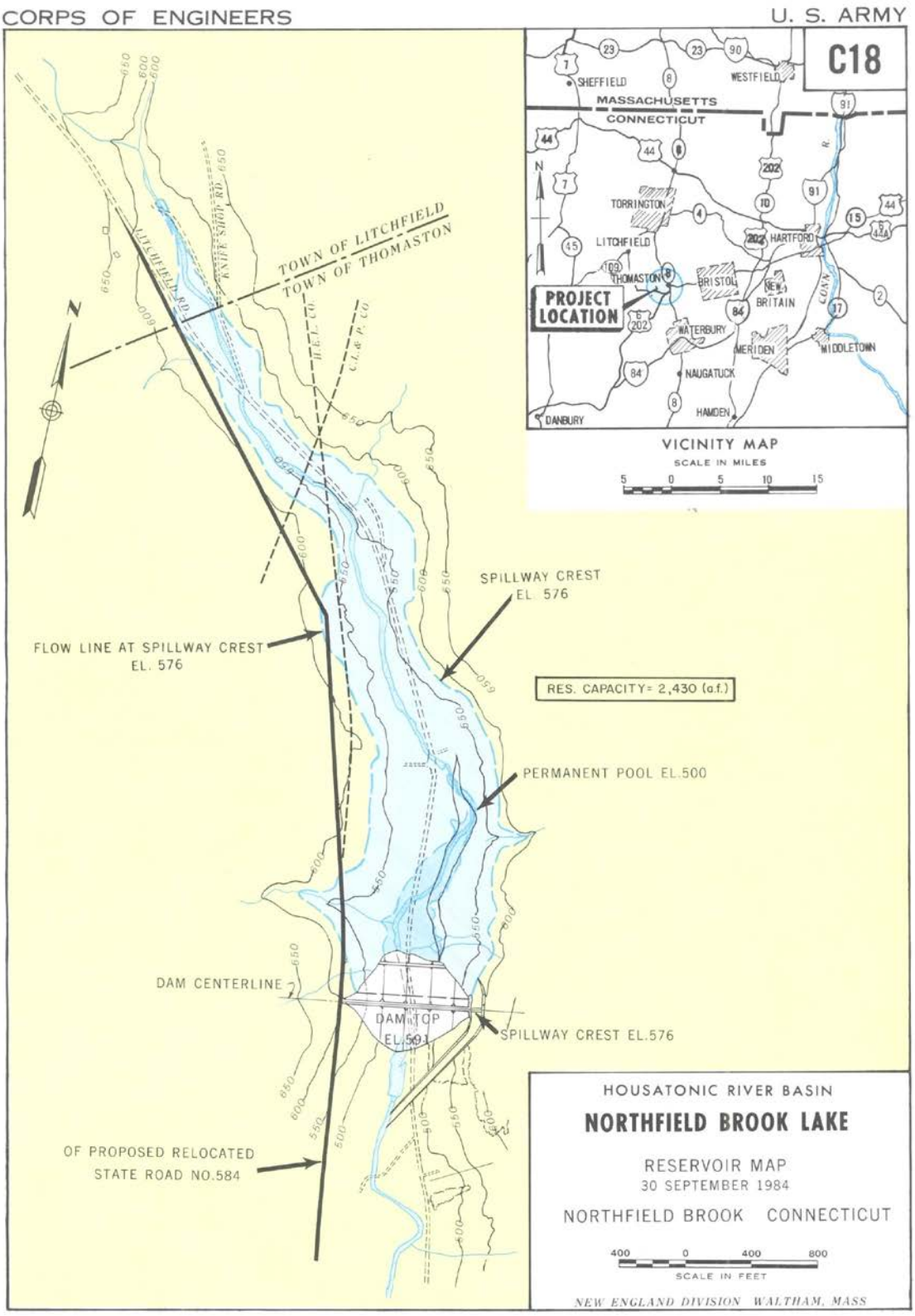


Figure 2: Northfield Brook Lake Location
Thomaston, Connecticut

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

A bedrock principle of NEPA is that an agency should consider reasonable alternatives to a proposed action. Considering alternatives helps to avoid unnecessary impacts and allows for the analysis of reasonable ways to achieve the stated purpose. To warrant detailed evaluation, an alternative must be reasonable. To be considered reasonable, an alternative must capable of implementation, and satisfactory with respect to meeting the purpose of and need for the action. This section discusses the reasonable alternatives, including the No Action Alternative.

Engineering Regulations (ER) 1105-2-100 requires civil works studies and projects to be in compliance with all applicable Federal environmental statutes and regulations and with applicable State laws and regulations where the Federal government has clearly waived sovereign immunity. The National Environmental Policy Act (NEPA) requires Federal agencies, including USACE, to comply with a process that includes the inventory and assessment of the environmental resources within the study area. NEPA also requires the evaluation and comparison of alternatives to determine the impacts to those ecological, cultural, and aesthetic resources identified and investigated. Involvement by resource agencies and the general public during the study process is also required. USACE NEPA guidance can be found in ER 200-2-2. The NEPA process will be integrated with the Corps six step planning process. This should also include all measures required for compliance with other applicable environmental statutes, such as the Endangered Species Act, the Clean Air Act, the Clean Water Act, the Fish and Wildlife Coordination Act, and the Historic Preservation Act, among others.

2.2 PROPOSED ACTION

The proposed action is to alleviate the negative water quality conditions and ongoing sediment accumulation within the reservoir area of the Northfield Brook Dam.

The preferred alternative and other alternatives to accomplish this are discussed in greater detail in Section 2.3, Alternatives Considered for the Proposed Action.

2.3 ALTERNATIVES CONSIDERED FOR THE PROPOSED ACTION

The options for USACE to alleviate the impaired waters and build up of sedimentation at Northfield Brook Lake are limited. The alternatives include:

(1) ***Alternative 1, River Restoration*** - Eliminating the eight-acre artificial lake and restoring the flood water storage basin (reservoir) to a more natural stream that allows downstream sediment passage.
(2) ***Alternative 2, Mechanical Removal/Dredging Alternative*** – Temporarily draining the reservoir (lake) and removing accumulated sediment by mechanical means.
(3) ***No Action Alternative*** – Take no action and allow the lake to remain on the impaired waters list and allow sediment accumulation to continue.

The preferred alternative to accomplish the proposed action is *Alternative 1, River Restoration.*

2.3.1 Alternative 1 – River Restoration (Preferred Alternative)

The U.S. Army Corps of Engineers is proposing to eliminate the permanent eight-acre lake (reservoir) behind the dam, restoring the Northfield Brook to a natural meandering channel within the reservoir area, and creating a riparian/riverine bufferzone system, and with any leftover acreage creating additional recreational space. The USACE would operate the project there-after as a run-of-the-river flood control project during non-flood operations. The proposed action would alleviate the negative water quality conditions and increasing sediment management considerations within the reservoir of the Northfield Brook Dam. Under flood conditions, the reservoir would be utilized for its authorized flood control purposes and store water to protect downstream communities from flood damage.

Under this alternative, Northfield Brook within the reservoir would be restored to a natural stream course and stabilized by the restoration of the banks with a riparian zone over a period of about 2 to 3 years. This restoration would begin immediately and will be a coordinated effort with biologists from the Connecticut Division of Inland Fisheries and input from the Thomaston Conservation Commission. The restoration plan consists of, generally, a three step process that involves stabilization of the streambanks, stream restoration, and riparian restoration all within the reservoir area of the Project. The plan would include stabilizing the banks by the installation of limited stone riverbank protection along meandering stream sections where velocities create erosion and undercutting of banks, restoring the stream for fisheries habitats, establishing a 100 foot buffer/riparian zone, and creating recreation lands for public use consistent with the park operational management plan (see Section 5.0, Findings and Conclusions). Each year, as necessary, USACE would build the overall transformation of the project lands to protect and enhance aquatic resources, riparian zones, and recreational opportunities. The remainder of the land outside the waterbody and bufferzone will be maintained for recreational purposes in accordance with the authorized mission of the project.

This alternative has environmental and operational advantages. It restores the area of the conservation pool to a riparian/riverine habitat, restores about 1,200 feet of the Northfield Brook to its original meandering channel within the area that would be the former water storage area, restores the water hydrology, allows for a more natural migration of sediments to downstream habitats, aids in increasing available coldwater habitats and species, and enhances the overall aquatic health immediately within and downstream of the existing impoundment. It would reduce recreation operating costs by eliminating a swimming beach that has a history of long-term closures due to negative water quality within the lake from point and non-point pollution, high bacteria levels that are above State public health limits, and eliminate increasing incidents of cyanobacteria blooms. It would eliminate the operational costs associated with water sampling and testing and beach sand replenishment. Further, it would reduce recreation operating costs by limiting flood damages to existing buildings and water/sewage systems, and potentially allows USACE to remove a low lying beach restroom and appurtenances and reduce impacts to buildings, grounds and utilities.

2.3.2 Alternative 2, Mechanical Removal/Dredging Alternative

Alternative 2, Mechanical Removal/Dredging Alternative requires the drawdown of the reservoir over a pre-determined period to allow for mechanical removal of the sedimentation that has accumulated behind the dam. Under this alternative, the reservoir would be drained to allow all or a portion of the reservoir sediment (sand, gravel, rocks, boulders) that have accumulated since the previous dredging action to be removed. The material could then be transported for beneficial uses or to a long-term disposal site. Sediment would be removed by conventional excavation with transport to disposal site by truck. Long-term disposal sites could include old gravel pits or landfills. Mechanical removal would attempt to reduce the influx of downstream concentration of sediment and turbidity by removing sediments from the reservoir before they could erode. This type of alternative is the most conservative and, potentially, the most costly because of the potential expense associated with dredging and disposal, and may require increased duration of construction activities adjacent to or within the waterbody requiring additional environmental mitigations to be implemented.

Conventional excavation requires lowering of the reservoir so that sediment excavation and removal can be accomplished in generally dry conditions. After sediment has become dry enough to support conventional excavating equipment, the sediment can be excavated (by front-end loaders) and hauled (by truck) to an appropriate disposal site. The viability of this approach depends upon the facilities available, sediment volume, the amount of time required to dry the sediment, and the haul distance to the disposal site (U.S. Bureau of Reclamation, 2006).

The long-term advantages of this alternative are that it returns the conservation pool to depth that is closer to the original contours and the original conditions, which aids in restoring lost flood storage capacity, temporarily increases the lake's ability to sustain cooler waters for fish habitats, and still allows the USACE to maintain warmwater fish populations, and a recreational lake for limited boating and swimming when water quality conditions allow.

The disadvantages of this alternative is that once excavation operations are completed, the long term sedimentation issues are not resolved, poor water quality conditions would only temporarily be alleviated and would continue to deteriorate, and there would continue to be an increase in the length and frequency of beach closures and limited use of the waters as a recreational instrument. This alternative would require additional in-stream work. The USACE would continue to provide a recreational beach that incurs unnecessary operational costs associated with beach nourishment and maintenance at this project. The aquatic ecosystem would not be returned to a riverine system.

In 1999, this maintenance alternative was completed by the New England District to alleviate significant siltation and sedimentation accumulations behind the dam. About 4,500 cubic yards of gravel, stone, and silt were removed from the area behind the dam. While a reasonable alternative, this alternative does not provide for a long-term beneficial solution to the recurring adverse water quality conditions, and incur longer-term impacts to downstream aquatic resources from the ongoing need for sediment management of the lake.

2.3.3 Alternative 3, No Action Alternative

CEQ regulations require analysis of the No Action Alternative in an EA to serve as the baseline against which the impacts of the proposed action and alternatives will be evaluated. Accordingly, the No Action Alternative is evaluated in this EA.

Under the No Action Alternative, the USACE would not implement the proposed action. The current pool would remain its current level of 500 feet NGVD and water would spill over the weir. There would be continued reservoir sediment accumulation, ongoing reduction in reservoir storage capacity, the recreational beach would continue to experience frequent long-term closures from poor water quality conditions and water depths would continue, overtime, to be reduced by trapping and settling of sediments in the slower moving pool. The waterbody would remain listed as impaired. Future conditions would result in a fully silted pool area reducing the storage capacity of the Project.

2.4 OPTIONS CONSIDERED FOR DRAWDOWN OF THE EIGHT-ACRE RESERVOIR

2.4.1 General Considerations

The timeframe for water release is the spring or autumn when temperatures are cooler and the release can be timed to coincide with a higher rain event(s) when the steam experiences natural increases in water velocities and turbidity through the watershed.

USACE has flexibility in the time of year to drawdown the existing reservoir, but has mechanical limitations from the manual gate operations and in the manner to accomplish a drawdown. The dam operates by use of a weir with two manually operated gates. One is located on the exterior of the weir at its base (sluice gate), and is kept closed which allows the water level behind the dam in the reservoir to be maintained by the height of the weir. The second gate is located within the concrete outflow conduit where the gate height that is maintained establishes the control over the downstream water outflow, which prevents flood damages to downstream properties. To adjust either of the gate heights requires labor intensive manual changes and adjustments, and imprecise control of outflow velocities.

Two reasonable options were considered to drawdown the reservoir:

- High Rain Event (Inflow) Drawdown Option
- Low Outflow Option

Each of the 2 options can be implemented to drawdown the reservoir to achieve the purpose and need for the federal action. Each has potential beneficial and adverse impacts associated with them, and either could achieve the proposed project goals without significant long-term adverse impacts, whereas immediate short-term adverse impacts may be realized. These are discussed in this EA.

Not all resources discussed or evaluated in this EA would be affected by these options. In this EA a discussion of the potential impacts to a resource is included where consideration is warranted or there could be consequences of using one of the drawdown options.

2.4.2 *High Rain Event (Inflow) Drawdown Option*

The preferred option to empty the reservoir is to drawdown the reservoir during the season of year where cooler temperatures exist and a one-time release can be timed with a forecasted high rain event. Seasonal cool temperatures can aid in mitigating adverse impacts to aquatic invertebrates as the water levels decrease behind the dam, and water velocities temporarily increase downstream.

This option would be implemented using the USACE Reservoir Regulation Section (RRS) Outflow Guidance and completed over a period of several days as water received from the watershed and the water that is stored are released during flood operations. The release would continue until the Northfield Brook has returned to its channel, and the area behind the dam is drained of water. Increases in sedimentation into the water column would begin to be realized when the pool level begins to reach its lowest points and the outflow velocity begins to pick-up sediment as the watercourse re-establishes a flow pattern within the original banks of Northfield Brook, a channel that has been inundated within the conservation pool since the construction of the dam. USACE used this process for the 1999 maintenance dredging that required drawdown of the pool to remove about 4,500 cubic yards of a mixture of sediment fill material consisting silt and gravel. This proposal has been commonly identified as the River Erosion method because it allows the river, as it passes through the dam, to erode portions of the sediments existing behind the dam through a natural process and feed sediment starved aquatic habitats downstream.

The reservoir depth is maintained by a weir with gate, and a service gate. The gate on the weir is kept closed allowing the water level. The service gate that is within the outflow conduit controls the outflow and downstream velocities. Typically, the manual service gate within the outflow conduit is preset to 1.1 foot. Given the Northfield Brook Dam reservoir's capacity to fill quickly during a high rain event, USACE would time the release of the permanent pool to coincide with the onset of a sudden rain event during the spring or during the winter snow melt or in late autumn when the summer low-flow periods have passed. This method would equate to a one time high outflow event and continue until the reservoir has emptied to a level that allows the Northfield Brook to re-establish itself into the original meandering stream channel. Increases in sediment within the water column would be higher during this one-time event and is expected to transport trapped sediment into undercut banks a short distance downstream, rather than allow for sediment to drop into the middle of the channel from slower moving outflow velocities. This option consists of a 'one-time" temporary increase in sedimentation outflow that is equivalent to or slightly greater than routine flood control operations. The outflow would remain restricted by the 1.1 ft conduit gate, or more importantly restricted by the flood capacity of the channel. USACE cannot allow the outflow to cause flooding to downstream locations. USACE Reservoir Regulation Section will need to authorize a slightly larger opening near the end of this event in order to pass any larger cobble. This will be requested by the project manager and done after the flood threat subsides for a short period of time to ensure the gate passage and conduit is clear.

The environmental impacts of this type of drawdown strategy are short term adverse impacts that may occur to downstream aquatic habitats by increasing the suspended sediment in the water and the transport of sediment as it moves downstream from the dam's outlet works. This method would realize a greater amount of mobilized loose sediment in the water column as water velocities increase near the end of the release than in comparison to the Low Outflow Option. The result would deposit sediment that exists

behind the dam onto benthic and fisheries habitats that could, in some instances, have negative short-term impacts. The deposition (depth, distance, location) would be subjective but would recover to provide stable aquatic habitat for fisheries. Gravel and cobble within the old reservoir basin may become re-exposed, as rocky materials that were previously covered under fine sediments are washed downstream. Re-exposing gravel or cobble in the riverbed often provides new colonization habitat for aquatic insects and revitalized spawning habitat for fish (American Rivers, 2002).

One potential advantage of this proposed option is the higher stream velocities would carry sediment volumes through the dam and are expected to experience deposition along the outer limits of the stream channel where erosion and undercutting of banks are occurring because of the reduced downstream sediment transport that occurs with the presence of the dam. Within the reservoir, a controlled increase in the hydraulic action to release the water downstream could minimize negative adverse impact to aquatic invertebrates and other aquatic resources by moving them quickly downstream and avoid entrapment and mortality from a slower velocity release. Coordination with USACE's Reservoir Regulation Section would maximize the outflow through the flood control gates in a manner to empty the reservoir, allow sufficient hydrology to move fisheries downstream undamaged to the extent practical, and ensure downstream safety and protection of structures and related resources. *USACE Reservoir Regulation Section would authorize outflow rates based on the downstream channel capacity, which has a maximum 200 cfs channel capacity with a discharge capacity of 160cfs.*

2.4.3 *Low Outflow Option*

The Low Outflow Option requires opening the sluice gate on the weir to allow a constant outflow rate that is slightly above the inflow rates, but does not rely on a high rain event and/or time of year (snow melt). Coordination with the USACE RRS would provide outflow guidance. The action, because of the existing mechanical limitations associated with the gates, would require a longer period of time to draw the reservoir down, and also require significant staffing and manual gate adjustments to follow inflow rates. This low flow plan is completed by adjusting the outer sluice gate to a pre-determined opening and allowing a slower, steady drawdown to prevent rapid sloughing and minimize movement of trapped sediment into the water column. This method would need to be accomplished over a period of weeks or months and initiated when seasonal temperatures are cooler and there remains a growing season to aid in establishing vegetation on the banks. The plan for the long-term operation of the facility, when the reservoir is emptied and the river returns to riverine channel, is to maintain the outer sluice gate in an open position, at a predetermined height, while the inside flood control gate would remain set at the level directed by USACE RRS to control outflow and allow the flood control dam to function as it was designed.

This alternative would require the mechanical removal of greater volumes of sediment (rocks, boulders, sand, and gravel) with the potential for less sediment moving downstream during the drawdown. This would also require USACE to dispose of remnant sediment within the basin to upland locations (thus keeping the natural material out of the aquatic system). This option would require re-use of the material within the former lake bed to aid in restoration of the upland portions, and/or use the sediment as shoreline stabilization and repair during the stream and bank restoration mitigation in accordance with the

bufferzone/stream restoration plan. This alternative has a greater potential for adverse impacts to freshwater invertebrates by entrapment.

To reduce the potential for adverse impacts, USACE could slowly reduce water levels and coordinate with resource agencies to time the final gate opening/release to occur before a high flow event so that fish and sediments are moved to downstream habitats where they need to be. Under this alternative, it is the tail end of the drawdown, when the stream returns closer to its original channel at the conduit's inlet, that most the fish and sediment begin to move out from the area behind the dam. A disadvantage of this alternative is that a slower drawdown may require an increased timeline to ensure the newly exposed stream banks within the reservoir are stabilized which prolongs restoration activities. Delayed stabilization of streambanks subjects the exposed sediment to the 'flashy' potential of the watershed and ultimately greater potential for erosion and uncontrolled sediment releases. The manual control of the gates to control the drawdown over a long period of time is a difficult operation. Using this method, it is difficult for Operations staff to hold the pool at desirable levels or a steady outflow due to variables in inflow and gate setting as it would be done by "feel." USACE Operations personnel have indicated that there is a higher risk of losing the pool under low flow conditions and this is environmentally undesirable.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 GENERAL INTRODUCTION

This section describes the existing environmental and human resources that could potentially be affected by the proposed action and alternatives. The environment described in this chapter is the baseline for the consequences that are presented for each resource and each alternative. The geographic region of influence (ROI) of the proposed action is the serviceable area of Northfield Brook Lake, within the Naugatuck River Basin. Most of the baseline information was taken from existing USACE data, existing documentation, and coordination with Federal and State resource agencies.

This chapter also describes potential consequences and impacts for each environmental and human resource. An impact is defined as a consequence that could occur from modifying the existing environment due to a proposed action or alternative. Impacts can be beneficial or adverse, can be a primary result of an action (direct) or a secondary result (indirect), and can be permanent or long lasting (long term) or temporary and of short duration (short term). Impacts can vary in degree from a slightly noticeable change to a total change in the environment. For this EA, short-term impacts are defined as those impacts resulting from the drawdown of the area behind the dam and immediately downstream, and the construction measures taken to restore the area formally inundated by the conservation pool to a natural flowing waterbody and recreation area (e.g., those that are of temporary duration). Long-term impacts are those resulting from the permanent drawdown or the impact of operating the dam after a permanent change in the existing operations.

The proposed action would result in direct and indirect short-term (temporary, 1 to 3 years) impacts to downstream aquatic habitats. It could also have longer-termed (3 to 5 years) or permanent adverse impacts to the existing aquatic based recreation and existing warmwater resident fish habitat in the reservoir of the Northfield Brook Dam.

The proposed action would result in creating beneficial uses and reduce adverse impacts. These include naturalized sediment transport, restoration of riverine habitat for a species diverse assemblage of coldwater stream fish and other riverine aquatic species, and improved stream health and water quality, for example cooler summer water temperatures and increased dissolved oxygen levels. Other benefits include creation of riparian bufferzones for wildlife habitat and shade for aquatic habitats. Aquatic based recreation and fisheries habitat will continue to be available at the Project in a different format. It would maintain existing recreational opportunities such as fishing while providing additional recreational use areas.

Significance criteria for this EA were developed for the affected resource categories and outlined in the site-specific resource section. Impacts are classified as significant or not significant based on these significance criteria. Significant impacts are those which would exceed an outlined quantitative or qualitative limit of an established criterion, such as actions that would threaten a violation of Federal, state or local law or requirements imposed for the protection of the environment, or that would have adverse effects upon public health or safety. Impacts do not necessarily mean negative changes, and any detectable change is not, in and of itself, considered to be negative.

In the following discussions, to highlight impacts for the decision maker, the expected impacts are identified as adverse or beneficial, or are simply identified for understanding the changes that could occur with converting to a dry-bed, run of the river flood control project. The impacts that are adverse (temporary or permanent) are specifically noted. Resources that have been determined will have no impact from the proposed action and not considered in this EA, include transportation, utilities, and noise.

3.2 PROJECT DESCRIPTION (NORTHFIELD BROOK LAKE AND DAM)

3.2.1 General Information

The 235-acre Northfield Brook Lake and Dam project area is a Federally-owned and operated flood control project. It is one of seven reservoirs along with several local protection projects that comprise the U.S. Army Corps of Engineers flood protection plan for the Naugatuck River Basin. Five dams are operated by the USACE and two by the State of Connecticut. These projects include Hall Meadow Brook Dam, East Branch Dam, Thomaston Dam, Northfield Brook Lake, Black Rock Lake, Hancock Brook Lake, and Hop Brook Lake. As part of the Northfield Brook project, USACE owns 208 acres in fee and holds flowage easements on another 27 acres. There are mown lawns and fields at the recreation areas, but the project lands are mostly hardwood forest.

3.2.2 Flood Control Operations

Northfield Brook Dam maintains a recreational pool (reservoir) and is self-regulating. There are no mechanical gates that need adjusting during flood periods. As a result, there are no operating constraints. The dam's outlet gate is preset to control the desired discharge. If water flows into the reservoir faster than the gate can drain it, the extra water backs up behind the dam. If the volume of water flowing into the dam from the waterbody and tributaries exceeded the outflow long enough, the stored water would

eventually flow over the spillway back into Northfield Brook. USACE has established outflow guidance for this project to ensure the project provides a minimal aquatic base flow to sustain downstream aquatic resources (see Figure 3.2.2-1). With the dam's self-regulating nature, this outflow guidance would remain applicable to project operations if the proposed action is selected.

Figure 3.2.2-1

OUTFLOW GUIDANCE for NORTHFIELD BROOK DAM
NORTHFIELD BROOK, CONNECTICUT

Chief, Const/Operations Division 2/19/09 Date New England District Dam Safety Officer 2/19/09 Date		Maximum Outflow (cfs)	Minimum Outflow and Aquatic Base Flow (ABF) in cfs			Maximum change in Outflow (cfs/hr)	
			Oct. – March ABF=6 cfs	**April – May ABF=25 cfs**	**June – Sept. ABF=3 cfs**	Increase	Decrease
NORTHFIELD BROOK DAM (DA = 6 sq.mi.)	FLOOD CONTROL	200	100% Weir Control No Gate changes are made during flood periods			N/A	N/A
	NORMAL OPERATION	NA	100% Weir Control No Gate changes are made during normal periods			Weir controls normal pool Maintains run-of-river all times	
	MAINTENANCE	NA	6 cfs or inflow whichever is less	25 cfs or inflow whichever is less	3 cfs or inflow whichever is less	6 cfs/hr above 25 cfs and 3 cfs/hr below 25 cfs	

NOTES:
1. This dam is self-regulating, 100% weir control. No gate operations are ever made unless reservoir maintenance is needed.
2. Normal Pool Level: 22.5 Ft

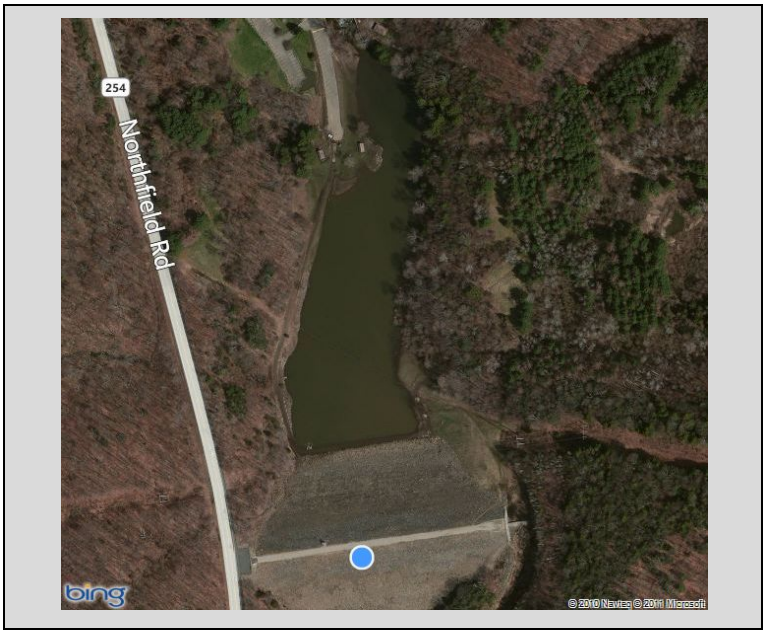
The USACE will follow the water release outflow protocol established for maintenance actions when implementing the proposed action. A new Outflow Guidance would be required to reflect a run-of-the-river mode water transport flow for the dam that would no longer maintain a permanent recreational pool.

3.3 LAND USE AND RECREATION AREAS

3.3.1 Affected Environment

3.3.1.1 Land Use

Land uses in the Northfield Brook watershed consist of primarily forested lands, residential development and agriculture. The watershed is characterized by developed areas, forested wetlands, deciduous forests, coniferous forests, other grasses and agriculture, barren/open areas, turf and grass, and utility rights of way (Northwest Conservation District, 2009).



Within the Federal project area, USACE designates land uses in accordance with established land management policy for Corps administered project lands and waters, based on authorizing legislation and the principles of good environmental stewardship.[2] The Master Plan is the document guiding the use and development of the natural and manmade resources of a given project or group of projects. It prescribes an overall land and water management plan, resource objectives, and associated design and management concepts and is the basic document guiding the USACE responsibilities pursuant to Federal laws to preserve, conserve, restore, maintain, manage, and develop the project lands, waters, and associated resources.

USACE identifies and documents land on Civil Works projects in accordance with the authorized purposes for which they were acquired. There are four primary land allocation categories applicable to Corps projects, including (1) operations (i.e., flood control), (2) recreation, (3) fish and wildlife, and (4) mitigation. The Project lands are further classified to provide for development and resource management consistent with authorized project purposes and the provisions of NEPA and other Federal laws. This land classification process is a further distribution of project lands by management categories which, based upon resources available and public needs, provides for the full utilization of the lands while protecting project resources. These include, but are not limited to, project operations, recreation, environmental sensitive areas, multiple resource management such as recreation, wildlife management, vegetation management, etc., and easement lands.

Northfield Brook Lake has four primary land use classifications within the 208-acre property, including: project operation areas (22 acres), recreation areas (23 acres), multiple resource management areas (144 acres), and water areas (12 acres).

3.3.1.2 Recreation Areas

Northfield Brook is a small project with an eight acre conservation pool. The flood control project is located in a scenic area adjacent to the highly industrialized Naugatuck Valley, a region where public recreation is at a premium. The recreational development of the Project includes hiking, picnicking, swimming, fishing, and other outdoor activities.

[2] Engineering Regulation 1130-2-540 *Project Operations - Environmental Stewardship Operations and Maintenance Guidance and Procedures,* Engineering Pamphlet 1130-2-550 *Project Operations - Recreation Operations and Maintenance Guidance and Procedures.*

3.3.2 Consequences

3.3.2.1 Land Use

The considerations of impacts to land use as a result of the proposed action are site-specific to the existing 208 acres of fee-owned lands. Land uses outside the Project will not be changed with the implementation of the proposed action and direct or indirect impacts are therefore not considered. Once the impounded water that is the existing eight-acre lake has been drained the available lands would be subject to USACE's established land management policies for administration of project lands and waters, the Project's Master and Operational Management Plans, regulations, and land availability. Conformity with surrounding land uses are of utmost importance. Impacts to land uses are considered significant if the Proposed Action would:

- Conflict with applicable ordinances and/or permit requirements;
- Utilize a new land use that is inconsistent with Corps land management policies; or
- Preclude adjacent or nearby properties from being used for existing activities.

The Northfield Brook Lake is a Federally-owned and operated project for the purpose of flood control and recreation. Selecting either Alternative 1 (Preferred Alternative), Alternative 2, or Alternative 3, the Project will continue to function in its existing Congressionally-authorized purposes. There are no local or state applicable land ordinances or permit requirements that have been identified and there are no limitations that will be preclude adjacent or nearby properties from being used for existing activities.

USACE, as a requirement of the overall management of flood control dams, will continue to update project Master Plans (MP) and Operational Management Plans (OMP) based on predetermined schedules and funding sources for projects within the Naugatuck River Basin. The MP and OMP will be updated to include the addition of upland and riverine recreational uses in the former eight-acre lake area. These re-designations of the former lake area is a permanent change in land use designation, but does not represent a significant adverse impact nor a departure from the land management policy for USACE administered project lands and waters. The impact to land use classifications for each of the Alternatives is therefore not considered significant.

Alternative 1, River Restoration (Preferred Alternative). Within the reservoir, about 0.4 acres will continue to be designated as open water, and the remaining acreages will be designated as riparian buffer zone (wildlife habitat) and recreational use. In addition to these designations, USACE will designate a small amount of area as official operations access areas to ensure safe operations and inspections of the dams, for example along the base of the dam and log boom. Mitigation will restore the reservoir area to a riparian/riverine system, and create new recreation areas. These changes to the land use at the federal project will result in a minor change in the existing land uses and are not considered significant.

Alternative 2, Mechanical Removal/Dredging. This alternative is a maintenance action where the pool is temporarily drained to allow mechanical removal of silt, gravel, and rocks, and when completed the pool is refilled. There are no changes to the designated land uses within the federal project and therefore there is no adverse impact to land uses with this proposed alternative.

Alternative 3, No Action Alternative. The Northfield Brook Lake will remain in its current conditions, and there will be no changes to the Project. There is no adverse impact to land uses with this proposed alternative.

3.3.2.2 Recreation Areas

Considerations of impacts to recreation opportunities as a result of the Proposed Action are specific to the existing 208 acres of fee-owned lands. Within the Naugatuck River Basin, the development of the recreational resources within the USACE owned and operated reservoirs were planned to supplement each other, and therefore the public use planning of the project areas within the USACE flood control dams within the Basin are interrelated. In implementing the preferred alternative for the proposed action, once the reservoir has been drained, the land available is subject to USACE established land management policies for administration of project lands and waters, the Project's Master and Operational Management Plans, regulations, and land availability. Conformity with surrounding land uses are of primary importance.

Alternative 1, River Restoration (Preferred Alternative). The greatest impact to the recreation structure available at the Northfield Brook Dam is the permanent loss of lentic (lake-like) based warmwater fisheries opportunities associated with the artificial reservoir. There would be a loss of swimming and boating opportunities but to a lesser extent because these recreational opportunities are already significantly adversely affected by water quality degradation conditions throughout the year. The poor water quality condition requires closure of the lake to public use and contributes to an existing adverse condition for recreational uses. Restoration of the Northfield Brook within the reservoir area will offset the loss of the permanent pool by continuing to provide a water-based recreation opportunity. USACE will continue to offer recreation opportunities, and the overall change in recreation afforded to the public is not considered a significant adverse impact.

Alternative 2, Mechanical Removal/Dredging Alternative. This alternative is a maintenance action with a temporary short term adverse impact to the existing reservoir water area and the downstream river habitats as the reservoir is temporarily drained to allow for mechanical removal of silt, gravel, and rocks. There would be a short-term loss of fishing and boating opportunities; however with the availability of recreation opportunities associated with water-based recreation, the impact would be negligible. The lake would be restored. This alternative would have a short-term adverse impact to warmwater recreational fishing opportunities, but the water levels would be restored on completion of the dredging and would be expected to provide, temporarily, better habitat conditions for fish.

Alternative 3, No Action Alternative. The Northfield Brook Lake will remain as it is and there will be no changes to the Project.

The impact to recreation opportunities for each of the Alternatives is not considered significant.

3.4 GEOLOGY AND SOILS

3.4.1 Affected Environment

The Northfield Brook Lake is located in the southern part of the Western Connecticut Highlands which is an area of low, smoothly rounded drumloidal ridges. The area around Northfield Brook Lake shows evidences of glaciation on exposed bedrock. Much of the Naugatuck River basin is underlain by bedrock of Paleozoic formations, and is covered with thick deposits of outwash material and glacial till. The area is fairly stable, geologically, and neither earthquakes nor landslides are significant concerns during reservoir regulation events. The region's soils and topography cause runoff to be fairly rapid. Combined with the steep gradient in Northfield Brook, the rapid runoff gives the watershed a "flashy" nature with streams rising and falling quickly after rainstorms. The woodlands generally occur on steep and stony or poorly drained soils.

There are 4 types of soils that surround the Northfield Brook Lake. These include:

Soil Description	Setting	Properties and qualities
Hinckley gravelly sandy loam, 3 to 15 percent slopes	*Landform:* Eskers, kames, outwash plains, terraces	Excessively drained
Canton and Charlton soils, 8 to 15 percent slopes	*Landform:* Hills	Well drained
Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	*Landform:* Hills	Well drained
Udorthents, Urban land complex	*Landform*: soils that have been disturbed by filling or removal of material	Well drained
Udorthents, smoothed	soils that have been disturbed by filling or removal of material	Moderately well drained

Source: Natural Resources Conservation Service, Custom Soil Report for the Northfield Brook Lake, Thomaston, CT

There are no prime farmland soils in the project area**.**

3.4.2 Consequences

A total drawdown of the existing lake would not materially alter the geologic conditions of the project area. The primary impact would include direct disturbance to the reservoir bed's topography from construction-related actions associated with mitigation, including bank stabilization of the Northfield Brook and minor tributaries. Potential impacts to geology or soils are considered significant if the Proposed Action would:

- Expose people or structures to major geologic hazards;
- Cause substantial erosion or siltation; or
- Cause substantial land sliding.

Alternative 1, River Restoration (Preferred Alternative). Impacts to geology and soils from the Preferred Alternative would not be significant. Construction and operations associated with the permanent drawdown of the reservoir would not materially alter the geologic conditions of the project area. The primary effects would be from the temporary disturbances required to restore the riverbanks, stabilize sediment, and create topographic conditions to establish a riverine bufferzone and recreation areas. These disturbances would occur after the drawdown and be from the use of smaller construction equipment for stabilizing areas along the banks of the waterbody and/or minor altering the ground contours to establish the 100-foot bufferzone and new recreation areas within the approximate eight acre area.

This type of construction-related activity involving ground disturbance is subject to the National Pollutant Discharge Elimination System (NPDES) Stormwater Program which regulates stormwater discharges from construction activities with ground disturbance of more than one acre. Section 4.0, Mitigation, discusses the NPDES requirements.

To avoid any substantial erosion while the river restoration is occurring or until the recreation areas are stabilized with vegetation, sediment erosion and control will be utilized, as necessary, in a manner that prevents material from entering waterbodies and allows successful revegetation. The area would either be closed to public use or have limited access until soil stabilization and revegetation is determined by USACE to be sufficient to allow public access. By implementing a sediment and erosion control plan, the activity would neither expose people or structures to any new geologic hazards or increase or cause substantial erosion or siltation. Substantial land sliding is not considered probable because of the topography of the reservoir.

Alternative 2, Mechanical Removal/Dredging Alternative. Impacts to geology and soils from Alternative 2 would not be significant. The reservoir would be temporarily drained and upon successful removal of the identified sediment volumes of silt, gravel, and rocks, the water levels would be returned to the existing pool levels in accordance with the Project's Outflow Guidance. The volume of material required to be removed requires additional engineering evaluation. This dredging operation would not result in a significant change of conditions that would produce adverse impacts to the geology and soils of the Project.

Alternative 3, No Action Alternative. There would no change in conditions or adverse impacts to geology and soils if no action is taken.

3.5 BIOLOGICAL RESOURCES

This section describes existing vegetation, fish and wildlife, and endangered and threatened species at Northfield Brook Lake, and the expected impacts to these resources from converting the reservoir basin from a permanent pool to a run-of-the-river/riparian habitat. It focuses on plant and animal species or habitat types that are typical or are an important element of the ecosystem, are of special category importance, or are protected under state or Federal law or statute regulatory requirement. Vegetation is discussed first, followed by wildlife and fish, and finally endangered and threatened species.

3.5.1 Affected Environment

3.5.1.1 Vegetation

Northfield Brook Lake is located in the northeastern part of the central hardwoods forest region of the United States. The project site comprises about 208 acres of forested uplands. Northfield Brook bisects the project site and drains into an eight acre lake at the base of the Northfield Dam. A small power line corridor contains early successional scrub habitat. Although some forest is adjacent to the project site, the area is essentially surrounded by suburban development. Substantial areas of agricultural open field habitat occur in the vicinity of the site and prior survey reports include species that depend on such early successional grassland habitat (USACE, 2009). The dominant cover types are transition hardwoods, including oak-hickory, beech-birch-maple, and hemlock with aspen-birch, and white pine. The eastern and western banks of the project area are steeply sloped forestland with rock ledge and outcrop banks. Site-specific vegetation that can be identified consists of hemlocks, oaks, maples, sycamores, and cottonwoods. Bush honeysuckle, fleabane and asters are present in the ground layers. The eastern banks of the project area are adjacent to the State of Connecticut's Wopowog Wildlife Management Area. Forests cover about 75 to 80 percent of the federal flood control project.

3.5.1.2 Wildlife and Fish Resources

Wildlife

Wildlife species inhabiting the Northfield Brook Lake project areas are characteristic of deciduous and coniferous forests, early successional, riparian and wetlands habitats in central and western Connecticut. Many wildlife species within the Northfield Brook Lake use the aquatic and riparian systems that are associated with the dam's uplands, riparian corridors, the lake, and perennial streams for food, cover, and nesting. Wildlife species also use the vegetation and cover provided by riparian systems as corridors for movement.

Ninety two species of terrestrial vertebrates (amphibians, reptiles, birds and mammals) were observed during wildlife surveys at Northfield Brook Lake, the most recent completed between 2008 and 2009. Amphibian and reptile species with the project boundaries include Redspotted Newt, American Toad, Bullfrog, Pickerel Frog, Painted turtle, Northern Water Snake. Avian species include Canada Goose, Mallard, Common Merganser, Wild Turkey, Great Blue Heron, Black Vulture, Turkey Vulture, Sharp-shinned Hawk, Cooper's Hawk, Broad-winged Hawk, Red-tailed Hawk, American Kestrel, Killdeer, Mourning Dove, Ruby-throated Hummingbird, Red-bellied Woodpecker, Yellow-bellied Sapsucker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Eastern Wood Pewee, Eastern Phoebe, Great Crested Flycatcher, Eastern Kingbird, Blue-headed Vireo, Red-eyed Vireo, Blue Jay, American Crow, Common Raven, Tree Swallow, Northern Rough-winged Swallow, Barn Swallow, Black-capped Chickadee, Tufted Titmouse, White-breasted Nuthatch, Red-breasted Nuthatch, House Wren, Golden-crowned Kinglet, Ruby-crowned Kinglet, Blue-gray Gnatcatcher, Veery , Wood Thrush, American Robin, Gray Catbird, European Starling, American Pipit, and Cedar Waxwing. Mammal

species includes gray squirrel, eastern chipmunk, white-tailed deer, coyote, turkey, river otter, white-footed mouse, and short-tailed and long-tailed shrews.

Fisheries and Aquatic Resources

Benthic macroinvertebrates such as mayflies, stoneflies and caddis flies are found in the project area. These insect larvae and nymph populations are representative of the study area and are characteristic of freshwater environments.

Fisheries may be considered significant for a variety of reasons including recreational use, state management practices, or the presence of commercial or protected fisheries. The Northfield Brook Lake project does not have a fisheries management program implemented by the USACE or the State of Connecticut, with the exception of the annual stocking of coldwater fisheries by the CT Inland Fisheries Division. The lake does not have commercial or protected fisheries.

Fisheries in Northfield Brook and Lake consists of both warmwater and coldwater fisheries. The reservoir provides habitat for warm water fish that are not often adapted to the cooler, fast-moving waters farther upstream and downstream of the dam. The warmwater fisheries are found in the impoundment of the Northfield Brook Dam where the slower moving waters provides habitat for largemouth bass, smallmouth bass, yellow perch, and pumpkinseed. Coldwater streams and rivers are typically faster moving, well-oxygenated, low temperature waterbodies with hard substrates of gravel, cobble, or rock.

There have been limited fisheries population studies in Northfield Brook or in the USACE reservoir. Each year Northfield Brook and the lake are stocked with trout (brook trout and brown trout) by the Connecticut Department of Energy and Environmental Protection. Based on USACE's limited sampling efforts, the USACE has found indications of a well-balanced warm water fishery in the lake, with largemouth bass and a good distribution of forage fish. Fish species found in the project area includes recreational species such as brown bullhead, white perch, white catfish, yellow perch, alewife, blueback herring, brown trout, and largemouth bass. Sampling found rainbow trout and limited brook trout which are attributed to holdover species from the spring stocking or, in the likely case of the brown trout, are from native reproduction or from stocked reproduction. These fisheries exist without special management activities by the USACE or the State of Connecticut, other than annual stocking programs.

3.5.1.3 Endangered and Threatened Species

The USACE maintains inventories of federally-listed, proposed and/or candidate species and their critical habitats that occur within the project boundaries of its flood control projects. The most recent survey/inventory for the Northfield Brook Lake Project was completed for the USACE by the Connecticut Audubon Society in 2008 to 2009. In addition, the U.S. Fish and Wildlife Service, New England Field Office maintains a website for endangered species consultation for projects with Federal involvement. The website outlines guidelines to assist in determining if a federally-listed, proposed and/or candidate species may occur within the proposed project area and the follow-up steps to take if additional coordination or consultation is warranted.

The USACE inventory also includes species listed in the State of Connecticut's Endangered and Threatened Species Act (CT-ESA). This involves endangered, threatened, or special concern. It also includes taxa listed as of "Greatest Conservation Need" (GCN) in Connecticut's Comprehensive Wildlife Conservation Strategy (CWCS). GCN species are recognized and ranked as most important, very important, or important (USACE, 2009).

Federally-listed Species

Based on the 2008-2009 USACE survey inventory and cross-reference with the USFWS endangered species website, no federally-listed species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the Project, with the exception of occasional, transient bald eagles (USACE, 2009; FWS, 2012).

State-listed Species

Of the total 75 bird species observed and recorded in the 2008 to 2009 survey, four species are listed in the CT Endangered Species Act, and 35 species are listed under the Greatest Conservation Need in the CT Comprehensive Wildlife Conservation Strategy, including 13 species that are "Very Important" and 22 species that are "Important." Table 4.5-1 lists these species.

Table 4.5-1: USACE 2008-2009 Survey/Inventory Results for species listed under the CT Endangered Species Act (CT-ESA) and CT Comprehensive Wildlife Conservation Strategy (CWCS)

Common Name	CT-ESA	CWCS	Common Name	CT-ESA	CWCS
Common Merganser		Important	Blue-gray Gnatcatcher	-	Important
Great Blue Heron	-	Important	Veery	-	Important
Sharp-shinned Hawk	Endangered	Very Important	Wood Thrush	-	Very Important
Cooper's Hawk	-	Important	Gray Catbird	-	Important
Broad-winged Hawk	-	Important	Northern Parula	Special Concern	Important
American Kestrel	Threatened	Very Important	Chestnut-sided Warbler	-	Very Important
Ruby-throated Hummingbird	-	Important	Black-throated Green Warbler	-	Important
Northern Flicker	-	Important	Blackburnian Warbler	-	Important
Pileated Woodpecker	-	Important	Prairie Warbler	-	Very Important
Eastern Wood Pewee	-	Important	Black-and-white Warbler	-	Very Important
Great Crested Flycatcher	-	Very Important	Ovenbird	-	Important
Eastern Kingbird	-	Important	Louisiana Waterthrush	-	Important
Blue-headed Vireo	-	Very Important	Scarlet Tanager	-	Important
Common Raven	Special Concern	Very Important	Eastern Towhee	-	Very Important
N. Rough-winged Swallow	-	Important	Dark-eyed Junco	-	Important

Red-breasted Nuthatch	-	Important	Rose-breasted Grosbeak	-	Very Important
Golden-crowned Kinglet	-	Very Important	Indigo Bunting	-	Very Important
Baltimore Oriole	-	Important			

Source: *Wildlife Survey Report and Habitat Management Recommendations for the Northfield Brook Flood Control Project, U.S. Army Corps of Engineers.*

No state listed or GCN amphibians were found during the 2008-2009 survey period. No state endangered, threatened or special concern mammals were found during the 2008-2009 survey period.

3.5.2 Consequences

This section describes the expected impacts to vegetation and biological resources in the project area. Impacts to vegetation, wildlife, fish and aquatic species, and endangered and threatened species would occur in two phases: The short-term impacts associated with the drawdown of the reservoir, and the long-term or permanent impacts. Dewatering the reservoir would incur the same short term impacts to the resources regardless if the USACE selects the Preferred Alternative or Alternative 2, Mechanical/Dredging Alternative because the water would have to be emptied from behind the dam.

The potential impacts to biological resources are considered significant if the Proposed Action or Alternative would:

- Substantially diminish habitat for a plant or animal species;
- Substantially diminish a regionally or locally important plant or animal species;
- Interfere substantially with wildlife movement or reproductive behavior;
- Result in substantial loss of fisheries populations or habitats;
- Result in a substantial infusion of exotic plant or animal species;

3.5.2.1 Alternative 1, River Restoration Alternative (Preferred Alternative)

Vegetation

Impact on vegetation from the Preferred Alternative would not be significant. There have been no short-term or long-term adverse impacts identified that would substantially diminish habitat for a plant or animal species.

Vegetation in and around the area of the reservoir/lake is uniquely isolated because of how the Northfield Brook passes over the historic old mill dam as the brook enters the reservoir/lake. There are no expected changes to the vegetation by a permanent drop in water levels.

There would be long term beneficial impacts with the creation of riparian bufferzones along the restored Northfield Brook within the reservoir area. Conversion of the existing reservoir basin from open water to riverine/riparian habitat would have no overall long-term negative effects on vegetation biodiversity, or regional and local vegetation populations. It would not have a notable negative adverse impact to

vegetation communities within the Northfield Brook Lake project. With the waters of Northfield Brook passing over the old mill dam on the upper end of the reservoir, the loss of the lake would have no adverse impacts to the hydrologic regime upstream of the reservoir and therefore have no affect on upstream vegetation either short or long-term. Often the loss of a reservoir would have a direct adverse impact to upstream streambank vegetation and wetlands, but not in this case.

Impacts to vegetation immediately downstream of the dam are expected to be limited since the outflow will continue to be controlled by the height of the flood control gate inside the dam which restricts the outflow during flood periods. USACE maintains the same gate setting all year and makes no manual changes unless a maintenance action requires temporary gate adjustments. The permanent outflow will be set to a run-of-the river operation and still be under the Outflow Guidance established by Reservoir Regulation Section. The difference in outflow of the water through the outlet conduit will be that the water will pass directly through the sluice gate into the conduit and not over the weir.

Implementing the Preferred Alternative (River Restoration) will result in a net benefit to vegetation in the federal flood control project. The USACE final restoration plan will adhere to USACE natural resources management policy for protection and enhancement of project lands. Riverbank restoration and revegetation includes creating a 100-foot bufferzone to aid in the stabilization of riverbanks. The restoration plan will be coordinated with the State of Connecticut and local natural resource agencies to create a habitat that results in beneficial uses for wildlife species, aquatic species, and recreational uses. USACE mitigations within the reservoir basin will create a riparian corridor that will increase habitat for wildlife species and field that can be used for recreation. Each would be functional and allow the reservoir to be inundated by flood waters. Riparian systems are important as yearlong habitats for numerous resident wildlife species and are used seasonally as stopovers for migrating waterfowl along migratory flyway routes. Fischenich and Copeland (2001) noted that a large number of studies have documented that vegetated riparian ecosystems provide essential habitat requirements for a large diversity of vertebrate species. Not only are they important to terrestrial animals, but they also control the associated lotic habitat for amphibians and fish.

USACE prefers the *High Rain Event (Inflow) Drawdown Option* because it allows for a restoration plan to stabilize the streambanks, select plantings and initiate seeding, where necessary, to be initiated almost immediately following the drawdown, and in consultation with the resource agencies. Selecting the *Low Outflow Option* would extend the length of time to establish a beneficial riparian bufferzone, and subject the waterbody to potential increases in downstream sedimentation from flood events. The exposed sediment could be eroded by the 'flashy' potential of the watershed adding unnecessary sediment deposition into the water column during any flood related event. While this option is viable, the longer the time for vegetation to establish and stabilize the soils along the riverbanks, the greater potential for increased sedimentation and erosion within the water which can adversely impact downstream aquatic ecosystems.

Final restoration of the reservoir basin will not substantially diminish habitat for a plant or animal species, nor substantially diminish a regionally or locally important plant or animal species. The mitigation of the reservoir basin will be a net beneficial impact by providing increased habitat for wildlife movements and

reproduction. The overall long-term impact from this alternative would result in an overall positive impact to vegetation within the Project area.

Wildlife and Fish Resources

Wildlife

USACE has not identified a significant adverse impact in the short- or long-term if the Preferred Alternative is implemented. It would create long-term beneficial impacts for wildlife by increasing the available wildlife corridors along the Northfield Brook. Wildlife species that use the river for food, cover, shelter, drinking water, or migration will benefit from the increased water quality and expanded riparian habitat in the area of the impoundment. Existing wildlife species would not experience significant adverse impacts by draining the current Northfield Brook Lake.

Fisheries

Impact on fishery resources such as loss of warmwater habitat, sedimentation and turbidity, destruction of cover, introduction of water pollutants, or entrainment of fish could potentially occur by taking steps to address the poor water quality and increasing sedimentation within the reservoir. These potential impacts are primarily associated with the dewatering of the reservoir which will occur regardless of the alternative selected.

Loss of warmwater habitat. The elimination of the lake would permanently affect warmwater fish populations and habitat that exists in the flood control reservoir. This loss would be confined to the current reservoir and not to upstream or downstream reaches of the waterbody. While this loss is an adverse impact to existing warmwater fish populations and habitats, the reservoir area is an artificially created habitat, and if eliminated and returned to a natural riverine state, it would not represent a significant adverse impact to fisheries populations or habitats. The conversion to a riparian/riverine system would result in a net increase of coldwater fisheries habitat available throughout the reservoir area, and restore habitat that once existed prior to construction and operation of the dam.

Sedimentation and turbidity. Increased sedimentation and turbidity has the greatest potential to adversely affect fisheries resources during the drawdown of the reservoir. Impacts on fisheries from increased sedimentation and turbidity would be reduced to short-term, temporary disturbances if drawdown occurs during a high outflow event when the watershed is experiencing flood conditions. The concentration of suspended solids would be relatively high for a short period and short distances downstream, with the greatest concentration occurring when the reservoir water levels begin to reach its lowest points as increased velocities passing through the conduit begin to pick up sediment as the waterbody returns to its original channel. The covering of downstream habitats from increased sedimentation could degrade downstream habitat for a period of time until the natural sediment transport processes of the river can restore the downstream conditions. A faster draining of the reservoir could result in sediment temporarily covering the substrate along the outsides of the channel downstream of the dam, rather than see a deposition in the middle of the waterbody if the Low Outflow Option is implemented.

Overall the impact to benthic macroinvertebrates and fish is expected to be minimal, of short duration, and isolated to the immediate channel downstream of the outlet conduit. Turbidity resulting from suspension of sediments during the release could reduce light penetration. Resuspension of organic and inorganic materials can cause an increase in biological and chemical uptake of oxygen, resulting in a localized depletion in dissolved oxygen within the water column, which could temporarily displace fish from the affected area, or in some cases result in mortality because of clogging and abrasion of the gills of fish and other aquatic organisms; however, given the higher velocity outflow during a high rain event these impacts are expected to quickly dissipate.

Destruction of cover. Streambank vegetation, in-stream logs, rocks and undercut banks provide important cover for fish. Within the reservoir the existing cover would be lost with the permanent drawdown of the area behind the dam, but would be offset by the creation of in-stream riffle and pool areas, in-stream placement of rocks or boulders, and additional cover from riparian vegetation as designed and directed by the CT Division of Inland Fisheries. The effects of loss of cover would be relatively minor because the affected area would be confined primarily to the area behind the dam and offset during restoration of the original stream channel.

The greatest potential for impact to fisheries with the preferred alternative is the short-term, direct impacts associated with the method used to dewater the lake. The *High Rain Event (Inflow) Drawdown Option*, which is the preference for Alternative 1, River Restoration, would allow sediment to flow downstream during the drawdown process (sediment re-deposition by natural processes). Using this method, temporarily increased suspended sediments and turbidity could also result in increased mortality and stress for downstream resident fishes. Increased suspended sediment concentration levels as the water levels reach the lower limits of the reservoir area could increase invertebrate drift and reduce fish feeding for a short period until turbidity settles out of the water column. Overall, the impact of using the High Rain Event (Inflow) Drawdown Option on benthic and macroinvertebrates and fish is expected to be minimal and short-term. During high rain events, water turbidity is significantly increased by run-off in the watershed and a timed release could result in the best option to minimize sediment and turbidity impacts. Entrainment of fish would not likely result from implementing this option. This method of dewatering has been used by USACE in previous maintenance activities without significant impacts observed by the action.

Selecting the *Low Outflow Option* could have a greater impact to fisheries by increasing the potential for entrapment of fish by the slower moving waters as they pass through the outlet conduit. Increased mortality of fisheries could be realized and observed during this timeline. In comparison to a faster outflow of water from behind the dam which allows for species to move downstream to other habitats quickly, the impact to fisheries is expected to be greater if the low outflow option is selected.

The long-term impacts associated with the elimination of the eight acre lake and restoration of a riverine system will alter the current fish populations and recreational fishing experiences within the Northfield Brook flood control project. These losses are not significant and the overall action would result in a net benefit to the Northfield Brook watershed. Recreational fishing opportunities will be altered with the loss of the warmwater fisheries habitat associated with loss of the lake. Loss of this artificial habitat would not have a notable impact on fisheries associated with the Northfield Brook Lake. Trout would benefit

from restoring the river system because the action would lower water temperatures and return the flows within the reservoir from lentic (lake-like) to a lotic (riverine) environment. Fish that could benefit once the water levels are returned to a run-of-the-river includes species of suckers, darters, daces, creek chubs, minnows, and other warmwater species that prefer cooler waters, such as smallmouth and rock bass.

Introduction of water pollutants. A permanent drawdown of the reservoir could introduce pollutants into the water column during the dewatering process and result in deposition along reaches of the waterbody as they sediment settles out of the water column. Section 3.8, Sediment Management, discusses the potential introduction of pollutants as a result of implementing the proposed action.

Together the USACE with the CT DEEP will develop and implement a mitigation plan to establish a riparian bufferzone, stabilize the banks, and provide habitat for fish and wildlife resources. These efforts will result in a higher quality riparian habitat for local species in a relatively short span of time. The presence of the dam will likely remain as a velocity barrier to upstream fish migration even under low flows.

Threatened and Endangered Species

There are no Federally-listed species in the Project and therefore, the Preferred Alternative would not impact Federally-listed species. State-listed species occurring in the project area are not expected to experience a significant reduction in available supporting habitats and are not likely to experience adverse impact.

3.5.2.2 Alternative 2, Mechanical Removal/Dredging Alternative

Vegetation

Impacts to vegetation would be the same as those described in Alternative 1, with the exception that there would not be the conversion of the reservoir into a vegetated bufferzone or recreation area. As soon as mechanical removal of material is complete the reservoir would be refilled to its existing levels.

Wildlife and Fish Resources

Impacts to wildlife and fish and aquatic resources would be the same as described in Alternative 1, with the exception that upon successful removal and disposal of accumulated sediments the USACE would refill the reservoir during a high rain event and return project operations to the current conditions allowing water to pass over the weir and through the outlet conduit. Impacts to wildlife, and fish resources are considered temporary and within the established operating procedures for the project.

Threatened and Endangered Species

There would be no long or short term impact to federal or state-listed species with this alternative.

3.5.2.3 Alternative 3, No Action Alternative

The No Action Alternative would have no discernible effect on the existing vegetative and wildlife communities as long as the dam remains in its existing state. This alternative would contribute to increasing an adverse impact to fish resources as the water quality continues to deteriorate and shallower lake waters contribute to increasing poor habitat conditions.

3.6 WETLANDS AND VERNAL POOLS

3.6.1 Affected Environment

Wetland ecosystems are valuated natural resource in New England because they perform several important functions such as flood-storage and conveyance, groundwater recharge and discharge, and erosion control. Wetlands aid to maintain water quality by the removal and retention of nutrients and reduction in sediment loads. They provide valuable habitats for fisheries, wildlife, and vegetation communities and also serve to provide scenic and aesthetic views. Northfield Brook Lake contains about 15.09 acres of wetlands within the project boundary. The isolated reservoir impoundment is largely devoid of expansive areas of littoral vegetation, and is primarily open water. Table 4.5-1 lists the acreage of wetlands according to cover type within fee-owned lands.

Table 4.5-1
Acreages of Wetlands (according to cover type for Northfield Brook Lake)
a/ b/ c/

U.S. Fish and Wildlife Service Cover Type	Acres of Wetland
Palustrine Open Water (POW)	8.29
Riverine (R)	1.88
Palustrine Emergent (persistent) PEM1	1.73
Palustrine Emergent (persistent)(dominated by sphagnum (PEM1)	0.41
Palustrine Scrub-Shrub Broad-leaft Decidous (PSS1)	0.59
Palustrine Forested Broad-Leaf Deciduous (PF01)	2.19
Total	**15.09**

a/ Source: USACE Internal document, 1997 Wetland Community Description, Northfield Brook, Thomaston and Litchfield, Connecticut
b/ Wetlands classified based on the *Classification of Wetland and Deepwater Habitats* (Cowardin et al., 1979)
c/ USACE management obje ctives incorporate wetlands within project specific ecosystems and communities where natural resources management is characterized by resource/unit objects and/or land use classifications.

Vernal pools

Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rainfall and rising groundwater and remain ponded through the spring and into summer. Vernal pools dry completely by the middle or end of summer each year, or at least every few years. Occasional drying prevents fish from establishing permanent populations, which is critical to the reproductive success of many amphibian and invertebrate species that rely on breeding habitats free of fish predators (Massachusetts Natural Heritage and Endangered Species, 2012).

The absence of ephemeral wetlands in the Northfield Brook Dam project area renders the habitat unsuited for facultative and obligate vernal pool breeding amphibian species such as Wood Frog, Spotted Salamander, and other mole salamanders (USACE, 2009).

3.6.2 Consequences

For this environmental assessment, impacts to wetlands and vernal pools are considered significant if the Proposed Action would destroy, lose, or degrade jurisdictional wetlands, as defined by Section 404 of the Clean Water Act

3.6.2.1 Alternative 1, River Restoration Alternative (Preferred Alternative)

A drawdown of the existing reservoir area using any of the 2 options considered - High Rain Event (Inflow) Drawdown Option or the Low Outflow Option – would not have an adverse impact to wetlands within the Northfield Brook project that may be present in the upland reaches of Northfield Brook nor any of the adjoining tributaries because of the isolated nature of the reservoir basin with the presence of the old mill dam at the upstream end of the reservoir basin, and the steeper topography of the adjoining tributary streams.

Given the absence of wetlands and vernal pools in the project area, the Preferred Alternative - Alternative 1 (River Restoration) - would have no adverse impact to wetlands or vernal pools.

Restoration of about 1,200 feet of the Northfield Brook within the reservoir basin could result in topographical conditions that favor the creating of new wetland areas adjacent to Northfield Brook. USACE will consider opportunities for creation of wetlands during consultation with interested resource agencies and the creation of the 100 feet wide bufferzone adjacent to the waterbody.

3.6.2.2 Alternative 2, Mechanical Removal/Dredging Alternative

Alternative 2 (Mechanical Removal/Dredging) would have no adverse impact to wetlands or vernal pools.

To dewater the existing reservoir area using any of the 2 options considered - High Rain Event (Inflow) Drawdown Option or the Low Outflow Option – would not have an adverse impact to wetlands or vernal pools that may be present in the upland reaches of Northfield Brook or any of the adjoining tributaries because of the isolated nature of the reservoir basin with the presence of the old mill dam at the upstream end of the reservoir basin, and the steeper topography of the adjoining tributary streams.

3.6.2.3 Alternative 3, No Action Alternative

The No Action Alternative would maintain existing baseline conditions. There would be no direct or indirect impact to wetlands located within the federal-fee owned lands. Operation of the project would continue under its current standard operation procedures and in compliance with the USACE natural resource management guidelines.

3.7 WATER RESOURCES

3.7.1 Affected Environment

3.7.1.1 General

The Naugatuck River Basin is a small drainage basin of about 312 square miles that is part of the Housatonic River Basin. It is 47 miles long with a maximum width of about 10 miles and drains into the Housatonic River near Derby, Connecticut. The watershed area of Northfield Brook Lake is about 5.7 miles.

The Northfield Brook is identified by the CT DEP as Local Basin 6909. The watershed is approximately 4 miles long and 2 miles wide at the widest point between the top of the watershed and the Northfield Flood Control Dam. The watershed above the Northfield Brook Lake Dam is approximately 3,700 acres and has about 10 miles of associated perennial and intermittent streams. The top of the watershed is located in Mattatuck State Forest. The watershed becomes progressively more developed as you travel down to the Northfield Dam. Most of the watershed is forested, with the balance being agricultural and residential development (Northwest Conservation District, 2012).

Northfield Brook has a fairly steep gradient with an elevation drop of 125 feet over the 1.3-mile stretch from the dam outlet to its junction with the Naugatuck River. Northfield Brook originates at the 20-acre Northfield Pond, which is impounded by Knifeshop Pond Dam and about a half a mile upstream from the Corps project boundary. The main inflow to Northfield Pond is Humaston Brook, which runs through some small wetland areas to the northwest. The other major tributary to Northfield Brook is Turner Brook, which originates at the 18-acre Nystrom Pond.

The main effect of existing project operations on surface waters is the warming of the water by maintaining an impoundment, which contributes to the poor water quality conditions. The open area of the lake itself and the lack of cover along its shore encourage solar warming of the water. Pool-level fluctuations associated with flood-control activities make it difficult for trees along the edge of the conservation pool to survive, and the pool is much too small to have a reservoir of cold water in its depths that could be used to reduce discharge temperatures. Consequently, the only change to project operations that could reduce the warming of the water would be to eliminate the recreation pool. Normal flood-control operations have minimal effects on water quality. Water quality deteriorates during floods due to material washed into the waterways, but Northfield Brook Lake's outlet weir is designed to hold flood-control pools a relatively short time. This minimal holding of flood-control pools minimizes adverse effects on water quality.

3.7.1.2 Surface Water

Surface waters are generally classified by the state according to the most beneficial existing and potential future uses of the waterbody. Northfield Brook has been designated a class B stream by the Connecticut Department of Environmental Protection. Class B waters are meant to be suitable for bathing and other

recreational purposes, agricultural uses, certain industrial processes, and cooling. Class B waters should be excellent fish and wildlife habitat, and have good aesthetic value.

The reservoir area is fed by the Northfield Brook and 4 intermittent and 3 perennial streams.

3.7.1.3 Water Quality

The Northfield Brook is an impaired stream that drains the watershed and flows into the Northfield Dam Flood Control Project.

Section 303(d) of the Clean Water Act requires States to list all waters that are not expected to achieve their designated use goals even after all appropriate and required water pollution control technologies have been applied. Criteria for inclusion in this list include waterbodies that do not or are not expected to meet water quality standards after all point-source discharges are achieving appropriate treatment must be included on the 303(d) list of impaired waters. The 303(d) list includes the reason for impairment, which may be one or more point sources such as industrial or sewage discharges, or non-point sources such as urban or agricultural runoff. The State of Connecticut lists the Northfield Brook Lake impaired for it designated use for recreation because of elevated *Escherichia coli* from non-point sources (Connecticut Department of Environmental Protection, 2011).

The Northwest Conservation District (NCD) has indicated that the watershed contributes substantial sediments and nutrient loads to the Northfield Brook Lake (Northwest Conservation District, 2012). In addition to USACE determinations, the NCD also recognized that the lake has large sediment problems, high nutrient concentrations, and high bacteria count problems. The swimming area is closed many times during the summer because of poor water quality conditions.

USACE Water Quality Classification

To use resources efficiently, while meeting requirements to monitor water quality trends and changes at Corps projects, the New England District USACE classifies its projects according to the level of their water quality concerns and sets the monitoring program to the project classification. There are 3 categories used by USACE, based on past and present water quality conditions.

Class I projects have generally high water quality with no known water quality problems. Class II projects have minor water quality problems, with USACE collecting sufficient data over the years so that annual monitoring is not required. Class III projects are those with continuing water quality problems, and receive more frequent and intensive sampling than Class I or II projects. Northfield Brook Lake is a Class III project mainly due to its problems with elevated bacteria counts, but also due to sedimentation problems and nuisance algal blooms. Table 4.7-1summarizes the beach closures for USACE-managed flood control facilities in Connecticut from Fiscal Year 2006 to Fiscal Year 2010.

4.7-1
USACE-managed flood control facilities in Connecticut
Fiscal Years 2006 to 2009, 2011

Connecticut	Days Closed In FY11	Days Closed In FY09	Days Closed In FY08	Days Closed In FY07	Days Closed In FY06
Hop Brook Lake	Not Available	38	21	28	32
Northfield Brook Lake	50	51	32	22[b/]	22[b/]
Total for Connecticut		**89**	**53**	**50**	**54**

a/ The number of days closed is the total time between the collection of a sample that fails to meet standards and one that passes. At Hop Brook and Northfield Brook Lakes, some of the closures were strictly administrative and there were no bacteria measurements that exceeded standards. Because of the effects of flood control operations on beaches, the total duration of beach closings calculated in this method is a poor indicator of overall water quality. However, it is used by some states in their 305(b) reports.

b/ Administrative closures only.

3.7.1.4 Floodplain Management

The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, covers about 67 acres and extends 1.25 miles. Northfield Brook Lake can store up to 792 million gallons of water for flood control purposes. This is equivalent to eight inches of water covering its drainage area of 5.7 square miles.

Unlike many other flood control dams in New England Northfield Brook Lake is "self-regulating". The gate is preset to control the desired discharge. If water flows into the reservoir faster than the gate can drain it, the extra water backs up behind the dam. If this inflow exceeded outflow long enough, the stored water would eventually flow over the spillway back into Northfield Brook.

3.7.2 Consequences

Potential impacts to water resources, including surface water and groundwater, are considered significant if the Proposed Action would:
Irreversibly diminish water resource availability, quality, and beneficial uses;

- Reduce water availability or interfere with a potable supply or water habitat;
- Result in an adverse effect on water quality or an endangerment to public health
- by creating or worsening adverse health hazard conditions;
- Result in a threat or damage to unique hydrological characteristics; or
- Violate an established law or regulation that has been adopted to protect or manage water resources of an area.
- Degrade fisheries habitat

Potential impacts that would be considered significant related to floodplain management include:

- Potential damage to structures located in the floodplain; and
- Changes to the extent, elevation, or other features of the floodplain as a result of
- flood protection measures or other structures being sited in or removed from the floodplain

3.7.2.1 Proposed Action, Alternative 1, River Restoration Alternative

Surface Water

Long-term impacts to surface waters from the proposed action would not be significant. The proposed action would eliminate the artificial impoundment and return the Northfield Brook to a more natural meandering flowing riverine system – a length of about 1,200 feet - within the Federal project. The old mill pond at the upper end of the reservoir creates an isolated impoundment between this dam and the Northfield Brook dam. The presence of the old mill dam ensures the aquatic resources and wetlands upstream of the Northfield Brook dam would not experience an adverse impact if the USACE lake were eliminated.

Hydrology of the downstream sections of the Northfield Brook would not be significantly altered. While the waterbody would flow through the base of the weir through the outlet conduit, the flood control gate that exists within the conduit and controls the outflow velocity would remain at the existing height. The dam would continue to remain unregulated in accordance with the Outflow Guidance for the Northfield Brook Dam. The topographical features of the perennial and intermittent streams that feed into the reservoir basin will continue to flow unimpeded and the drop in a lake level would not result in a change in aquatic conditions to these waterbodies; and they are expected to contribute to a sustainable riparian system along the restored Northfield Brook within the former lake bed.

The greatest potential impact on surface water from implementing the preferred alternative could result from the short-term adverse impacts experienced by the suspension of sediments or by erosion of accumulated sediments. The extent of the impact would depend on the sediment loads, stream velocity, turbulence, streambank composition, and sediment particle size. These factors will determine how far downstream the turbid plum of sediment travels. One of the advantages of using this alternative is the sediment supply is restored to the downstream river channel.

The USACE prefers the *High Rain Event (Inflow) Drawdown Option* and would time the release of water with a high rain event when the watershed is experiencing natural turbid conditions. This is expected to allow for one-time, fast moving surface water release (controlled in accordance with the Outflow Guidance) to afford protection to downstream communities. The surface waters during high rain event conditions experience greater increases in turbidity and sediment in the water column that would mix with the increased stream velocities. The waterbody would return to normal within a relatively short period of time without significant impacts or long-term suspended sediment loads. Moving the sediment downstream in this capacity is expected to provides greater opportunity for sediment starved downstream waterbody segments to experience replenishment of the outer sections of the stream channel that are experiencing undercutting and bank erosions. Use of this method allows for mitigation and restoration measures to advance sooner and stabilize the reservoir area.

The *Low Outflow Option* could have a lesser direct impact on surface waters, at least until the water levels are lowered to a level where stream velocities begin to accelerate and begin to pick up fine and course sediments near the end of the drawdown process. This type of drawdown could reduce the amount of sediment that moves downstream; however, the sediment that does move downstream with the lower

outflow velocity would likely result in sediment deposition in the middle sections of the waterbody rather than being distributed to the undercut, eroded areas of the downstream river banks. This option requires USACE to staff the hand-controlled gates over several days or weeks to achieve the designated goals of the drawdown process. The dam is engineered to operate in a manner where the sluice gate (bottom of the weir) is closed and the impounded water spills over the trash rack at the weir. For USACE to hold a pool at any elevation below the weir requires manual regulation of the sluice gate. At this dam, there is no measuring device to indicate the outflow rates and the gates are hand operated, therefore the gates are operated by site. Maintaining a low flow option to accomplish the drawdown goals can be attempted by USACE, however, the outcome of successfully implementing this option may have a greater adverse impact to downstream resources if the outflow cannot be achieved in the manner that is targeted.

Water Quality

The Northfield Brook Lake is listed as an impaired waterbody and targeted for management to improve the water quality conditions of the watershed. The sources of impairment are identified as nonpoint source pollution likely occurring from stormwater and possibly waste water mismanagement in the watershed (Northwest Conservation District, 2009).

Northfield Brook Lake has chronic problems with elevated bacteria counts after rainstorms and excessive sedimentation, and occasional problems with nuisance algal blooms and low DO levels. These water quality problems have been mostly caused by upstream non-point sources, but geese use of the project waters may also contribute to the problem. Eliminating the reservoir would allow water to freely flow through the dam and eliminate a primary contributor to the impaired status of the waterbody.

Floodplain Management

There will be no change in USACE's floodplain management if the Proposed Action is implemented.

3.7.2.2 Alternative 2, Mechanical/Dredging Alternative

This alternative would be implemented if the decision was made by USACE to maintain the lake and continue with water flowing over the weir and through the outlet conduit.

Surface Water

Under this alternative, during reservoir drawdown, the surface waters could experience the same short-term adverse impacts that are realized in Alternative 1, River Restoration. When the reservoir is lowered, the sediment removal would be made by conventional methods to a depth determined by USACE engineering and dam safety project teams. In-stream work would need to be used thereby increasing the potential adverse impacts to surface waters from longer periods of increased sedimentation and turbidity. These impacts stop after sediment removal within the basin is completed and the restored following completion of the operations. Under this alternative adverse impacts to waters would continue to be realized over the life of the flood control project as the dam and lake would continue to act as a sediment

trap and require the reservoir to periodically be drawn down to accommodate future sediment accumulations and required mechanical removals.

Water Quality

Implementing this alternative would provide a temporary reprieve from the poor water quality conditions associated with the lake. Short- and long-term water quality would continue to pose a major problem and require ongoing sampling of the recreational beach coupled with unknown lengths of closures. The waterbody would remain on the list of impaired waters. There is no advantage of this alternative to resolve the adverse water quality conditions that are in the watershed.

Floodplain Management

There will be no change in USACE's floodplain management if the Proposed Action is implemented.

3.7.2.3 Alternative 3, No Action Alternative

The No Action Alternative would maintain existing baseline conditions. There would be no direct or indirect impact to wetlands located within the federal-fee owned lands. Operation of the project would continue under its current standard operation procedures and in compliance with the USACE natural resource management guidelines. Short- and long-term water quality would continue to pose a major problem and require ongoing sampling of the recreational beach coupled with unknown lengths of closures. The waterbody would remain on the list of impaired waters. There is no advantage of this alternative to resolve the adverse water quality conditions that are in the watershed.

3.8 SEDIMENT MANAGEMENT

3.8.1 Affected Environment

Rainfall, snowmelt, and river channel erosion provide a continuous supply of sediment that is hydraulically transported and deposited in reservoirs (Bureau of Land Management, 2009). Because of the slow velocities, reservoirs serve as efficient sediment traps. Sedimentation in the reservoir consists primarily of road sands, glacial till, gravel, and stones with a sediment overburden.

At the Northfield Brook Lake flood control project the USACE has historically needed to remove sediment deposition because of build-up within the reservoir. A total of about 17,000 cubic yards of silt and organic material were removed from the lakebed during the spring of 1973, fall and winter of 1974-75, and the falls of 1979 and 1980. Additional material was removed at locations in 1984 to reduce the establishment of an aquatic weed that infiltrated the recreation pool from an upstream source. In 1986 the pool was drained after Labor Day so that 5,000 to 6,000 cubic yards of material could be removed. The Town of Thomaston performed the work, using the material for landfill cover and general-purpose fill.

Current engineering estimates, based on pre-dam contour data, are that about 12,000 cubic yards of sediment currently exists in the reservoir.

Pollutants. In March 2003, USACE completed "Northfield Brook Lake, Priority Pollutant Scan." As part of USACE's continuing program of priority pollutant scans at all projects, sediment samples were collected from stations 5 stations: NBOl, NB02, and 3 within the Northfield Brook Lake on 19 September 2002 and analyzed for metals, PCB's, pesticides, volatile and semi-volatile organics, and total organic carbon. On April 25, 2014, USACE performed confirmatory sampling within the Northfield Brook Lake collecting samples from 3 locations and analyzed for several pollutants, including metals, PCB's, pesticides, volatile and semi-volatile organics, and total organic carbon.

3.8.2 Consequences

Potential adverse impacts from efforts to address the sedimentation issues would be considered significant if:

- The effort would result in a release of toxic sediments that would adversely affect biological resources;
- Induce local instabilities if the depositional features create large islands or bars;
- Create unacceptable conditions that would increase flooding in downstream areas; or
- Violates the Clean Water Act by passing material during the dewatering process that may be of the wrong type to benefit a stream (e.g., mud or fines as opposed to gravel), adversely degrade important aquatic habitat, as when silt or mud sluiced through a dam covers up spawning areas for fish at critical times in their lifecycles, or fills in niches for invertebrates in large cobble bottom systems.

3.8.2.1 Alternative 1, River Restoration (Preferred Alternative)

Implementing the proposed action will result in the net beneficial sediment management at the flood control project. Eliminating the lake and restoring the reservoir to a run-of-the-river project will allow greater transport of sediment through the dam and into downstream habitats. It will eliminate the continual sedimentation issues that contribute to the adverse water quality conditions within the lake and be replaced with a free flowing riverine habitat. Accumulation of sediment may still occur during periods of flood control, however, these impacts will be minor and project operations and maintenance efforts will proactively address sediment accumulation.

Sediment transport in a river is vital to riparian and riverine habitats and species. Sediment accumulation behind a dam restricts the amount and types of sediment that reach areas downstream, as well as the habitat available within the reservoir. Dams reduce the amount of sediments deposited downstream, creating an adverse effect on downstream aquatic species and their habitats. Because dams force sediments to settle to the bottom of the streambed, the waters that eventually pass through a dam are “sediment starved” and are also known as “clear-water releases”. Downstream of a dam, sediment-starved rivers often regain sediments lost behind a dam by eroding deeper into the river channel and away at the stream banks. Consequently, the river channel may become coarse, encouraging stream bank erosion and the disappearance of riffles. By limiting access to water, dams can also exacerbate channel scouring, a process which may lower groundwater tables and negatively impact riparian habitats. Together, stream-bank erosion and channel incision can render the remaining river habitat inhospitable for many

organisms, altering the community of species that live in the stream (American Rivers, 2002). This alternative allows a more natural flow of sediment along a restored river channel and through the dam is expected, over time, to aid in downstream habitat improvements for aquatic species.

USACE's experience at Northfield Brook Dam indicates a drawdown of the reservoir, as observed during past maintenance actions, would not increase the potential for flooding or increase downstream bank instability. The amount of volume expected to be transported downstream is not known. Past drawdown at the dam to conduct maintenance action because of sediment deposition has not historically created increased flooding potential by the creation of island or bars that could hinder downstream conveyance of flood waters.

Over the short term, the release of fine lakebed sediment (silt and clay-sized material) could affect water quality, including suspended sediment concentration and turbidity. The release of courser sediment (sand, gravel, and cobble-sized sediment), could (temporarily) increase flood stage, the rate of river migration, and deposition in downstream waterbodies. USACE experience at this Project has not show this to occur. The amount and timing of reservoir sediment release and the depositional effects and concentrations affect both short term and long term impacts. Release of gravel may be beneficial for fish spawning habitats. Over the long term, the amount and timing of sediment supplied to the downstream channel would return to pre-dam conditions (Bureau of Reclamation, 2006).

The *High Rain Event (Inflow) Outlflow Drawdown Option* could see more sediment volumes initially transported downstream which could have a short-term adverse impact to downstream aquatic resources. Behind the dam within the reservoir, the erosion of sediment would likely be greater than in comparison to the *Low Outflow Options.* It would require less sediment to be removed or re-contoured within the reservoir as part of the mitigation for re-establishing the riverine system.

In comparison to the *High Rain Event (Inflow) Outlflow Drawdown Option*, USACE believes that using the *Low Outflow Option* would require additional measures to be taken to remove and dispose of the material. These options would contribute to more in-stream work and mechanical re-contouring of the stream to achieve the goals of the stream restoration. Given the flashy nature of the watershed, a flood event occurring during the restoration of the waterbody and river banks could risk the success of the reservoir basin sediment stabilization, and creation of a riparian bufferzone along the waterway, and increase, over the long-term, the loss of additional sediment that has not yet be stabilized by mitigation efforts. While these are options, the potential for adverse impacts associated with them may be greater than the preferred option, *High Rain Event (Inflow) Outlflow Drawdown Option.* The results of using the either of the dewatering methods not create large islands or bars; nor create unacceptable conditions that would increase flooding in downstream areas.

Pollutants/Contaminants. Northfield Brook is impaired for recreational use because of excessive *E. Coli* concentrations. The causes of the impairment are not known, however non-point source pollution from agricultural operations and densely developed neighborhoods with failing stormwater management structures are the potential contributors (Northwest Conservation District, 2009). There are no known point sources of pollution within the watershed or known historical events to introduce pollutants into the riverbed. Dredged material removed from the reservoir has historically been used by the Town of

Thomaston for landfill cover and general-purpose fill. In 1990, the reservoir was drawn down to remove about 4,500 cubic yards of sedimentation. The material was taken by the contractor and used in landscaping operations.

Results from sampling and testing in 2003 showed generally low concentrations of contaminants indicative of background conditions of metals, PCB's, pesticides, volatile and semi-volatile organics, and total organic carbon, most below detectible limits. No substances were in high enough concentrations to require the USACE to conduct additional testing of sediments or take additional actions, nor did the results warrant additional precautions to be taken by flood control operations of the Northfield Brook Lake project or its waters related to sediment transport.

In April 2014 sediment sampling was conducted in Northfield Brook Lake to provide additional data on the potential for high concentrations of contaminants to be present and potentially transported downstream. Three samples were collected and compared with the Connecticut Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013, and the Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013. PAHs were detected in each of the three samples at levels slightly above the CT residential direct contact criteria, but well below the industrial/commercial levels. The levels of some contaminants were slightly elevated but the potential for temporary adverse affects on benthic organisms is considered negligible. USACE testing indicates little potential for adverse impacts associated with downstream transport and deposition. This sediment movement would not contribute to negative water quality or habitat conditions. Based on the existing data and historical uses, the potential for downstream migration of contaminated sediments is considered negligible.

The proposed action would deviate one time from the normal operation of the dam in a manner that bottom sediment accumulated behind a dam could be transported downstream through the dam, either deliberately or accidentally (if the pool gets away during the lowering of the pool). To accommodate this transportation, the USACE evaluated the activity under Section 404 of the Clean Water Act to evaluate any special conditions minimizing the potential adverse effects on the downstream aquatic environment of releases of sediments.

Appendix C contains the USACE Clean Water Act Section 404 evaluation for releases of water and water-carried sediment from the transportation and reduction of bottom sediment accumulations through the dam and the results of the 2014 sampling of Northfield Brook Lake.

3.8.2.2 Alternative 2, Mechanical/Dredging Alternative

Under this alternative, the reservoir's flood storage capacity is restored by removal of trapped sediment, the dam refilled, and future sedimentation within the reservoir would continue to occur. With the reservoir continuing to trap sediment, the flood storage capacity will be diminished and require USACE to conduct future mechanical removal operations. This alternative would temporarily alleviate poor water quality conditions in the reservoir but the length of time is not known. The result of this alternative could temporarily improve the impairment issues experienced to the aquatic habitat and result in a temporary beneficial impact from implementing this alternative, but it would fail to satisfy the long term purpose

and need for the federal project. The USACE would continue an extensive water quality monitoring program, and there would remain ongoing beach maintenance.

The expected impacts to aquatic resources from sediment management considerations on aquatic resources that are considered in Section 3.8.2.1, *Alternative 1, River Restoration (Preferred Alternative))* from using any of the 3 drawdown options is expected to be the same.

3.8.2.3 Alternative 3, No Action Alternative

The No Action Alternative would maintain existing baseline conditions. There would be no direct or indirect impact to sediment or from implementing sediment management efforts within the federal-fee owned lands. Operation of the project would continue under its current standard operation procedures and in compliance with the USACE natural resource management guidelines. The consequences of not taking any action would result in continued filling of the area behind the dam with sediment transported from upstream sources and result in multiple resource impacts, including increased poor water quality conditions and loss of flood storage capacity.

3.9 HISTORIC AND ARCHAEOLOGICAL RESOURCES

3.9.1 Affected Environment

Pre-Contact context

The documented record of Pre-Contact-era Thomaston is reported largely through isolated artifact finds and lithic scatters throughout the region. Several studies associated with flood control projects and other regional studies provide some context for the project area. Native American sites were identified in the vicinity of Hop Brook Dam in nearby Middlebury, Naugatuck and Waterbury, Connecticut (Wilson 1977), while Jordan (1959) reported at least eight sites within the Thomaston Dam study area just to the southeast of Northfield Brook. Additionally, Jordan identified one possible site near the former Swanson Farm site which may be located beneath the present permanent pool for Northfield Brook and a second site approximately ¾ of a mile below the dam, between Northfield Brooks and Litchfield Street.

The majority of archaeological sites in the area are characterized as short term occupations by small groups for specific resource procurement and exploitation. A wide range of sites have been identified as a result of cultural resource management surveys within southern New England upland environments including rockshelters and open sites. Most of these sites were located along streams and swamps and contained small amounts of chipped stone tools and isolated features. Expected site types within the Northfield Brook vicinity are likely to conform to this pattern and reflect small group resource utilization.

Prior to European settlement, a wide range of Native American tribes occupied Connecticut, most belonging to the Mahican branch of eastern Algonquian peoples who spoke different dialects of the same language. Quinnipiac bands resided to the east of the Housatonic and Naugatuck Rivers. Also on the east side of the Housatonic and near the confluence with the Naugatuck River were the Paugassets whose main seat was at present-day Derby. The Paugassets later moved to the west of the Naugatuck River to an

area known as Pomperaug. Eventually, some members of the tribe joined the nearby Potatucks, others migrated further west to New York State and the Iroquois Confederacy, and some joined the Schaghticoke Indians in Kent or the Stockbridge Indians in western Massachusetts (Rossano 1996:11).

Historic context

The Northfield Brook Dam and Reservoir is located 1.3 miles above the mouth of the Northfield Brook in the town of Thomaston, northwestern Connecticut. The spillway crest extends up Northfield Brook approximately 1.5 miles beyond Thomaston, just over the Litchfield line.

The region that now encompasses Litchfield County was essentially an unexplored wilderness in the late 17th Century, except for southern settlements known as "the Western Lands" and small villages established at what is today Waterbury and Naugatuck. The town of Litchfield was the first community in the project area to be formally settled during the period of 1720-1721. Deeds with the local Native peoples date from 1719 when the town's name was changed from Bantam to Litchfield. Families from Hartford, Windsor, and Farmington began to move to this "frontier" village.

Harwinton was incorporated as a town in 1736 and was acquired via deed from the Native populations in May 1728. Plymouth was a parish of Waterbury, despite having its deed dated 1657. Originally known as Northbury, Plymouth was not incorporated as a separate town until 1795. Lastly, Thomaston was a part of Plymouth until 1875 when it became a separate town.

Population density was relatively low during this early period with subsistence agriculture as the primary economic activity. Colonial settlement patterns were characterized by dispersed farmsteads surrounded by individual land holdings including farm plots, wood lots and pasture. Within these small areas were also located a meetinghouse, tavern or store, and a mill. By the early 19th Century, small urban villages developed in Litchfield County that consisted of both commerce and industry along with residential areas. Industrialization of the Naugatuck River valley in communities such as Thomaston, Plymouth, and Terryville resulted in a clustering of population in these areas.

Industrial production was varied and included carriages, clocks, musical instruments, palm leaf hats, and other products requiring intensive labor and little capital investment. Most of these enterprises ultimately failed with the exception of the clockworks. In 1813, Seth Thomas bought an existing clock factory in Plymouth and began making his own clocks. By 1840, he employed over 200 people. Thomas diversified his operations beyond clockworks, constructing a cotton mill north of his existing plant in 1834 which later became a large clock movement factory. His adoption in the 1830's of clock movements made from sheet brass rather than wood, necessitated construction of a brass mill on East Main Street in Thomaston. Thomas's sons established their own clock factory on Main Street in Terryville in 1824. The large scale nature of Thomas's productions transformed Plymouth Hollow (later to be renamed Thomas Town or Thomaston) into an urban village that included large production facilities, a large labor force, and supporting institutions alongside the existing agricultural economy.

The construction of the New York, New Hampshire and Hartford Railroad parallel to the Naugatuck River in 1848 spurred additional industrial growth and communities such as Fluteville, Campville, Northfield, and Reynold's Bridge.

The community of Northfield was established as an "ecclesiastical society" in 1794, one of four in Litchfield, and encompassed the southeast corner of Litchfield and part of Plymouth. Plymouth was originally a part of Waterbury and known as Northbury, but was renamed at the time of its incorporation in 1795. Northfield was located about 4.5 miles north of Plymouth Hollow and in 1870 its most prominent industrial facility was the Northfield Knife Company, makers of high quality cutlery during the late 19th and early 20th Centuries. Northfield also contained a grist mill, slaughterhouse, two churches, a school, post office, store and about 20 houses at that time.

By 1875 when Plymouth was renamed Thomaston, Plymouth Hollow had become a major urban village including a linear settlement of homes and mills along Northfield Brook known as Humaston Hill. The earliest and northernmost mill from circa 1820 was the Whitlock Mill which manufactured hoes and pitchforks and contained a shingle mill. South of the Whitlock was the 1830's Huntington Mill which served as a carding mill, a rivet factory and a tobacco or snuff mill. The third mill to the south was the Humaston Mill, a combination lumber, shingle, grist, and cinder mill. The fourth, just north of the Northfield Brook Dam, was the Pierpont textile mill. The two homes associated with the mills were the 1808 house occupied by the Humaston family until the early 20th Century and the 1830 Huntington house.

According to the archaeological reconnaissance survey conducted by PAL Inc. in 1986, the only Native American site mentioned in the literature for the entire Northfield Brook project area is a find spot of obscure provenience near Swanson's Farm. A total of half a dozen small stemmed projectile points, one a grey green flint and the others quartz, were found during a reconnaissance survey of various flood control reservoirs in the 1960's. The Swanson Farm area has been heavily impacted by construction of and landscaping by the Northfield Brook Lake recreation area and the Northfield Brook Dam. Subsurface testing in areas not disturbed by these activities revealed no evidence of historic properties.

Known Archaeological Sites

The only Native American archaeological site mentioned in the literature for the Northfield Brook project area is a find spot of unknown provenience located in the vicinity of Swanson's Farm. Half a dozen small stemmed projectile points, quartz with one of gray green flint, were found there during an archaeological reconnaissance survey of several New England flood control reservoirs in 1965 (Jordan, 1965). The Swanson Farm area had been heavily impacted by construction of Northfield Brook Dam and landscaping for the adjacent Northfield Brook recreation area. Subsurface testing in areas least impacted by dam construction failed to identify evidence of this site.

Most of the structures associated with the Swanson Farm property were destroyed during construction of the picnic areas and rest rooms associated with the Northfield Brook recreation area downstream of the dam. A map drawn by USACE Project Manager Vincent Gualtieri, based upon information provided by a Swanson family member, depicted many of the structures associated with the farm such as barns and chicken coops as well as a series of mills along Northfield Brook. The map depicted the possible

American Indian campsite with coins and arrowheads mentioned above. The area where the chicken coops and barn were once located is now a parking lot for the recreation area.

3.9.2 Consequences

USACE completed a Historic Properties Management Plan (HPMP) for Northfield Brook Lake (Atwood 1999) in accordance with the requirements of ER 1130-2-540 which states that "it is the policy of the Chief of Engineers to identify, evaluate, protect, preserve, and manage historic properties located on Civil Works Water Resource project lands." The purpose of the HPMP "is to provide a comprehensive program to direct the historic preservation activities and objectives at the Northfield Brook Lake Flood Control Project, and to effectively manage and protect each historic property." Section 110 of the National Historic Preservation Act (NHPA) of 1966, as amended, directs Federal agencies to establish a historic preservation program for properties under their jurisdiction, and requires Federal agencies to integrate historic preservation concerns into agency plans and programs.

Recorded Historic Properties at Northfield Brook Lake

The PAL archaeological reconnaissance survey (Leveillee, Gallagher, McNiff 1986) identified one pre-Contact and three historic archaeological sites within the Northfield Brook Lake project area. The description of these sites from the PAL report follows:

The precise type and function of the pre-Contact site could not be determined based on the limited testing. The site known as N.D. #1 consists of 3 slate flakes, two pieces of pre-Contact ceramics, one fire cracked rock, and six pieces of charcoal, located near the confluence of two unnamed brooks. The ceramics indicate that the site dates from the Woodland Period (3,000 – 450 Years Before Present (BP)). This site was located on a gently sloping area lying entirely east of Northfield Brook in an area where the Thomaston Rod and Gun Club had been located prior to dam construction.

In addition to the above site, a findspot consisting of one quartz flake was identified on a terrace that runs parallel to and west of Northfield Brook. Lastly, the inventory of recovered cultural material lists four unprovenienced stone tool fragments (one quartz cobble, two hornfels flakes and one quartz shatter) that were found in the same test pit interval (20 – 30 centimeters below ground surface). However, the site's location was not recorded in the survey results.

The presence of chipping debris at N.D. #1, the findspot, and the unprovenienced location all indicated that some level of stone tool making and maintenance was taking place at these locations. It is likely that these recovered pre-Contact deposits represent camp site activities associated with the procurement and processing of natural resources that would have been available along Northfield Brook and its tributaries and wetlands during the pre-Contact period. It is likely that Northfield Brook had at least some minor importance to pre-Contact populations in west central Connecticut.

The three historic archaeological sites consist of two different functional types: rural industrial (saw mill and manmade waterfall) and transportation (the bridge located at the upper end of the recreation area on

Old Litchfield Road). These resources are related to the historical development of the village of Northfield (Litchfield) and this section of Thomaston in the 19th Century.

The sawmill was reported to be along Northfield Brook near the Old Litchfield Road. Foundation walls and the remnants of a dam are visible in the area, and are likely the foundation and dam for the sawmill. Portions of the dam were reportedly reconstructed. No artifacts were found during subsurface testing around this area. No further information is available on the waterfall and bridge sites.

An evaluation of the potential significance of the recorded sites at Northfield Brook Lake cannot be presently made based on the limited testing and information currently available. More intensive archaeological investigations of these sites are necessary to access integrity and determine eligibility for listing on the National Register of Historic Places (NRHP). Until such an assessment is completed, the known archaeological sites shall be treated as eligible for the NRHP and avoided if possible.

Archaeological Sensitivity at Northfield Brook Lake

The archaeological reconnaissance survey identified several zones of high and moderate archaeological sensitivity for pre-Contact and historic archaeological resources within Northfield Brook Lake. These sensitive areas contain favorable environmental attributes (e.g. well drained sandy soils on terraces and bluffs with slopes of 0 to 8 percent, within 100 meters of Northfield Brook and/or tributary streams, and with little or no ground disturbance). All sensitive areas were evaluated and tested and no further archaeological testing within the Northfield Brook Lake project area is required.

Determination of Effect upon Historic Properties

The proposed plan of converting operation of Northfield Brook Lake from an eight-acre artificial impounded lake to a dry-bed reservoir and run-of-the-river flood storage project is not expected to impact significant historic properties. The action would restore the original Northfield Brook channel behind the dam, create a riparian buffer zone, and create additional recreational lands. Erosion control along the banks of the newly restored Northfield Brook should be implemented to minimize soil impacts. A walkover of the restored Northfield Brook should be conducted to evaluate bank erosion and to identify archaeological resources that may have been located beneath the present conservation pool. Identified sites should be recorded and impacts from bank stabilization and reconfiguration of the channel minimized.

Newly identified sites, if present, should be maintained and managed in accordance with the guidance in the Northfield Brook Lake HPMP and in compliance with Section 110 of the NHPA as amended. The Connecticut State Historic Preservation Officer (SHPO) is expected to concur with this determination.

3.10 SOCIOECONOMIC RESOURCES

3.10.1 Affected Environment

Socioeconomic factors include economic development, demographics, housing, quality of life, environmental justice, and protection of children.

Environmental justice is the fair treatment for people of all races, cultures, and incomes, regarding the development and implementation (or lack thereof) of environmental laws, regulations, and policies. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs Federal agencies to address environmental and human health conditions in minority and low-income communities. A memorandum from President Clinton concerning EO 12898 stated that Federal agencies would collect and analyze information concerning a project's effects on minorities or low-income groups when required by NEPA. If such investigations find that minority or low-income groups experience a disproportionate adverse effect, then avoidance or mitigation measures are necessary.

Executive Order 13045, *Protection of Children from Environmental Health and Safety Risks*, requires Federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. The Army takes special precautions for the safety of children, including the use of fencing and signage.

3.10.2 Consequences

Potential socioeconomic impacts are considered significant if the Proposed Action would cause:

- Substantial gains or losses in population and/or employment; or
- Disequilibrium in the housing market, such as severe housing shortages or surpluses, resulting in substantial property value changes.
- Potential environmental justice impacts are considered significant if the Proposed Action would cause disproportionate effects on low-income and/or minority populations.
- Potential impacts to protection of children are considered significant if the Proposed Action would cause disproportionate effects on children.

Implementing the proposed action or any of the alternatives would not adversely affect the region or local economic development, demographics, housing, quality of life, environmental justice, and protection of children. USACE will continue to operate the project in accordance with the Congressionally-authorized purposes for the project by providing flood protection and recreational opportunities. There are no expected changes to these resources with the proposed action.

3.11 AESTHETICS AND VISUAL RESOURCES

3.11.1 Affected Environment

This section describes the existing aesthetic and visual resource conditions in the area of Northfield Brook Lake. Visual resources include natural and manmade physical features that provide the landscape its character and value as an environmental resource. Landscape features that form a viewer's overall impression about an area include landform, vegetation, water, color, adjacent scenery, scarcity, and constructed modifications to the natural setting.

Northfield Brook Lake is located in a scenic area adjacent to the highly industrialized Naugatuck Valley. The reservoir lies in a narrow valley flanked by steep rising hills characteristic of the terrain in the western highlands of Connecticut. Northfield Brook flows through the project in a generally southeasterly direction. The forest cover on the steep slopes along the valley is primarily second growth mixed hardwood with stands of hemlock. The highly scenic area is largely rural in nature.

3.11.2 Consequences

Potential impacts to aesthetic and visual resources are considered significant if the Proposed Action would substantially degrade the natural or constructed physical features in the narrow valley where the reservoir is located behind the dam. The magnitude of any adverse impact would be primarily determined by the number of viewers affected, viewer sensitivity to changes, distance of viewing, and compatibility with existing land use.

3.11.2.1 Alternative 1, River Restoration (Preferred Alternative)

Impacts to aesthetics and visual resources from the Preferred Alternative would not be significant. The Preferred Alternative would cause minor short-term visual impacts resulting from draining the area behind the dam. The presence of workers, vehicles, and equipment for restoring the reservoir area while restoring the area to a functioning riparian-riverine habitat would have a temporary visual impact. The visual impacts would not be notable outside the confines of the USACE recreation area where the reservoir is located. There would be a long-term adverse impact with the loss of the lake as a visual resource. This loss is not considered a significant adverse impact. Once the pool has been eliminated and Northfield Brook returns to a meandering course, the remaining area within the former eight-acre pool area will be converted to 100 foot riparian bufferzone and recreation area that is consistent with the surrounding aesthetics and designated park management plan.

3.11.2.2 Alternative 2, Mechanical Removal/Dredging

Impacts to aesthetics and visual resources from the Preferred Alternative would be temporary and short-lived and are not considered to result in significant adverse impacts. Short-term adverse impacts that would occur to the aesthetic and visual resources within the reservoir/recreation area would be realized during the duration of the drawdown, the dredging by mechanical means, the removal of dredged material, and the refilling of the waters to the weir level/non-flood reservoir elevation. This effort would

be completed during the off-season, autumn through early spring when the potential for adverse visual impacts to users would be minimal since the area is closed during the off-season.

3.11.2.3 Alternative 3, No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to aesthetics and visual resources. The conservation pool area would continue to fill in with sediment and negative water quality conditions would continue to exist.

3.12 AIR QUALITY

3.12.1 Affected Environment

Northfield Brook Lake is located in Litchfield County, an area that has been designated as a moderate non-attainment area under the 8-hour ozone standard and occurring in the designated Ozone Transport Region. The pollutants of concern for an ozone nonattainment area are NOx and VOCs. Section 176c of the Clean Air Act (CAA) requires that Federal agencies assure that their activities are in conformity with state plans for non-attainment areas.

A conformity review was completed and documented formally to ensure that a proper review of a federal action takes place under the Clean Air Act, and to tangibly demonstrate the Army's compliance with the general conformity rule. The general conformity determination was designed to ensure that Federal actions do not impede local efforts to control air pollution. The evaluation of the Proposed Action determines if the activity will generate air pollutant emissions that aggravate a nonattainment problem or jeopardize the maintenance status of the area. A significant impact would occur if the action requires a formal Conformity Determination and does not conform to the State's Implementation Plan for ozone.

3.12.2 Consequences

Impact to air resources would be identical regardless of the alternative selected for the Proposed Action. If the total of direct and indirect emissions for any individual pollutant will equal or exceed the National Ambient Air Quality Standard (NAAQS) nonattainment area pollutants and general conformity thresholds, a full general conformity determination is required, and must include an evaluation of *direct* and *indirect* air emissions associated with the Proposed Action. If projected emissions will be below the individual pollutant threshold levels, the action is exempt from further conformity analysis if, also it is determined that the emissions are not considered *regionally significant.* For activities that do not exceed the thresholds or are exempt from a general conformity determination, a *Record of Non-Applicability* is prepared. There are no new emissions associated with the action. A RONA is a short, written document used to declare that the requirements of the general conformity rule do not apply to a specific action.

Appendix B contains the Record of Non-Applicability to show compliance with the requirements of the Clean Air Act. This RONA is applicable with any of the alternatives evaluated in this EA. There are no significant impacts to air quality as a result of the proposed action.

3.13 CUMULATIVE EFFECTS

Cumulative effects are those environmental impacts that result from the incremental effects of other past, present, or reasonably foreseeable future actions when combined with the Proposed Action. CEQ regulations stipulate that the cumulative effects analysis within an EA consider the potential environmental impacts resulting from the "incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions" (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, and local) or individuals.

The scope of the cumulative effects analysis involves evaluating impacts to environmental resources by geographic extent of the effects and the time frame in which the effects are expected to occur. Past, present, and reasonably foreseeable actions are identified first, followed by the cumulative effects that could result from these actions when combined with the Proposed Action

3.13.1 Past, Present, and Reasonably Foreseeable Actions

The geographic area analyzed for cumulative effects includes the Northfield Brook Dam and an area about 1 mile surrounding the project, and river corridor downstream of the dam. The USACE dam is a Congressionally-authorized project for flood control and recreation. There are no future changes to the authorized purposes that are anticipated to be made by the U.S. Congress.

Land uses and land cover in the Northfield Brook Watershed has been primarily forest land with some residential development and agriculture (Northwest Conservation District, 2009). Aside from limited land use applications, there watershed surrounding the dam is expected to remain the same and there are no known identifiable actions that are expected to occur.

3.13.2 Cumulative Effects Summary

The construction of the Highwood Farms residential development adjacent to the Northfield Brook Lake has contributed to the increased runoff and sedimentation in the reservoir, and therefore has not aided in resolving the water quality and sedimentation impacts observed in the Northfield Brook Lake.

The Northwest Conservation District has indicated that within the basin their office has reviewed land use applications in the Northfield Brook Watershed, and has worked with the land use commissions and the development community in Litchfield and Thomaston to ensure development projects are protective of surrounding wetland and open water resources.

Overall, cumulative impacts from implementing the Proposed Action under Alternatives 1 or 2, when combined with the limited development and minimal changes to the watershed, is not expected to have an adverse impact to the watershed or the USACE operation of the dam.

4.0 MITIGATION

Drawdown

Time of year was considered for the optimal timeframe to protect downstream habitats and aquatic invertebrates and either the spring or autumn would have less impact to aquatic resources.

The options to drawdown the reservoir in support of the Preferred Alternative reflect USACE efforts to consider and determine the best method to minimize the potential for short- and long-term adverse impacts to aquatic resources. Increases in turbidity, siltation, and downstream settling of sediment in the water column are considered to be the greatest threat to resources. These are expected to be realized at its greatest when the water levels are lower and the out velocities begin to pick up sediment. USACE natural resource managers and operations managers are limited by the mechanical limitations of the design of the Northfield Brook dam. The gates to control the outflow are subject to intensive or even long-term manual operations to accommodate a seasonal drawdown or slow outflow drawdown. The outflow would be determined by 'feel' rather than at a controlled rate by sensors or other mechanical means. Severe impacts to water quality and flooding could occur if the reservoir drawdown rate is too fast; however, the alternative of a very slow drawdown could take too long to implement and have a greater adverse impact to fish resources. In general, the discharge of the waters during a high rain event under flooding, represent USACE's position that this type of regulated drawdown option is the best method to limit downstream adverse impacts and fish survivability, and remains the best opportunity to move sediment through the aquatic system to deposit in downstream reaches and riverbanks that are currently eroded along the outside of the waterbody channel. The reservoir discharge rate would be within the limits of the Outflow Guidance in a manner to avoid a downstream flood wave.

A permanent drawdown and conversion of the reservoir to riverine habitat will not adversely impact upland resources and does not require mitigation beyond the reservoir area.

Restoration of Northfield Brook and Recreational Use Areas

Restoration of the reservoir after the permanent drawdown of the eight acre lake will begin immediately. The USACE final mitigation plan will adhere to USACE natural resources management policy for protection and enhancement of project lands. The restoration plan consists of, generally, a three step process that involves stabilization of the streambanks, stream restoration, and riparian restoration all within the reservoir area of the Project. The plan would include stabilizing the banks by the installation of limited stone riverbank protection along meandering stream sections where velocities create erosion and undercutting of banks, restoring the stream for fisheries habitats, establishing a 100 foot buffer/riparian zone, and creating recreation lands for public use consistent with the park operational management plan. A mitigation plan will be developed and coordinated with the State of Connecticut and local natural resource agencies and partners to create habitats that result in beneficial uses for wildlife species, aquatic species, and recreational uses.

It is unlikely the conversion to a dry bed reservoir and the subsequent restoration can be completed as a single event but rather in stages. Northfield Brook, within the reservoir, is to be restored to a natural meandering stream course and the banks stabilized with the development of riparian vegetation over a

period of about 2 to 3 years, in a coordinated effort with biologists from the Connecticut Division of Inland Fisheries and input from the Thomaston Conservation Commission. Restoration will involve removal of some sediments or re-contouring of the lake bed to create recreational use areas. Each year, as necessary, USACE would build the overall transformation of the project lands to protect and enhance aquatic resources, riparian zones, and recreational opportunities. The remainder of the land outside the waterbody and bufferzone will be maintained for recreational purposes in accordance with the authorized mission of the project.

With the exception of the open water (river), the site will vegetate both naturally and with riparian plantings to create a bufferzone, and seeding for vegetation that allows for beneficial uses and a public recreation area. Because of the waterbody flowing through the flood storage basin, the conditions exist so that natural wetlands could develop along the eastern portion of the former impoundment. The western section of the reservoir basin is targeted to be managed as open-area field with no formally developed recreation facilities. Picnic tables are currently expected to be placed around the perimeter of the western portion of the former lake.

About 1,200 feet of the Northfield Brook that flows through the reservoir will be restored to support fish resources. Stream restoration design will be completed in consultation and supported by the Connecticut Division of Inland Fisheries with additional support from the Thomaston Conservation Commission.

Areas along the Northfield Brook that are subject to increased erosion from the natural meandering of the stream or during higher stream velocities will be subject to limited stone armoring. About 300 linear feet of stream bank immediately below the old mill dam, where the current sediment deposits are located, may need stabilization or re-sloping after a period of drawdown and dry out. Placement of armoring or fill into wetland and waters of the U.S. will be minimal or not at all but will be evaluated at the time to determine if Section 404 of the Clean Water Act will be applicable and additional NEPA analysis based on the activity. USACE projects that that the stream bank plantings and Coir logs for stabilization and restoration will be a functional component of the final restoration plan for the dewatered reservoir area.

Sediment remaining following the drawdown will be recontoured and the banks stabilized by seeding with a conservation mix to limit additional erosion. Minor regarding will take place via pre-ordered equipment services in order to stabilize the bank and provide visitor safety as soon as the area is accessible after drawdown/dry out. Once the reservoir area has dried, and an assessment can be made, removal of sediment may be implemented, and could range from about 3,400 cubic yards to 8,900 cubic yards depending on engineering determination of slopes for restored areas.

The CT DEEP habitat fisheries biologist will evaluate the stream after drawdown for in stream structure and cover improvements and pool-riffle ratios that area compatible with flood operations. The overall impacts from mitigation measures would result in an overall net benefit to the resources.

National Pollution Discharge Elimination System (NPDES)

The State of Connecticut is authorized by the U.S. EPA to implement the NPDES stormwater program. Federal actions that have over one acre of ground disturbance, regardless of their location, are required to obtain a General Construction permit from the U.S. EPA. USACE would need to obtain the NDPES permit prior to initiating restoration activities. Stormwater discharges from construction activities (such as grading, excavating, and stockpiling) that disturb one or more acres are regulated under the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Construction General Permit requires implementation of activities to control soil erosion during construction. Erosion control during construction activities could include the use of hay bales and silt fencing, as appropriate, to prevent the movement of soils into low-lying areas, revegetation, and top soil management. The effect of implementing these provisions would minimize erosion and control stormwater to the extent required of Federal facilities.

Following the drawdown of the waters behind the dam, construction equipment would re-grade and move soils adjacent to the waterway to facilitate the restoration and stabilization of the riverbank. These earth-disturbing activities would occur within 50 feet of the impaired waterbody that would receive stormwater discharges. The entire area that has been permanently dewatered would be about 8-acres but the actual disturbance of soils for habitat restoration would consist of an estimated 1 to 5 acres. This creates a potential site where there could be increases in soil erosion by wind and runoff until revegetation stabilizes the remaining sediments.

5.0 FINDINGS AND CONCLUSIONS

The EA evaluates the potential impacts from converting an existing eight-acre lake to a run-of-the-river project to alleviate ongoing poor water quality conditions and continued sediment build-up behind the dam. Direct, indirect, and cumulative impacts of Alternative 1, Alternative 2, and the No Action Alternative have been considered. Alternative 1, River Restoration, is the Preferred Alternative because it allows the USACE to change the project operations in a manner that alleviates the negative water quality conditions associated with the reservoir. It creates beneficial sediment management by eliminating the permanent eight acre lake allowing waters and allowing sediment to flow freely through the reservoir instead of becoming trapped. The Preferred Alternatives allows USACE to restore the Northfield Brook behind the dam and creates a bufferzone and recreation area. USACE is proposing to operate the project as a run-of-the-river project during non-flood operations. Alternative 2, Mechanical/Dredging Alternative would only temporarily achieve the goals of the proposed action.

No significant long-term impacts have been identified that would occur with converting the project operations of the Northfield Brook Dam to a run-of-the-river project. The Proposed Action would result in a net benefit to water quality and aquatic habitats in the Northfield Brook watershed. The expected ecological impacts associated with the preferred alternative (river restoration) are the temporary increases in turbidity within the water column during the initial downstream sediment transport, potential short-lived impacts to aquatic resources, and potentially temporary losses to immediate downstream fisheries habitats. Increases in turbidity and siltation would increase as the waters begin to reach the lowest points and sediment begins to migrate through the outlet conduit. Temporary short-term impacts associated with

the dewatering of the dam would occur, and USACE's preferred method is to allow for a one-time dewatering at the time of a high rain event to move sediment downstream to feed currently starved areas of the river downstream; and with an increased outflow velocity to maximum the potential for successfully moving aquatic invertebrates downstream instead of potentially risking aquatic losses within the reservoir associated with a slower releases as described in the EA.

The long term effects are anticipated to result in a net benefit to the Northfield Brook and Naugatuck River ecosystems in terms of increased Dissolved Oxygen, lower water temperatures, restoration of a more natural waterflow, and increased stability of the downstream shoreline. The action is expected to provide a significant change in the impaired waters status of the Northfield Brook.

Implementation of the No Action Alternative is not considered feasible because the Northfield Brook Lake would continue to deteriorate and the sedimentation would continue to accumulate thereby adding to overall negative water quality conditions within the watershed.

6.0 LIST OF PREPARERS

Paiva, Marcos - Archaeologist
M.A. Historical Archaeology, 1993 (University of Massachusetts at Boston)
B.A. History, 1989 (University of Massachusetts at Dartmouth)

Bargerhuff, Kirk E. - Biologist
B.S. Wildlife Management, 1988 (Purdue University)

7.0 DISTRIBUTION LIST AND COORIDNATION (See Appendix A)

Correspondence
Project information letters were mailed to the following prior to the preparation of this report:

- U.S. Environmental Protection Agency, Mr. Curt Spalding, Regional Administrator
- U.S. Fish and Wildlife Service, Melissa Grader, Fish and Wildlife Biologist
- CT Department of Energy and Environmental Protection, Don Mysling, Senior Fisheries Biologist
- CT Department of Energy and Environmental Protection, Mr. Daniel C. Esty, Commissioner
- Town of Thomaston (CT), Inland Wetlands and Watercourses Commission, Mr. Joseph Fainer, Chairman

Correspondence Received (see also Appendix C).

- Mr. Don Mysling, CT Department of Energy and Environmental Protection
- Mr. David Fox, CT Department of Energy and Environmental Protection
- Mr. Steven Perkins, Office of Ecosystem Protection, U.S. Environmental Protection Agency
- Town of Thomaston (CT) Conservation Commission

8.0 REFERENCES

36 Code of Federal Regulations Part 327. Rules and Regulations Governing Public Use of Water Resource Development Projects Administered By the Chief of Engineers.

U.S. Department of the Interior, Bureau of Reclamation. 2006. Erosion and Sedimentation Manual. Technical Service Center, Sedimentation and River Hydraulics Group. Denver, Colorado

Connecticut Department of Environmental Protection. 2009. Nonpoint Source Management Program 2009 Annual Report < http://www.ct.gov/dep/lib/dep/water/nps/annualreports/2009annualreport.pdf>

Connecticut Department of Environmental Protection. 2011. State of Connecticut Integrated Water Quality Report.
<http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/ctiwqr10final.pdf>

Northwest Conservation District, 2012. Watershed Management Northfield Brook Litchfield/Thomaston Online: http://www.conservect.org/northwest/TechnicalServices/tabid/81/Default.aspx

Polyak, L. and L. Webber. 2002. Technical Guide for Compliance with the General Conformity Rule. U.S. Army Center for Health Promotion and Preventative Medicine.

U.S. Army Corps of Engineers Engineer Regulation 1130-2-540. Project Operations - Environmental Stewardship Operations and Maintenance Guidance and Procedures. 11 August 2008.
<http://140.194.76.129/publications/eng-regs/ER_1130-2-540/toc.htm

U.S. Army Corps of Engineers Engineer Pamphlet 1130-2-550, Projection Operations - Recreation Operations and Maintenance Guidance and Procedures. 30 August 2008.
<http://140.194.76.129/publications/eng-pamphlets/ep1130-2-550/toc.htm>

U.S. Army Corps of Engineers. 2009. Wildlife Survey Report and Habitat Management Recommendations for the Northfield Brook Flood Control Project, U.S. Army Corps of Engineers. Internal survey report completed as Connecticut Audubon Society Technical Report #011210.

U.S. Army Corps of Engineers. 2004. Northfield Brook Lake, Connecticut Water Quality Evaluation. Internal Report. 48 pages.

U.S. Department of the Interior, Department of the Interior, Bureau of Reclamation. 2006. Erosion and Sedimentation Manual.
<http://www.usbr.gov/pmts/sediment/kb/ErosionAndSedimentation/index.html>

9.0 COMPLIANCE WITH FEDERAL ENVIRONMENTAL STATUTES, EXECUTIVE ORDERS AND EXECUTIVE MEMORANDA

9.1 FEDERAL STATUTES

1. Archaeological Resources Protection Act of 1979, as amended, 16 USC 470 et seq.

Compliance: Issuance of a permit from the Federal land manager to excavate or remove archaeological resources located on public or Indian lands signifies compliance.

2. Preservation of Historic and Archeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq.

Compliance: The Project has been coordinated with the Connecticut State Historic Preservation Officer.

3. American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.

Compliance: Must ensure access by native Americans to sacred sites, possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. There are no sites located on the Project.

4. Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Compliance: Public notice of the availability of this report to the Environmental Protection Agency is required for compliance pursuant to Sections 176c and 309 of the Clean Air Act. As required by Department of Defense Policy a Record of Non-Applicability is included with this report

5. Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.

Compliance: A Clean Water Act Section 404(b)(1) Evaluation and Compliance Review is included with the EA and is located in Appendix C of this EA. If USACE determines restoration will require additional CWA review, the EA will be referenced and a 30-day public notice will be prepared. An application would then be filed for State Water Quality Certification pursuant to Section 401 of the CWA.

6. Coastal Zone Management Act of 1982, as amended, 16 U.S.C. 1451 et seq.

Compliance: Not Applicable. The project does not occur in the coastal zone.

7. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Compliance: Coordination with the U.S. Fish and Wildlife Service (USFWS) has determined formal consultation requirements pursuant to Section 7 of the Endangered Species Act have been met. Coordination with the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act is not required.

8. Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Compliance: Not Applicable. This report is not being submitted to Congress.

9. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Compliance: Public notice of availability to the project report to the National Park Service (NPS) and Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

10. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Compliance: Coordination and full consideration of comments from the FWS and Connecticut fish and wildlife agencies signifies compliance with the Fish and Wildlife Coordination Act.

11. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq.

Compliance: Public notice of the availability of this report to the National Park Service (NPS) and the Office of Statewide Planning relative to the Federal and State comprehensive outdoor recreation plans signifies compliance with this Act.

12. Marine Protection, Research, and Sanctuaries Act of 1971, as amended, 33 U.S.C. 1401 et seq.

Compliance: Not Applicable. The operation of the project does involve the transportation or disposal of dredged material in ocean waters pursuant to Sections 102 and 103 of the Act, respectively.

13. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Compliance: Coordination with the State Historic Preservation Office signifies compliance.

14. Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3000-3013, 18 U.S.C. 1170

Compliance: Regulations implementing NAGPRA will be followed if discovery of human remains and/or funerary items occur during implementation of this project.

15. National Environmental Policy Act of 1969, as amended, 42 U.S.C 4321 et seq.

Compliance: Preparation of the Environmental Assessment signifies partial compliance with NEPA. Full compliance shall be noted at the time the Finding of No Significant Impact is signed by the District Engineer.

16. Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.

Compliance: No requirements for projects or programs authorized by Congress. The project is operated pursuant to the Congressionally-approved authority.

17. Watershed Protection and Flood Prevention Act as amended, 16 U.S.C 1001 et seq.

Compliance: Floodplain impacts have been considered in project planning. The project will not result in the loss of floodplain.

18. Wild and Scenic Rivers Act, as amended, 16 U.S.C 1271 et seq.

Compliance: Not applicable. The Northfield Brook is not designated as a Wild and Scenic River. Additional coordination with the Department of the Interior is not required for the activity..

19. Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.

Compliance: Not applicable. The project does not require coordination with the National Marine Fisheries Service for an Essential Fish Habitat (EFH) Assessment.

9.2 EXECUTIVE ORDERS

1. Executive Order 11593, Protection and Enhancement of the Cultural Environment, 13 May 1971

Compliance: Coordination with the Connecticut Historic Preservation Officer signifies compliance.

2. Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.

Compliance: Public notice of the availability of this report or public review fulfills the requirements of Executive Order 11988, Section 2(a)(2).

3. Executive Order 11990, Protection of Wetlands, 24 May 1977.

Compliance: Public notice of the availability if this report for public review fulfills the requirements of Executive Order 11990, Section 2 (b).

4. Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, 4 January 1979.

Compliance: Not applicable to projects located in the United States geographical boundaries.

5. Executive Order 12898, Environmental Justice, 11 February 1994.

Compliance: The project will not have a significant impact on minority or low-income population, or any other population in the United States.

6. Executive 13007, Accommodation of Sacred Sites, 24 May 1996

Compliance:

7. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. 21 April, 1997.

Compliance: Not applicable. The project would not create a disproportionate environmental health or safety risk for children.

8. Executive Order 13061, and Amendments – Federal Support of Community Efforts Along American Heritage Rivers

Compliance: The Environmental Assessment considers the Federal action that may affect the quality of the Connecticut River, an American Heritage River.

9. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, 6 November 2000.

Compliance: Consultation with Indian Tribal Governments, where applicable, and consistent with executive memoranda, DoD Indian policy, and USACE Tribal Policy Principles signifies compliance.

9.3 EXECUTIVE MEMORANDUM

1. Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, 11 August 1980.

Compliance: There existing reservoir area is not considered a prime agricultural land on the project.

2. White House Memorandum, Government-to-Government Relations with Indian Tribes, 29 April 1994.

Compliance: Consultation with Federally Recognized Indian Tribes, where appropriate, signifies compliance.

APPENDIX A CONSULTATION AND COORDINATION

Consultation Received

RCVD 13 OCT 11

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

October 6, 2011

Mr. H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Dear Mr. McMillan:

This is in response to your September 20, 2011, letter seeking EPA-New England's input and recommendations regarding the Corps' preparation of an Environmental Assessment (EA) for the proposed alteration of the aquatic management of the Northfield Brook Lake flood control facility in Northfield, CT. Specifically, the Corps is proposing to eliminate the existing eight acre conservation pool, and convert the operation to a run-of-river flood control facility.

Your letter indicates that operating the facility as a run-of-river, dry bed reservoir would allow for the restoration of the natural stream bed and local hydrology, and would potentially enhance coldwater habitat and water quality both within and downstream of the existing impoundment. You further note that the existing impoundment has a history of adverse water quality issues, in particular, high bacterial concentrations that have required the frequent closing of the recreational swimming beach at the facility due to potential human health concerns.

While we have not yet received a draft EA or detailed project description for review, EPA-New England is generally supportive of these types of projects, which result in the improvement of water quality and the restoration of critical fish and wildlife habitat. We look forward to the opportunity to review a draft EA and a more detailed description of the proposed project, and would be happy to work in coordination with the Corps in the development of the EA and the project design.

Please forward project information to Michael Marsh of my staff at the address given above (Mail Code OEP5-2), or by email at marsh.mike@epa.gov. He may also be reached by phone at 617.918.1556.

Sincerely,

Kelly for

Stephen S. Perkins, Director
Office of Ecosystem Protection

cc: Tom Chapman, USFWS, Concord, NH
Denise Ruzicka, CTDEEP, Hartford, CT

From: Fox, David [David.Fox@ct.gov]
Sent: Friday, July 20, 2012 9:55 AM
To: Bargerhuff, Kirk E NAE
Cc: Mysling, Donald; Peterson, Susan; Christian, Art; Bellucci, Christopher; Hannon, Robert
Subject: RE: Northfield Brook Lake, CT _ proposed drawdown (UNCLASSIFIED)
Attachments: DamRemovalStudy.pdf

Kirk,

I've circulated your project description for the proposed elimination of the lake at Northfield Brook Dam in Thomaston to various offices of the Department.

Alternative 1, River Restoration, is preferred from the standpoint of a fisheries/riverine habitat enhancement/restoration for Northfield Brook as well as from a water quality perspective. The brook is annually stocked with approximately 300 trout, at various points within ACOE project lands upstream of the lake. Elimination of the lake and restoration of the river would result in 1200 linear feet of additional trout habitat.

As reflected in your narrative, there is a great deal of uncertainty regarding the amount and fate of sediments that may be released during the drawdown of the impoundment. Based on our preliminary review, either the proposed Multi-Season Drawdown or Low Outflow Alternatives are recommended to prevent excessive downstream transport and deposition of accumulated sediments. The difficulty in maintaining a controlled release is recognized, but if a significant fraction of the impounded sediment can be stabilized, potential impacts to the downstream brook and ultimately the Naugatuck River would be reduced.

I have enclosed a Dam Removal Feasibility Study that the Department recently had done for a dam on the Scantic River. It includes an analysis of the geomorphology of downstream stretches of the watercourse to try to determine where released sediments may be deposited. Perhaps a similar evaluation of Northfield Brook would help in selecting the least damaging method of drawdown.

The following comments are included for your information.

The Department has been working with the Northwest Conservation District (NCD) through the federal Clean Water Act 319 Nonpoint Source grant program to address the recreational water quality impairment related to bacteria in the Northfield Brook watershed and, more specifically, in the ACOE's Northfield Brook Lake facility:

* Starting in 2006, the 319 NPS grant program funded NCD to develop a simplified EPA watershed based plan for the Northfield Brook watershed to identify the potential sources of bacteria causing the impairment, particularly at the ACOE Northfield Brook Lake facility. NCD completed this plan in 2009. After conducting a trackdown survey within the basin, NCD felt that the primary source of bacteria might be an older, nearby subdivision in Thomaston. Two stormwater management basins associated with this subdivision are no longer functioning properly, and stormwater - with no or little treatment - has been draining directly into Northfield Brook, just upstream of ACOE's Northfield Brook Lake. According to NCD research, stormwater runoff from densely developed residential neighborhoods of this type has the potential to contain high levels of bacteria. NCD also identified some agricultural activities further upstream in the watershed that might also be contributing to the impairment. NCD consulted directly with ACOE during the course of this 319 project.

* As part of another 319 project initiated in 2009, NCD hired a consulting engineer to design retrofit plans for the two failing stormwater basins at the subdivision in Thomaston. Retrofit design plans were completed in 2010.

* As part of another 319 project, initiated in 2011, NCD has been pursuing implementation of the retrofit designs for the two failing stormwater basins at the subdivision in Thomaston. We are currently working with NCD to amend the current contract to include some additional 319 funding. NCD hopes to complete the retrofit of these stormwater basins within the next year. NCD was anticipating that ACOE would continue bacteria monitoring at their Northfield Brook Lake facility to help determine if the stormwater basin retrofits, once completed, would be successful in helping to reduce bacteria levels significantly in Northfield Brook and, specifically, in Northfield Brook Lake.

The Natural Diversity Data Base, maintained by DEEP, contains no records of extant populations of Federally listed endangered or threatened species or species listed by the State, pursuant to section 26-306 of the Connecticut General Statutes, as endangered, threatened or special concern in the area of Northfield Brook Lake or downstream reaches of the brook. This information isnot the result of comprehensive or site specific field investigations. Consultations with the NDDB should not be substituted for on-site surveys required for environmental assessments.

David J. Fox
Senior Environmental Analyst
Office of Environmental Review
Connecticut Department of Energy and Environmental Protection
79 Elm Street, Hartford, CT 06106-5127
P: 860.424.4111
F: 860.424.3192
E: david.fox@ct.gov

Project Consultation/Coordination

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

September 20, 2011

Engineering/Planning Division
Evaluation Branch

Melissa Grader, Fish and Wildlife Biologist
US FWS/New England Field Office
C/o Connecticut River Coordinator's Office
103 East Plumtree Road
Sunderland, Massachusetts 01375

Dear Ms. Grader:

The U.S. Army Corps of Engineers, New England District (Corps), is preparing an Environmental Assessment that identifies, evaluates and documents the potential environmental effects of changing the existing aquatic management of the Northfield Brook Lake flood control facility in Northfield, Connecticut. The Corps is proposing to eliminate the eight-acre conservation pool and operating as a run-of-the river flood control facility. This study is being conducted under the requirements of the National Environmental Policy Act, as amended. The purpose of this letter is to seek your office's input and recommendations associated with the proposed action. A location map is provided to aid you in your work.

Northfield Brook Lake has been plagued with adverse water quality issues requiring the Corps to routinely implement long-term closures of the recreational swimming beach, often during the summer recreational season. The Corps believes the water quality issues within the conservation pool are increasing the potential health concerns, from waterbourne illnesses that can occur as a result of high bacteria levels that exceed the State of Connecticut standards, and through the increasing incidents of cyanobacteria blooms.

The alternative of converting the existing conservation pool to a run-of-the river, dry bed reservoir during non-flood operations has been discussed informally with resource agencies for a number of years. The conversion allows for the restoration of the natural streambed and local hydrology and would potentially aid in increasing the coldwater habitats, species, and aquatic health immediately within and downstream of the existing impoundment. It would serve to reduce Federal operating costs by eliminating a public swimming beach that has a long history of water quality concerns requiring long-term closures.

You are invited to attend a coordinated site visit on Wednesday, October 19, 2011 at 11am, meeting at the Thomaston Dam Project Office: 331 Hill Road, Thomaston, Connecticut 06786. Your agency's input will aid the Corps in its investigation to identify practicable alternatives to the current water quality issues found at the flood control facility and aid in determining whether to operate the facility without a permanent conservation pool.

It is requested that written comments under the Fish and Wildlife Coordination Act, as amended, be provided within 30 days from the date of the on-site meeting. If you have any questions they can be directed to Mr. Kirk Bargerhuff, of our Environmental Resources Section, at (978) 318-8029, or Kirk.E.Bargerhuff@usace.army.mil.

Sincerely,

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

September 20, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Curt Spalding, Regional Administrator
USEPA Region 1 - New England
5 Post Office Square
Mail Code: ORA01-4
Boston, Massachusetts 02109-3912

Dear Mr. Spalding:

The U.S. Army Corps of Engineers, New England District (Corps), is preparing an Environmental Assessment that identifies, evaluates and documents the potential environmental effects of changing the existing aquatic management of the Northfield Brook Lake flood control facility in Northfield, Connecticut. The Corps is proposing to eliminate the eight-acre conservation pool and operating as a run-of-the river flood control facility. This study is being conducted under the requirements of the National Environmental Policy Act, as amended. The purpose of this letter is to seek your office's input and recommendations associated with the proposed action. A location map is provided to aid you in your work.

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Sincerely,

H. Farrell McMillan

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosure

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NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

September 20, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Daniel C. Esty, Commissioner
CT Department of Energy and Environmental Protection
79 Elm Street
Hartford, Connecticut 06106-5127

Dear Commissioner Esty:

The U.S. Army Corps of Engineers, New England District (Corps), is preparing an Environmental Assessment that identifies, evaluates and documents the potential environmental effects of changing the existing aquatic management of the Northfield Brook Lake flood control facility in Northfield, Connecticut. The Corps is proposing to eliminate the eight-acre conservation pool and operating as a run-of-the river flood control facility. This study is being conducted under the requirements of the National Environmental Policy Act, as amended. The purpose of this letter is to seek your office's input and recommendations associated with the proposed action. A location map is provided to aid you in your work.

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Sincerely,

H. Farrell McMillan

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosure

Copy Furnished:

Mr. Don Mysling, Senior Fisheries Biologist
CT DEEP Inland Fisheries Division
Habitat Conservation & Enhancement Program
Western Headquarters
230 Plymouth Road
Harwinton, Connecticut 06791

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
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REPLY TO
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September 20, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Don Mysling, Senior Fisheries Biologist
CT DEEP Inland Fisheries Division
Habitat Conservation & Enhancement Program
Western Headquarters
230 Plymouth Road
Harwinton, Connecticut 06791

Dear Mr. Mysling:

The U.S. Army Corps of Engineers, New England District (Corps), is preparing an Environmental Assessment that identifies, evaluates and documents the potential environmental effects of changing the existing aquatic management of the Northfield Brook Lake flood control facility in Northfield, Connecticut. The Corps is proposing to eliminate the eight-acre conservation pool and operating as a run-of-the river flood control facility. This study is being conducted under the requirements of the National Environmental Policy Act, as amended. The purpose of this letter is to seek your office's input and recommendations associated with the proposed action. A location map is provided to aid you in your work.

Northfield Brook Lake has been plagued with adverse water quality issues requiring the Corps to routinely implement long-term closures of the recreational swimming beach, often during the summer recreational season. The Corps believes the water quality issues within the conservation pool are increasing the potential health concerns, from waterbourne illnesses that can occur as a result of high bacteria levels that exceed the State of Connecticut standards, and through the increasing incidents of cyanobacteria blooms.

The alternative of converting the existing conservation pool to a run-of-the river dry bed reservoir, during non-flood operations has been discussed informally with resource agencies for a number of years. The conversion allows for the restoration of the natural streambed and local hydrology and would potentially aid in increasing the coldwater habitats, species, and aquatic health immediately within and downstream of the existing impoundment. It would serve to reduce Federal operating costs by eliminating a public swimming beach that has a long history of water quality concerns requiring long-term closures.

You are invited to attend a coordinated site visit on Wednesday, October 19, 2011 at 11am, meeting at the Thomaston Dam Project Office: 331 Hill Road, Thomaston, Connecticut 06786. Your agency's input will aid the Corps in its investigation to identify practicable alternatives to the current water quality issues found at the flood control facility and aid in determining whether to operate the facility without a permanent conservation pool.

It is requested that written comments under the Fish and Wildlife Coordination Act, as amended, be provided within 30 days from the date of the on-site meeting. If you have any questions they can be directed to Mr. Kirk Bargerhuff, of our Environmental Resources Section, at (978) 318-8029, or Kirk.E.Bargerhuff@usace.army.mil.

Sincerely,

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

September 20, 2011

Engineering/Planning Division
Evaluation Branch

Mr. Joseph Fainer, Chairman
Town of Thomaston
Inland Wetlands and Watercourses Commission
158 Main Street
Thomaston, Connecticut 06787

Dear Mr. Fainer:

The U.S. Army Corps of Engineers, New England District (Corps), is preparing an Environmental Assessment that identifies, evaluates and documents the potential environmental effects of changing the existing aquatic management of the Northfield Brook Lake flood control facility in Northfield, Connecticut. The Corps is proposing to eliminate the eight-acre conservation pool and operating as a run-of-the river flood control facility. This study is being conducted under the requirements of the National Environmental Policy Act, as amended. The purpose of this letter is to seek the Town of Thomaston's input and recommendations associated with the proposed action. A location map is provided to aid you in your work.

Northfield Brook Lake has been plagued with adverse water quality issues requiring the Corps to routinely implement long-term closures of the recreational swimming beach, often during the summer recreational season. The Corps believes the water quality issues within the conservation pool are increasing the potential health concerns, from waterbourne illnesses that can occur as a result of high bacteria levels that exceed the State of Connecticut standards, and through the increasing incidents of cyanobacteria blooms.

The alternative of converting the existing conservation pool to a run-of-the river, dry bed reservoir during non-flood operations has been discussed informally with resource agencies for a number of years. The conversion allows for the restoration of the natural streambed and local hydrology and would potentially aid in increasing the coldwater habitats, species, and aquatic health immediately within and downstream of the existing impoundment. It would serve to reduce Federal operating costs by eliminating a public swimming beach that has a long history of water quality concerns requiring long-term closures.

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It is requested that written comments be provided within 30 days from the date of the on-site meeting. If you have any questions they can be directed to Mr. Kirk Bargerhuff, of our Environmental Resources Section, at (978) 318-8029, or Kirk.E.Bargerhuff@usace.army.mil.

Sincerely,

H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosure

Northfield Brook Lake, CT

http://www.bing.com/maps/?v=2&cp=qydskj8x84q5&lvl=17&dir=0&sty=b&where1=Northfield%20Brook%20Lake%2C%20CT&form=LMLTCC

APPENDIX B
CLEAN AIR ACT RECORD OF NON-APPLICABILITY

GENERAL CONFORMITY - RECORD OF NON-APPLICABILITY

Project Name: Northfield Brook Lake Flood Control Project, Thomaston, Connecticut - Operations and Maintenance Action to Address Poor Water Quality and Sedimentation Accumulation

Project/Action Identification Number: not applicable

Project/Action Point of Contact:
Vince A. Gualtieri, Project Manager, Northfield Brook Lake, Naugatuck River Basin, U.S. Army Corps of Engineers.
Phone: 978-318-8377

Begin Date: 2015

General Conformity under the Clean Air Act, Section 176 has been evaluated for the project described above according to the requirements of 40 CFR 93, Subpart B. The requirements of this rule are not applicable to this project/action because:

_X_ The project/action is an exempt action as outlined in 40 CFR 93.153(c)(2)(xiii) and (x) - The requirements of this subpart shall not apply to the following Federal actions: (2) Actions which would result in no emissions increase or an increase in emissions that is clearly *de minimis*: (xiii) Routine operation of facilities, mobile assets and equipment; and (x) Actions, such as the following, with respect to existing structures, properties, facilities and lands where future activities conducted will be similar in scope and operation to activities currently being conducted at the existing structures, properties, facilities, and lands; for example, relocation of personnel, disposition of federally-owned existing structures, properties, facilities, and lands, rent subsidies, operation and maintenance cost subsidies, the exercise of receivership or conservatorship authority, assistance in purchasing structures, and the production of coins and currency.

Supporting documentation and emissions estimates are

( ) ATTACHED
( ) APPEAR IN THE NEPA DOCUMENTATION
(X) OTHER

SIGNED _____

Joseph B. Mackay, Chief, Environmental Resources Section
New England District, U.S. Army Corps of Engineers

APPENDIX C
CLEAN WATER ACT
Section 404 (b) 1 Evaluation

And

Sediment Sampling Results from
25 April 2014

EVALUATION - SECTION 404 OF THE CLEAN WATER ACT
DISCHARGE OF SEDIMENTS FROM OR THROUGH A DAM

U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT
CONCORD, MA

PROJECT:	Northfield Brook Dam, Naugatuck River Basin, Connecticut	
OPERATIONS MANAGER:	Christopher Way	Telephone Number: 978.318.8366
FORM COMPLETED BY:	Mr. Kirk Bargerhuff	Telephone Number: 978.318.8029

A review of the impacts associated with discharges to waters of the United States for the permanent conversion of the Northfield Brook Lake federal flood control facility to a dry-bed, run-of-the river flood control facility in Thomaston, Connecticut is being conducted per Section 404(b)(1) of the Clean Water Act, as amended (Public Law 92-500).

The review is initiated based on the U.S. Army Corps of Engineers (USACE) Regulatory Guidance Letter 05-04 (19 August 2005). This guidance suggest review of the action under Section 404 of the Clean Water Act since the federal action deviates from normal operation of the dam in such a manner that bottom sediment accumulated behind the dam could be removed and transported downstream through the dam. The regulatory guidance applies to the releases of water and water-carried sediment that may result in the transportation, reduction, or elimination of bottom sediment accumulations from or through dams.

DESCRIPTION:

Location. Northfield Brook Lake Flood Damage Reduction Project, Thomaston, Connecticut and surrounding communities.

General Description. The Northfield Brook Lake (Project) is a Federal multi-purpose dam authorized for flood control, recreation, and fish and wildlife habitat. It is located on Northfield Brook, within the Naugatuck River Basin, Connecticut, operated by the Operations Division of the New England District, U.S. Army Corps of Engineers. It is part of the Congressionally-authorized overall flood control plan for the Naugatuck Valley. The flood control facility is within the boundaries of Thomaston and Litchfield, with the actual dam located about 1.3 miles upstream from its confluence with the Naugatuck River, in the town of Thomaston, Litchfield County. The total acreage of the reservoir and project lands is about 235 acres, including 208 acres that are owned by the Federal government and 27 acres held in flowage easement.

Purpose. The Northfield Brook Lake has consistent problems with water quality and increasing sedimentation. It is on the Connecticut Impaired Waters List because it exceeds the water quality standards for recreational uses from elevated levels of *Escherichia coli* from non-point and unknown source pollution. The USACE has a need to address the poor water quality issues and increasing sediment deposition within the reservoir area in a manner that will (1) eliminate the impaired status of the impounded water within the reservoir area, (2) improve sediment management of the area behind the dam and allow a more natural run-of-the-river sediment transport, and (3) increase the overall storage capability by eliminating the long term needs to remove sediment accumulation. Additionally, positive changes to the management of the flood control dam from the permanent conversion to a dry-bed reservoir are expected, and include (4) providing access to new and better recreational opportunities, and (5) minimizing the maintenance costs associated with management of adverse aquatic conditions within the federal flood control project.

Proposed Plan, Preferred Alternative. The U.S. Army Corps of Engineers (USACE), New England District is proposing to take steps to alleviate the negative water quality issues and ongoing sediment accumulation within the reservoir area of the Northfield Brook Dam. The USACE preferred alternative to improve the water quality and minimize sediment accumulation behind the dam is to eliminate the permanent pool that exists behind the dam. This alternative will convert the existing permanent reservoir at the Northfield Brook Lake Federal Flood Control Project in Thomaston, Connecticut to a dry bed reservoir. USACE proposes to empty the reservoir by initiating the release of water behind the dam immediately prior to or during a high rain event and continue to allow the water flow out at a rate where outflow is slightly above inflow and within the outflow limits established for downstream flood control managment. This method of dewatering the Northfield Brook Dam is expected to have greater results in replenishing undercut stream banks and fisheries survivability. The method, completed during higher seasonal turbid conditions, would have a closer approximation of a seasonal sediment flow regime which historically moved sediment in the stream during and after high flows such as spring run-off. The Northfield Brook within the emptied reservoir will be restored to a natural free flowing river. The dam will continue to operate for its authorized flood control mission.

General Description of Dredged or Fill Material. There are two types of discharges associated with this project: (1) the existing sediment behind the dam being released downstream during the dewatering of the impounded water behind the dam (2) and, during river restoration, the placement of stone riprap below mean high water along the banks to stabilize certain sections of the banks that may be subject to erosion. The placement of stone riprap for bank stabilization under the Clean Water Act will be addressed separately when a known quantity of material to be placed below the river's mean low water is identified by the site restoration plan.

During drawdown an estimated (up to) 3,000 to 5,000 cubic yards of material may pass through the dam as the impounded water levels reach their lowest as they exit from behind the dam. The sediment consists of fines, sand, and gravel. Water column turbidity is expected to behave in the same manner as observed during routine flood control operations until the water level reaches its lower limits, and sediment migration begins to pick up the material. This method is expected to supply sections of Northfield Brook downstream of the dam with much needed sediments. The result is anticipated to provide beneficial sediment material to sediment-starved sections of Northfield Brook below the dam that has been down cut or has experienced erosion of the bed and banks from the presence of the dam.

Once the drawdown is complete, the Northfield Brook will return to a natural stream channel through the reservoir basin. USACE will work to establish bank stabilization and will require use of stone riprap to stabilize sections of the riverbank that may experience increased erosion and sedimentation. This use of riprap will be integrated into the overall bufferzone and river restoration plan.

NEW ENGLAND DISTRICT
US ARMY CORPS OF ENGINEERS, CONCORD, MA

PROJECT: Northfield Brook Dam, Naugatuck River Basin, Connecticut

CLEAN WATER ACT
Evaluation of Section 404(b)(1) Guidelines

1. Review of Compliance (Section 230.10(a) - (d))

An evaluation of the Federal action indicated that:

		Yes	No
a.	The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose.	X	
b.	The activity does not appear to:		
	(1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA	X	
	(2) jeopardize the existence of Federally listed threatened and endangered species or their habitat	X	
	(3) violate requirements of any Federally designated marine sanctuary.		NA
c.	The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values	X	
d.	Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.	X	

2. Technical Evaluation Factors (Subparts C-F)

a. Potential Impacts on Physical and Chemical Characteristics of the Ecosystem (Subpart C)

			N/A	Yes	No
	1.	Substrate a. Substrate Elevation and Slope: varies b. Sediment Type: sand/cobble/gravel/river stone c. Fill Material Movement: Sediment redeposition by natural processes. The sediment behind the dam will move quickly downstream when water levels begin to reach their lowest levels and will deposit in undercut and eroded sections of riverbank. d. Physical Effects on Benthos: Temporary, minor effect on flow and patterns during the final release as any sediment transported downstream settles. It is expected that benthos will quickly recolonize the area in a short period of time.		X	
	2.	Suspended particles/turbidity. a. Expected changes in suspended particulates and turbidity levels in vicinity of fill site: Temporary, observable effect during the final stages of water drawdown. The area should reach a stabilized equilibrium in a relatively short time period. b. Effects on Chemical and Physical Properties of the Water Column: Temperature: Positive effect after dam removal. Area of impoundment will be a free flowing stream with cooler water temperatures.		X	
	3.	Water column impacts. a. Light Penetration: Temporary effect, during last stages of water leaving the reservoir. b. Dissolved Oxygen: Temporary, minor effect. c. Toxic Metals and Organics: No effect. d. Pathogens: No effect e. Aesthetics: Temporary, minor effects that will occur at the dewatering period. The empty reservoir basin will be affected until the revegetation period. Site should stabilize quickly and planting plan is in place for any exposed riverbanks due to the dam removal.		X	

	4.	Current patterns and water circulation. - minor effect on flow and patterns during the final release.		X	
	5.	Normal water fluctuations.			X
	6.	Salinity gradients.	X		

b. Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D).

			N/A	Not Significant	Significant
	1.	Threatened and endangered species.		X	
	2.	Fish, crustaceans, mollusks, and other organisms in the aquatic food web.		X	
	3.	Other wildlife (mammals, birds, reptiles, and amphibians).		X	

c. Potential Impacts on Special Aquatic Sites (Subpart E)

			N/A	Not Significant	Significant
	1.	Sanctuaries and refuges.	X		
	2.	Wetlands		X	
	3.	Mud flats	X		
	4.	Vegetated shallows - Temporary, minor. Vegetated shallows are limited within the 8-acre lake. Vegetated shallows within the impoundment will likely re-establish at a lower elevation along the riverbank once the water is removed from behind the dam, and is expected to recolonize along the riverbank shoreline after a short period of time.		X	
	5.	Coral reefs	X		
	6.	Riffle and pool complexes		X	

d. Potential Effects on Human Use Characteristics (Subpart F)

			N/A	Not Significant	Significant
	1.	Municipal and private water supplies	X		
	2.	Recreational and commercial fisheries. - Temporary, minor effect during dewatering		X	
	3.	Water-related recreation. - Positive effect		X	
	4.	Aesthetic impacts. - Temporary, minor effect. Positive effect.		X	
	5.	Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves. - Temporary, minor effect		X	

Remarks:
2.a.1-4. See Environmental Assessment. Temporary impacts to riverbed from downstream sediment migration may be realized with the de-watering of the reservoir. Between 3,000 to 5,000 cubic yards of accumulated stream sediment could be transported to downstream locations. Stored sediment passing through the dam consists of material already existing within the waterbody and does not represent new material being placed into wetlands or waterbodies of the United States. Impacts from the downstream distribution of this material expected to be minor, temporary, and recover quickly as natural events re-distribute the material within the stream bed. Increases in suspended particles and turbidity are expected to relatively high as the bulk of

sediment begins to pass through the dam and enters the water column during naturally turbid conditions; however increases are expected to be relatively high only for short periods and short distances downstream, settling out quickly. The impacts would be minimal and short term. Impacts to current patterns and water circulation would be realized as the material re-contours current sediment starved sections of the waterbody. These impacts are expected to be temporary and short-lived. The loss of environmental characteristics and values is not considered significant and the material is expected to be beneficial to in-stream habitats. The impact for sediment passes through the dam could temporarily degrade aquatic habitats from deposition; however, release during a high storm event is expected to redistribute material to undercut banks and result in no long-term adverse. impacts. Mitigation measures are to be implemented to ensure, to the extent practical, aquatic based resource impacts are below significant levels.

3. Evaluation and Testing (Subpart G).

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

			N/A	Not Significant	Significant
	1.	Physical characteristics -fines, sand, gravel		X	
	2.	Hydrology in relation to known or anticipated sources of contaminants.		X	
	3.	Results from previous testing of the material similar material in the vicinity of the project.		X	
	4.	Known, significant sources of persistent pesticides from land runoff or percolation.		X	
	5.	Spill records for petroleum products or designated hazardous substances (Section 311 of CWA).	X		
	6.	Spill records of significant introduction of contaminants from industries, municipalities, or other sources.		X	
	7.	Known existence of substantial material deposits of substances that could be released in harmful quantities to the aquatic environment.	X		
	8.	Other sources (specify)	X		

List appropriate references:
See Environmental Assessment, Section 3.8 . The impaired status of the lake is from non-source point pollution. USACE chemical and physical sediment sampling (April 2014) was completed to provide general data on concentrations of contaminants, if present, that could potentially be transported downstream. The results were compared with CT-ICS, Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - effective June 27, 2013, and CT-RC, Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - effective June 27, 2013.

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to require constraints. The material meets the testing exclusion criteria.

		X	
		Yes	**No**

4. Disposal Site Delineation (Section 230.11(f))

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

			N/A	Not Significant	Significant
	1.	Depth of water at disposal site - Varies. Riverine habitat		X	
	2.	Current velocity, direction, and variability at disposal site		X	
	3.	Degree of turbulence		X	
	4.	Water column stratification		X	
	5.	Discharge vessel speed and direction	X		
	6	Rate of discharge		X	
	7	Dredged material characteristics (constituents, amount, and type of material, settling velocities		X	
	8	Number of discharges per unit of time	X		
	9.	Other factors affecting rates and patterns of mixing (specify)	X		

List appropriate references:

See Environmental Assessment. Sediment volumes from discharge are expected to be within the seasonal variability of the amount of sediment and water carried by the Northfield Brook watershed over an annual cycle. Sediment dissemination from material existing behind the dam could range from 3,000 to 5,000 cubic yards and is expected to distribute in accordance with water velocities of the course of a normal flood and non-flood season.

b. An evaluation of the appropriate factors in 4a above indicated that our disposal sites and/or size of mixing zone are acceptable.

		X	
		Yes	**No**

5. Actions To Minimize Adverse Effects (Subpart H)

All appropriate and practicable steps have been taken, through application of recommendation of Section 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.

		X	
		Yes	**No**

List Actions Taken:

See Environmental Assessment, Section 3.15, Mitigation Measures. The release of water and downstream sediment transport will occir in conjuction with a high rain event and the water from the dam as quickly as possible, consistent with the Outflow Guidance. High water flow dam operations allow sediment-laden waters to flow from or through a dam; however the action to dewater the entire lake deviates from normal flood control dam operations that may see the discharge of bottom sediment to downstream locations.

6. Factual Determination (Section 230.11)

All review of appropriate information, as identified in items 2 through 5 above, indicate there is minimal potential for short or long-term environmental effects of the proposed discharge as related to:

			Yes	No
	a.	Physical substrate at the disposal site (review sections 2a, 3,4, and 5 above substrate elevation and slope: instream transport sediment type: fines, sand, gravel fill material movement: with stream velocity physical effects on benthos: Temporary, minor	X	

	b.	Water circulation, fluctuation and salinity (review sections 2a, 3, 4, and 5 Salinity: Not applicable; Taste: No effect Water chemistry: Temporary minor effect; Nutrients: No effect Clarity: Temporary, major effect; Eutrophication: Permanent, Major positive effects Color: No effect; Temperature: Positive effects after permanent drawdown Odor: Temporary, minor effect	X	
	c.	Suspended particles/turbidity (review sections 2a, 3, 4, and 5). – Expected changes in suspended particulates and turbidity levels in vicinity of fill site: Temporary, observable effect during the final stages of water drawdown. The area should reach a stabilized equilibrium in a relatively short time period. 2. Effects on Chemical and Physical Properties of the Water Column: a. Light Penetration: Temporary, major effect. b. Dissolved Oxygen: Temporary, major effect. c. Toxic Metals and Organics: No effect. d. Pathogens: No effect e. Aesthetics: Temporary, major effects limited to the construction period. Site should stabilize quickly and planting plan is in place for any exposed riverbanks due to the dam removal. f. Temperature: Positive effect after dam removal. Area of impoundment will be a free flowing stream with cooler water temperatures.	X	
	d.	Contaminant availability (review sections 2a, 3, and 4).	X	
	e.	Aquatic ecosystem structure, function and organisms (review sections 2b, 2c, 3, and 5)	X	
	f.	Proposed disposal site (review sections 2, 4, and 5).	X	
	g.	Cumulative effects on the aquatic ecosystem. - No significant adverse effects are anticipated. The result is expected to benefit the aquatic ecosystem.	X	
	h.	Secondary effects on the aquatic ecosystem. - No significant secondary effects are anticipated. The result is expected to be a significant benefit to the aquatic ecosystem.	X	

List appropriate references:

The nature and degree of impacts identified in a. through e. are temporary and short-term with no long-term adverse affects anticipated to be realized to water circulation, suspended particles/turbidity, and aquatic system structure and function in the area immediately downstream of the dam. These conditions will be highly localized. The material passing through the dam will not introduce an new contaminants, nor relocate any significant concentrations of contaminants that would be harmful to the aquatic ecosystem. USACE has not identified secondary and cumulative effects on the aquatic ecosystem associated with the proposed action.

7. Findings

The proposed disposal site for discharge of dredged or fills material complies with the Section 404(b)(1) guidelines. The material consists of sediment that has accumulated behind the dam.

Date

Christopher J. Barron
Colonel, Corps of Engineers
District Engineer

US Army Corps of Engineers®
New England District

Northfield Brook Lake Sediment Sampling & Testing
Thomaston, Connecticut

Date: 25 April 2014

Testing Criteria:

State of Connecticut

- Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013

- Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013

Sampling Coordinates:

A =	-73.09036351	41.68518166
B =	-73.09049120	41.68424175
C=	-73.09108088	41.68353638

Sampling Conducted by:
U.S. Army Corps of Engineers
New England District
Environmental Resources Section
R. Loyd, K. Bargerhuff

TABLE C.1
NORTHFIELD BROOK SEDIMENT SAMPLING & TESTING
Moisture & Solids/Grain Size Analysis/Total Organic Carbon

LOCATION within Northfield Brook Lake c/					A c/	B c/	C c/
SAMPLING DATE					**4/25/2014**	**4/25/2014**	**4/25/2014**
	Case Number	**CT-ICS a/**	**CT-RCS b/**	**Units**			
GENERAL							
Moisture	NONE	-	-	%	24.6	62	37.4
Solids, Total	NONE	-	-	%	75.4	38	62.6
Grain Size Analysis							
% Total Gravel	NONE	-	-	%	0.7	0.1	7.5
% Coarse Sand	NONE	--	-	%	4.2	4.6	7.9
% Medium Sand	NONE	-	-	%	44.4	19.3	25.8
% Fine Sand	NONE	--	-	%	49.5	34.1	31.7
% Total Fines	NONE	-	-	%	1.2	41.9	27.1
Total Organic Carbon							
Total Organic Carbon (Rep1)	7440-44-0	-	-	%	0.927	6.1	2.13
Total Organic Carbon (Rep2)	7440-44-0	-	-	%	1.06	6.02	2.57

a/ CT-ICS. Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.

b/ CT-RCS. Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.

U - Not detected at the reported detection limit for the sample.

- No established standard

c/ coordinates of samples:

A = -73.09036351 41.68518166

B = -73.09049120 41.68424175

C= -73.09108088 41.68353638

TABLE C.2
NORTHFIELD BROOK SEDIMENT SAMPLING & TESTING
Metals and Pesticides

LOCATION within Northfield Brook Lake c/					A		B		C	
SAMPLING DATE					**4/25/2014**		**4/25/2014**		**4/25/2014**	
	Case Number	**CT-ICS a/**	**CT-RCS b/**	**Units**						
METALS										
Arsenic, Total	7440-38-2	10	10	mg/kg	0.912		3.79		2.18	
Cadmium, Total	7440-43-9	1000	34	mg/kg	0.111		1.2		0.562	
Chromium, Total	7440-47-3			mg/kg	8.63		34.9		21.2	
Copper, Total	7440-50-8	76000	2500	mg/kg	13.1		60.3		30.5	
Lead, Total	7439-92-1	1000	400	mg/kg	9.61		51.3		34.6	
Mercury, Total	7439-97-6	610	20	mg/kg	0.016	U	0.106		0.069	
Nickel, Total	7440-02-0	7500	1400	mg/kg	7.37		46.2		21.6	
Zinc, Total	7440-66-6	610000	20000	mg/kg	35		214		163	
PESTICIDES										
4,4'-DDD	72-54-8	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
4,4'-DDE	72-55-9	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
4,4'-DDT	50-29-3	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
Aldrin	309-00-2	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
cis-Chlordane	5103-71-9	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
cis-Nonachlor	5103-73-1	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
Dieldrin	60-57-1	0.36	0.038	mg/kg	0.00296	U	0.00605	U	0.0037	U
Endosulfan I	959-98-8	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
Endosulfan II	33213-65-9	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
Endrin	72-20-8	610	20	mg/kg	0.00296	U	0.00605	U	0.0037	U
gamma-BHC	58-89-9	610	20	mg/kg	0.00296	U	0.00605	U	0.0037	U
Heptachlor	76-44-8	1.3	0.14	mg/kg	0.00296	U	0.00605	U	0.0037	U
Heptachlor epoxide	1024-57-3	0.63	0.067	mg/kg	0.00296	U	0.00605	U	0.0037	U
Hexachlorobenzene	118-74-1	3.6	1	mg/kg	0.00888	U	0.0181	U	0.0111	U
Methoxychlor	72-43-5	10000	340	mg/kg	0.106	U	0.218	U	0.133	U
Oxychlordane	27304-13-8	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
Toxaphene	8001-35-2	5.2	0.56	mg/kg	0.149	U	0.304	U	0.186	U
trans-Chlordane	5103-74-2	-	-	mg/kg	0.00296	U	0.00605	U	0.0037	U
trans-Nonachlor	39765-80-5	-	-	mg/kg	0.00739		0.00605	U	0.0037	U

a/ CT-ICS. Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.

b/ CT-RCS. Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.

U - Not detected at the reported detection limit for the sample.

c/ coordinates of samples: A = -73.09036351 41.68518166 / B = -73.09049120 41.68424175 C= -73.09108088 41.68353638

TABLE C.3
NORTHFIELD BROOK SEDIMENT SAMPLING & TESTING
PAHs

LOCATION within Northfield Brook Lake c/					A	B	C
SAMPLING DATE					**4/25/2014**	**4/25/2014**	**4/25/2014**
	Case Number	**CT-ICS a/**	**CT-RCS b/**	**Units**			
PAHs							
Acenaphthene	83-32-9	-	-	mg/kg	0.0415	0.0516	0.0461
Acenaphthylene	208-96-8	2500	1000	mg/kg	0.424	0.313	0.328
Anthracene	120-12-7	2500	1000	mg/kg	0.344	0.23	0.218
Benz(a)anthracene	56-55-3	7.8	1	mg/kg	1.54	1.08	0.954
Benzo(a)pyrene	50-32-8	1	1	mg/kg	1.31	1.14	0.979
Benzo(b)fluoranthene	205-99-2	7.8	1	mg/kg	1.09	1.48	1.15
Benzo(ghi)perylene	191-24-2	-	-	mg/kg	0.804	0.811	0.686
Benzo(k)fluoranthene	207-08-9	78	8.4	mg/kg	1.16	0.903	0.85
Chrysene	218-01-9	-	-	mg/kg	1.59	1.24	1.06
Dibenz(a,h)anthracene	53-70-3	-	-	mg/kg	0.274	0.234	0.206
Fluoranthene	206-44-0	2500	1000	mg/kg	3.28	2.81	2.42
Fluorene	86-73-7	2500	1000	mg/kg	0.159	0.0826	0.0961
Indeno(1,2,3-cd)Pyrene	193-39-5	-	-	mg/kg	0.789	0.834	0.717
Naphthalene	91-20-3	2500	1000	mg/kg	0.0829	0.0367	0.036
Phenanthrene	85-01-8	2500	1000	mg/kg	2.12	1.17	1.04
Pyrene	129-00-0	2500	1000	mg/kg	2.69	2.03	1.84

a/ CT-ICS. Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.
b/ CT-RCS. Residential Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.
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TABLE C.4
NORTHFIELD BROOK SEDIMENT SAMPLING & TESTING
PCBs

LOCATION within Northfield Brook Lake c/					A		B		C	
SAMPLING DATE					**4/25/2014**		**4/25/2014**		**4/25/2014**	
	Case Number	**CT-ICS a/**	**CT-RCS b/**	**Units**						
PCBs										
Cl10-BZ#209	2051-24-3			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl2-BZ#8	34883-43-7			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl3-BZ#18	37680-65-2			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl3-BZ#28	7012-37-5			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl4-BZ#44	41464-39-5			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl4-BZ#49	41464-40-8			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl4-BZ#52	35693-99-3			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl4-BZ#66	32598-10-0			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl5-BZ#101	37680-73-2			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl5-BZ#105	32598-14-4			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl5-BZ#118	31508-00-6			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl5-BZ#87	38380-02-8			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl6-BZ#128	38380-07-3			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl6-BZ#138	35065-28-2			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl6-BZ#153	35065-27-1			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl7-BZ#170	35065-30-6			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl7-BZ#180	35065-29-3			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl7-BZ#183	52663-69-1			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl7-BZ#184	74472-48-3			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl7-BZ#187	52663-68-0			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl8-BZ#195	52663-78-2			mg/kg	0.00118	U	0.00242	U	0.00148	U
Cl9-BZ#206	40186-72-9			mg/kg	0.00118	U	0.00242	U	0.00148	U

a/ CT-ICS. Industrial/Commercial Direct Exposure Criteria for Soil Criteria per Amended Remediation Standard Regulations - Effective June 27, 2013.

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