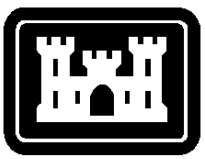
Section 206 Aquatic Ecosystem Restoration
Feasibility Report and Environmental Assessment

Removal of Bloomsbury Dam on the Musconetcong River

Borough of Bloomsbury,
Hunterdon County
Township of Greenwich,
Warren County
New Jersey

April 2013



US Army Corps of Engineers
Philadelphia District

Executive Summary

This Feasibility Report for Removal of the Bloomsbury Dam on the Musconetcong River was prepared under the continuing authority of Section 206 of the Water Resources Development Act of 1996 (PL 104-303) entitled "Aquatic Ecosystem Restoration". The report consists of a summary of the existing conditions of the project area, problem identification, plan formulation, an Environmental Assessment, comparison and evaluation of alternative plans, selected plan description, and recommendations. The study accomplished the following:

- Examined existing conditions and assessed the degradation of the aquatic ecosystem caused by the dam.
- Developed and evaluated alternative plans for removing the dam.
- Assessed the environmental impacts of the alternative plans.
- Evaluated the ecological benefits of the alternative plans and conducted a preliminary hydrologic and hydraulic analysis.
- Conducted a cultural resources survey and negotiated a programmatic agreement to implement future studies.
- Prepared a preliminary cost estimate.
- Determined the Federal interest in participating in improvements.
- Identified the capability and willingness of the non-Federal Sponsor, the New Jersey Department of Environmental Protection Office of Natural Resource Restoration, to share the cost of implementing the project.
- Established preliminary design assumptions and construction sequence.
- Identified tasks to be completed in the Design and Implementation phase of the project.

The dam is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River. Ownership of the dam is shared by a private citizen and a corporation. It is a run-of-the-river dam that is approximately 7 feet high and 170 feet long. It does not have the capability of controlling flows or generating hydroelectric power. The construction is cast-in-place concrete that was likely placed on top of the remnants of a former timber crib mill dam. At the crest of the dam, the impoundment is approximately170 feet wide. Upstream, the width of the impoundment slowly tapers down over the course of approximately 1,600 feet to the normal width of the river, which is approximately 90 feet.

The Musconetcong River has been federally designated as a National Wild and Scenic River that has outstanding ecological value in free-flowing condition. Bloomsbury Dam is one of three remaining dams on the lower Musconetcong River that acts as an impediment to migratory fish from the Delaware River. A partnership of federal and state agencies and non-profit organizations is currently conducting feasibility studies for removal of the other two dams. When all three of these dams are removed, it will restore 13.3 miles of the Musconetcong River to its natural, free-flowing condition and allow migratory fish to access spawning habitat which they have not been able to reach for over 200 years.

The Musconetcong River sustains naturally breeding populations of Eastern brook trout, the region's only native trout. Brook trout are a culturally and recreationally important species and an indicator of high water quality; however, populations are in decline across their

historic habitat in the northeast U.S. The Eastern Brook Trout Joint Venture, a partnership of state and federal agencies, nongovernmental organizations, and academic institutions has invested considerable funds into habitat restoration projects to benefit native brook trout on a regional and national scale. The removal of Bloomsbury Dam would provide significant habitat improvements for this valuable native species.

The Musconetcong also provides habitat for 36 other individual resident fish species and the NJDEP Division of Fish and Wildlife Bureau of Freshwater Fisheries stocks the river each year with brook, brown and rainbow trout.

This feasibility study was performed to determine the environmental benefits of removing the dam in an effort to significantly enhance the aquatic habitat, improve fisheries, and restore the river to natural conditions. In its current condition, the dam degrades the aquatic environment by impeding the passage of aquatic organisms, obstructing natural sediment transport processes, and impairing the water quality and benthic habitat in the impoundment.

The study has concluded that removal would result in numerous environmental benefits including restoration of free flowing conditions, free passage of aquatic organisms, and improved aquatic habitat. Approximately 7.8 miles of the river would be reconnected and approximately 7.5 acres of impoundment would be restored to natural river conditions. Key native fish species that would benefit from the project would include brook trout and American eel. Removal would also eliminate a public drowning hazard and provide safe passage for recreational boats.

The alternative plans considered included both complete and partial dam removal. It was determined that a partial dam removal would provide all of the benefits of a complete dam removal (i.e. allow passage for aquatic organisms and recreational boats, restoration of riverine aquatic habitat, re-establishment of natural sediment transport, elimination of a safety hazard), but would also provide several additional benefits (ie. maintain the structural integrity of the existing embankments, diversion of flows toward the center of the river, preservation of dam remnants for appreciation as a historic resource, reduction of demolition material that requires re-use or disposal). Therefore, the partial dam removal plan has been identified as the selected plan.

Based on the preliminary design assumptions that were formulated as part of this effort, a cost estimate was prepared for implementing the selected plan. A cost of $825,000 was estimated for a partial dam removal. The non-Federal cost share for the proposed project would equal 35% of the first cost of construction, which is estimated at $289,000. The sponsor, the New Jersey Department of Environmental Protection Office of Natural Resource Restoration, has indicated its willingness and capability to provide the required non-Federal cost-sharing and other items of non-Federal cooperation as specified in the draft Project Partnership Agreement. Based on this analysis, the District Commander recommends that that the dam removal project described in this report be approved and implemented under the continuing authority of Section 206 of the Water Resources Development Act of 1996 (PL 104-303).

FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT
SECTION 206 AQUATIC ECOSYSTEM RESTORATION STUDY
REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER
BOROUGH OF BLOOMSBURY, HUNTERDON COUNTY
TOWNSHIP OF GREENWICH, WARREN COUNTY
NEW JERSEY

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1.0 INTRODUCTION

This feasibility report is the result of engineering and environmental evaluations to determine the viability of the removal of the Bloomsbury Dam along the Musconetcong River for the purpose of restoring the aquatic ecosystem. The non-Federal sponsor for the project is the New Jersey Department of Environmental Protection Office of Natural Resource Restoration.

1.1 Study Area

The Bloomsbury Dam ("the dam") is situated within the Musconetcong River between the Borough of Bloomsbury in Hunterdon County, New Jersey and Greenwich Township in Warren County, New Jersey (Longitude 40°39'20''N, Latitude 75°05'19"W) (Figures 1,2, and 3). The dam is adjacent to the intersection of NJ State Route 173 (Warren Glen Bloomsbury Road) and County Route 579 (Church Street). It is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River.

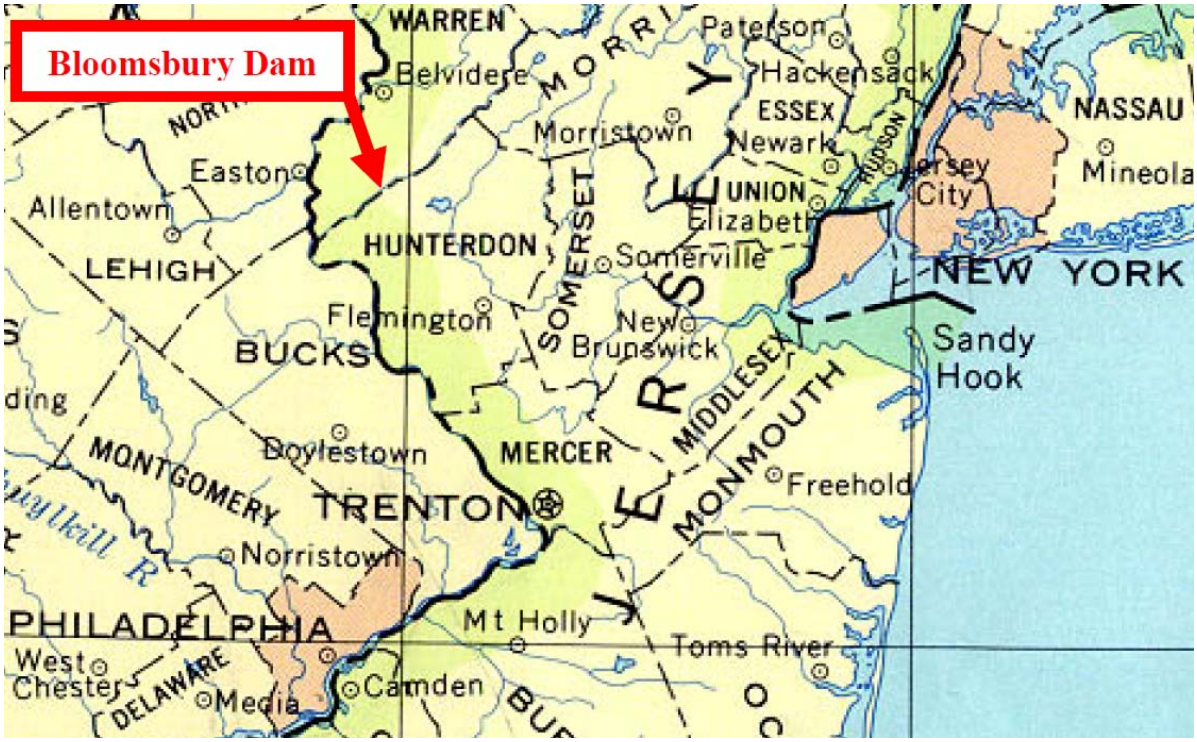


Figure 1 – Project Location

The Musconetcong River flows for approximately 42 miles from Lake Hopatcong to the Delaware River in a northeast to southwest direction. It drains a 158 square mile, mostly rural, watershed area in northwestern New Jersey. The watershed is primarily forested and is located in parts of 25 municipalities in Sussex, Morris, Warren and Hunterdon Counties in New Jersey. Approximately 15 percent of the watershed's 100,864 acres are permanently preserved as open space or farmland. As a major tributary to the Delaware River, the Musconetcong River is also part of the 12,755 square mile Delaware River watershed (Figure 4).

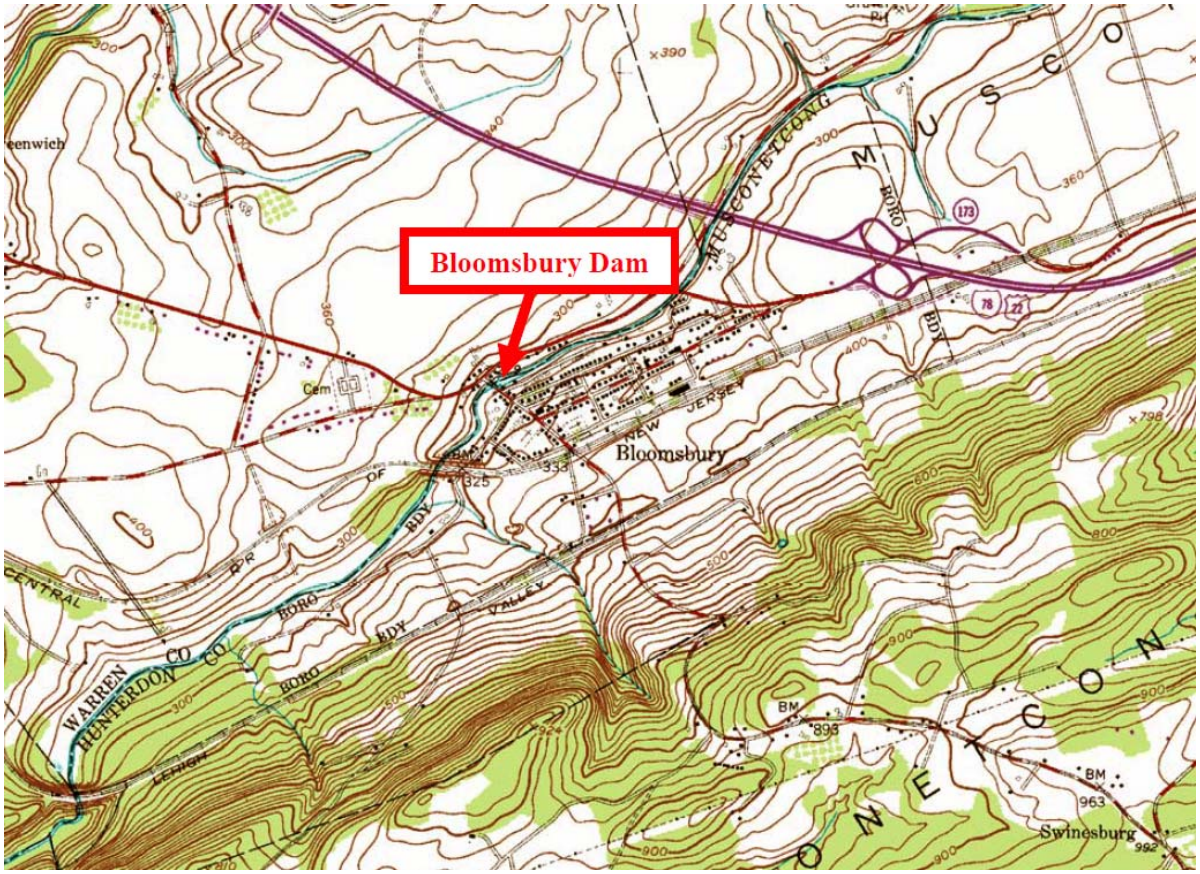


Figure 2 –Project Location (USGS Bloomsbury Quadrangle)

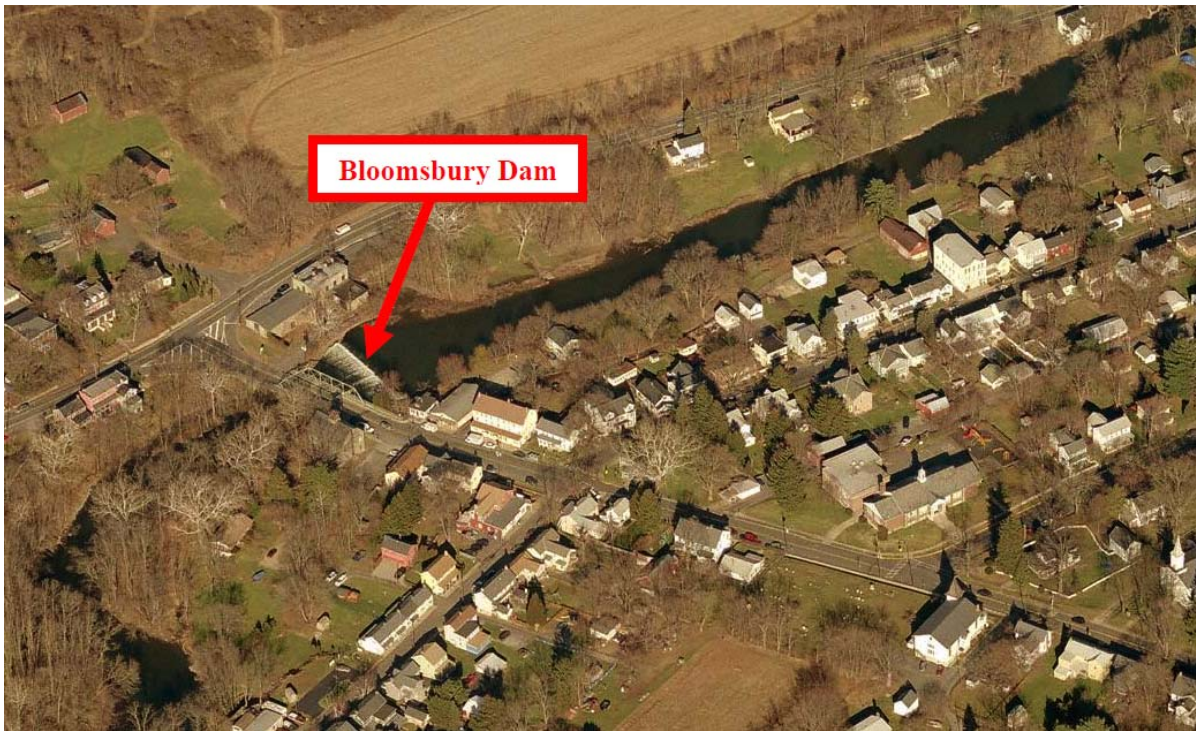


Figure 3 –Project Location (Aerial Photograph)

The Musconetcong River has been designated by the New Jersey Department of Environmental Protection (NJDEP) as a Category One water. Category One waters are defined in the New Jersey Surface Water Quality Standards rules as waters protected from any measurable changes in water quality because of their exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources.

On December 26, 2006, President George W. Bush signed Public Law 109-452 - designating the Musconetcong River a National Wild and Scenic River. The National Wild and Scenic River System was created by Congress in 1968 with the Wild and Scenic Rivers Act. The Act calls on the nation to preserve select rivers with outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural or other important values in free-flowing condition. Rivers in this national system are protected for the benefit and enjoyment of present and future generations.

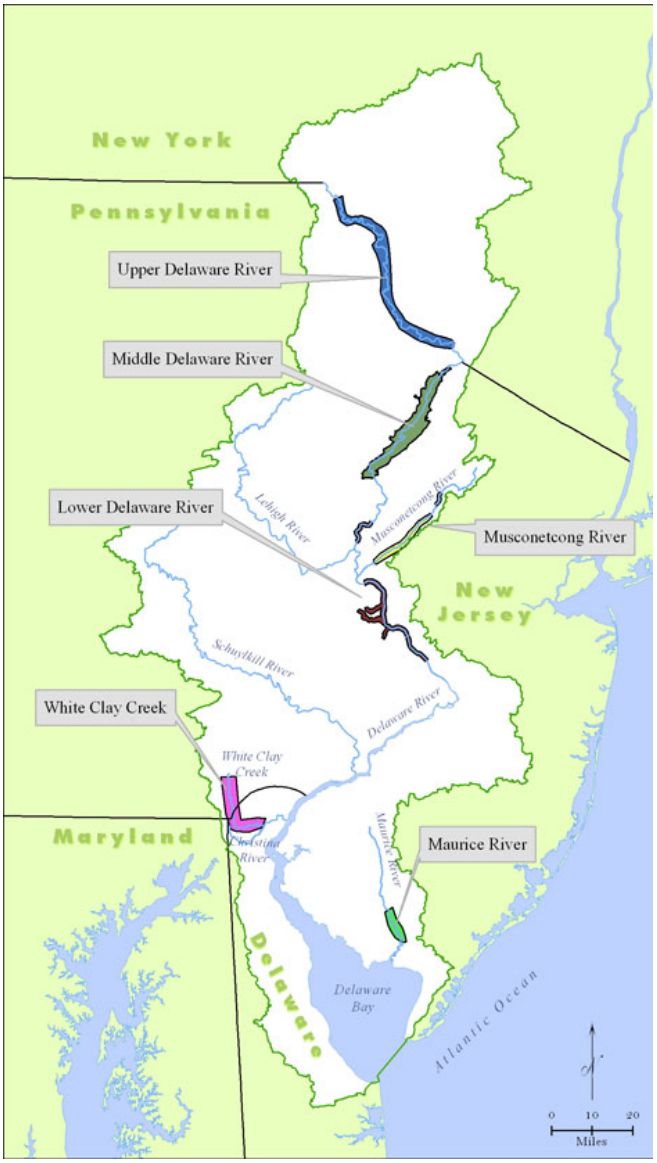


Figure 4 –Delaware River Watershed (highlighted areas are National Wild and Scenic Rivers).

The dam is also located within the New Jersey Highlands. The Highlands is a 1,343 square mile area in the northwest part of the state noted for its scenic beauty and environmental significance. The region was designated in 2004 by the Highlands Water Protection and Planning Act to preserve open space and protect the state's greatest diversity of natural resources. This includes the water resources that supply drinking water to more than half of the State (approximately 5.4 million people). The dam is located in a portion of the Highlands designated as the Highlands Preservation Area. Within this Area, all "major development" as defined by the Act is regulated by the NJDEP.

There are eleven dams of varying size along the main stem of the Musconetcong River from Lake Hopatcong to Finesville. A majority these dams were built for industrial purposes in the early 1900s and are no longer used for their original purpose. There are two existing downstream dams located along the Musconetcong River between the Bloomsbury Dam and the confluence with the Delaware River (Figure 5). Beginning at the confluence and moving upriver toward Bloomsbury, the dams are the Hughesville Dam and the Warren Glen Dam. Approximately 5.5 miles upstream of the Bloomsbury Dam, the next dam on the river is the Asbury Graphite Dam.

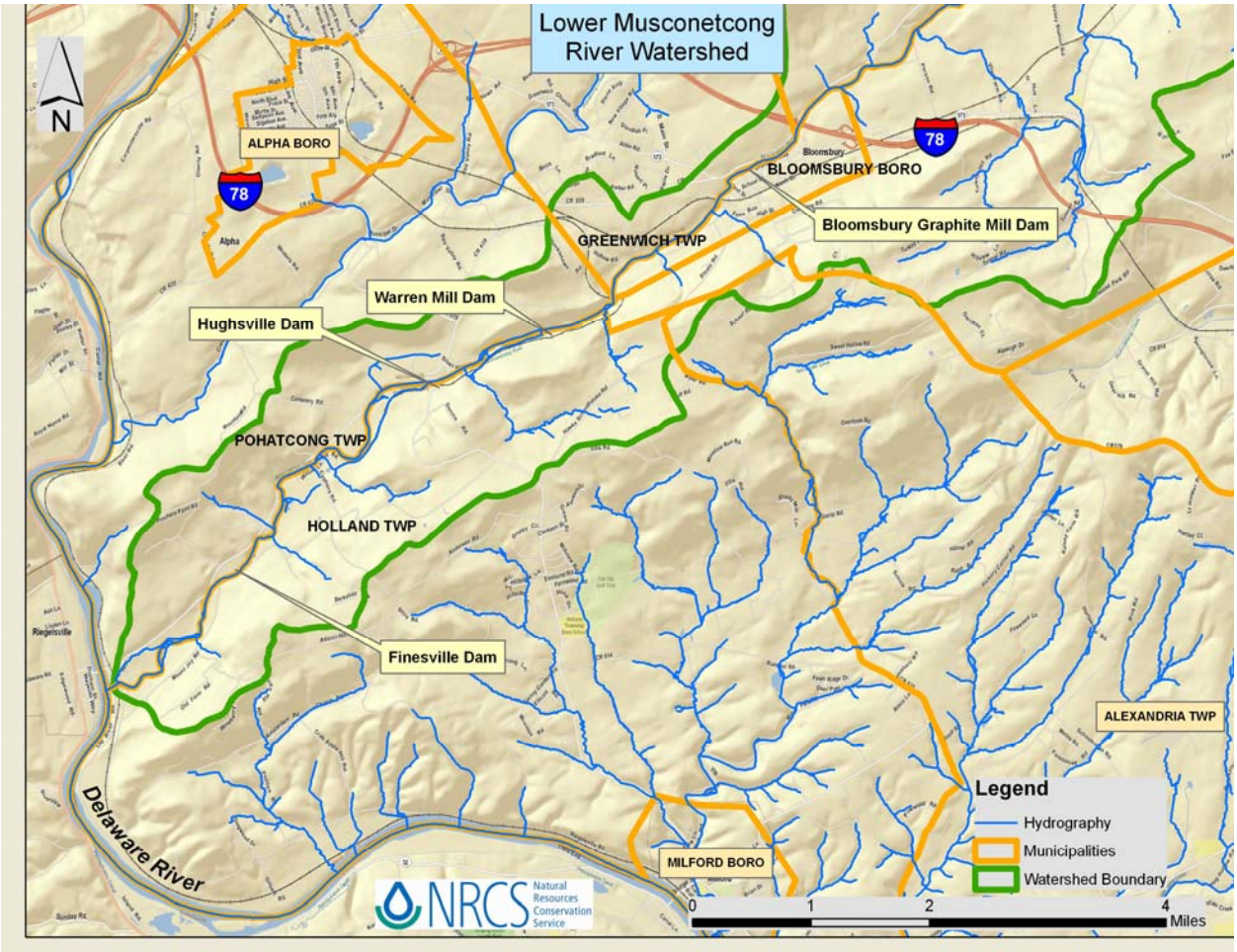


Figure 5 –Lower Musconetcong River Watershed

A third dam, the Finesville Dam, was also located on the Musconetcong River downstream of the Bloomsbury Dam until its recent removal. The Finesville Dam was located between the confluence with the Delaware River and the Hughesville Dam. From 2008 to 2010, a partnership of federal and state agencies and non-profit organizations conducted a feasibility study for the removal of the Finesville Dam. This partnership includes the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), the NJDEP Bureau of Dam Safety and Flood Control, the NJDEP Division of Fish and Wildlife, the Musconetcong Watershed Association (MWA), American Rivers, and Trout Unlimited. The Finesville Dam was removed in November 2011. The partnership has also received permission from the owner of the Hughesville and Warren Glen Dams to conduct feasibility studies for their removal. The studies began in 2012.

1.2 Study Authority

Authority to perform this investigation was provided under Section 206 of the Water Resources Development Act of 1996 (PL 104-303) entitled "Aquatic Ecosystem Restoration", which states in part, "The Secretary [of the Army] may carry out an aquatic ecosystem restoration and protection project if the Secretary determines the project will restore the quality of the environment and is in the public interest; and is cost-effective."

1.3 Study Purpose and Scope

The purpose of this study is to determine the environmental benefits/costs of removing the Bloomsbury Dam on the Musconetcong River in an effort to significantly enhance the local aquatic habitat, improve fisheries, and restore the river to natural conditions. The objective is to ensure the implementation of an environmentally, economically, and technically sound design. The study includes identification and evaluation of these plans within identified planning constraints. The study results in the recommendation of single plan that achieves the identified goals in an efficient manner while considering the interests of the sponsor.

1.4 Prior Studies

No existing or previous USACE projects were identified in the vicinity of the dam. There were also no prior studies identified that specifically examined Bloomsbury Dam. However, there were previous and on-going studies along the Musconetcong River that are relevant to this feasibility effort and were consulted as information resources.

In April 2003, the "Musconetcong River National Wild and Scenic Rivers Study – River Management Plan" (River Management Plan) was published by a partnership of the National Park Service, the Musconetcong Advisory Committee, the Musconetcong Watershed Association, and the Heritage Conservancy. The plan proposed a strategy for managing the Musconetcong River and its many outstanding resource values. It was prepared as part of a study to evaluate the Musconetcong River for inclusion in the National Wild and Scenic Rivers System.

In 2007, an Environmental Resource Inventory (ERI) was prepared for the Borough of Bloomsbury by Amy S. Greene Environmental Consultants, Inc. The purpose of the ERI

was to objectively identify and describe the natural resources, cultural conditions and environmental features within the Borough. The ERI was prepared with the aid of a Smart Growth Planning Grant from the Association of New Jersey Environmental Commissions.

As noted in Section 1.1, a partnership of Federal, state, and non-profit agencies removed the Finesville Dam in November 2011 (Figure 6). The Finesville Dam was located approximately 6.2 miles downstream of Bloomsbury and was the first impediment upstream from the confluence of the Musconetcong River and the Delaware River. For the Finesville effort, a Feasibility Study (Princeton Hydro, 2009) and an Environmental Assessment (USDA NRCS, 2009) were prepared. These studies are especially useful references for this Bloomsbury project because the Finesville Dam was so similar to the Bloomsbury Dam. The Finesville Dam was also a run-of-the-river, former mill dam that was 5.5 feet high and 109 feet long. It was a timber crib dam that was capped with concrete. A steel truss bridge is also located immediately downstream of the former dam location. The Corps has consulted with the Finesville partnership as they have progressed through their efforts so that our study may benefit from any lessons they have learned. Given that the two dams were so similar, the technical, regulatory, and public perception challenges are likely to be comparable. And the fact that their study progressed approximately 2 years ahead of the Bloomsbury study gives the Corps the ability to modify our plans based on their experience and recommendations.

Figure 6 – Finesville Dam Before and After Removal

2.0 EXISTING CONDITIONS

2.1 Dam and Study Area Description

Location

The dam is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River. There are three existing dams located between the Bloomsbury Dam and the confluence of the two rivers. The Warren Glen Dam is the first dam located downstream from Bloomsbury and is approximately 2.3 miles to the southwest. Upstream of Bloomsbury, the next impediment on the Musconetcong River is the Asbury Graphite Dam, which is located approximately 5.5 miles to the northeast.

Therefore, removal of the Bloomsbury Dam would restore the connectivity of approximately 7.8 miles of the river.

Construction and Condition

The Bloomsbury Dam is a run-of-the-river dam that is approximately 7 feet high and 170 long (Photograph 1). It does not have the capability of controlling flows or generating hydroelectric power. The majority of the dam appears to be comprised of cast-in-place concrete. However, based on the observations of similar dams on the river and the results of the cultural resource investigation (described below), it is likely that there are remnants of a timber crib dam either within the concrete structure, or immediately upstream. According to NJDEP Bureau of Dam Safety and Flood Control records, the dam was rebuilt from an earlier dam circa 1912 to help provide power for the Bloomsbury Graphite Company. The Bureau does not have as-built drawings for the dam or any records of its composition. The dam has not been given a hazard status classification by the Bureau.

Photograph 1 – Bloomsbury Dam.

The downstream face of the spillway appears to be in good condition. It is unknown if a concrete apron exists at the foot of the spillway, or if a scour hole has formed in the absence of an apron. When the dam was observed during low flows, large cobbles and small boulders were visible within 20 feet of the foot of the dam.

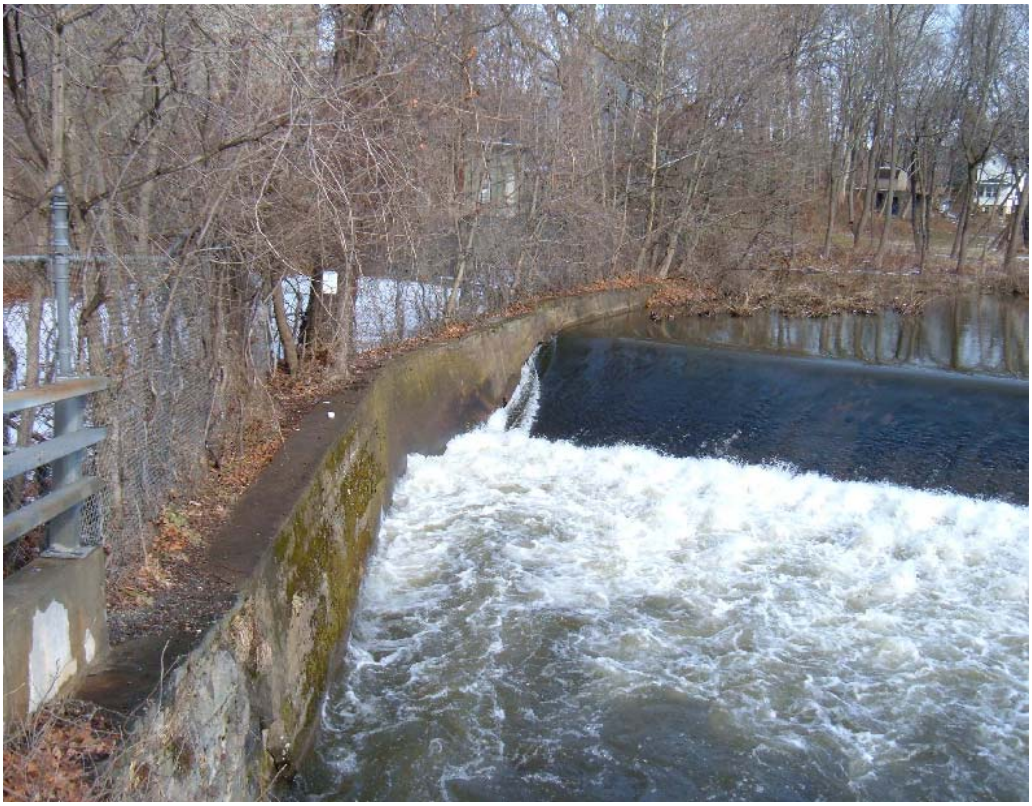
The embankments of the dam are composed of large stone and masonry walls that also form the base of the steel truss bridge that is approximately 90 feet downstream of the dam (Photographs 2 and 3). The sections of the embankments that are in contact with the dam

appear to have a small degree of scour present (Photographs 4 and 5). However, in general, the embankments appear to be stable.

Photograph 2 – Dam and downstream bridge on Route 579 (Church Street).

Photograph 3 – Downstream bridge on Route 579 (Church Street).

Photograph 4 – Southern embankment of the dam and the adjacent residential property in Borough of Bloomsbury.



Photograph 5 – Northern embankment of the dam in Greenwich Township.

Dam Ownership and Adjacent Buildings

Ownership of the dam is shared by a private citizen and a corporation. The southern half of the dam that is located in the Borough of Bloomsbury is part of a residential property that sits next to the river (30 Church Street) and is owned by a private citizen. A two-story home is located on the property (Photograph 4).

The northern half of the dam that is located in Greenwich Township is part of a former industrial property that sits next to the river and is owned by Asbury Graphite Mills, Inc. (Photograph 6). A representative of Asbury Graphite Mills, Inc. has indicated that the industrial activities at the facility ceased in the 1950s or 1960s. The facility was used for the production of graphite materials for industrial applications.

Both the private citizen and Asbury Graphite Mills, Inc. have provided the Philadelphia District with letters indicating that they support this study regarding removal of the dam.

Photograph 6 – Former industrial facility adjacent to the dam in Greenwich Township.

Maintenance and Liability

Neither of the owners of the dam are currently maintaining the dam or are interested in doing so in the future. Both owners of the dam would like to remove the dam and relieve themselves of the liabilities that are associated with ownership. Even though the dam does not appear to be in immediate risk of failure and is not considered a high hazard by the Bureau of Dam Safety, there is always the possibility of accidental drownings or a catastrophic failure caused by an abnormal natural event.

Mill Races

According to the 1915 Sanborn Insurance Map (Figure 6), two mill races were associated with the dam in the past, with one on each side of the river. The map indicates that a head race branched off of the south side of the river immediately upstream of the dam and went under Church Street and through the Bloomsbury Graphite Mill No.1 (location of current Bloomsbury Black Mill, 27 Church Street). The tail race then exited the Mill and rejoined the river downstream (Photograph 7). At some point after the cessation of milling activities, the head race on the south side of the river was filled, however the remnants are still visible (Photograph 4). When the southern head race was observed during high river flows, it appeared that some flow from the river was still entering the race and then flowing out of a corrugated plastic pipe downstream of the dam, but before the bridge. It does not appear that any flows from the southern head race continue to go under Church Street to the Mill. The southern tail race was also filled at some point in the past and the remains are no longer visible.

On the north side of the river, flow was diverted into a head race and flowed into the Bloomsbury Graphite Mill No. 2 (location of current Asbury Graphite Mills building). The tail race exited the Mill in a tunnel that went under County Route 579 and then flowed into an open channel which rejoined the river downstream. Both the head race and the tail race still exist on the north side of the river, however they are not being used for their original purpose. The head race is located approximately 60 feet upstream of the dam and appears to hold slackwater from the impoundment behind the dam. When the river was observed at high flows, the water in the northern head race appeared to be relatively stagnant and did not appear to be flowing through the Mill. At the same time, water in the tail race appeared to be stagnant.

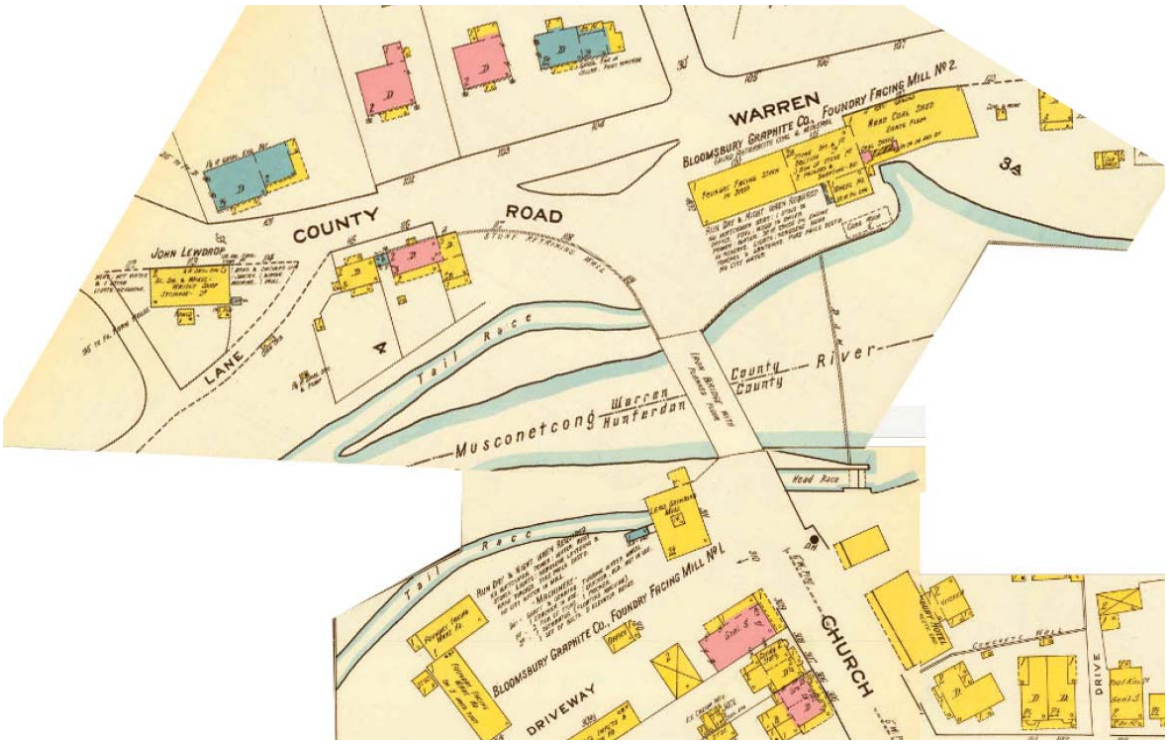


Figure 7 – 1915 Sanborn Insurance Map

Photograph 7 – Musconetcong River downstream of the Bloomsbury Dam.

Impoundment

At the crest of the dam, the impoundment is approximately170 feet wide (Photograph 8). As it extends to the northeast, the width of the impoundment slowly tapers down over the course of approximately 1,600 feet to the normal width of the river, which is approximately 90 feet. From a hydraulic perspective, the impoundment extends approximately 3,600 feet upstream from the dam to the point where Interstate 78 crosses the river. This is the furthest upstream point where the dam is impacting the velocity and surface elevation of the river.

For this feasibility effort, a sediment quality investigation was performed by Versar, Inc. in May 2011 to characterize the physical and chemical parameters of the sediment that is impounded behind the dam. The investigation also included measurements of sediment thickness that were used to estimate the quantity of sediment behind the dam.

Analytical testing of the sediment samples indicated that, with the exception of cyanide, none of the inorganic, semi-volatile organic, pesticide, or aroclor PCB analytes were found to exceed the NJDEP soil clean up criteria for residential and non-residential uses or the NJDEP Ecological Screening Values for Freshwater Sediment. Sediment grain size analysis indicated that approximately 98% of the sediment behind the dam was a mix of sand and gravel. Approximately 2% of the sediment was composed of silt or clay. Sediment volume calculations estimated that approximately 6,000 cubic yards of sediment has accumulated behind the dam. The Versar, Inc. sediment quality testing report has been included as Appendix D of the Environmental Assessment.

Photograph 8 – Impoundment upstream of the Bloomsbury Dam.

2.2 Environmental Resources

The Musconetcong River has outstanding ecological value in its free flowing condition. It is a renowned trout fishing river that sustains naturally breeding populations of Eastern brook trout (*Salvelinus fontinalis*), the region's only native trout, and provides habitat for 36 other individual resident fish species. The NJDEP Division of Fish and Wildlife Bureau of Freshwater Fisheries also stocks the river each year with brook, brown and rainbow trout.

The Musconetcong is a tributary of the Delaware River and both rivers have features that are recognized as being of national importance. The Delaware River is one of four major bird migratory routes in North America and the Musconetcong is part of this important wildlife corridor. The forested ridges that define the watershed boundaries of the Musconetcong River have been identified by the U.S. Forest Service as critically important forestland. These ridges form critical migration routes for passerines (songbirds) and raptors following the distinct topography of the New England Uplands physiographic province.

Physiographic and Geologic Setting

The Bloomsbury Dam is located in the Highlands physiographic province of New Jersey, which has a generally rugged topography consisting of a series of discontinuous rounded ridges separated by deep narrow valleys. It is comprised of granite and gneiss bedrock types.

The soils that occur in the vicinity of the dam include the Fluvaquent and Udifluvent series on the Hunterdon County side and the Fredon and Halsey complex series on the Warren County side. The Fluvaquent series consists of poorly drained soils formed in sandy alluvium. The Udifluvent series consists of moderately drained soils formed in sandy alluvium. The Fredon and Halsey complex series consists of poorly drained soils formed in sandy and gravelly glaciofluvial deposits derived from limestone, sandstone, and shale. There are no prime and unique farmland soils present in the vicinity of the dam.

The bed materials of the Musconetcong River downstream and upstream of the impoundment are primarily comprised of cobbles and gravels. The natural substrate of the impoundment has been covered by sandy sediment due to the presence of the dam.

Land Use and Flooding Concerns

Land use in the Musconetcong River Valley includes farms, hamlets, villages, and undeveloped forested areas. State, county and local parklands within the river corridor provide significant opportunities for hiking, fishing, canoeing, camping, nature study and other outdoor activities. In the immediate vicinity of the dam, the land is used primarily for residential and commercial purposes. An abandoned industrial property (Asbury Graphite Mills property) is directly north of the dam and a residential property is directly south. The owners of the Asbury Graphite property have indicated that the only industrial activity that has occurred on the site is the milling of graphite, which is an inert material that poses no environmental hazards.

The Bloomsbury Dam is not a flood control structure and does not have the capability of controlling flows. Some properties along the river in the vicinity of the dam have experienced flooding of backyards during extreme rainfall events, but do not have frequent flooding concerns. However, some properties did experience flood damage during the record rainfall of Hurricane Irene in 2011.

Vegetation

Natural plant communities located in the vicinity of the project consist of deciduous hardwood upland forests. Wetlands near the project site consist of forested floodplain, deciduous scrub/shrub, and herbaceous wetlands.

Upland deciduous forests consist of oak (*Quercus spp*.), hickory (*Carya spp*.) and red maple (*Acer rubrum*) tree species. The understory is made up of spice bush (*Lindera benzoin*) and arrowwood (*Viburnum spp*.). Poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*) and various grasses and sedges make up the herbaceous layer.

The forested wetland canopy in the floodplain will typically include sycamore (*Platinus occidentalis*), red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), sweetgum (*Liquidambar styraciflua*). Common understory vegetation will include highbush blueberry (*Vaccinium corymbosum*), southern arrowwood (*Viburnum dentatum*), ironwood (*Carpinus caroliniana*), spicebush, and witch hazel (*Hamamelis virginiana*). Common herbaceous species include skunk cabbage (*Symplocarpus foetidus*), jack-in-the-pulpit (*Arisaema triphyllum*), jewelweed (*Impatiens capaensis*), sensitive fern (*Onoclea sensiblis*), and cinnamon fern (*Osmunda cinnamomea*).

Aquatic Resources

The Musconetcong River and approximately 20 of its tributary streams support natural breeding populations of brook trout. Brook trout are the only trout native to the region and have inhabited the coldwater streams of northeast U.S. since the retreat of the continental glaciers. They survive in only the coldest and cleanest water and serve as indicators of the health of the watersheds they inhabit. Since brook trout are extremely sensitive to thermal pollution, siltation, and habitat degradation, their populations in the East have been greatly reduced or extirpated in watersheds where they historically thrived. Their presence in the Musconetcong River demonstrates the exceptional value of this aquatic ecosystem.

The NJDEP Division of Fish and Wildlife stocks the river each year with brook, brown and rainbow trout (Table 1). The main stem of the Musconetcong River is classified by the NJDEP as Trout Maintenance Waters for its entire length. Eighteen of its tributaries are classified as Trout Production Streams. These classifications are determined by the NJDEP Division of Fish and Wildlife – Bureau of Freshwater Fisheries and are contained in the State Surface Water Quality Standards. A Trout Maintenance designation means that a water body supports trout throughout the year, whereas Trout Production means that the water body is used by trout for spawning or nursery purposes during their first summer.

Table 1 – New Jersey Division of Fish and Wildlife Sign
Posted at the Bloomsbury Dam in 2009

The NJ Division of Fish and Wildlife stocks trout at this location and public fishing is allowed.	
2009 General Trout Regulations	
Season	Daily Limit
January 1 – March 22	4 Trout
March 23 – April at 8 AM	Closed to all fishing
April 11 at 8 AM – May 31	6 Trout
June 1 – March 21, 2010	4 Trout
The minimum size for brook, brown, and rainbow trout is 9 inches.	

A wide variety of resident fish species, other than trout, are found in the Musconetcong River. A Freshwater Fish Management Database Report by the NJ Division of Fish and Wildlife Bureau of Freshwater Fisheries lists 36 individual species sampled over 23 different survey areas of the river. A representative from the Division of Fish and Wildlife has indicated that the key native fish species that would benefit from the project would include brook trout and American eel. Other fishes that would benefit once "run of the river" is restored would be white suckers and a variety of cyprinds (blacknose & longnose dace, tesselated darters, fallfish, creek chub, common shiner, cutlip minnow, spottail shine) and warmwater fish that prefer cooler water (smallmouth bass and rock bass) and redbreast sunfish.

By restoring the connectivity of the Musconetcong River all aquatic resources will benefit. The Bloomsbury Dam acts as a barrier that restricts movement of fish, macroinvertebrates, and other aquatic species from dispersing throughout the river. In addition, this dam and other dams make the river inhospitable for diadromous fish that were historically found in the river.

The current condition of the impoundment behind the dam creates a lentic (lake-like) habitat which is warmer, slower in velocity, and more nutrient rich than the typical lotic (flowing) habitat within the river. This condition within the impoundment may be providing favorable habitat for introduced, non-native species. At the same time, it may be detrimental to the native river fishes because they are not well suited to the altered environment and therefore cannot successfully compete.

Wetland Resources

No wetlands exist within the proposed limit of disturbance for the removal of the dam. According to the NJDEP i-MapNJ program (a Geographic Information System used for mapping environmental resources) the closest wetlands are located approximately 0.3 miles upstream and downstream of the dam. In addition, no wetlands were identified in the project area using the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) maps. The NWI maps classified the dam and impoundment area as R2UBH (riverine, lower perennial, unconsolidated bottom, permanently flooded).

The project area was examined by USACE biologists during numerous site inspections in 2009 and 2010. The inspections indicated that the banks of the river along the impoundment are primarily covered by turf grass that is maintained by the residents as part of their backyards. On the north side of the impoundment, a thin fringe of emergent aquatic vegetation (cattails, bulrushes, etc.) lines the edges of the head race that enters the Asbury Graphite Mills building. This unmapped wetland area that is approximately 0.02 acres in size.

Terrestrial Wildlife

Wildlife in the project area is consistent with those species found throughout northern New Jersey and the Highlands region. Common mammal species include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail rabbit (*Sylvilagus floridanus*), white-footed mouse (*Peromyscus leucopus*), beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*).

Reptiles commonly found in the vicinity of Bloomsbury include common garter snake (*Thamnophis sirtalis*), black racer (*Coluber constrictor*), eastern ribbon snake (*Thamnophis sauritus*), northern water snake (*Nerodia sipedon*), snapping turtle (*Chelydra serpentine*), and painted turtle (*Chrysemys picta*).

Amphibians typically found in the project area include American bullfrog (*Rana catesbeiana*), wood frog (*Lithobates sylvaticus*), American toad (*Bufo americanus*), spring peeper (*Pseudacris crucifer*), pickerel frog (*Lithobates palustris*), wood frog (*Lithobates sylvaticus*), red backed salamander (*Plethodon cinereus*), northern red salamander (*Pseudotriton ruber*), and spotted salamander (*Ambystoma maculatum*).

Threatened and Endangered Species

According to the New Jersey Natural Heritage Program, there are a number of State threatened and endangered species that potentially utilize the river corridor in Bloomsbury. The State threatened species include the Cooper's Hawk (*Accipiter cooperii*), bobolink (*Dolichonyx oryzivorus*), longtail salamander (*Eurycea longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), savannah sparrow (*Passerculus sandwitchenis*), and wood turtle (*Clemmys insculpta*). The State endangered species include the bobcat (*Lynx rufus*), and the vesper sparrow (*Pooecetes gramineus*). The U.S. Fish and Wildlife Service has also indicated that the river corridor may be used by a transient bald eagle (*Haliaeetus leucocephalus*) or the Federally endangered Indiana bat (*Myotis sodalis*).

2.3 Socio-Economic Resources

The Borough of Bloomsbury is approximately 1 square mile in size. According to the 2000 U.S. Census, Bloomsbury had a population of 886, with 342 housing units, and a median household income of $64,375. The U.S. Small Business Administration does not identify any low income areas in the vicinity of the dam. There are also no minority communities located near the dam.

Greenwich Township is approximately 10.5 square miles in size. According to the 2000 U.S. Census, Greenwich had a population of 4,365, with 1,477 housing units, and a median household income of $ 87,613.

Within both municipalities, the dam and the impoundment behind it do not currently serve any economic purposes. It does not provide power, electricity, irrigation water, municipal or industrial water supply, flood control benefits, or fish and wildlife benefits. The industrial mills on the north and south sides of the river that historically used the dam to route river water into their mill races have been vacant and unused for decades. The mill race on the south side of the river has been filled in and is no longer functional.

On a broader scale, the Musconetcong River valley is one of the most scenic river valleys in New Jersey and the surrounding region and is a high-quality setting for a wide variety of recreational activities such as hiking, hunting, fishing, canoeing, camping, nature study and other outdoor activities. Local residents as well people from the surrounding region come to the Musconetcong River Valley to enjoy the recreational opportunities. The scenic and recreational resources combined are an important part of the local and regional economy.

2.4 Recreational Resources

Recreational opportunities in the Musconetcong River Valley are found in the over 5,000 acres of state-owned parks and river access points. There are also several hundreds of acres of county and local municipal parklands along the river. In addition, several property owners lease their riverfront lands to private fishing and hunting clubs and many riverfront landowners permit public access for fishing.

The Musconetcong is one of the most popular fishing streams in New Jersey and the surrounding region and has more miles of stocked waters than any other stream statewide. The Musconetcong River's popularity is growing with the increase of public fishing access

sites maintained by the NJDEP. The Green Acres Program, the land acquisition agent for the NJDEP, maintains an aggressive program of land acquisition along the river and these properties are turned over to the NJ Division of Fish and Wildlife. The Division maintains these areas primarily in the form of parking for anglers. The 625 acres owned by Fish and Wildlife are scattered along the river, providing almost two dozen access points.

The river is an important source of recreation for boating (primarily canoes and kayaks), and has been identified by the NJDEP Office of Natural Lands Management in its New Jersey Trails Plan as a Waterways Trail. The most frequently canoed sections of the river are between Bloomsbury and Beattystown (approximately 17 miles upstream to the northeast). Swimming and tubing are also common recreational pursuits at various points along the river.

The Musconetcong Gorge Preserve is a 425 acre park that is owned by the Hunterdon County Department of Parks and Recreation. It is located along the river, approximately 1.5 miles southwest of Bloomsbury. The Preserve is primarily maintained for recreational hiking purposes and has seven different trails. If the Bloomsbury dam were to be removed, the Preserve would be accessible by canoe or kayak from approximately 7 miles upstream.

2.5 Historic and Archeological Resources

Since the Musconetcong River corridor is located in a more rural part of New Jersey, much of the corridor's historical and archeological resources remain intact. River related historic features, many of which are listed on the New Jersey and National Registers of Historic Places, can be found in Stanhope, Waterloo Village, Asbury, Finesville and several other river communities. These features contribute greatly to the scenic character and overall quality of life in the Musconetcong valley and are important to the local economy as key components of regional tourism.

For this feasibility effort, a Phase IA Cultural Resources survey was performed by A.D. Marble & Company in early 2010 to identify potential historic architectural and archaeological constraints that could impact the selection, design, and construction of the proposed alternatives plans. The survey included a review of historic documents and a site visit conducted on March 10, 2010 to examine the Area of Potential Effects (APE).

In terms of historic architecture, it was determined that the APE includes a National Register-eligible historic district (North Bloomsbury Historic District), a non-contributing feature of the historic district (Asbury Graphite Mill), an individually eligible and contributing feature of the district (Bloomsbury Bridge), and five properties with no previous determinations that are located in a potential historic district associated with the Borough of Bloomsbury. The preliminary survey indicates that out of the five properties recommended for further research, only the Bloomsbury Black Mill has the potential for individual listing in the National Register. If the Black Mill or the Borough of Bloomsbury were determined to be National-Register-eligible, then the dam would likely be considered a contributing feature.

The survey also determined that there is a high potential for historic archaeological resources within the APE. This potential is related to the eighteenth and nineteenth-century industrial activities that included a forge/foundry, a grist mill, and later in time, a graphite

mill. Although archeological sensitivity for prehistoric resources in the general area of the Musconetcong River is moderate to high, the potential is considered low within the footprint of the APE because of previous disturbance from historic industrial activities. The Cultural Resources Reconnaissance Report has been included as Appendix C of the EA.

3.0 WITHOUT PROJECT CONDITION (NO FEDERAL ACTION IS TAKEN)

If no Federal action is taken to modify or remove the Bloomsbury Dam, the present condition of the Musconetcong River in the vicinity of the dam will remain unchanged. The dam will continue to block the passage of aquatic organisms and interrupt the connectivity of the river. The water quality in the impoundment will continue to be impaired by temperature increases, nutrient build up, algal growth, and oxygen depletion. Benthic habitat for invertebrates in the impoundment will remain covered by sediment.

The dam will continue to be an obsolete structure that is no longer used for its intended industrial purposes. It will require continual maintenance and repairs in the future. It will remain a public safety hazard and an impediment to recreational canoeing and kayaking.

4.0 PROBLEM IDENTIFICATION

The presence of the Bloomsbury Dam on the Musconetcong River creates a variety of problematic conditions that are typical of the obsolete, run-of-the-river, low head dams that are located on many rivers and tributaries throughout the northeastern U.S. The problems created by the dam are summarized below.

- Impedes the free passage of aquatic organisms.
- Blocks access of fish to spawning habitats.
- Prevents recolonization of upstream habitats by downstream species following weather or human-induced disturbances.
- Obstructs the movement of materials (sediment, nutrients, woody debris) down the river.
- Changes the condition of the impoundment from that of a riverine habitat with riffles and pools to that of a lacustrine habitat (similar to a lake).
- Accumulates sediments in the impoundment which cover the natural substrate of the river and make the habitat less hospitable to the macroinvertebrates on which fish feed.
- Warms the water in the impoundment by slowing its velocity and increasing its exposure to sunlight. This creates an altered temperature regime that is inconsistent with normal conditions in the river and may favor introduced non-native species.
- Degrades water quality in the impoundment by accumulating nutrients in the sediment, promoting the growth of algae, and lowering the levels of dissolved oxygen. The accumulation of nutrients in the impoundment also prevents them from reaching downstream aquatic habitats.
- Creates a hydraulic roller at the bottom of the spillway that is a public safety hazard and drowning risk. Dam related fatalities commonly occur below low-head dams with a low hazard rating, such as Bloomsbury. In 2003, a 29-year old woman drowned in the hydraulic roller at Bloomsbury while she was swimming in the river.
- Prevents the passage of recreational boats, such as kayaks or canoes.

5.0 PLAN FORMULATION

5.1 Federal Objectives

According to Section 206 of the Water Resources Development Act of 1996 (PL 104-303), the Federal objective of a water resource project such as this one is to restore the quality of the environment when it is in the public interest and is cost-effective.

The USACE Planning Guidance Notebook (ER 1105-2-100) identifies the objective of a Section 206 project as follows:

"The objective of ecosystem restoration is to restore degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Restored ecosystems should mimic, as closely as possible, conditions which would occur in the area in the absence of human changes to the landscape and hydrology."

5.2 Planning Objectives

Several planning objectives were identified which specifically address the problems associated with the Bloomsbury Dam. These objectives are outlined below:

- Restore free-flowing conditions and increase connectivity of the Musconetcong River.
- Allow free passage of fish and other aquatic organisms in the location of the dam.
- Restore riverine habitat and improve water quality in the impoundment area.
- Restore the natural movement of materials (sediment, nutrients, woody debris) down the river.
- Eliminate the existing public safety hazard and reduce the risk of accidental drowning.
- Provide safe passage for recreational boats.
- Eliminate risk of future catastrophic failure.
- Provide a plan that satisfies the needs of the study sponsor and the local community.
- Minimize impacts to environmental and cultural resources.

5.3 Planning Constraints

Planning constraints are parameters that limit the implementation of any proposed plan of improvement and serve to eliminate from consideration all those possibilities that offer no acceptable degree of satisfaction. These constraints can include natural conditions, economic factors, social and environmental considerations and legal and policy restrictions. In the case of the Bloomsbury Dam, the following constraints were identified as those that could constrain the planning process.

Technical Criteria

- The plan must avoid weakening the integrity of the existing embankments, or provide for their re-design if they will be undermined by the plan.

- The structural integrity of the downstream bridge must not be impacted by the plan.
- The plan must not result in an increase in flooding upstream or downstream of the dam.

Social Criteria

- The plan must not result in a greater public safety hazard than currently exists.

Economic Criteria

- Since the dam is no longer used for any economic purposes, there are no economic constraints associated with removing it.

Environmental Criteria

- The plan must not result in ecological conditions that are more degraded than the current conditions (i.e. promote the spread of non-native invasive species or transport contaminated sediment down the river.)
- The plan should not promote erosion of the river bed (i.e. headcutting).

5.4 Plan Formulation Rationale

The consideration of the problems and solutions within the study area led to the formulation of alternative plans. These plans are developed and designed to achieve the planning objectives previously identified. Sponsor objectives are important considerations in the evaluation of alternative plans.

The formulation of plans for ecological restoration of the Musconetcong River at the Bloomsbury Dam was based on a standard set of criteria. Alternative plans must be complete in that they provide and account for all necessary investments or other actions to ensure the realization of the planned effects. Alternative plans must be effective so as to alleviate the specified problems and achieve the desired goals. Alternative plans must be efficient, demonstrating a cost effective means of alleviating the specified problems and realizing the specified opportunities. Alternative plans must also be acceptable to state and local entities and the public and be compatible with existing laws, regulations, and public policies.

Each alternative is considered on the basis of its effective contribution to the planning objectives. Selection of a specific plan is based on technical and environmental criteria, which permit the fair and objective appraisal of the impacts and feasibility of alternative solutions.

5.5 Screening of Management Measures

Several management measures were identified and evaluated as the basis for formulating alternative plans to restore the Musconetcong River to more natural conditions in the vicinity of the Bloomsbury Dam.

Screening of Management Measures

Management measures were evaluated using the four criteria of completeness, effectiveness, efficiency, and acceptability as described in the Principles and Guidelines and the Planning Guidance Notebook. The following paragraphs describe each measure and Table 2 summarizes the results of the screening as it relates to the completeness, effectiveness, efficiency, and acceptability of each measure.

Fish Ladder

Construction of a fish ladder at Bloomsbury Dam will address only a portion of the planning objectives discussed in Section 5.2. Traditional approaches to fish ladders involve the use of concrete baffles and compartments. Many times these designs require fish to jump from one compartment to the next, which is not possible for many species. The steep slopes and small compartments in these designs can also make passage difficult for the fish. In addition to these potential inadequacies for fish passage, a fish ladder would not allow for the passage of other aquatic organisms such as amphibians, freshwater crustaceans, and macroinvertebrates. Fish ladders also require maintenance work to remove accumulated debris and can be labor intensive when compared to other restoration options.

A fish ladder would fail to achieve a majority of the planning objectives presented in Section 5.2 and therefore fails to meet the effectiveness criteria. It would also fail to meet the acceptability criteria because it is not acceptable to the non-Federal sponsor. The main objective of the project for the non-Federal sponsor is to restore the river to pre-dam conditions.

Rock Ramp

Construction of a rock ramp involves the placement of rock on the downstream side of the dam to create a gentle slope from the existing downstream channel bottom to the crest of the dam. This type of a fishway that emulates natural rapids would not only promote passage of fish, but would create beneficial habitat for fish as well as aquatic insects. The placement of this rock “wedge” at the foot of the dam would also alleviate potential drowning hazards by eliminating the hydraulic roller.

Although a rock ramp would achieve more planning objectives than a fish ladder, it does not achieve the ideal ecological condition where all of the objectives are met and the river is restored to pre-dam conditions. There are also three major problems with this measure. The first is construction cost. Construction of a rock ramp with a slope gentle enough (typically 1:20) to allow fish passage requires the importation of large quantities of stone and gravel. The second is maintenance. Although it will not require maintenance as frequently as a fish ladder, a rock ramp will need to be monitored periodically ensure that the slope remains stable and passage remains possible. This maintenance will result in on-going costs that

continue in perpetuity. And the third is permitting. Any proposed filling within a watercourse is heavily scrutinized, and frequently opposed, by state and federal regulatory agencies.

A rock ramp would fail to achieve more than half of the planning objectives presented in Section 5.2 and therefore fails to meet the effectiveness criteria. Given the high costs associated with construction and on-going maintenance, and the limited number of planning objectives achieved, it would fail to meet the efficiency criteria. It would also fail to meet the acceptability criteria because it is not acceptable to the non-Federal sponsor.

Bypass Channel

This measure involves the construction of a channel that will branch off of the river immediately downstream of the dam, cut through the land adjacent to the dam, and connect to the upstream impoundment. Although this method can successfully promote fish passage when properly designed, it requires the permanent acquisition and disturbance of land adjacent to the river for construction.

A bypass channel would fail to achieve all but one of the planning objectives presented in Section 5.2 and therefore fails to meet the effectiveness criteria. Given the high costs associated with real estate acquisition and construction of the channel, and the achievement of only one of the planning objectives, it would fail to meet the efficiency criteria. It would also fail to meet the acceptability criteria because it is not acceptable to the non-Federal sponsor.

Public Awareness (buoys, cables, fences, portages and rescue facilities)

The intent of this measure is to increase public awareness of hazards related to the dam and reduce the risk of accidental drownings. This method could provide an increased level of protection for the public, however it would not eliminate the hazard of the hydraulic roller at the foot of the dam and would not achieve any of the other study objectives.

The public awareness measures would fail to achieve a majority of the planning objectives presented in Section 5.2 and therefore fails to meet the effectiveness criteria. It would also fail to meet the acceptability criteria because it is not acceptable to the non-Federal sponsor.

Complete or Partial Dam Removal

Complete removal would involve demolishing and excavating the entire width of the dam up to the embankment walls. Partial removal would demolish and excavate a majority of the dam, but would leave small sections of it in place on both sides of the river. Complete or partial dam removal meets the completeness criteria because it accounts for all of the necessary actions to ensure the realization of the planned restoration outputs. Unlike the measures considered above, a removal is unlikely to require follow up maintenance after the initial restoration, which results in long term cost savings and a self-sustaining solution.

Removal of the dam is the most effective measure for addressing the problems identified in Section 4.0 and restoring the structure and function of the river ecosystem to a meaningful

degree. It achieves all of the planning objectives for the project and meets the effectiveness criteria.

Dam removal meets the efficiency criteria because it will achieve all of the planning objectives with a one-time construction cost and no costs related to on-going operation and maintenance.

Partial or full dam removal both meet the acceptability criteria because they will fulfill the objective of the non-Federal Sponsor by restoring the river to pre-dam conditions. Removal of the dam is also supported by Federal and state regulatory agencies, as well as national and local national non-profit agencies.

Measures Considered for Alternative Analyses

It was determined that either a partial or complete removal of the dam were the measures that would achieve all of the planning objectives presented in Section 5.2 and would meet the four planning criteria of completeness, effectiveness, efficiency, and acceptability.

Table 2 – Screening of Management Measures Using the Four Planning Criteria. Grey shading indicates that the measure did not meet the criteria. Costs for the Efficiency criteria are presented as high, medium, or low and are relative to the cost of the other measures.

	Completeness	Effectiveness	Efficiency	Acceptability
Fish Ladder	Accounts for all necessary investments and actions	Does not restore river to pre-dam condition	Low initial cost, but requires long term O&M	Not acceptable to NJDEP (ONRR and BDSFC*), or MWA**
Rock Ramp	Accounts for all necessary investments and actions	Does not restore river to pre-dam condition	High initial cost and requires long term O&M	Not acceptable to NJDEP (ONRR and BDSFC*), or MWA**
Bypass Channel	Accounts for all necessary investments and actions	Does not restore river to pre-dam condition	High initial cost and requires land acquisition	Not acceptable to NJDEP (ONRR and BDSFC*), or MWA**
Public Awareness	Accounts for all necessary investments and actions	Does not restore river to pre-dam condition	Low initial cost, but requires long term O&M	Not acceptable to NJDEP (ONRR and BDSFC*), or MWA**
Complete Dam Removal	Accounts for all necessary investments and actions	Restores river to pre-dam condition (maximum ecosystem restoration benefits)	Medium initial cost and requires no O&M	Preferred by NJDEP (ONRR and BDSFC*), and MWA**
Partial Dam Removal	Accounts for all necessary investments and actions	Restores river to pre-dam condition (maximum ecosystem restoration benefits)	Medium initial cost and requires no O&M	Preferred by NJDEP (ONRR and BDSFC*), and MWA**

* Office of Natural Resource Restoration (sponsor) and Bureau of Dam Safety and Flood Control

** Musconetcong Watershed Association

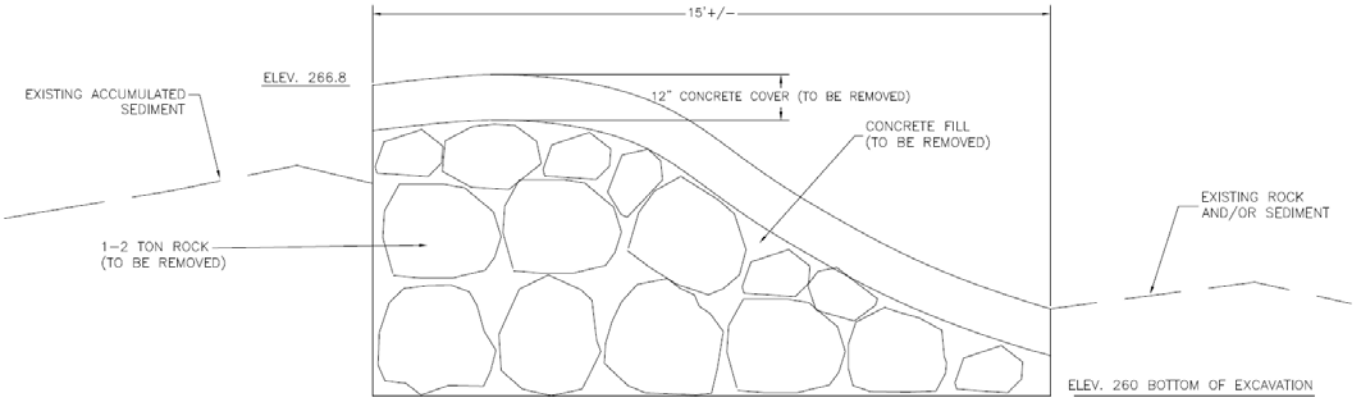
6.0 COMPARISON OF ALTERNATIVE PLANS

Two alternative plans were examined for achieving the planning objectives for ecosystem restoration: complete removal of the dam or partial removal of the dam.

6.1 Description of Alternative Plans

6.1.1 Complete Removal

Complete removal entails demolishing and excavating the entire width of the dam (170 feet) up to the embankment walls. An excavator fitted with a hydraulic hammer or similar equipment would be used to break up the concrete spillway and any large solid pieces that may exist inside the structure (Figure 8). An excavator with a bucket and thumb, or a grapple, would then be used to remove the demolished debris and clear out the channel. The excavators would access the river from the north side from the Asbury Graphite Mills property. This property has an open field (approximately 2,500 square feet) that is directly adjacent to the river and the owners have agreed to provide a temporary easement for access and the staging of equipment.



BLOOMSBURY DAM REMOVAL
TYPICAL CROSS SECTION
NOT TO SCALE

QUANTITIES FOR COMPLETE DAM REMOVAL:

DESCRIPTION	UNIT	ESTIMATED QUANTITY
1. CONCRETE REMOVAL	CY	200
2. ROCK REMOVAL	CY	291
3. TIMBER CRIB REMOVAL 20'L	EA	221
4. TIMBER CRIB REMOVAL 15'L	EA	221

QUANTITIES FOR PARTIAL DAM REMOVAL:

DESCRIPTION	UNIT	ESTIMATED QUANTITY
1. CONCRETE REMOVAL	CY	118
2. ROCK REMOVAL	CY	171
3. TIMBER CRIB REMOVAL 20'L	EA	170
4. TIMBER CRIB REMOVAL 15'L	EA	150

Figure 8 – Cross section of Bloomsbury Dam and approximate quantities of material to be removed by alternative plans.

Pending approval by the appropriate regulatory agencies (eg. NJDEP, USFWS, Soil Conservation District), the excavators would enter the river upstream of the dam, "in the wet", without the use of a coffer dam. Other recent dam removal projects on the Musconetcong River in 2008 and 2009 (approximately 19 miles to the northeast) and the Finesville Dam removal were performed in this manner and were approved by the regulatory agencies. Depending on the condition of substrate in the river, timber mats may be laid down in the path of the excavators to evenly distribute the weight and minimize disturbance of the benthic substrate. The benefit of using this method, rather than a coffer dam, is that heavy equipment is in the river for much less time. The construction and deconstruction of a coffer dam would most likely double the time required for the removal and significantly increase costs.

The probable technique for removing the dam would be to enter the river on the north side, cross the river, and begin breaking up the south end first. The excavator would then proceed to demolish the dam and clear the rubble in small sections as it moves back toward the north side. If necessary, the timber mats would be laid out beforehand, and then collected as the excavator retreats to the north side of the river. If the technique of working "in the wet" was opposed by regulatory agencies, another option would be the use of a long boom excavator that would remain on the Asbury Graphite property and reach across the river.

As indicated in section 2.1, chemical analyses of the sediment samples collected within the impoundment did not detect any constituents of concern (COCs) that exceeded regulatory screening criteria, with the exception of minor cyanide exceedences. Therefore it is unlikely that the sediment would pose an ecological or human health risk if it was allowed to gradually flow downstream during, and following, the removal process. Pending approval by regulatory agencies, this is the method that will be used for the removal. Sediment behind the downstream Finesville Dam was allowed flow in this manner during its removal.

The removal will be scheduled for a time of the year when low-flow conditions are expected in the river. The schedule will also be coordinated with regulatory agencies so removal does not occur during a sensitive biological time period, such as spawning season. Best Management Practices (BMPs) will be used and may be mandated by conditions contained in State approvals (i.e., 401 Water Quality Certificate). The BMPs would minimize water quality impacts during project implementation.

As the demolished dam material is removed from the river, it will be sorted so that a maximum amount, if any, can be reused for bank and channel stabilization purposes. It is anticipated that some of the concrete rubble and stones from the interior of the dam could be re-used to stabilize and naturalize the channel and to provide toe protection along the existing embankments. Toe protection would enhance the long term stability of the embankments and protect them from excessive velocities and debris during high flows. If a scour hole is present at the foot of the spillway, demolished material could also be used to fill and stabilize the area. Demolition debris that cannot be reused on site will be hauled off site for disposal or recycling.

As the dam is removed, the impoundment will drain and the upstream river channel will become narrower. In the new channel, velocity will increase and sediment transport will resume. The river will gradually develop fluvial features including a thalweg, localized

pools, riffles, runs, and depositional areas. It is expected that these features will develop naturally and that manipulation of the stream bed to create them will not be necessary. However, if these fluvial features do not develop as expected, a variety of stream restoration techniques could be employed to promote their development. These restoration techniques could also be used to create riffles in the location of the dam that would create ambient noise similar to the dam.

The narrower channel will also expose substrates that are currently submerged on the fringes of the impoundment and immediately downstream of the dam (Figure 9). The U.S. Fish and Wildlife Service (USFWS) has agreed to support the project and will oversee the planting of native trees and shrubs in the new riparian areas following the removal. The USFWS has indicated that local community organizations, such as the Musconetcong Watershed Association, and national non-profit organizations, such as American Rivers, will likely provide volunteer labor that will help in the planting effort. Approximately 200 trees and shrubs per acre will be planted within the project area. Shrubs and trees that will be planted within the riparian area may include, but are not limited to, black willow (*Salix nigra*), shadbush (*Amelanchier canadensis*), black gum (*Nyssa sylvatica*), elderberry (*Sambucus canadensis*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), winterberry (*Ilex verticillata*), buttonbush (*Cephalanthus occidentalis*), red chokeberry (*Pyrus arbutifolia*), and spicebush (*Lindera benzoin*). In addition, the understory of the newly exposed river banks will be seeded with a native riparian seed mix to help prevent colonization by non-native species. Upland edges of the riparian buffer will be seeded with warm season grasses to provide additional habitat diversity. The warm-season grass mixture (certified seed) would include, but is not limited to: little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorgastrum nutans*), big bluestem (*Andropogon gerardi*), or switchgrass (*Panicum virgatum*). The trees, shrubs and native seed mixes will be provided by the USFWS.

The complete removal scenario will provide the following benefits:

- Reconnection of 7.8 miles river.
- Restoration of 7.5 acres of impoundment to natural river conditions.
- Passage for aquatic organisms and recreational boats.
- Downstream movement of materials.
- Elimination of a safety hazard.

6.1.2 Partial Removal

Partial removal of the dam would involve demolishing and excavating a majority of the dam, but leaving small sections of it in place on both sides of the river. Approximately 20 feet would be left on the south side and 50 feet on the north side. The removal process would be performed in the same manner described above for the complete removal, except that demolition with the hydro hammer would start 20 feet away from the south embankment and end 50 feet away from the north embankment. If it is determined that the edges of remaining dam sections should display a clean cut, specialized concrete cutting tools, such as a diamond wire saw, can be used prior to demolition.

A partial removal would provide all of the same benefits of a complete removal, but would

also provide several additional benefits listed below.

- The remaining sections would help to maintain the structural integrity of the existing embankments.
- The remaining sections would direct high flows toward the center of the river, diverting them away from the downstream bridge abutments.
- Remnants of the dam would be visible for appreciation as a historic resource. The interior construction may also be visible after removal.
- There will be less demolition material that requires re-use or disposal.

Figure 9 – Approximate example of new river bank locations and aquatic areas that will become new riparian land following removal of the dam.

As with a complete removal it is anticipated that some concrete rubble and stones from the interior of the dam may be used for bank and bed stabilization purposes. If it is determined to be necessary, demolished material or imported material will also be used to armor the remaining dam sections to protect them from excessive velocities and debris during high flows.

The development of fluvial features and the exposure of new riparian areas are expected to occur in the same manner as the complete removal scenario. The use of stream restoration techniques, plantings, and stabilization are also possible options for this scenario.

6.2 Cost Estimates

Preliminary costs estimates have been prepared for the two alternative plans (Table 3). The detailed cost estimates were prepared with the Tri-Service Automated Cost Engineering Systems (TRACES) Micro-Computer Aided Cost Estimating System (MCACES), Version 4.1, and are provided in Appendix A.

Table 3 – Cost Estimates for Complete and Partial Dam Removal Alternatives

Complete Dam Removal	$905,000
Partial Dam Removal	$825,000

7.0 EVALUATION OF ALTERNATIVES

7.1 Hydraulics

Existing Stream Condition

The Musconetcong River in the vicinity of Bloomsbury Dam is a low-gradient, low sinuosity stream with bed materials made up of mostly cobbles and gravels. The average bed slope ranges from approximately 0.001 ft/ft to approximately 0.005 ft/ft with some areas upstream of the dam having an even milder slope. These mildly-sloped areas occur upstream from the dam in the vicinity of the State Route 173 road crossing and the Interstate 78 road crossing at approximately 2,650 feet and 3,750 feet upstream of Bloomsbury Dam, respectively (Figure 10). As a result of the mild slopes, the impoundment at base flow extends beyond the upstream road crossings. Despite the long length of the impoundment, it does not appear to be much wider than the width of the natural river, estimated at 90 feet, except in the area just upstream of the dam (Figure 11).

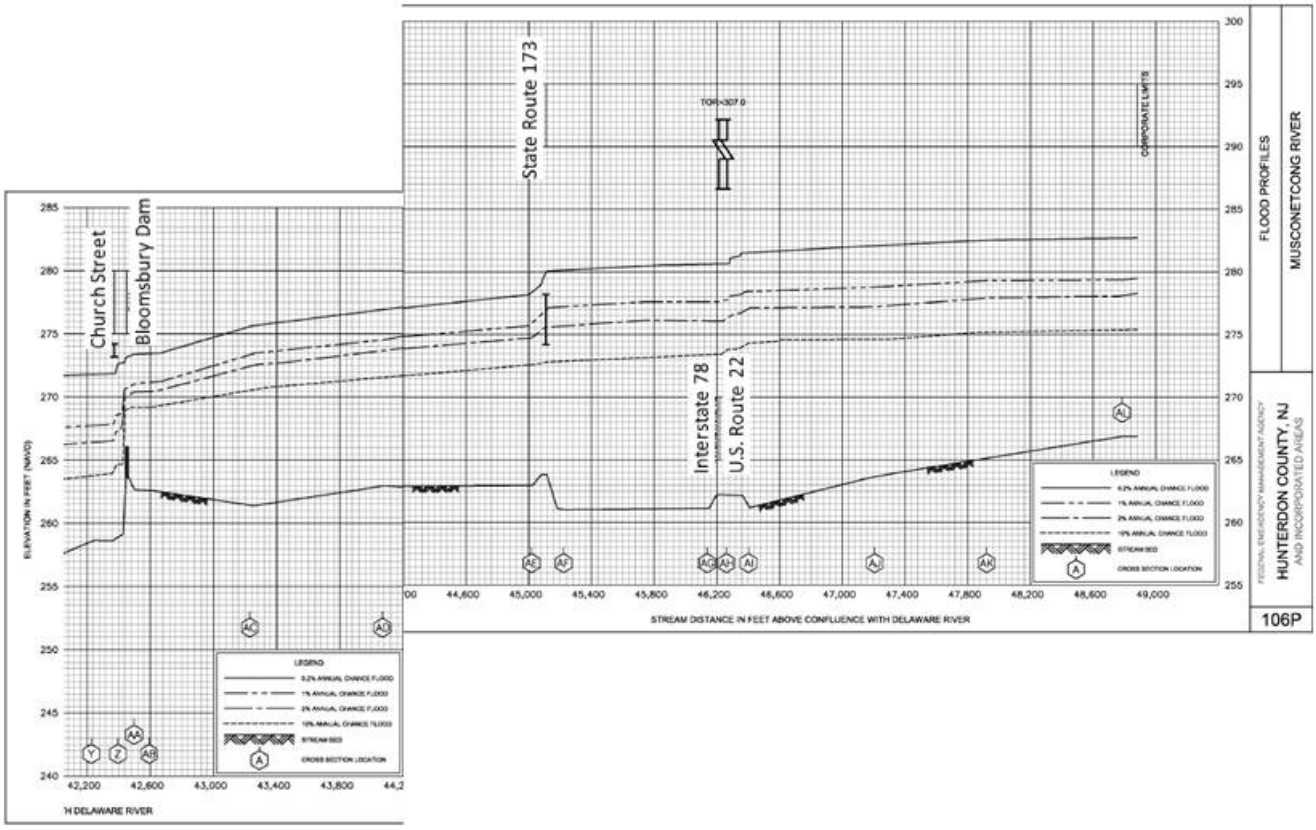


Figure 10 – FEMA water surface profile for the Musconetcong River (Bloomsbury and upstream reach).

As shown in Figure 11, the impoundment is confined between State Route 173 and Bloomsbury Road on the north and Musconetcong Drive, Bethlehem Avenue and residential areas on the south. In addition, the Church Street bridge defines the stream elevation, width and alignment approximately 90 feet downstream of the dam. Despite the confinement, no significant bank erosion was noted during the site field inspection upstream or downstream of the dam and trees and other vegetation appear to be present up to the river's edge. Photographs 7 and 8 show the downstream and upstream reaches, respectively, from the Church Street bridge.

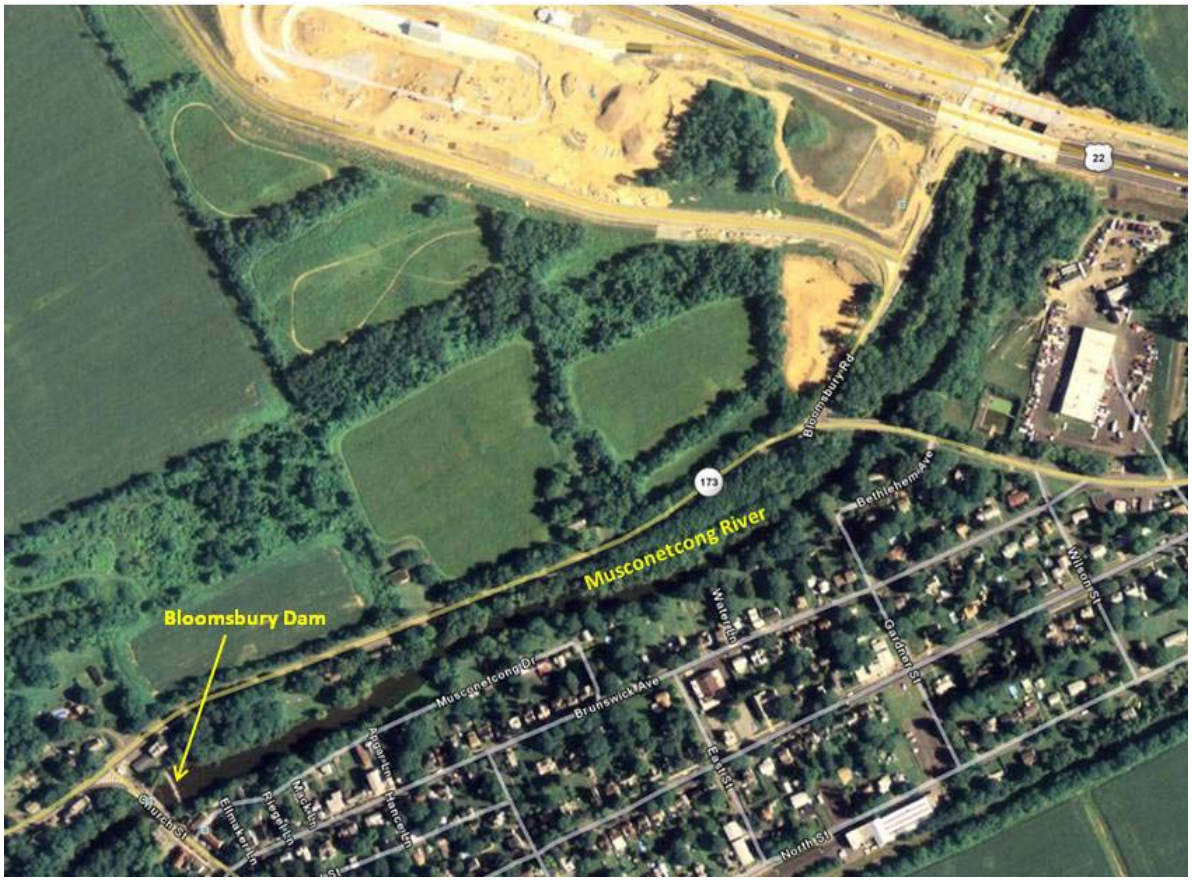


Figure 11 – Aerial photograph of the impoundment and the upstream reach of the Musconetcong River.

Preliminary Hydrologic and Hydraulic Analyses:

New Jersey's Dam Safety Standards (NJAC 7:20) define the need to quantify the upstream and downstream impacts resulting from complete or partial dam removal. Any dam removal will result in increases in velocity and decreases in flow depth upstream of the dam. Hydraulic analyses were performed as part of this study to quantify these upstream changes for each alternative. Although this is a run-of-the-river dam and its removal is not expected to result in any negative downstream impacts, both hydrologic and hydraulic analyses will be conducted in accordance with NJAC 7:20 to determine any potential downstream effects. These analyses will be conducted in the design phase in conjunction with the removal design and will examine any potential increases in 10-year, 50-year, or 100-year flooding due to the dam removal alternatives.

The upstream hydraulic analysis included herein was performed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Centers' River Analysis System (HEC-RAS), Version 4.0. An existing hydraulic model for the Musconetcong River, dated May 8, 1980, and performed using HEC-2 software, was obtained from the Bureau of Dam Safety and Flood Control, New Jersey Department of Environmental Protection. The model reach extends from a railroad crossing approximately 8,800 feet downstream of Bloomsbury Dam to approximately 15,000 feet upstream of the dam. This hydraulic model is identical to the Federal Emergency Management Agency (FEMA) effective model for this reach of the

flooding source. The HEC-2 hydraulic data was imported into HEC-RAS and adjusted for conversion errors. The resulting HEC-RAS model is used to represent the existing condition for this reach of the Musconetcong River.

The 10-year, 50-year, 100-year and 500-year peak discharges used in the FEMA HEC-2 model were used in the HEC-RAS model as well as the 100-year + 25% discharge used as a regulation tool by NJDEP (regulatory flow). In addition, an extrapolation of the FEMA flows was performed to estimate the 1-year and 2-year peak discharges, representing a range of discharges typically thought of as channel-forming discharges. The mean daily discharge at USGS 01457000 Musconetcong River near Bloomsbury, NJ from 91 years of record is approximately 300 cfs. This mean daily discharge was also included in the HEC-RAS model to represent an average flow condition. Discharges used in the model are provided below in Table 4.

Table 4: Modeled Discharges

Frequency	**Discharge (cfs)**
Mean Daily	300
1 - year	2,010
2 - year	2,500
10 - year	4,010
50 - year	7.040
100 - year	8,690
100 – year + 25%	10,865
500 - year	13,630

To represent existing conditions, the geometry, roughness values, and expansion and contraction coefficients were not varied from the FEMA HEC-2 model with the exception of minor changes to facilitate the conversion from HEC-2 to HEC-RAS. As a result of differences in the computational routines at bridges between HEC-2 and HEC-RAS, differences in water surface elevation are observed between the HEC-2 results shown on the FEMA Flood Insurance Study profile and the existing conditions HEC-RAS model run performed for this analysis. Specifically in the area of Bloomsbury Dam, the HEC-RAS water surface elevations are approximately 1 foot higher than the values shown on the FEMA profile. These differences are not related to the potential dam removal and are not shown in Tables 5, 6, and 7 below.

Table 5: Comparison of Results for Existing Conditions and Full Dam Removal Conditions									
	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
Downstream of Dam	42420	Mean Daily	Existing	300	261.68	2.49	104.91	0.41	
	42420	Mean Daily	Full Removal	300	261.66	1.28	154	0.18	-0.02
	42420	2 yr	Existing	2500	263.91	7.07	104.94	0.68	
	42420	2 yr	Full Removal	2500	264.36	3.84	154.42	0.33	0.45
	42420	10 yr	Existing	4010	265.39	7.86	108.44	0.64	
	42420	10 yr	Full Removal	4010	265.9	4.51	154.66	0.33	0.51
	42420	50 yr	Existing	7040	268.15	8.35	140.99	0.6	
	42420	50 yr	Full Removal	7040	268.65	5.36	158.43	0.32	0.5
	42420	100 yr	Existing	8690	269.63	8.1	194.02	0.54	
	42420	100 yr	Full Removal	8690	270.07	5.65	211.96	0.32	0.44
	42420	100 yr + 25%	Existing	10865	271.55	7.86	239.01	0.47	
	42420	100 yr + 25%	Full Removal	10865	271.94	5.88	246.16	0.3	0.39
Dam	42429				Dam Structure				
Upstream of Dam	42438	Mean Daily	Existing	300	267.63	0.73	236.21	0.08	
	42438	Mean Daily	Full Removal	300	261.63	2.43	81.49	0.35	-6
	42438	2 yr	Existing	2500	269.38	3.42	252.52	0.3	
	42438	2 yr	Full Removal	2500	264.08	6.69	122.61	0.68	-5.3
	42438	10 yr	Existing	4010	270.21	4.52	260.92	0.36	
	42438	10 yr	Full Removal	4010	265.65	6.83	148.97	0.61	-4.56
	42438	50 yr	Existing	7040	271.36	6.37	275.47	0.45	
	42438	50 yr	Full Removal	7040	268.52	6.57	244.49	0.46	-2.84
	42438	100 yr	Existing	8690	271.9	7.18	282.4	0.49	
	42438	100 yr	Full Removal	8690	270	6.44	258.3	0.41	-1.9
	42438	100 yr + 25%	Existing	10865	272.52	8.18	291.88	0.53	
	42438	100 yr + 25%	Full Removal	10865	271.91	6.32	282.5	0.36	-0.61
	42448	Mean Daily	Existing	300	267.63	0.73	236.21	0.08	
	42448	Mean Daily	Full Removal	300	261.65	2.43	81.56	0.35	-5.98
	42448	2 yr	Existing	2500	269.4	3.36	252.69	0.29	
	42448	2 yr	Full Removal	2500	264.17	6.53	124.02	0.65	-5.23
	42448	10 yr	Existing	4010	270.24	4.41	261.33	0.35	
	42448	10 yr	Full Removal	4010	265.71	6.75	149.9	0.6	-4.53
	42448	50 yr	Existing	7040	271.44	6.15	276.5	0.43	
	42448	50 yr	Full Removal	7040	268.54	6.56	244.7	0.46	-2.9
	42448	100 yr	Existing	8690	272.02	6.89	283.84	0.47	
	42448	100 yr	Full Removal	8690	270.02	6.44	258.51	0.41	-2
	42448	100 yr + 25%	Existing	10865	272.68	7.78	295.23	0.5	
	42448	100 yr + 25%	Full Removal	10865	271.92	6.32	282.66	0.36	-0.76
	42488	Mean Daily	Existing	300	267.64	0.54	236.28	0.05	
	42488	Mean Daily	Full Removal	300	261.74	2.48	81.55	0.36	-5.9
	42488	2 yr	Existing	2500	269.49	2.77	253.57	0.22	
	42488	2 yr	Full Removal	2500	264.51	6.06	129	0.6	-4.98
	42488	10 yr	Existing	4010	270.38	3.74	263.1	0.27	
	42488	10 yr	Full Removal	4010	265.96	6.49	153.87	0.57	-4.42
	42488	50 yr	Existing	7040	271.67	5.3	279.43	0.35	
	42488	50 yr	Full Removal	7040	268.66	6.52	245.78	0.46	-3.01
	42488	100 yr	Existing	8690	272.29	5.98	287.29	0.37	
	42488	100 yr	Full Removal	8690	270.1	6.44	259.49	0.41	-2.19
	42488	100 yr + 25%	Existing	10865	273.01	6.8	301.91	0.41	
	42488	100 yr + 25%	Full Removal	10865	271.98	6.33	283.34	0.36	-1.03
	43230	Mean Daily	Existing	300	267.68	0.8	100.94	0.07	
	43230	Mean Daily	Full Removal	300	264.14	3.95	63.08	0.63	-3.54
	43230	2 yr	Existing	2500	270.3	3.56	155.66	0.29	
	43230	2 yr	Full Removal	2500	267.66	6.69	100.8	0.61	-2.64
	43230	10 yr	Existing	4010	271.5	4.53	178.42	0.33	
	43230	10 yr	Full Removal	4010	268.96	7.78	124.47	0.67	-2.54
	43230	50 yr	Existing	7040	273.31	6.02	212.84	0.38	
	43230	50 yr	Full Removal	7040	270.56	9.49	160.58	0.75	-2.75
	43230	100 yr	Existing	8690	274.15	6.65	228.89	0.4	
	43230	100 yr	Full Removal	8690	271.37	10.04	176.07	0.74	-2.78
	43230	100 yr + 25%	Existing	10865	275.16	7.37	247.66	0.42	
	43230	100 yr + 25%	Full Removal	10865	272.72	10.11	201.64	0.67	-2.44

Table 5 (cont'd): Comparison of Results for Existing Conditions and Full Dam Removal Conditions									
	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
	44070	Mean Daily	Existing	300	267.77	1.34	113.76	0.15	
	44070	Mean Daily	Full Removal	300	266.63	2.33	75.84	0.31	-1.14
	44070	2 yr	Existing	2500	271.06	4.36	172.7	0.32	
	44070	2 yr	Full Removal	2500	270.24	5.18	162.64	0.41	-0.82
	44070	10 yr	Existing	4010	272.4	5.52	192.36	0.36	
	44070	10 yr	Full Removal	4010	271.76	6.15	182.99	0.43	-0.64
	44070	50 yr	Existing	7040	274.42	7.28	221.81	0.42	
	44070	50 yr	Full Removal	7040	273.86	7.83	213.68	0.47	-0.56
	44070	100 yr	Existing	8690	275.32	8.04	236.42	0.45	
	44070	100 yr	Full Removal	8690	274.71	8.66	226.05	0.5	-0.61
	44070	100 yr + 25%	Existing	10865	276.38	9.09	282.89	0.48	
	44070	100 yr + 25%	Full Removal	10865	275.67	9.66	242.85	0.53	-0.71
	45020	Mean Daily	Existing	300	268	1.23	82.66	0.13	
	45020	Mean Daily	Full Removal	300	267.31	1.57	71.87	0.17	-0.69
	45020	2 yr	Existing	2500	271.93	3.91	142.63	0.28	
	45020	2 yr	Full Removal	2500	271.56	4.17	138.14	0.3	-0.37
	45020	10 yr	Existing	4010	273.46	4.96	161.25	0.31	
	45020	10 yr	Full Removal	4010	273.15	5.18	157.56	0.33	-0.31
	45020	50 yr	Existing	7040	275.73	6.62	232.86	0.37	
	45020	50 yr	Full Removal	7040	275.48	6.8	214.22	0.38	-0.25
	45020	100 yr	Existing	8690	276.75	7.31	306	0.39	
	45020	100 yr	Full Removal	8690	276.46	7.55	285.36	0.4	-0.29
	45020	100 yr + 25%	Existing	10865	278.03	7.96	397.8	0.4	
	45020	100 yr + 25%	Full Removal	10865	277.62	8.31	368.83	0.42	-0.41
Downstream of State Route 173 bridge	45080	Mean Daily	Existing	300	268.02	1	119.87	0.11	
	45080	Mean Daily	Full Removal	300	267.34	1.35	108.98	0.17	-0.68
	45080	2 yr	Existing	2500	272.1	2.82	175.08	0.21	
	45080	2 yr	Full Removal	2500	271.75	3	170.11	0.23	-0.35
	45080	10 yr	Existing	4010	273.72	3.54	198.67	0.23	
	45080	10 yr	Full Removal	4010	273.44	3.68	194.69	0.24	-0.28
	45080	50 yr	Existing	7040	276.2	4.55	310.3	0.25	
	45080	50 yr	Full Removal	7040	275.97	4.67	292.63	0.26	-0.23
	45080	100 yr	Existing	8690	277.32	4.97	396.61	0.26	
	45080	100 yr	Full Removal	8690	277.08	5.1	378.09	0.27	-0.24
	45080	100 yr + 25%	Existing	10865	278.68	5.38	501.6	0.27	
	45080	100 yr + 25%	Full Removal	10865	278.36	5.56	476.84	0.28	-0.32

Table 6: Comparison of Results for Existing Conditions and Partial Dam Removal Conditions									
	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
Downstream of Dam	42420	Mean Daily	Existing	300	261.68	2.49	104.91	0.41	
	42420	Mean Daily	Partial Removal	300	261.71	1.72	104.91	0.23	0.03
	42420	2 yr	Existing	2500	263.91	7.07	104.94	0.68	
	42420	2 yr	Partial Removal	2500	264.09	5.89	104.94	0.52	0.18
	42420	10 yr	Existing	4010	265.39	7.86	108.44	0.64	
	42420	10 yr	Partial Removal	4010	265.51	6.98	109.45	0.54	0.12
	42420	50 yr	Existing	7040	268.15	8.35	140.99	0.6	
	42420	50 yr	Partial Removal	7040	268.23	7.77	146.34	0.53	0.08
	42420	100 yr	Existing	8690	269.63	8.1	194.02	0.54	
	42420	100 yr	Partial Removal	8690	269.68	7.86	195.96	0.48	0.05
	42420	100 yr + 25%	Existing	10865	271.55	7.86	239.01	0.47	
	42420	100 yr + 25%	Partial Removal	10865	271.57	7.83	239.38	0.44	0.02
Dam	42429			Dam Structure					
Upstream of Dam	42438	Mean Daily	Existing	300	267.63	0.73	236.21	0.08	
	42438	Mean Daily	Partial Removal	300	261.7	2.55	70.45	0.35	-5.93
	42438	2 yr	Existing	2500	269.38	3.42	252.52	0.3	
	42438	2 yr	Partial Removal	2500	263.9	8.39	93.52	0.83	-5.48
	42438	10 yr	Existing	4010	270.21	4.52	260.92	0.36	
	42438	10 yr	Partial Removal	4010	265.32	9.17	99.87	0.77	-4.89
	42438	50 yr	Existing	7040	271.36	6.37	275.47	0.45	
	42438	50 yr	Partial Removal	7040	268.04	9.73	240.04	0.64	-3.32
	42438	100 yr	Existing	8690	271.9	7.18	282.4	0.49	
	42438	100 yr	Partial Removal	8690	269.55	9.43	254.13	0.57	-2.35
	42438	100 yr + 25%	Existing	10865	272.52	8.18	291.88	0.53	
	42438	100 yr + 25%	Partial Removal	10865	271.5	9.07	277.31	0.49	-1.02
	42448	Mean Daily	Existing	300	267.63	0.73	236.21	0.08	
	42448	Mean Daily	Partial Removal	300	261.72	2.55	70.61	0.35	-5.91
	42448	2 yr	Existing	2500	269.4	3.36	252.69	0.29	
	42448	2 yr	Partial Removal	2500	264.14	7.83	96.17	0.76	-5.26
	42448	10 yr	Existing	4010	270.24	4.41	261.33	0.35	
	42448	10 yr	Partial Removal	4010	265.78	7.76	143.77	0.72	-4.46
	42448	50 yr	Existing	7040	271.44	6.15	276.5	0.43	
	42448	50 yr	Partial Removal	7040	268.9	6.72	248.04	0.48	-2.54
	42448	100 yr	Existing	8690	272.02	6.89	283.84	0.47	
	42448	100 yr	Partial Removal	8690	270.27	6.65	261.69	0.43	-1.75
	42448	100 yr + 25%	Existing	10865	272.68	7.78	295.23	0.5	
	42448	100 yr + 25%	Partial Removal	10865	272.07	6.55	284.49	0.38	-0.61
	42488	Mean Daily	Existing	300	267.64	0.54	236.28	0.05	
	42488	Mean Daily	Partial Removal	300	261.82	2.42	79.25	0.34	-5.82
	42488	2 yr	Existing	2500	269.49	2.77	253.57	0.22	
	42488	2 yr	Partial Removal	2500	264.87	5.72	128.56	0.55	-4.62
	42488	10 yr	Existing	4010	270.38	3.74	263.1	0.27	
	42488	10 yr	Partial Removal	4010	266.39	6.09	160.61	0.53	-3.99
	42488	50 yr	Existing	7040	271.67	5.3	279.43	0.35	
	42488	50 yr	Partial Removal	7040	269.11	6.19	250.04	0.43	-2.56
	42488	100 yr	Existing	8690	272.29	5.98	287.29	0.37	
	42488	100 yr	Partial Removal	8690	270.42	6.27	263.66	0.39	-1.87
	42488	100 yr + 25%	Existing	10865	273.01	6.8	301.91	0.41	
	42488	100 yr + 25%	Partial Removal	10865	272.18	6.28	285.92	0.36	-0.83
	43230	Mean Daily	Existing	300	267.68	0.8	100.94	0.07	
	43230	Mean Daily	Partial Removal	300	264.1	4.09	62.29	0.66	-3.58
	43230	2 yr	Existing	2500	270.3	3.56	155.66	0.29	
	43230	2 yr	Partial Removal	2500	267.67	6.69	100.82	0.61	-2.63
	43230	10 yr	Existing	4010	271.5	4.53	178.42	0.33	
	43230	10 yr	Partial Removal	4010	269.05	7.62	126.58	0.66	-2.45
	43230	50 yr	Existing	7040	273.31	6.02	212.84	0.38	
	43230	50 yr	Partial Removal	7040	270.71	9.21	163.41	0.72	-2.6
	43230	100 yr	Existing	8690	274.15	6.65	228.89	0.4	
	43230	100 yr	Partial Removal	8690	271.58	9.68	180.03	0.7	-2.57
	43230	100 yr + 25%	Existing	10865	275.16	7.37	247.66	0.42	
	43230	100 yr + 25%	Partial Removal	10865	272.91	9.83	205.33	0.64	-2.25

Table 6 (cont'd): Comparison of Results for Existing Conditions and Partial Dam Removal Conditions									
	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
	44070	Mean Daily	Existing	300	267.77	1.34	113.76	0.15	
	44070	Mean Daily	Partial Removal	300	266.64	2.31	76.12	0.31	-1.13
	44070	2 yr	Existing	2500	271.06	4.36	172.7	0.32	
	44070	2 yr	Partial Removal	2500	270.24	5.18	162.63	0.41	-0.82
	44070	10 yr	Existing	4010	272.4	5.52	192.36	0.36	
	44070	10 yr	Partial Removal	4010	271.77	6.14	183.04	0.43	-0.63
	44070	50 yr	Existing	7040	274.42	7.28	221.81	0.42	
	44070	50 yr	Partial Removal	7040	273.83	7.85	213.3	0.47	-0.59
	44070	100 yr	Existing	8690	275.32	8.04	236.42	0.45	
	44070	100 yr	Partial Removal	8690	274.68	8.69	225.64	0.5	-0.64
	44070	100 yr + 25%	Existing	10865	276.38	9.09	282.89	0.48	
	44070	100 yr + 25%	Partial Removal	10865	275.67	9.66	242.78	0.53	-0.71
	45020	Mean Daily	Existing	300	268	1.23	82.66	0.13	
	45020	Mean Daily	Partial Removal	300	267.32	1.56	71.92	0.17	-0.68
	45020	2 yr	Existing	2500	271.93	3.91	142.63	0.28	
	45020	2 yr	Partial Removal	2500	271.56	4.17	138.14	0.3	-0.37
	45020	10 yr	Existing	4010	273.46	4.96	161.25	0.31	
	45020	10 yr	Partial Removal	4010	273.15	5.18	157.58	0.33	-0.31
	45020	50 yr	Existing	7040	275.73	6.62	232.86	0.37	
	45020	50 yr	Partial Removal	7040	275.46	6.81	213.46	0.38	-0.27
	45020	100 yr	Existing	8690	276.75	7.31	306	0.39	
	45020	100 yr	Partial Removal	8690	276.45	7.55	284.55	0.41	-0.3
	45020	100 yr + 25%	Existing	10865	278.03	7.96	397.8	0.4	
	45020	100 yr + 25%	Partial Removal	10865	277.62	8.31	368.71	0.42	-0.41
Downstream of State Route 173 bridge	45080	Mean Daily	Existing	300	268.02	1	119.87	0.11	
	45080	Mean Daily	Partial Removal	300	267.35	1.35	109.07	0.17	-0.67
	45080	2 yr	Existing	2500	272.1	2.82	175.08	0.21	
	45080	2 yr	Partial Removal	2500	271.75	3	170.1	0.23	-0.35
	45080	10 yr	Existing	4010	273.72	3.54	198.67	0.23	
	45080	10 yr	Partial Removal	4010	273.44	3.68	194.7	0.24	-0.28
	45080	50 yr	Existing	7040	276.2	4.55	310.3	0.25	
	45080	50 yr	Partial Removal	7040	275.96	4.67	291.9	0.26	-0.24
	45080	100 yr	Existing	8690	277.32	4.97	396.61	0.26	
	45080	100 yr	Partial Removal	8690	277.07	5.11	377.37	0.27	-0.25
	45080	100 yr + 25%	Existing	10865	278.68	5.38	501.6	0.27	
	45080	100 yr + 25%	Partial Removal	10865	278.36	5.56	476.75	0.28	-0.32

Table 7: Comparison of Results for Full Dam Removal Conditions and Partial Dam Removal Conditions

	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
Downstream of Dam	42420	Mean Daily	Full Removal	300	261.66	1.28	154	0.18	
	42420	Mean Daily	Partial Removal	300	261.71	1.72	104.91	0.23	0.05
	42420	2 yr	Full Removal	2500	264.36	3.84	154.42	0.33	
	42420	2 yr	Partial Removal	2500	264.09	5.89	104.94	0.52	-0.27
	42420	10 yr	Full Removal	4010	265.9	4.51	154.66	0.33	
	42420	10 yr	Partial Removal	4010	265.51	6.98	109.45	0.54	-0.39
	42420	50 yr	Full Removal	7040	268.65	5.36	158.43	0.32	
	42420	50 yr	Partial Removal	7040	268.23	7.77	146.34	0.53	-0.42
	42420	100 yr	Full Removal	8690	270.07	5.65	211.96	0.32	
	42420	100 yr	Partial Removal	8690	269.68	7.86	195.96	0.48	-0.39
	42420	100 yr + 25%	Full Removal	10865	271.94	5.88	246.16	0.3	
	42420	100 yr + 25%	Partial Removal	10865	271.57	7.83	239.38	0.44	-0.37
Dam	42429				Dam Structure				
Upstream of Dam	42438	Mean Daily	Full Removal	300	261.63	2.43	81.49	0.35	
	42438	Mean Daily	Partial Removal	300	261.7	2.55	70.45	0.35	0.07
	42438	2 yr	Full Removal	2500	264.08	6.69	122.61	0.68	
	42438	2 yr	Partial Removal	2500	263.9	8.39	93.52	0.83	-0.18
	42438	10 yr	Full Removal	4010	265.65	6.83	148.97	0.61	
	42438	10 yr	Partial Removal	4010	265.32	9.17	99.87	0.77	-0.33
	42438	50 yr	Full Removal	7040	268.52	6.57	244.49	0.46	
	42438	50 yr	Partial Removal	7040	268.04	9.73	240.04	0.64	-0.48
	42438	100 yr	Full Removal	8690	270	6.44	258.3	0.41	
	42438	100 yr	Partial Removal	8690	269.55	9.43	254.13	0.57	-0.45
	42438	100 yr + 25%	Full Removal	10865	271.91	6.32	282.5	0.36	
	42438	100 yr + 25%	Partial Removal	10865	271.5	9.07	277.31	0.49	-0.41
	42448	Mean Daily	Full Removal	300	261.65	2.43	81.56	0.35	
	42448	Mean Daily	Partial Removal	300	261.72	2.55	70.61	0.35	0.07
	42448	2 yr	Full Removal	2500	264.17	6.53	124.02	0.65	
	42448	2 yr	Partial Removal	2500	264.14	7.83	96.17	0.76	-0.03
	42448	10 yr	Full Removal	4010	265.71	6.75	149.9	0.6	
	42448	10 yr	Partial Removal	4010	265.78	7.76	143.77	0.72	0.07
	42448	50 yr	Full Removal	7040	268.54	6.56	244.7	0.46	
	42448	50 yr	Partial Removal	7040	268.9	6.72	248.04	0.48	0.36
	42448	100 yr	Full Removal	8690	270.02	6.44	258.51	0.41	
	42448	100 yr	Partial Removal	8690	270.27	6.65	261.69	0.43	0.25
	42448	100 yr + 25%	Full Removal	10865	271.92	6.32	282.66	0.36	
	42448	100 yr + 25%	Partial Removal	10865	272.07	6.55	284.49	0.38	0.15
	42488	Mean Daily	Full Removal	300	261.74	2.48	81.55	0.36	
	42488	Mean Daily	Partial Removal	300	261.82	2.42	79.25	0.34	0.08
	42488	2 yr	Full Removal	2500	264.51	6.06	129	0.6	
	42488	2 yr	Partial Removal	2500	264.87	5.72	128.56	0.55	0.36
	42488	10 yr	Full Removal	4010	265.96	6.49	153.87	0.57	
	42488	10 yr	Partial Removal	4010	266.39	6.09	160.61	0.53	0.43
	42488	50 yr	Full Removal	7040	268.66	6.52	245.78	0.46	
	42488	50 yr	Partial Removal	7040	269.11	6.19	250.04	0.43	0.45
	42488	100 yr	Full Removal	8690	270.1	6.44	259.49	0.41	
	42488	100 yr	Partial Removal	8690	270.42	6.27	263.66	0.39	0.32
	42488	100 yr + 25%	Full Removal	10865	271.98	6.33	283.34	0.36	
	42488	100 yr + 25%	Partial Removal	10865	272.18	6.28	285.92	0.36	0.2
	43230	Mean Daily	Full Removal	300	264.14	3.95	63.08	0.63	
	43230	Mean Daily	Partial Removal	300	264.1	4.09	62.29	0.66	-0.04
	43230	2 yr	Full Removal	2500	267.66	6.69	100.8	0.61	
	43230	2 yr	Partial Removal	2500	267.67	6.69	100.82	0.61	0.01
	43230	10 yr	Full Removal	4010	268.96	7.78	124.47	0.67	
	43230	10 yr	Partial Removal	4010	269.05	7.62	126.58	0.66	0.09
	43230	50 yr	Full Removal	7040	270.56	9.49	160.58	0.75	
	43230	50 yr	Partial Removal	7040	270.71	9.21	163.41	0.72	0.15
	43230	100 yr	Full Removal	8690	271.37	10.04	176.07	0.74	
	43230	100 yr	Partial Removal	8690	271.58	9.68	180.03	0.7	0.21
	43230	100 yr + 25%	Full Removal	10865	272.72	10.11	201.64	0.67	
	43230	100 yr + 25%	Partial Removal	10865	272.91	9.83	205.33	0.64	0.19

Table 7 (cont): Comparison of Results for Full Dam Removal Conditions vs Partial Dam Removal Conditions

	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude # Chl	Water Surface Difference (ft)
	44070	Mean Daily	Full Removal	300	266.63	2.33	75.84	0.31	
	44070	Mean Daily	Partial Removal	300	266.64	2.31	76.12	0.31	0.01
	44070	2 yr	Full Removal	2500	270.24	5.18	162.64	0.41	
	44070	2 yr	Partial Removal	2500	270.24	5.18	162.63	0.41	0
	44070	10 yr	Full Removal	4010	271.76	6.15	182.99	0.43	
	44070	10 yr	Partial Removal	4010	271.77	6.14	183.04	0.43	0.01
	44070	50 yr	Full Removal	7040	273.86	7.83	213.68	0.47	
	44070	50 yr	Partial Removal	7040	273.83	7.85	213.3	0.47	-0.03
	44070	100 yr	Full Removal	8690	274.71	8.66	226.05	0.5	
	44070	100 yr	Partial Removal	8690	274.68	8.69	225.64	0.5	-0.03
	44070	100 yr + 25%	Full Removal	10865	275.67	9.66	242.85	0.53	
	44070	100 yr + 25%	Partial Removal	10865	275.67	9.66	242.78	0.53	0
	45020	Mean Daily	Full Removal	300	267.31	1.57	71.87	0.17	
	45020	Mean Daily	Partial Removal	300	267.32	1.56	71.92	0.17	0.01
	45020	2 yr	Full Removal	2500	271.56	4.17	138.14	0.3	
	45020	2 yr	Partial Removal	2500	271.56	4.17	138.14	0.3	0
	45020	10 yr	Full Removal	4010	273.15	5.18	157.56	0.33	
	45020	10 yr	Partial Removal	4010	273.15	5.18	157.58	0.33	0
	45020	50 yr	Full Removal	7040	275.48	6.8	214.22	0.38	
	45020	50 yr	Partial Removal	7040	275.46	6.81	213.46	0.38	-0.02
	45020	100 yr	Full Removal	8690	276.46	7.55	285.36	0.4	
	45020	100 yr	Partial Removal	8690	276.45	7.55	284.55	0.41	-0.01
	45020	100 yr + 25%	Full Removal	10865	277.62	8.31	368.83	0.42	
	45020	100 yr + 25%	Partial Removal	10865	277.62	8.31	368.71	0.42	0
Downstream of State Route 173 bridge	45080	Mean Daily	Full Removal	300	267.34	1.35	108.98	0.17	
	45080	Mean Daily	Partial Removal	300	267.35	1.35	109.07	0.17	0.01
	45080	2 yr	Full Removal	2500	271.75	3	170.11	0.23	
	45080	2 yr	Partial Removal	2500	271.75	3	170.1	0.23	0
	45080	10 yr	Full Removal	4010	273.44	3.68	194.69	0.24	
	45080	10 yr	Partial Removal	4010	273.44	3.68	194.7	0.24	0
	45080	50 yr	Full Removal	7040	275.97	4.67	292.63	0.26	
	45080	50 yr	Partial Removal	7040	275.96	4.67	291.9	0.26	-0.01
	45080	100 yr	Full Removal	8690	277.08	5.1	378.09	0.27	
	45080	100 yr	Partial Removal	8690	277.07	5.11	377.37	0.27	-0.01
	45080	100 yr + 25%	Full Removal	10865	278.36	5.56	476.84	0.28	
	45080	100 yr + 25%	Partial Removal	10865	278.36	5.56	476.75	0.28	0

For the full dam removal scenario, the estimated 170-foot width of dam is removed from the dam cross section in the hydraulic model. Also for cross sections from just downstream of the dam to approximately 500 feet upstream of the dam, a natural channel was created assuming a 50-foot bottom width and side slopes of approximately 1:8 or milder. The invert of the revised reach was determined using a slope of 0.003 ft/ft to smooth the channel invert profile from upstream to downstream of the dam. Figures 12 and 13 show the revised dam cross section and invert profile changes for the complete dam removal alternative. The roughness coefficients used were the same as those used for the natural channel in the existing conditions model. The expansion and contraction coefficients were revised to 0.1 and 0.3, respectively, in the area where the dam was removed to indicate more natural flow conditions.

The partial dam removal alternative is represented in the model by removing a 100-foot section from the dam at the dam cross section. The natural channel from just downstream to approximately 500 feet upstream of the partially-removed dam has the same dimensions and roughness coefficients as used for the full dam removal alternative. Figures 14 and 15 show the revised dam cross section and invert profile changes for the partial dam removal. The expansion and contraction coefficients were left as 0.3 and 0.5 near the removed dam section. The removed section will cause a constriction at higher flows however lower flows would flow freely in the natural channel.

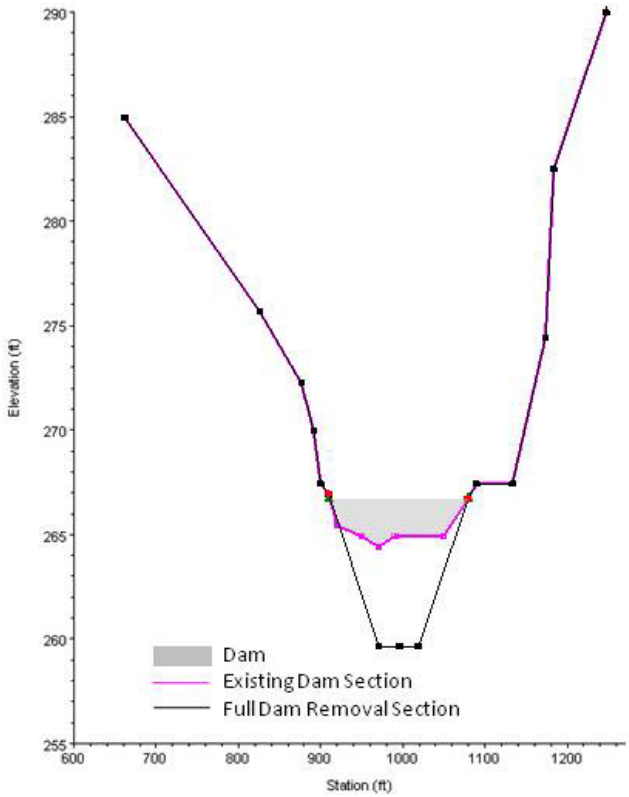


Figure 12 – Complete removal alternative cross section.

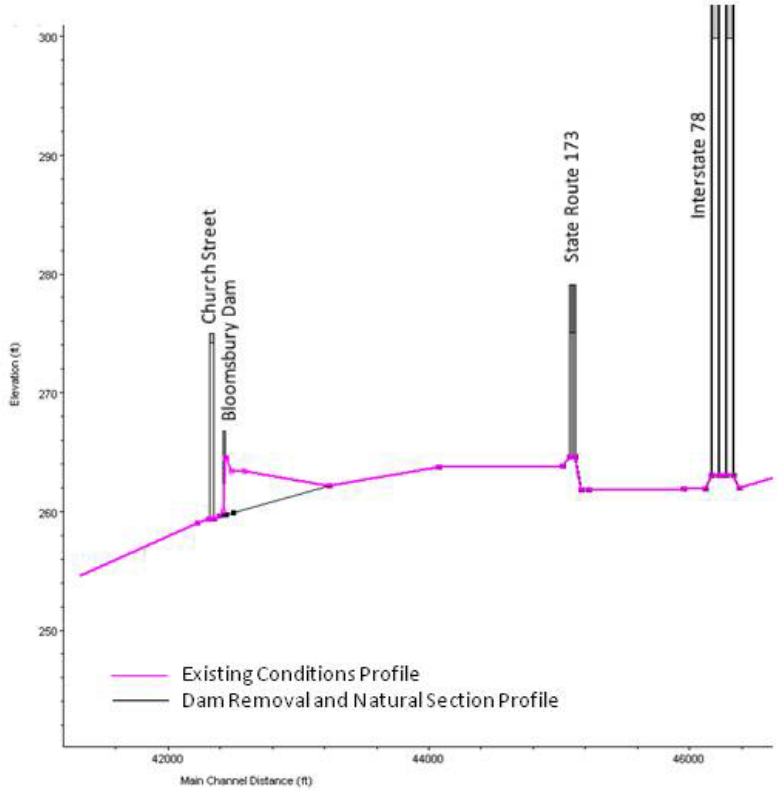


Figure 13 – Complete removal alternative profile.

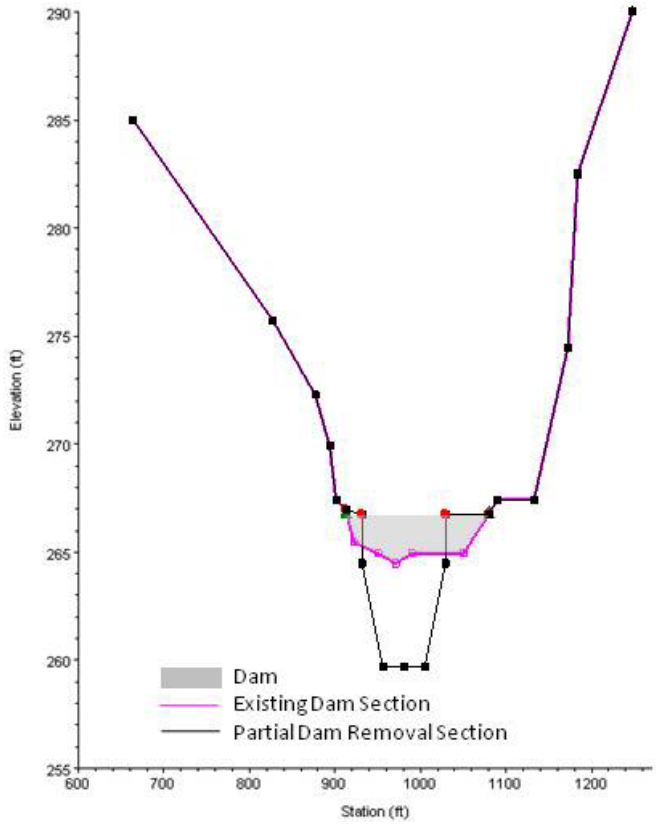


Figure 14 – Partial removal alternative cross section.

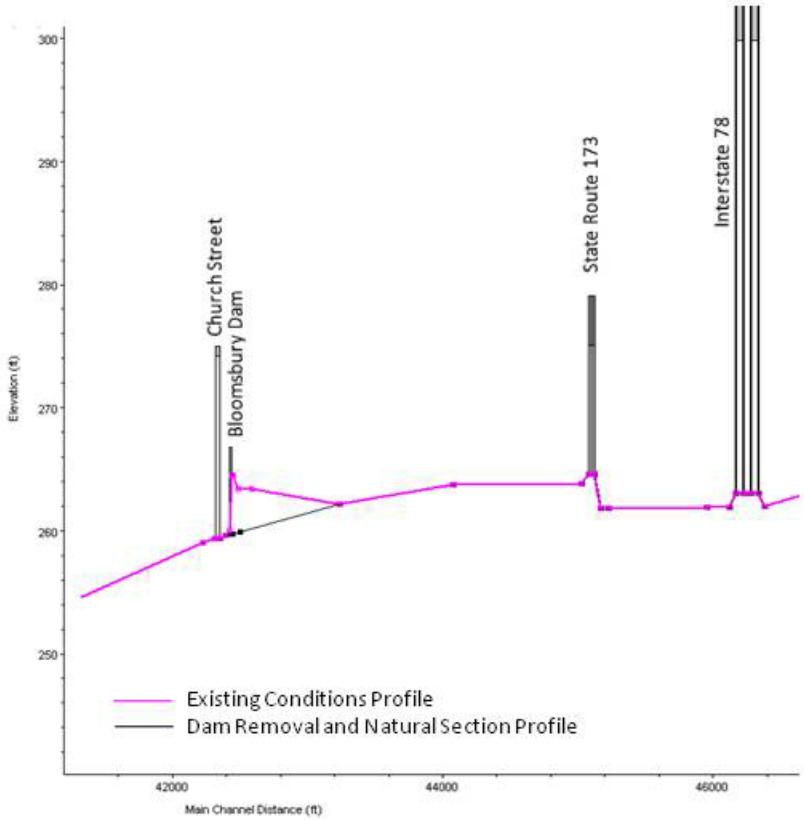


Figure 15 – Partial removal alternative profile.

The HEC-RAS model results for both alternatives are summarized in Tables 5, 6, and 7. Table 5 shows a comparison of the existing conditions and full dam removal conditions. Table 6 compares the existing conditions to partial dam removal conditions. Table 7 compares the two dam removal alternatives.

For the range of flows from mean daily flow to the NJDEP regulatory flow, both dam removal alternatives result in increases in water surface elevations compared to existing conditions just downstream of the dam with a maximum of 0.5 ft for the 10-year discharge for the full dam removal. These increases at this cross section are minor and do not greatly increase the top width of the floodplain. The increases are likely due to changing the roughness coefficient to reflect a more vegetated condition. Site survey information collected during the design phase will help to provide a more accurate prediction of the water surface elevation changes in the project area that would follow a removal.

Upstream of the dam, both dam removal alternatives decrease water surface elevations compared to existing conditions. At the dam, the decrease in water surface elevation is as much as 6 feet for the mean daily flow but only about 1 foot for the NJDEP regulatory flow. The magnitude of the changes in water surface elevation decreases at cross sections further upstream. Just downstream of the State Route 173 bridge, the water surface elevation decreases are less than 0.5 foot for all flows except the mean daily flow (Figures 16 and 17).

In comparing the full dam removal to the partial dam removal, Table 7 shows that just upstream and downstream of the dam location the partial removal water surfaces are lower than the full dam removal water surfaces. This occurs because the partial removal cross sections are narrower resulting in higher velocities and therefore lower water surface elevations for the same flowrates. Upstream of the dam location, where the cross sectional areas for both the full and partial dam removals are nearly identical, the partial dam removal water surface elevations are higher than the full dam removal water surface elevations as expected. The magnitude of the water surface elevation changes between the two dam removal scenarios is not more than 0.5 foot at any cross section for any of the computed flowrates.

Both dam removal alternatives will result in velocity increases immediately upstream of the dam location. In particular, for the partial dam removal alternative, velocities immediately upstream of the dam may be as high as 10 feet per second for some flows. Large rip rap, boulders or dam remnants may be used to stabilize this section. Natural sections of the river will be used as a guide in selecting vegetation and in-stream features to insure stability throughout this reach. Further upstream, the dam removal condition velocities will be more similar to the existing condition velocities.

Additional hydrologic and hydraulic analyses will be performed in the design phase of the project. These additional analyses will examine potential increases in discharge and/or flooding due to removal of the dam. They will also investigate sediment transport scenarios and the potential for scour at the Church Street bridge.

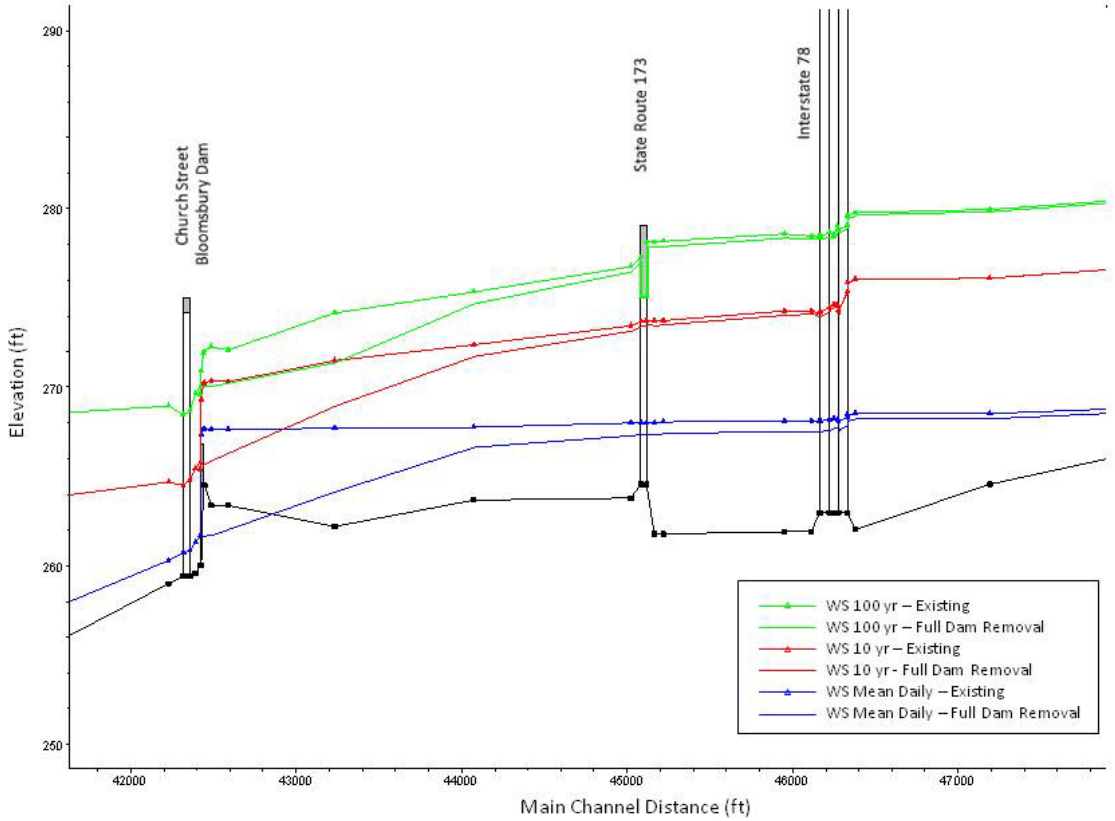


Figure 16 – Comparison of water surface profiles for selected flows for the existing condition and the complete dam removal condition.

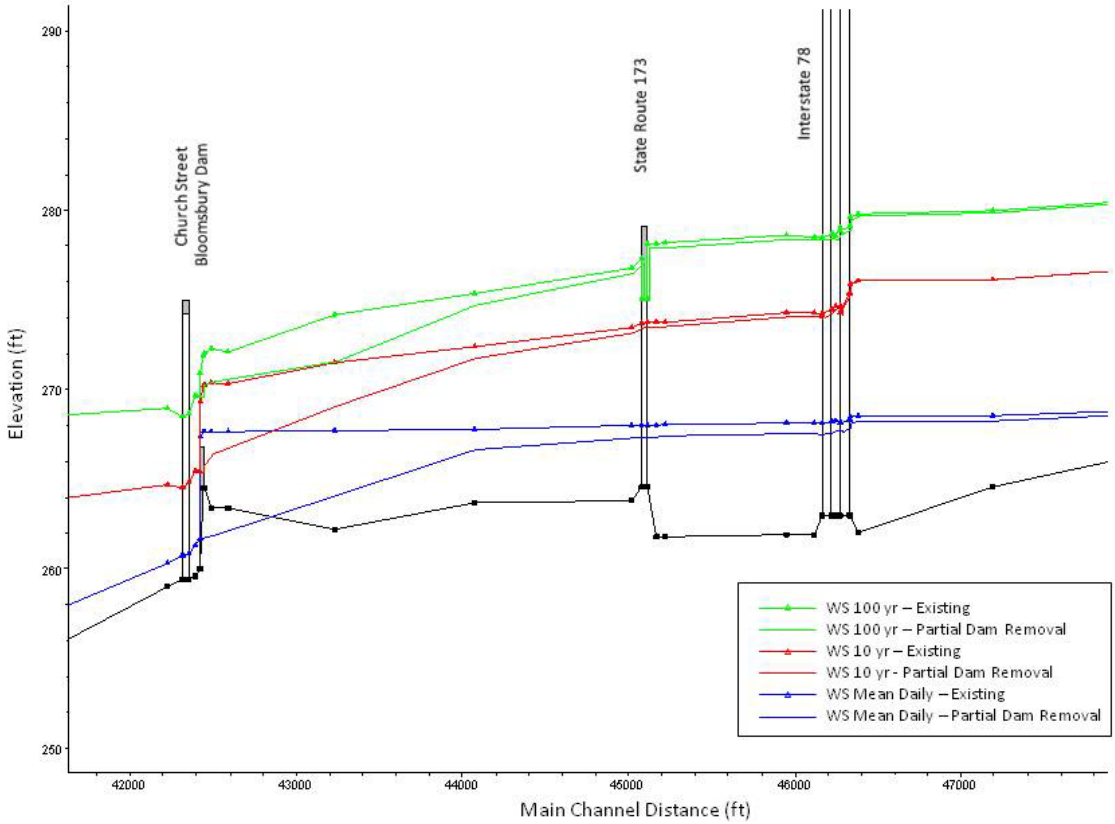


Figure 17 – Comparison of water surface profiles for selected flows for the existing condition and the partial dam removal condition.

7.2 Environmental Impacts

As per the National Environmental Policy Act (NEPA) of 1970, the District has completed an environmental review of alternatives for the project. This review involved coordinating an Environmental Assessment (EA) with other Federal and State agencies; the interested parties; and the general public. The EA (appended with this report) analyzed the alternatives described above and provided a justification for the selected plan of action. A NEPA scoping letter associated with this project was sent to agencies and potentially interested parties on October 5, 2009.

Scoping and Public Participation

The following stakeholder agencies and entities have been contacted in order to solicit input concerning this project.

- NOAA, National Marine Fisheries Service, Habitat Conservation Division
- National Park Service, National Wild and Scenic Rivers
- NRCS, New Jersey State Office
- U.S. Fish and Wildlife Service, New Jersey Field Office
- USEPA Region II, Environmental Review Section
- NJDEP Office of Permit Coordination and Environmental Review
- NJDEP Division of Parks &Forestry, Historic Preservation Office
- NJDEP Site Remediation Program, Office of Sediment and Dredging Technology
- NJDEP Bureau of Dam Safety and Flood Control
- NJDEP Division of Fish and Wildlife, Bureau of Freshwater Fisheries
- Delaware River Keeper Network
- New Jersey Sierra Club
- New Jersey Environmental Federation, Clean Water Action
- American Rivers
- Musconetcong Watershed Association
- Trout Unlimited
- North Jersey RC&D Council
- Hunterdon County Planning Department
- Warren County Planning Department
- Township of Greenwich
- Borough of Bloomsbury
- The Asbury Graphite Mills, Inc. (co-owner of dam)

Environmental Review Process

The EA was posted on the Philadelphia District's website for public review in April 2012. Public comments and responses can be found in Appendix E of the EA. Compliance with environmental quality protection statutes and other environmental review requirements is on-going.

It is anticipated that the selected alternative will not adversely affect federally listed species. The U.S. Fish and Wildlife Service supports this project and in an Intra-Service Section 7

Consultation dated February 2, 2011, concluded a no effect determination on federally listed species (Appendix A of EA). In a letter dated October 15, 2009, the National Marine Fisheries Service indicated their support for the project and that no resources under their jurisdiction are found in the project area (Appendix A of EA).

Coordination with NJDEP (Land Use Regulation Program) will be necessary to secure a Section 401 State Water Quality Certificate for the project. In addition, we will coordinate with NJDEP (Dam Safety and Dredging / Sediment Technology Sections) to make decisions about the methodology used for sediment management during the proposed dam removal project.

Based on comments received from the NJDEP, Division of Fish and Wildlife Section in response to our NEPA scoping letter, the Musconetcong River at Bloomsbury Dam is classified as a Trout Maintenance stream and is trout stocked waters. This classification is likely to result in an environmental restricted window for in-water construction from March 15 through June 15.

The project will require coordination with the Hunterdon County and Warren County Soil Conservation Districts for the preparation and approval of a Soil Erosion and Sediment Control (E&S) Plan. Since the Bloomsbury Dam spans both Hunterdon and Warren Counties, one county will likely take jurisdiction over the entire project and preclude the need for project review by both counties.

The Bloomsbury Dam Removal Project is located within the Highlands Preservation Area. Further research will be needed in the Design and Implementation phase to determine the extent that our project falls under the jurisdiction of this law and coordination requirements associated with the Highlands Water Protection and Planning Act.

Assessment of Environmental Consequences

A full review of the environmental impacts of the proposed alternatives is provided in the appended EA. Below is a summary assessment of the potential environmental benefits and consequences of removing the Bloomsbury Dam. Given that the conditions resulting from a complete removal versus a partial removal would be so similar, the benefits and consequences discussed below can be considered to apply to both alternatives, unless otherwise noted. For the "no action" alternative, it is assumed that the conditions would identical to those described above in Section 2.0 (Existing Conditions) and Section 3.0 (Without Project Condition).

Vegetation

If the dam is removed and the elevation of the water surface in the impoundment is lowered, it will expose banks and sediments that are currently under water. These new riparian areas will be planted with native trees and shrubs and seeded with a native riparian seed mix to help prevent colonization by non-native species. Upland edges of the riparian buffer will be seeded with warm season grasses to provide additional habitat diversity. These new riparian areas will function as a valuable buffer that will help to enhance water quality, slow floodwaters, stabilize the banks, and regulate the temperature of the river.

Aquatic Resources

Removal of the dam would reconnect 7.8 miles of the Musconetcong River and would restore natural river ecological functions such as sediment and nutrient transport. It would also re-establish the free passage of aquatic species including resident fish, amphibians, freshwater crustaceans, and macroinvertebrates. Increased movement opportunities will help to improve river-wide populations of all species because it will allow them to "weather" problems such as local pollution through avoidance. Species will also have more opportunities to reach optimum habitat.

Brook trout, the region's only native trout, would particularly benefit from the removal of the dam. This species requires cold and clean water and its presence in the Musconetcong River is a tribute to exceptionally valuable ecosystem that is present. The removal of the dam would restore miles of optimum habitat for populations of this species that has been greatly reduced in the northeast U.S. due to urbanization of watersheds.

The reconnection of this portion of the river could also potentially result in some negative impacts on the resident aquatic species. These impacts could include increased competition for limited resources, increased predation, and the introduction of invasive species from the downstream segment to the upstream segment.

Approximately 7.5 acres of impoundment would be restored to natural river conditions. The impoundment would revert to its original lotic (flowing) condition and no longer be a lentic (lake-like) system. The impoundment would no longer function as a low-velocity portion of the river where sediments and nutrients are accumulated, oxygen is depleted, and water temperatures are raised due to increased solar exposure. These changes would eliminate the current conditions that favor algal blooms in the impoundment. The transformation would also restore the riffle/run habitat that is so critical for many riverine species.

Since it has been determined that the sediments impounded behind the dam do not pose an ecological or human health risk, the sediments will be allowed to mobilize and move downstream during the removal (pending approval by regulatory agencies). It is likely that this method will result in temporary temperature, turbidity, and chemistry changes within the river water during the dam removal and will result in the destruction of some benthic organisms within the impoundment. It is also likely that the sediment will temporarily cover the substrate of the channel downstream of the dam . This could degrade downstream benthic habitat for a period of time until the natural sediment transport processes of the river can restore the pre-dam conditions. The temporarily increased turbidity could also result in increased mortality and stress for downstream resident fishes.

The frequency of large storms and flood events following dam removal will play a large role in determining how much and how fast the sediment will be transported. During the Design and Implementation phase of the project, a sediment transport analysis will be performed to more accurately forecast the movement of sediment following the dam removal. Information collected by the physical analysis of the sediments (ie. grain-size classes) will be used to predict how much will move as bedload and how much will move as suspended load when certain hydrologic conditions are met.

Wetland Resources

No wetlands exist within the proposed limit of disturbance for the removal of the dam and the closest mapped wetlands are located approximately 0.3 miles upstream and downstream of the dam. It is not anticipated that the project would have any negative impacts on these mapped wetland resources.

An unmapped, emergent wetland area approximately 0.02 acres in size lines the head race that enters the Asbury Graphite Mills property on the north side of the impoundment. When the dam is removed and the water level in the impoundment is lowered, the water level in the head race will also be lowered. This alteration of the hydrology is likely to convert this fringe wetland to upland. However, once the river adjusts to absence of the dam and a new river/land interface is established, it is expected that a new fringe wetland will establish along the bank of the river. Therefore, no net loss of wetlands is expected to occur as a result of the project.

Wildlife Resources

The removal of the dam will have no negative impacts on common wildlife species or threatened and endangered species in the vicinity of the project. Any of these species that use the river for feeding, drinking, resting, or migrating will benefit from the increased water quality and expanded riparian habitat in the area of the impoundment.

Water Supply

According to the Environmental Resource Inventory (Greene, 2007), the Borough of Bloomsbury has three public community wells supplying the community water system. There are also seven residences in Bloomsbury that do not use the public water system and most likely utilize private wells. None of these wells that are located in the Borough of Bloomsbury are in the vicinity of the dam or the impoundment.

The Warren County Health Department was contacted to inquire if any of the residences that are located along the north side of the impoundment in Greenwich Township have private groundwater wells. The Department indicated that all of these residences are connected to the public water supply and do not receive water from private wells.

Given that there are no groundwater supply wells located near the impoundment, the removal of the dam and the lowering of the water level in the impoundment is not expected to impact the water supply of any local residents.

Cumulative Effects

As noted in Section 1.1, a partnership of federal and state agencies and non-profit organizations is currently conducting feasibility studies for the removal of the downstream Hughesville and Warren Glen Dams. These two dams are the only remaining impediments located between the Bloomsbury Dam and confluence of the Musconetcong River and the Delaware River. When these two dams and the Bloomsbury Dam are removed, it will restore 13.3 miles of the Musconetcong River to its natural, free-flowing condition. This

will allow migratory fish, including shad, herring, alewife, striped bass, and American eel to access spawning habitat which they have not been able to reach for over 200 years.

7.3 Socio-Economic Impacts

As noted in Section 2.3, the dam, the impoundment, and the mill races do not currently serve any economic purposes. They do not provide power, electricity, irrigation water, municipal or industrial water supply, flood control benefits, or significant fish and wildlife benefits. The industrial mill on the south side of the river is no longer functional since its mill race has been filled. The Asbury Graphite Mills, Inc. building on the north side of the river has been unused for decades and a representative of the corporation has indicated that they have no future plans for the property, other than selling it. From this standpoint, the removal of the dam is not likely to cause any negative economic impacts. In fact, the removal of the dam and its corresponding liability is likely to increase the value of the adjacent properties and increase the likelihood that they will be purchased and renovated.

On a broader scale, the Musconetcong River valley is a popular destination for a wide variety of recreational activities such as hiking, hunting, fishing, canoeing, camping, nature study and other outdoor activities. The scenic and recreational resources combined are an important part of the local and regional economy. In this respect, the removal of the dam may provide an economic benefit to the region by eliminating a dangerous obstruction on the river, increasing the connectivity of the river, and improving the quality of the overall recreational experience. All of these improvements could lead to increased recreational tourism in the area.

7.4 Recreational Impacts

As mentioned above, the Musconetcong River valley has a wide variety of recreational resources. The resources which are most directly impacted by the dam, kayaking/canoeing and fishing, would see the greatest benefits from the removal of the dam. The reconnection of approximately 7.8 miles of river and the removal of a drowning hazard would allow longer and safer kayaking/canoeing experiences. And the free passage of resident fish and improved water quality would increase the likelihood of anglers catching fish.

One potential negative impact on recreational resources would be the loss of a fishing location for local anglers. If there are local anglers who use the impoundment as a favorite fishing hole, the removal of the dam would eliminate this flat-water resource that they utilize. However, given that the removal of the dam is likely to improve the movement and reproduction of all resident fish species in this section of the Musconetcong River, the loss of this single fishing hole is likely to be offset by the overall increase in river-wide angling opportunities.

As noted in Section 2.2, the NJDEP Division of Fish and Wildlife stocks the river with trout at the Bloomsbury Dam. During the design phase of the project, the Corps will work closely with the Division of Fish and Wildlife to determine if the removal of the dam will require a change in the stocking and management strategy for trout in the vicinity of Bloomsbury.

7.5 Historic and Archaeological Impacts

A Phase IA Cultural Resources survey was performed in early 2010 to identify potential historic, architectural, and archaeological constraints that could impact the proposed alternatives plans. The results of the survey indicated that the dam could be considered a contributing feature of the Black Mill or the Borough of Bloomsbury if either was determined to be eligible for the National Register of Historic Places. The survey also determined that there is a high potential for historic archaeological resources related to the eighteenth and nineteenth-century industrial activities, but a low potential for prehistoric resources because of previous disturbance from historic industrial activities.

The results of the cultural resources survey will be provided to the New Jersey State Historic Preservation Office (NJ SHPO) to determine if they concur with the conclusions. If NJ SHPO concurs, additional research will be conducted at local and state repositories and a strategically planned Phase IB investigation will be conducted within the Area of Potential Effects (APE). The Philadelphia District is currently negotiating a programmatic agreement (pursuant to 36 CFR 800.14{1}{ii}) with the Advisory Council, the local Sponsor, Federally Recognized Tribes and the State Historic Preservation Office to govern the implementation of the Section 106 process when the project moves into the design phase. A copy of the draft Programmatic Agreement and the letters to the tribes and regulatory agencies have been included in Appendix A of the EA.

7.6 Real Estate Requirements

A real estate plan will be prepared during the Design and Implementation Phase that will describe the lands, easements, rights-of-way and roadway requirements to be obtained by the non-Federal sponsor.

8.0 SELECTED PLAN DESCRIPTION

Removal of the dam, either completely or partially, would attain substantial ecological benefits when compared to the without project condition. However, since the partial removal plan would provide several more important benefits than the complete removal plan, partial dam removal is the selected plan.

As described in Section 6.1.2, partial removal of the dam would involve demolishing and excavating a majority of the dam, but leaving small sections of it in place on both sides of the river. Approximately 20 feet would be left on the south side and 50 feet on the north side. The remaining sections would maintain the structural integrity of the existing embankments, would direct high flows toward the center of the river, and would be visible for appreciation as a historic resource. Leaving these sections in place would also lessen the amount of demolition material that requires re-use or disposal.

Other benefits resulting from the removal of the dam have been described in detail in the previous sections. Briefly, these benefits include passage for aquatic organisms and recreational boats, restoration of the impoundment, resumption of the downstream movement of sediment and nutrients, and elimination of a public safety hazard.

Preliminary Design Assumptions

1.) Only the dam will be purchased or leased by the non-Federal sponsor prior to removal. Portions of the two adjacent properties will not be acquired.

2.) Removal of the dam will occur during a low flow period and will not occur during a sensitive biological time period. Pending regulatory approval, it will be done "in the wet" without the use of water diversions, such as a coffer dam.

3.) If the method is approved by regulatory agencies, the sediment will be allowed to gradually flow downstream during the removal process or to consolidate in place and stabilize.

4.) The section of the dam that will be removed will be excavated to the natural river bottom, which is assumed to be similar to the conditions immediately downstream of the dam (large cobbles).

5.) There is no concrete apron at the foot of the dam.

6.) The dam is assumed to be a timber crib construction that was improved with a concrete spillway. The interior is assumed to be approximately 75% rock fill and 25% concrete within the voids between rocks. The timber cribs are assumed to be 10 inches in diameter. The concrete on the top of the dam and on the spillway is assumed to be 12 inches thick and assumed to contain re-bar. Assumptions are based on observations made during the demolition of the downstream Finesville Dam.

7.) There is only the single dam. There are no remnants of previous dams upstream of the dam.

8.) All of the demolished dam material requiring off-site disposal will be classified as non-hazardous.

9.) The existing embankments will maintain their structural integrity and will not require any improvements.

10.) The removal of the dam will not result in any scour of the downstream bridge abutments and the bridge will not require improvements.

11.) The removal of the dam will not require the relocation of any utilities.

Potential Construction Sequence for Partial Dam Removal*

1.) The river will be accessed from the Asbury Graphite Mills, Inc. property on the north side. A temporary construction easement will be negotiated with the owner for the staging of equipment.

2.) Appropriate erosion control measures will be installed around the access area.

3.) Timber mats or similar measures will be placed on the substrate of the river where

the excavator will be moving.

4.) A concrete saw will be used to make a clean cut in the dam at the ends of the segments that will remain in place.

5.) The dam will be demolished by an excavator fitted with a hydraulic hammer or similar equipment. A bucket with a thumb or a grapple would be used to remove the demolished debris and clear out the channel down to the natural channel invert. The dam will be demolished from the south side towards the north side.

6.) As the demolished dam material is removed from the river, it will be sorted so that appropriate materials, if any, can be reused for bank and channel stabilization purposes. Demolition debris that cannot be reused on site will be hauled off site for disposal or recycling. Roll off containers will be staged on the Asbury Graphite property for disposal of the debris.

7.) Archaeological monitoring will be conducted as the dam is removed.

8.) As the dam is removed, the impoundment will drain and a new channel will form. The river will be allowed to gradually develop fluvial features including a thalweg, localized pools, riffles, runs, and depositional areas. Newly exposed sediments that have settled in place as new riparian areas will be temporarily stabilized with a quickly growing vegetation, such as an annual rye grass. After the river has reached a stable equilibrium and fluvial features have developed, the riparian areas will be planted with the appropriate native vegetation.

9.) If trash and debris, such as car tires, are located in the exposed impoundment areas after the dam removal, they will be collected for disposal prior to the restoration efforts.

10.) If it is determined to be necessary, material from the dam or imported material will also be used to armor the remaining dam sections or vulnerable sections of bank to protect them from excessive velocities and debris during high flows.

11.) Following the removal of the dam and the restoration efforts, the temporary easement on the Asbury Graphite property will be restored to pre-project conditions.

* The potential construction sequence was formulated for planning purposes. The actual construction sequence will be determined in the design and implementation phase.

9.0 COST APPORTIONMENT

Costs for implementation of Section 206 aquatic ecosystem projects are shared at a rate of 65 percent Federal and 35 percent non-Federal. Implementation costs for this project will include the topographic and bathymetric surveys, a cultural resource investigation, a real estate plan, preparation of project plans and specifications, project management, demolition of the dam, disposal of demolition materials, sediment management, and restoration of the channel and banks. Design and implementation will be managed by USACE. Based on the

preliminary cost estimates provided above, the estimated apportionment is $536,000 Federal and $289,000 non-Federal.

Sponsor Willingness

The non-Federal sponsor, the New Jersey Department of Environmental Protection, Office of Natural Resource Restoration (NJDEP ONRR), is committed to improvement and restoration of the Musconetcong River and has agreed to execute the Project Partnership Agreement (PPA). A Letter of Interest from the sponsor has been included as Appendix B.

10.0 CONCLUSIONS

The Bloomsbury Dam on the Musconetcong River between the Borough of Bloomsbury, NJ and Greenwich Township, NJ degrades the aquatic environment by impeding the passage of aquatic organisms, obstructing natural sediment transport processes, and impairing the water quality and benthic habitat in the impoundment. Numerous environmental benefits that would result from removing the dam have been identified in this Feasibility Study. Removing the dam would restore free flowing conditions, allow passage of aquatic organisms, and improve riverine habitat. Removal would also eliminate a public drowning hazard and provide safe passage for recreational boats.

According to the USACE Planning Guidance Notebook (ER 1105-2-100), ecosystems restored by a project such as this one "should mimic, as closely as possible, conditions which would occur in the area in the absence of human changes to the landscape and hydrology." The implementation of this project would fulfill this policy by returning the river to a self-regulating system that does not require long term maintenance.

The Musconetcong River has been Federally designated as a National Wild and Scenic River. The removal of the Bloomsbury Dam and the resulting environmental and social benefits would further enhance a river which has outstanding scenic, recreational, geologic, fish and wildlife, historic, and cultural attributes.

The dam is an obsolete structure that is no longer used for its intended industrial purposes. Both owners of the dam support the partial removal of the dam. The non-Federal sponsor, NJDEP ONRR, has agreed to execute the PPA. Partial dam removal has been identified as the selected plan maximizing the ecological benefits.

11.0 RECOMMENDATIONS

I recommend that the partial dam removal project described in this report be approved and implemented under the authority of Section 206 of the Water Resources Development Act of 1996 (PL 104-303). In my judgment, the proposed project is a justifiable expenditure of Federal funds. The total estimated cost of the project is $ 825,000.

The recommendations contained herein reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in local and state programs, or the formulation of a national Civil Works water resources program. Consequently, the recommendations may be modified at higher levels within the Executive Branch before they are used to support funding. However, prior to executing a Project Partnership Agreement, the non-Federal Sponsor will be advised of any modifications and will be afforded an opportunity to comment further.

29 April 2013
Date

John C. Becking, P.E.
Lieutenant Colonel, US Army
District Commander

FINDING OF NO SIGNIFICANT IMPACT
REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER
WARREN AND HUNTERDON COUNTIES, NEW JERSEY

OVERVIEW

The United States Army Corps of Engineers (Corps), Philadelphia District has evaluated the removal of the Bloomsbury Dam. The Bloomsbury Dam is situated within the Musconetcong River between the Borough of Bloomsbury in Hunterdon County, New Jersey and Greenwich Township in Warren County, New Jersey. It is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River.

PURPOSE AND SPECIFICATIONS

The goal of the project is to remove the Bloomsbury Dam. The objectives include: restore free-flowing conditions and increase connectivity of the Musconetcong River; allow free passage of fish and other aquatic organisms in the location of the dam; restore riverine habitat and improve water quality in the impoundment area; restore the natural movement of materials (sediment, nutrients, woody debris) down the river; eliminate the existing public safety hazard and reduce the risk of accidental drowning; and eliminate risk of future catastrophic failure.

There is considerable need for the project. The presence of the Bloomsbury Dam on the Musconetcong River creates a variety of problematic conditions that are typical of the obsolete, run-of-the-river, low head dams that are located on many rivers and tributaries throughout the northeastern U.S. The problems created by the dam include: impedes the free passage of aquatic organisms; obstructs the movement of materials (sediment, nutrients, woody debris) down the river; changes the condition of the impoundment from that of a riverine habitat with riffles and pools to that of a lacustrine habitat (similar to a lake); accumulates sediments in the impoundment which cover the natural substrate of the river and make the habitat less hospitable to the macroinvertebrates on which fish feed; warms the water in the impoundment by slowing its velocity and increasing its exposure to sunlight; degrades water quality in the impoundment by accumulating nutrients in the sediment, promoting the growth of algae, and lowering the levels of dissolved oxygen; creates a hydraulic roller at the bottom of the spillway that is a public safety hazard and drowning risk; and prevents the passage of recreational boats (e.g., kayaks and canoes).

COORDINATION

The project was coordinated with the New Jersey Department of Environmental Protection (NDJEP), the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Natural Resource Conservation Service (NRCS), and numerous other interested parties. NJDEP is the non-federal, cost-share sponsor for this project. In addition, a scoping letter was sent out to agencies and interested parties on this project in October 2009; as well as, as a Public Notice was sent in association with this document in April 2012. Furthermore, early in the project planning (September 2009), a meeting was held with key stakeholders, as well as, state and federal agencies to discuss the concept of the Bloomsbury Dam Removal project.

ENDANGERED SPECIES IMPACT

Consultation with USFWS and the NMFS has determined that there will be no effect on federally listed species found in the project area. Pursuant to Section 7 of the Endangered Species Act of 1973 as amended by P.L. 96-159, consultation with the FWS and NMFS has been completed for this project.

WATER QUALITY COMPLIANCE

Pursuant to Section 401 of the Clean Water Act, a Water Quality Certificate will be obtained from NJDEP prior to project construction.

WETLANDS

An unmapped, emergent wetland area approximately 0.02 acres in size lines the head race that enters the Asbury Graphite Mills property on the north side of the impoundment. When the dam is removed and the water level in the impoundment is lowered, the water level in the head race will also be lowered. This alteration of the hydrology is likely to convert this fringe wetland to upland. However, once the river adjusts to absence of the dam and a new river/land interface is established, it is expected that a new fringe wetland will establish along the bank of the river. Therefore, no net loss of wetlands is expected to occur as a result of the project. In addition, a review of the impacts associated with discharges to waters of the United States for the Bloomsbury Dam Removal as required by Section 404(b)(1) of the Clean Water Act, as amended was completed for this project.

COASTAL ZONE

Based on the information gathered during the preparation of the Environmental Assessment, the project is not located in the area defined under the Coastal Zone Management Act of 1972. Therefore, the project will not need a federal consistency determination in regards to the Coastal Zone Management Program of New Jersey.

CULTURAL RESOURCES

Pursuant to 36 CFR 800.14(1)(ii), the Corps will negotiate a programmatic agreement, in consultation with the Advisory Council, the local Sponsor, Federally Recognized Tribes and the State Historic Preservation Office to govern the implementation of the Section 106 process, since the effects on historic properties cannot be fully determined prior to the finalization of the NEPA document.

RECOMMENDATION

Because the Environmental Assessment concludes that the work described is not a major Federal action significantly affecting the human environment, I have determined that an Environmental Impact Statement is not required.

Philip M. Secrist, III
Lieutenant Colonel, Corps of Engineers
District Commander

14 JUN 2012
Date

ENVIRONMENTAL ASSESSMENT
REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER
SECTION 206, AQUATIC ECOSYSTEM RESTORATION
WARREN AND HUNTERDON COUNTIES, NEW JERSEY

PREPARED BY:
PHILADELPHIA DISTRICT
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA 19107

June 2012

ENVIRONMENTAL ASSESSMENT
REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER
SECTION 206, AQUATIC ECOYSTEM RESTORATION
WARREN AND HUNTERDON COUNTIES, NEW JERSEY

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1.0 Project Location and Description

The Bloomsbury Dam is situated within the Musconetcong River between the Borough of Bloomsbury in Hunterdon County, New Jersey and Greenwich Township in Warren County, New Jersey (Figures 1 and 2). The dam is adjacent to the intersection of New Jersey State Route 173 (Warren Glen Bloomsbury Road) and County Route 579 (Church Street). It is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River.

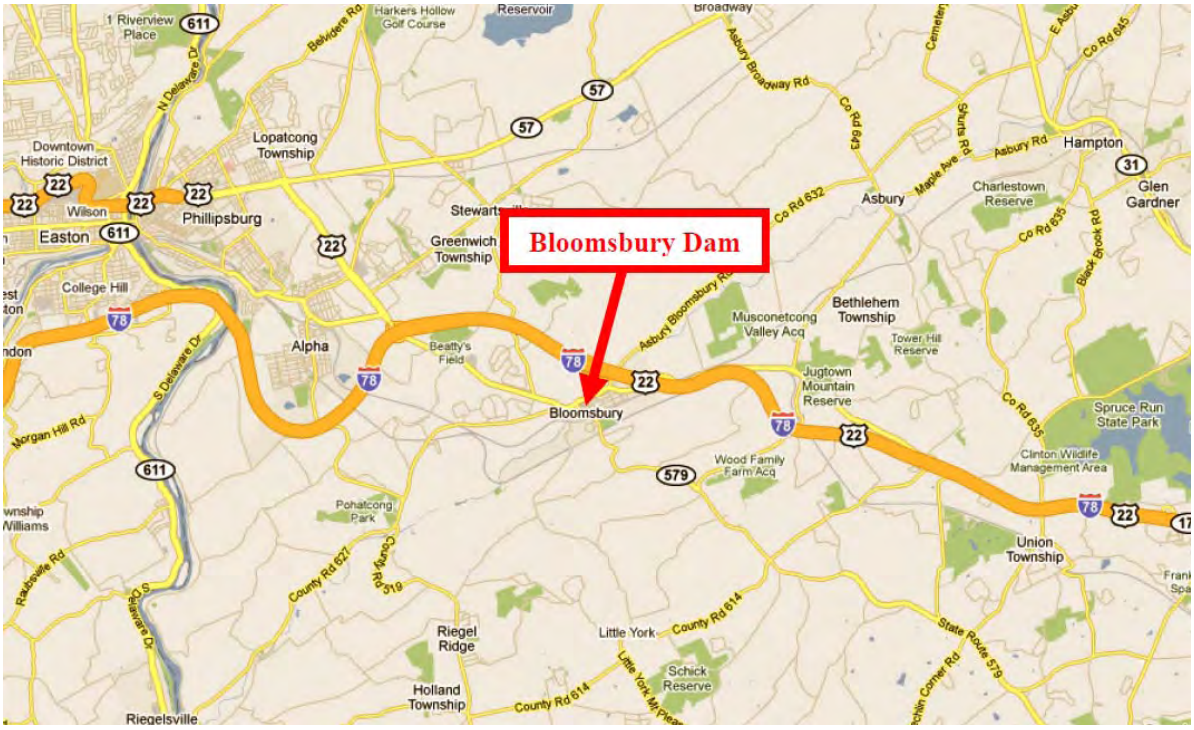

Figure 1. Project location in Bloomsbury, New Jersey.

The Musconetcong River flows for approximately 42 miles from Lake Hopatcong to the Delaware River in a northeast to southwest direction. It drains a 158 square mile, mostly rural, watershed area in northwestern New Jersey. The watershed is primarily forested and is located in parts of 25 municipalities in Sussex, Morris, Warren and Hunterdon Counties in New Jersey. Approximately 15 percent of the watershed's 100,864 acres are permanently preserved as open space or farmland.

The Musconetcong River was designated a National Wild and Scenic River on December 26, 2006 with the signing of Public Law 109-452. The National Wild and Scenic River System was created by Congress in 1968 with the Wild and Scenic Rivers Act. The Act calls on the nation to preserve select rivers with outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural or other important values in free-flowing condition. Rivers in this national system are protected for the benefit and enjoyment of present and future generations.

Figure 2. Bloomsbury dam aerial photograph.

The dam (Figure 3) is located within the New Jersey Highlands, designated as Highlands Preservation Area. The Highlands is a 1,343 square mile area in the northwest part of the state noted for its scenic beauty and environmental significance. The region was designated in 2004 by the Highlands Water Protection and Planning Act to preserve open space and protect the state's greatest diversity of natural resources.

There are ten dams of varying size along the main stem of the Musconetcong River from Lake Hopatcong to Hughesville. A majority of these dams were built for industrial purposes in the early 1900s and are no longer used for their original purpose. There are two existing down-stream dams located along the Musconetcong River between the Bloomsbury Dam and the confluence with the Delaware River. Beginning at the confluence and moving up-river toward Bloomsbury, the dams are the Hughesville Dam and the Warren Glen Dam. Approximately 5.5 miles upstream of the Bloomsbury Dam, the next dam on the river is the Asbury Graphite Dam.

In some communities, dam removal has widespread support for its environmental benefits. A partnership of federal/state agencies and non-profit organizations recently removed the Finesville Dam, which was located was located between the confluence with the Delaware River and the Hughesville Dam. This partnership includes the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), the NJDEP Bureau of Dam Safety and Flood Control, the NJDEP Division of Fish and Wildlife, the Musconetcong Watershed Association (MWA), American Rivers, and Trout Unlimited. The Finesville Dam was removed in November 2011. The partnership has also received permission from the owner of the Hughesville and

Warren Glen Dams to conduct feasibility studies for their removal. The studies are expected to begin in 2012.

Figure 3. Viewing Bloomsbury Dam from the south riverbank.

2.0 Study Authority

Authority to perform this investigation was provided under Section 206 of the Water Resources Development Act of 1996 (PL 104-303) entitled "Aquatic Ecosystem Restoration", which states in part, "The Secretary [of the Army] may carry out an aquatic ecosystem restoration and protection project if the Secretary determines the project will restore the quality of the environment and is in the public interest; and is cost-effective." Each project is limited to a federal cost of not more than $5 million, including all project related costs for feasibility studies, planning, engineering, design, and construction.

3.0 Purpose and Need for Action

The goal of the project is to remove the Bloomsbury Dam. The objectives that would be accomplished with the removal of the dam include:

- Restore free-flowing conditions and increase connectivity of the Musconetcong River.
- Allow free passage of fish and other aquatic organisms in the location of the dam.
- Restore riverine habitat and improve water quality in the impoundment area.
- Restore the natural movement of materials (sediment, nutrients, woody debris) down the

river.

- Eliminate the existing public safety hazard and reduce the risk of accidental drowning.
- Eliminate risk of future catastrophic failure.
- Minimize impacts to environmental and cultural resources.

There is considerable need for the project. The presence of the Bloomsbury Dam on the Musconetcong River creates a variety of problematic conditions that are typical of the obsolete, run-of-the-river, low head dams that are located on many rivers and tributaries throughout the northeastern United States. The problems created by the dam are summarized below.

- Impedes the free passage of aquatic organisms.
- Obstructs the movement of materials (sediment, nutrients, woody debris) down the river.
- Changes the condition of the impoundment from that of a riverine habitat with riffles and pools to that of a lacustrine habitat (similar to a lake).
- Accumulates sediments in the impoundment which cover the natural substrate of the river and make the habitat less hospitable to the macroinvertebrates on which fish feed.
- Warms the water in the impoundment by slowing its velocity and increasing its exposure to sunlight. This creates an altered temperature regime that is inconsistent with normal conditions in the river and may favor introduced non-native species.
- Degrades water quality in the impoundment by accumulating nutrients in the sediment, promoting the growth of algae, and lowering the levels of dissolved oxygen. The accumulation of nutrients in the impoundment also prevents them from reaching downstream aquatic habitats.
- Creates a hydraulic roller at the bottom of the spillway that is a public safety hazard and drowning risk. Dam related fatalities commonly occur below low-head dams with a low hazard rating, such as Bloomsbury (Minnesota Department of Natural Resources 2010). In 2003, a 29-year old woman drowned in the hydraulic roller at Bloomsbury while she was swimming in the river.
- Prevents the safe passage of recreational boats (e.g., kayaks and canoes).

Construction and Condition

The Bloomsbury Dam is a run-of-the-river dam that is approximately 7 feet high and 170 long. It does not have the capability of controlling flows or generating hydroelectric power. The majority of the dam appears to be comprised of cast-in-place concrete. However, based on the observations of similar dams on the river and the results of the cultural resource investigation (described below), it is likely that there are remnants of a timber crib dam either within the concrete structure, or immediately upstream. According to NJDEP Bureau of Dam Safety and Flood Control records, the dam was rebuilt from an earlier dam circa 1912 to help provide power for the Bloomsbury Graphite Company. The Bureau does not have as-built drawings for the dam or any records of its composition. The dam has not been given a hazard status classification by the Bureau.

The downstream face of the spillway appears to be in good condition. It is unknown if a concrete apron exists at the foot of the spillway, or if a scour hole has formed in the absence of an apron. When the dam was observed during low flows, large cobbles and small boulders were

visible within 20 feet of the foot of the dam. In addition, the embankments of the dam are composed of large stone and masonry walls that also form the base of the steel truss bridge that is approximately 90 feet downstream of the dam (Figure 4). The sections of the embankments that are in contact with the dam appear to have a small degree of scour present. However, in general, the embankments appear to be stable.

Figure 4. Dam and downstream bridge on Route 579 (Church Street).

Impoundment

- At the crest of the dam, the impoundment is approximately 170 feet wide (Figure 5). As you move upstream, the width of the impoundment slowly tapers down over the course of approximately 1,600 feet to the normal width of the river, which is approximately 90 feet. From a hydraulic perspective, the impoundment extends approximately 3,600 feet upstream from the dam to the point where Interstate 78 crosses the river. This is the furthest upstream point where the dam is impacting the velocity and surface elevation of the river.

- For this feasibility effort, a sediment quality investigation was performed by Versar, Inc. in May 2011 to characterize the physical and chemical parameters of the sediment that is impounded behind the dam. The investigation also included measurements of sediment thickness that were used to estimate the quantity of sediment behind the dam. Sediment grain size analysis indicated that approximately 98% of the sediment behind the dam was

a mix of sand and gravel. Approximately 2% of the sediment was composed of silt or clay. Sediment volume calculations estimated that approximately 6,000 cubic yards of sediment has accumulated behind the dam. The Versar, Inc. sediment quality testing report has been included as Appendix B.

Figure 5. Bloomsbury dam, looking upstream from Route 579 bridge.

Dam Ownership and Adjacent Buildings

Ownership of the dam is shared by a private citizen and a corporation. The southern half of the dam that is located in the Borough of Bloomsbury is part of a residential property that sits next to the river (30 Church Street). A two-story home is located on the property.

The northern half of the dam that is located in Greenwich Township is part of a former industrial property that sits next to the river and is owned by Asbury Graphite Mills, Inc (Figure 6). A representative of Asbury Graphite Mills, Inc. has indicated that the industrial activities at the facility ceased in the 1950s or 1960s. The facility was used for the production of graphite materials for industrial applications. Both owners have provided the Philadelphia District with letters expressing their interest in the removal of the dam.

Figure 6. Former industrial facility adjacent to the dam on north riverbank.

Maintenance and Liability

Neither of the owners of the dam are currently maintaining the dam or are interested in doing so in the future. Both owners of the dam would like to remove the dam and relieve themselves of the liabilities that are associated with ownership. Even though the dam does not appear to be in immediate risk of failure and is not considered a high hazard by the Bureau of Dam Safety, there is always the possibility of accidental drownings or a catastrophic failure caused by an abnormal natural event.

4.0 Alternatives

4.1 No action

The “no action” alternative would be not to remove the dam leaving the project site unchanged. The “no action” alternative would not improve the environmental condition of the Musconetcong River; therefore, the Corps considers this option unacceptable. It appears that other Musconetcong coalition groups have leveraged all their available resources for the removal of other resources at this time, so a no action would result in the Bloomsbury Dam not being removed in the near future. The Corps will keep the “no action” alternative in the analysis pursuant to National Environmental Policy Act regulations.

4.2 Complete Removal of the Dam

Complete removal entails demolishing and excavating the entire width of the dam (170 feet) up to the embankment walls. An excavator fitted with a hydraulic hammer or similar equipment would be used to break up the concrete spillway and any large solid pieces that may exist inside the structure. An excavator with a bucket and thumb, or a grapple, would then be used to remove the demolished debris and clear out the channel. The excavators would access the river from the north side from the Asbury Graphite Mills property. This property has an open field (approximately 2,500 square feet) that is directly adjacent to the river and the owners have agreed to provide a temporary easement for access and the staging of equipment.

Pending approval by the appropriate regulatory agencies (e.g., NJDEP, USFWS, County Conservation District), the excavators would enter the river upstream of the dam, "in the wet", without the use of a coffer dam. Other recent dam removal projects on the Musconetcong River in 2008 and 2009 (approximately 19 miles to the northeast) have been performed in this manner and were approved by the regulatory agencies. This is also the method that was used for the removal of the downstream Finesville Dam in 2011. Depending on the condition of substrate in the river, timber mats may be laid down in the path of the excavators to evenly distribute the weight and minimize disturbance of the benthic substrate. The benefit of using this method, rather than a coffer dam, is that heavy equipment is in the river for much less time. The construction and deconstruction of a coffer dam would most likely double the time required for the removal and significantly increase costs.

The probable technique for removing the dam would be to enter the river on the north side, cross the river, and begin breaking up the south end first. The excavator would then proceed to demolish the dam and clear the rubble in small sections as it moves back toward the north side. If necessary, the timber mats would be laid out beforehand, and then collected as the excavator retreats to the north side of the river. An alternative technique would be the use of a long boom excavator that would remain on the Asbury Graphite property and reach across the river.

Chemical analyses of the sediment samples collected within the impoundment did not detect any constituents of concern that exceeded regulatory screening criteria, with the exception of minor cyanide exceedance (see Section 6.2). Therefore it is unlikely that the sediment would pose an ecological or human health risk if it was allowed to gradually flow downstream during, and following, the removal process. Pending approval by regulatory agencies, this is the method that will be used for the removal. The recently completed downstream Finesville Dam Removal project also followed this method for sediment redistribution.

The removal will be scheduled for a time of the year when low-flow conditions are expected in the river. The schedule will also be coordinated regulatory agencies, so removal does not occur during a sensitive biological time period, such as fish spawning season.

As the demolished dam material is removed from the river, it will be sorted so that a maximum amount, if any, can be reused for bank and channel stabilization purposes. It is anticipated that some of the concrete rubble and stones from the interior of the dam could be re-used to stabilize and naturalize the channel and to provide toe protection along the existing embankments. Toe

protection would enhance the long term stability of the embankments and protect them from excessive velocities and debris during high flows. If a scour hole is present at the foot of the spillway, demolished material could also be used to fill and stabilize the area. Demolition debris that cannot be reused on site will be hauled off-site for disposal or recycling.

As the dam is removed, the impoundment will drain and the upstream river channel will become narrower. In the new channel, velocity will increase and sediment transport will resume. The river will gradually develop fluvial features including a thalweg, localized pools, riffles, runs, and depositional areas. It is expected that these features will develop naturally and that manipulation of the stream bed to create them will not be necessary. However, if these fluvial features do not develop as expected, a variety of stream restoration techniques could be employed to promote their development. These restoration techniques could also be used to create riffles in the location of the dam that would create ambient sound similar to the dam.

When the dam is removed and the elevation of the water surface in the impoundment is lowered, it will expose banks and sediments that are currently under water (Figure 7). The Service has volunteered to oversee planting any exposed river banks with native vegetation to stabilize the banks and provide habitat. The riparian stabilization and restoration plan will involve planting trees and shrubs on unconsolidated exposed mudflats and banks upstream of Bloomsbury Dam to create riparian habitat and provide erosion control upstream of the dam. Approximately 200 trees and shrubs per acre will be planted within the project area. The area to be planted will be approximately 0.5 acres. Shrubs and trees that will be planted within the riparian area may include, but are not limited to, black willow (*Salix nigra*), shadbush (*Amelanchier canadensis*), black gum (*Nyssa sylvatica*), elderberry (*Sambucus canadensis*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), winterberry (*Ilex verticillata*), buttonbush (*Cephalanthus occidentalis*), red chokeberry (*Pyrus arbutifolia*), and spicebush (*Lindera benzoin*). In addition, the current plan is to seed the exposed river banks with a native wetland seed mix.

Figure 7. Estimated change in river width in Bloomsbury, as a result of dam removal.

4.3 Partial Removal of the Dam

Partial removal of the dam would involve demolishing and excavating a majority of the dam, but leaving sections of it in place on both sides of the river. Approximately 20 feet would be left on the south side and 50 feet on the north side. The approximate size of the remaining dam remnants will be determined to achieve the most benefit (fully open stream channel) with the least amount of cost (demolition). The removal process would be performed in the same manner described above for the complete removal, except that demolition with the hydro hammer would start 20 feet away from the south embankment and end 50 feet away from the north embankment. If it is determined that the edges of remaining dam sections should display a clean cut, specialized concrete cutting tools, such as a diamond wire saw, can be used prior to demolition.

A partial removal would provide all of the same benefits of a complete removal (i.e. passage for aquatic organisms and recreational boats, restoration of the impoundment, downstream movement of materials, elimination of a safety hazard), but would also provide several additional benefits listed below.

- The remaining sections would help to maintain the structural integrity of the existing embankments.
- The remaining sections would direct high flows toward the center of the river, diverting them away from the downstream bridge abutments.
- Remnants of the dam would be visible for appreciation as a historic resource. The interior construction may also be visible after removal.

- There will be less demolition material that requires re-use or disposal.

As with a complete removal it is anticipated that some concrete rubble and stones from the interior of the dam may be used for bank and bed stabilization purposes. If it is determined to be necessary, demolished material or imported material will also be used to armor the remaining dam sections to protect them from excessive velocities and debris during high flows.

The development of fluvial features and the exposure of new riparian areas are expected to occur in the same manner as the complete removal scenario. The use of stream restoration techniques, plantings, and stabilization are also possible options for this scenario.

4.4 Fish Passage Facility

Three management measures that were considered in the preliminary stages of this feasibility study were found to be unable to meet the needs of the project. As such, they were not given any detailed consideration in the study. The primary problem with all of these measures is that they would leave the dam in place and would not relieve the co-owners of their current liabilities. The co-owners cooperation with the project is contingent upon their relief of liability. A brief summary of these measures and a discussion of the additional concerns that contribute to their infeasibility are provided below.

Fish Ladder

The installation of a fish ladder within the Bloomsbury Dam is a method for addressing part of the study objective regarding the free passage of aquatic organisms. Traditional approaches to fish ladders involve the use of concrete baffles and compartments. The steep slopes and small compartments in these designs can also make passage difficult for some fish and fish ladders are never 100% efficient for passage of all fish. In addition, fish ladders typically require maintenance work to remove accumulated debris and can be labor intensive when compared to other restoration options. Finally, this measure would not allow the passage of other aquatic organisms such as amphibians, freshwater crustaceans, and macroinvertebrates. Given these potential inadequacies, and the fact that it would only address part of a single planning objective, the fish ladder alternative was eliminated from further consideration.

Rock Ramp

Construction of a rock ramp involves the placement of rock on the downstream side of the dam to create a gentle slope from the existing downstream channel bottom to the crest of the dam. This type of a fishway that emulates natural rapids would not only promote passage of fish, but would create beneficial habitat for fish as well as aquatic insects. The placement of this rock "wedge" at the foot of the dam would also alleviate potential drowning hazards by eliminating the hydraulic roller.

There are three major issues with this fish passage measure. The first is construction cost. Construction of a rock ramp with a slope gentle enough to allow fish passage requires the importation of large quantities of stone and gravel. The second is maintenance. Although it will not require maintenance as frequently as a fish ladder, a rock ramp will need to be monitored

periodically to insure that the slope remains stable and passage remains possible. And the third is permitting. Any proposed filling within a watercourse is heavily scrutinized, and frequently opposed by state and federal regulatory agencies. These three issues rendered this measure infeasible.

Bypass Channel

Construction of a bypass channel has been used to provide fish passage at other sites across the nation. However, bypass channels are typically expensive and require large amounts of land to construct. Given these two factors and considering the lack of available land around the Bloomsbury Dam, no further investigation was given to this measure.

A summary of the four alternatives can be found in Table 1. In addition, the projected benefits and potential issues are also displayed in this table.

Table 1. Alternative Analysis				
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
	No Action	Complete Dam Removal	Partial Dam Removal	Engineered Fish Passage Facility
Benefits	● None	● Restores a more natural stream flow along this section of the Musconetcong River. ● Provides passage for all aquatic communities (i.e. fish, macroinvertebrates). ● Increase in coldwater fish species (i.e., brook trout).	● Restores a more natural stream flow along this section of the Musconetcong River. ● Provides passage for all aquatic communities (i.e. fish, macroinvertebrates). ● Increase in coldwater fish species (i.e., brook trout).	● Provides fish passage for select fish species.
Potential issues	● Does not restore stream to a more natural hydrogeomorphic state. ● Does not provide passage to any aquatic organisms.	● Loss of impoundment. ● Decline of warmwater fish species (i.e., largemouth bass).	● Loss of impoundment ● Decline of warmwater fish species (i.e., largemouth bass).	● Does not restore stream to a more nature hydrogeomorphic state. ● Does not provide passage to all aquatic communities.
Maintenance costs	No cost	No cost	Low	Medium
Wetland impacts (acres)	0	0	0	0
Construction Cost	No cost	High	Medium	High

4.5 Selected Plan

Based on an evaluation of the various alternatives (Table 1), including the environmental impacts, design elements, and costs, Alternative #3 - Partial Dam Removal was determined to be the selected plan. The other alternatives were eliminated because of cost and long-term maintenance issues. Alternative #3 most successfully achieves the project goals, which include enhancing the aquatic habitat, improving local/resident fisheries by providing access to additional habitat, restoring the river to a more natural conditions, and low future operational / maintenance costs.

The selected plan (Partial Dam Removal) has the following assumptions:

Preliminary Design Assumptions

1.) Removal of the dam will occur during a low flow period and will not occur during a sensitive biological time period. A timing restriction of in-water work will be 3/15 – 6/15 NJDEP, 2012). Based on NJDEP's response to the draft EA for the project, construction "in the wet" without the use of water diversions, such as a coffer dam will be acceptable (NJDEP, 2012).

2.) Sediment behind the dam has been tested and the results conclude no contaminant concerns. NJDEP has reviewed the testing data and concurred that it would be acceptable to allow the sediment to gradually flow downstream during the removal (sediment redeposition by natural processes). A sediment transport analysis will be completed during the Design and Implementation phase of the project to further forecast the movement of the sediment during and after dam removal.

3.) The section of the dam that will be removed will be excavated to the natural river bottom, which is assumed to be similar to the conditions immediately downstream of the dam (large cobbles).

4.) There is no concrete apron at the foot of the dam.

5.) The dam is assumed to be a timber crib construction that was improved with a concrete spillway. The interior is assumed to be approximately 75% rock fill and 25% concrete within the voids between rocks. The timber cribs are assumed to be 10 inches in diameter. The concrete on the top of the dam and on the spillway is assumed to be 12 inches thick and assumed to contain re-bar. We can use the recent demolition of the downstream Finesville Dam as a template for the demolition of the Bloomsbury Dam.

6.) There is only the single dam. There are no remnants of previous dams upstream of the dam.

7.) All non-hazardous material that can be used effectively and in an environmentally-acceptable way on site will be used. All of the demolished dam material requiring off-site disposal will be classified as non-hazardous and disposed off site properly.

8.) The existing embankments will maintain their structural integrity and will not require any improvements.

9.) The removal of the dam will not result in any scour of the downstream bridge abutments and the bridge will not require improvements. Additional hydraulic analysis during the Design and Implementation phase of the project, will determine if this assumption is correct.

10.) The removal of the dam will not require the relocation of any utilities.

Preliminary Construction Sequence for Partial Dam Removal

1.) The river will be accessed from the Asbury Graphite Mills, Inc. property on the north side. A temporary construction easement will be negotiated with the owner for the staging of equipment.

2.) Appropriate erosion control measures will be installed around the access area.

3.) If required by NJDEP, timber mats or similar measures will be placed on the substrate of the river where the excavator will be moving.

4.) A concrete saw will be used to make a clean cut in the dam at the ends of the segments that will remain in place.

5.) The dam will be demolished by an excavator fitted with a hydraulic hammer or similar equipment. A bucket with a thumb or a grapple would be used to remove the demolished debris and clear out the channel down to the natural channel invert. The dam will be demolished from the south side towards the north side.

6.) As the demolished dam material is removed from the river, it will be sorted so that appropriate materials, if any, can be reused for bank and channel stabilization purposes. Demolition debris that cannot be reused on site will be hauled off-site for disposal or recycling. Roll off containers will be staged on the Asbury Graphite property for disposal of the debris.

7.) As the dam is removed, the impoundment will drain and a new channel will form. The river will be allowed to gradually develop fluvial features including a thalweg, localized pools, riffles, runs, and depositional areas. Newly exposed sediments that have settled in place as new riparian areas will be temporarily stabilized with a quickly growing vegetation, such as an annual rye grass. After the river has reached a stable equilibrium and fluvial features have developed, the riparian areas will be planted with the appropriate native vegetation, contingent upon the Corps being able to acquire appropriate Real Estate conservation easements from local landowners.

8.) If trash and debris, such as car tires, are located in the exposed impoundment areas after

the dam removal, they will be collected for disposal prior to the restoration efforts.

9.) If it is determined to be necessary, material from the dam or imported material will also be used to armor the remaining dam sections or vulnerable sections of bank to protect them from excessive velocities and debris during high flows.

5.0 Existing Conditions

5.1 Air and Water Quality

Air Quality

Warren County, New Jersey, within which the Federal action will take place, is classified as nonattainment for 8-hour ozone (oxides of nitrogen [NOx] and volatile organic compounds [VOCs]) and Sulfur Dioxide (SO_2).
Ambient air quality is monitored by New Jersey Department of Environmental Protection (NJDEP) and is compared to the National Ambient Air Quality Standards (NAAQS) throughout the state, pursuant to the Clean Air Act of 1970. Six principal "criteria" pollutants are ozone (oxides of nitrogen (NOx) and volatile organic compounds (VOC)), carbon monoxide, nitrogen oxides, sulfur dioxides, particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). Stationary sources include power plants that burn fossil fuels, factories, boilers, furnaces, manufacturing plants, gasoline dispensing facilities, and other industrial facilities. Mobile sources include vehicles such as cars, trucks, boats, and aircraft.

The Bloomsbury Dam Removal Project is located within Warren County, which is included in New York – North New Jersey – NY-NJ-CT Nonattainment Area for 8-hr ozone and the Northeast Pennsylvania – Upper Delaware Valley AQCR Nonattainment Area for sulfur dioxide.

Water Quality

In New Jersey, it is the policy of the State to restore, maintain, and enhance the chemical, physical, and biological integrity of its waters; to protect the public health; to safeguard aquatic biota; protect scenic and ecological values and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters. Water quality is evaluated with respect to Surface Water Quality Standards (SWQS) and water quality concerns occur when SWQS are not met or are threatened. New Jersey's Surface Water Quality standards (NJAC7:9B, et seq.) establish the water quality goals and policies underlying the management of the State's water quality. The designation of Freshwater 1 or Freshwater 2 indicates uses and restrictions NJDEP may put on waters.

In addition to the standard water quality classifications, waters are also classified as either Category 1 or Category 2 waters. Category 1 waters are those waters designated for additional protection due to their "color, clarity, scenic setting other aesthetic value, exceptional ecological significance, recreational significance, and water supply significance or fisheries resources." All other waters are considered Category 2 waters. The Musconetcong River, which includes waters within Bloomsbury Borough, is classified as Category 1 waters (NJDEP 2011).

The major source of stream pollution in Bloomsbury Borough and along the Musconetcong River is non-point sources such as urban stormwater and agricultural runoff. These sources of pollution are somewhat difficult to identify since they do not discharge directly from a pipe, or a "point source." The major form of non-point source pollution is from stormwater that runs off of developed, impervious surfaces and from agricultural areas that are subject to erosion. Nonpoint source stormwater runoff affects the quantity and quality of water that enters a stream. The increase in quantity causes the downstream river to peak faster and higher than under natural or predevelopment conditions. This results in downstream flooding and erosion problems. This problem may be occurring in the Musconetcong River where increasing stream erosion in the lower watershed may be the result of volume increase caused by impervious surface increases in the upper watershed of the river. Although Bloomsbury is located within the Highlands Preservation Area, adjacent communities in Warren County are in the Planning Area and significant increases of impervious surfaces in these communities in the future may impact Bloomsbury's surface water quality (Greene 2007).

5.2 Sediment

Sediment Volume

Sediment volume in the Musconetcong River behind the Bloomsbury dam was estimated using a transect approach. Six transects perpendicular to the river were established behind the dam. For safety reasons, the closest location to the dam for field crews to work was at a distance of 60 feet upstream from the dam. The first transect was sampled here and the remaining transects were then evenly distributed in the 500 linear feet upstream of the dam.

At each transect, total river width was measured, and then divided into six equal portions. At the midpoint of each portion, a sediment depth measurement was taken. At each measuring point, half-inch rebar was placed on top of the river bed, resting on top of any loose sediment material that may have been present. The initial height of the top of the rebar was measured on a demarcated surveyor's stadia rod. The rebar was then forcefully pushed down into the sediment until hard surface was reached and it could not be pushed any further. The rebar was then tamped down three times with a 4 pound sledge hammer to ensure it was reaching refusal. At this point, the height of the top of the rebar was measured a second time on the stadia rod. The difference between the initial reading and the second reading was recorded as the depth of sediment present at that sampling point. This process was repeated at six sampling points along each of six transects. When water depths precluded wading, sediment depth measurements were taken from a canoe.

Total sediment volume was then estimated by adding the volume of sediment from each polygon from each transect (1 through 6) and the volume of sediment in each polygon of the former Mill Race area (1 through 4). The volume upstream of the dam was 6,051.5 cubic yards while the volume in the former Mill Race was 72.1 cubic yards. Thus, overall sediment volume present above Bloomsbury Dam was estimated to be 165,333 cubic feet, or 6,123.4 cubic yards. The spatial distribution of sediment build up behind Bloomsbury Dam is presented in Figure 8 (Versar 2011).

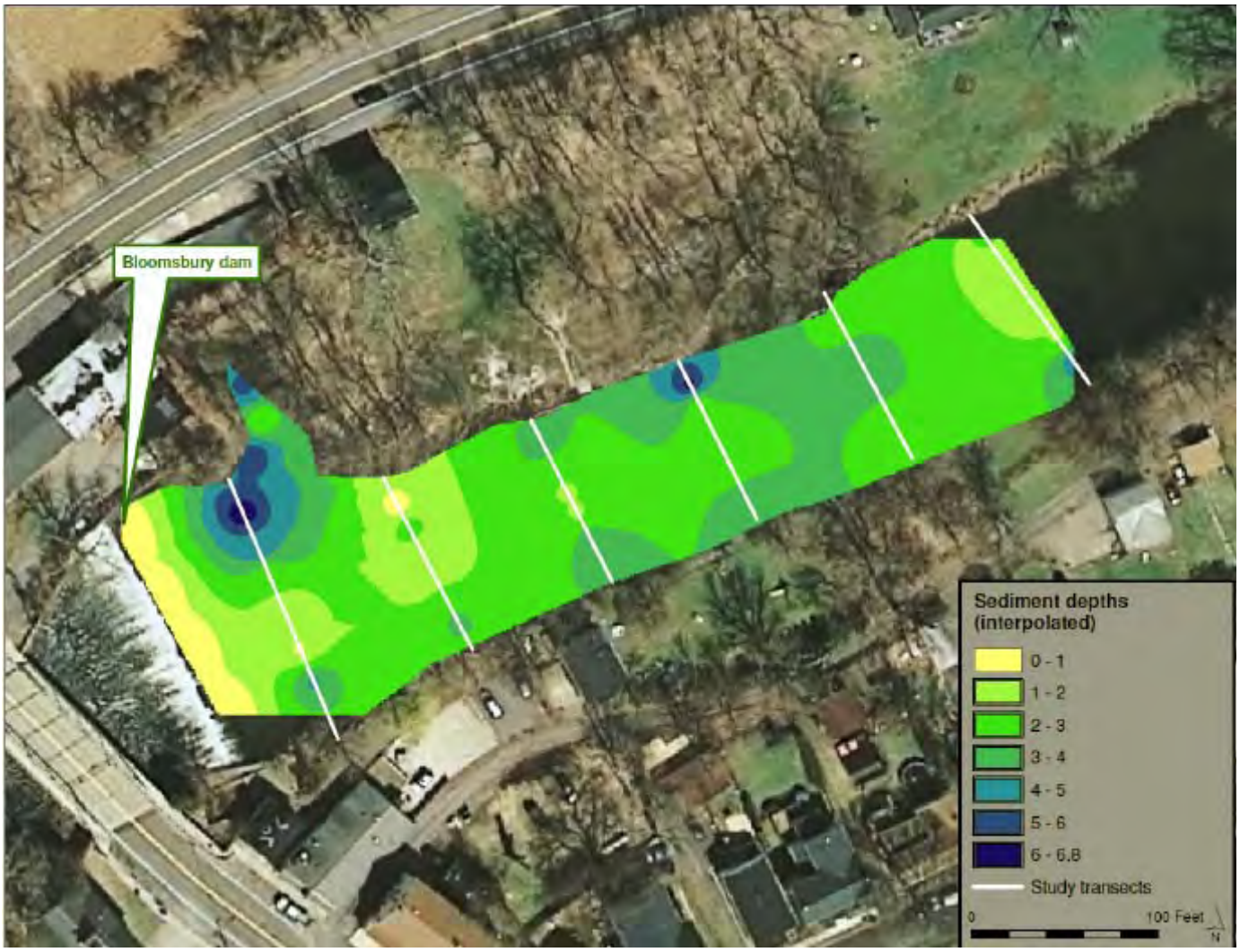

Figure 8. Distribution of sediment behind Bloomsbury Dam to 500 feet upstream. Sediment measurement transect lines indicate approximate sediment sampling points. This interpolation was performed for visual purposes only and may underestimate the true depth of sediment directly behind the dam. Sediment depth measurements could not be collected directly behind the dam due to safety concerns.

Sediment Testing

Sediment samples were collected from five stations; four upstream and one downstream of Bloomsbury Dam (Figure 9). Target collections points had to be repositioned slightly to obtain samples of silt due to the presence of bedrock and rock cobble substrate. Sediment samples for bulk chemical analysis were collected with a decontaminated stainless steel ponar grab. Each of the six samples was analyzed for Target Compound List (TCL) Semi Volatiles, TCL Pesticides and aroclor Polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) Inorganics. All sediment samples were analyzed for grain size using ASTM Method D422-63. Sieve sizes ranged from 4.75 mm (U.S. Standard Sieve No. 4) to 63 µm (U.S. Standard Sieve No. 230).

Figure 9. Sediment sampling locations for contaminant analysis at Bloomsbury Dam. Transect lines indicate the locations of the sediment depth measurements.

Sample locations were selected based on coordination with New Jersey Department of Environmental Protection (NJDEP). For the upstream samples, two samples (paired) were taken immediately behind (upstream) the dam and the other two collection points were approximately every 100 feet upstream. For the downstream sample, one was taken approximately 400 feet below the dam. For all samples, exact locations focused on the areas of apparent fine grain sediment.

The five sample site locations were recorded using Global Positioning System (GPS) units. Sediment contaminant results were compared to NJDEP soil cleanup screening values for residential and nonresidential soils to assess potential human health effects of the dam removal. Contaminant results were also compared to NJDEP's Ecological Screening Values (ESV) for freshwater sediments that include Lowest Effects Level (LEL) and Severe Effects Levels (SEL) (Versar 2011).

Sediment Results

Bulk sediment testing for inorganics, semi-volatile organics, pesticides, and PCB aroclors indicated that none of the parameters were over NJDEP residential or nonresidential soil clean up criteria. With the exception of total cyanide all concentrations were below LEL sediment guidelines.

In addition, sediment grain size analysis on the five surface samples taken for contaminant testing indicated that the sediment behind the dam is comprised of approximately 98% sand and gravel. Total organic carbon percentages were also low ranging from 1.2 to 5.6. Less than 2% of the sediments contained silt/clays.

5.3 Wetlands

According to the NJDEP i-MapNJ program (a Geographic Information System used for mapping environmental resources), the closest wetlands are located approximately 0.3 miles upstream and downstream of the dam and no wetlands exist within the proposed limit of disturbance for the removal of the dam. In addition, no wetlands were identified in the project area using the USFWS's National Wetland Inventory (NWI) maps. The NWI maps classified the dam and impoundment area as R2UBH (riverine, lower perennial, unconsolidated bottom, permanently flooded).

The project area was examined by Corps biologists during numerous site inspections in 2009 and 2010. The inspections indicated that the banks of the river along the impoundment are primarily covered by turf grass that is maintained by the residents as part of their backyards. On the north side of the impoundment, near the dam, a thin fringe of emergent aquatic vegetation (cattails, bulrushes, etc.) approximately 0.02 acres in size is located within the river.

5.4 Fish and Wildlife Resources

The NJDEP Division of Fish and Wildlife stocks the river each year with brook (*Salvelinus fontinalis*), brown (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*). Approximately 20 Musconetcong tributary streams support natural breeding populations of brook or brown trout. These streams support populations that are extremely sensitive to thermal pollution, siltation, and habitat degradation. The main stem of the Musconetcong River is classified by the NJDEP as Trout Maintenance Waters for its entire length. Eighteen of its tributaries are classified as Trout Production Streams. These classifications are determined by the NJDEP Division of Fish and Wildlife – Bureau of Freshwater Fisheries and are contained in the State Surface Water Quality Standards. A Trout Maintenance designation means that a water body supports trout throughout the year, whereas Trout Production means that the water body is used by trout for spawning or nursery purposes during their first summer.

The Musconetcong River and approximately 20 of its tributary streams support natural breeding populations of brook trout. Brook trout are the only trout native to the region and have inhabited the coldwater streams of northeast U.S. since the retreat of the continental glaciers. They survive in only the coldest and cleanest water and serve as indicators of the health of the watersheds they inhabit. Since brook trout are extremely sensitive to thermal pollution, siltation, and habitat degradation, their populations in the East have been greatly reduced or extirpated in watersheds where they historically thrived. Their presence in the Musconetcong River demonstrates the exceptional value of this aquatic ecosystem. In addition, the Eastern Brook Trout Joint Venture (EBTJV) a partnership of state and federal agencies, nongovernmental organizations, and academic institutions highlights the importance of brook trout on a regional and national scale. Furthermore, the USFWS and EBTJV have invested considerable funds into habitat restoration projects to benefit native brook trout.

A wide variety of resident fish species, other than trout, are found in the Musconetcong River. Survey of the river completed by the NJ Division of Fish and Wildlife Bureau of Freshwater Fisheries since the 1960s document 36 individual species sampled over 23 different survey areas of the river (Natural Resources Conservation Service 2010).

By restoring the connectivity of the Musconetcong River all aquatic resources will benefit. The Bloomsbury Dam acts as a barrier that restricts movement of fish, macroinvertebrates, and other aquatic species from dispersing throughout the river. In addition, this dam and other dams make the river inhospitable for diadromous fish that were historically found in the river.

The current condition of the impoundment behind the dam creates a lentic (lake-like) habitat which is warmer, slower in velocity, and more nutrient rich than the typical lotic (flowing) habitat within the river. This condition within the impoundment may be providing favorable habitat for introduced, non-native species. At the same time, it may be detrimental to the native river fishes because they are not well suited to the altered environment and therefore cannot successfully compete (Minnesota Department of Natural Resources 2010).

Wildlife in the project area is consistent with those species found throughout northern New Jersey and the Highlands region. Common mammal species include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern cottontail rabbit (*Sylvilagus floridanus*), white-footed mouse (*Peromyscus leucopus*), beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*).

Many species of birds, including migratory birds, are likely to use the Musconetcong River corridor for feeding and nesting. Species likely to be found in the project area would include: Canada goose (*Branta canadensis*) mallard (*Anas platyrhynchos*), kingfisher (*Megaceryle alcyon*), red-winged blackbird (*Agelius phoeniceus*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), barred owl (*Strix varia*), Great blue heron (*Ardea herodias*), American crow (*Corvus brachynrynchos*), robin (*Turdus migratorius*), northern cardinal (*Richmondena cardinalis*), blue jay (*Cyanocitta cristata*), and various species of sparrows.

Reptiles commonly found in the vicinity of Bloomsbury include common garter snake (*Thamnophis sirtalis*), black racer (*Coluber constrictor*), eastern ribbon snake (*Thamnophis sauritus*), northern water snake (*Nerodia sipedon*), snapping turtle (*Chelydra serpentine*), and painted turtle (*Chrysemys picta*).

Amphibians typically found in the project area include American bullfrog (*Rana catesbeiana*), wood frog (*Lithobates sylvaticus*), American toad (*Bufo americanus*), spring peeper (*Pseudacris crucifer*), pickerel frog (*Lithobates palustris*), wood frog (*Lithobates sylvaticus*), red backed salamander (*Plethodon cinereus*), northern red salamander (*Pseudotriton ruber*), and spotted salamander (*Ambystoma maculatum*) (Natural Resources Conservation Service 2010).

5.5 Threatened and Endangered Species

According to the New Jersey Natural Heritage Program, there are a number of State threatened and endangered species that potentially utilize the Musconetcong River. The State threatened species include the Cooper's Hawk (*Accipiter cooperii*), bobolink (*Dolichonyx oryzivorus*), longtail salamander (*Eurycea longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), savannah sparrow (*Passerculus sandwitchenis*), and wood turtle (*Clemmys insculpta*). The State endangered species include the bobcat (*Lynx rufus*), and the vesper sparrow (*Pooecetes gramineus*). The USFWS has also indicated that the river corridor may be used by federally endangered Indiana bat (*Myotis sodalis*).

5.6 Cultural Resources

Since the Musconetcong River corridor is located in a more rural part of New Jersey, much of the corridor's historical and archeological resources remain intact. River related historic features, many of which are listed on the New Jersey and National Registers of Historic Places, can be found in Stanhope, Waterloo Village, Asbury, Finesville and several other river communities. These features contribute greatly to the scenic character and overall quality of life in the Musconetcong valley and are important to the local economy as key components of regional tourism. (Musconetcong Advisory Committee, et al. 2003).

For this feasibility effort, a Phase IA Cultural Resources survey was performed by A.D. Marble & Company in early 2010 to identify potential historic architectural and archaeological constraints that could impact the selection, design, and construction of the proposed alternatives plans (Appendix C). The survey included a review of historic documents and a site visit conducted on March 10, 2010 to examine the Area of Potential Effects (APE).

In terms of historic architecture, it was determined that the APE includes a National Register-eligible historic district (North Bloomsbury Historic District), a non-contributing feature of the historic district (Asbury Graphite Mill), an individually eligible and contributing feature of the district (Bloomsbury Bridge), and five properties with no previous determinations that are located in a potential historic district associated with the Borough of Bloomsbury. The preliminary survey indicates that out of the five properties recommended for further research, only the Bloomsbury Black Mill has the potential for individual listing in the National Register. If the Black Mill or the Borough of Bloomsbury were determined to be National-Register-eligible, then the dam would likely be considered a contributing feature (A.D. Marble and Company 2010).

The survey also determined that there is a high potential for historic archaeological resources within the APE. This potential is related to the eighteenth and nineteenth-century industrial activities that included a forge/foundry, a grist mill, and later in time, a graphite mill. Although archeological sensitivity for prehistoric resources in the general area of the Musconetcong River is moderate to high, the potential is considered low within the footprint of the APE because of previous disturbance from historic industrial activities (A.D. Marble and Company 2010).

If the proposed dam removal activities were to occur, the cultural resources survey recommended

that additional research be conducted at local and state repositories and that a strategically planned Phase IB investigation is conducted within the APE.

Mill Races

According to the 1915 Sanborn Insurance Map (Figure 10), two mill races were associated with the dam in the past, with one on each side of the river. The map indicates that a head race branched off of the south side of the river immediately upstream of the dam and went under Church Street and through the Bloomsbury Graphite Mill No.1 (location of current Bloomsbury Black Mill, 27 Church Street). The tail race then exited the Mill and rejoined the river downstream. At some point after the cessation of milling activities, the head race on the south side of the river was filled, however the remnants are still visible. When the southern head race was observed during high river flows, it appeared that some flow from the river was still entering the race and then flowing out of a corrugated plastic pipe downstream of the dam, but before the bridge. It does not appear that any flows from the southern head race continue to go under Church Street to the Mill. The southern tail race was also filled at some point in the past and the remains are no longer visible.

On the north side of the river, flow was diverted into a head race and flowed into the Bloomsbury Graphite Mill No. 2 (location of current Asbury Graphite Mills building). The tail race exited the Mill in a tunnel that went under County Route 579 and then flowed into an open channel which rejoined the river downstream. Both the head race and the tail race still exist on the north side of the river, however they are not being used for their original purpose. The head race is located approximately 60 feet upstream of the dam and appears to hold slackwater from the impoundment behind the dam. When the river was observed at high flows, the water in the northern head race appeared to be relatively stagnant and did not appear to be flowing through the Mill. At the same time, water in the tail race appeared to be stagnant (A.D. Marble and Company 2010).

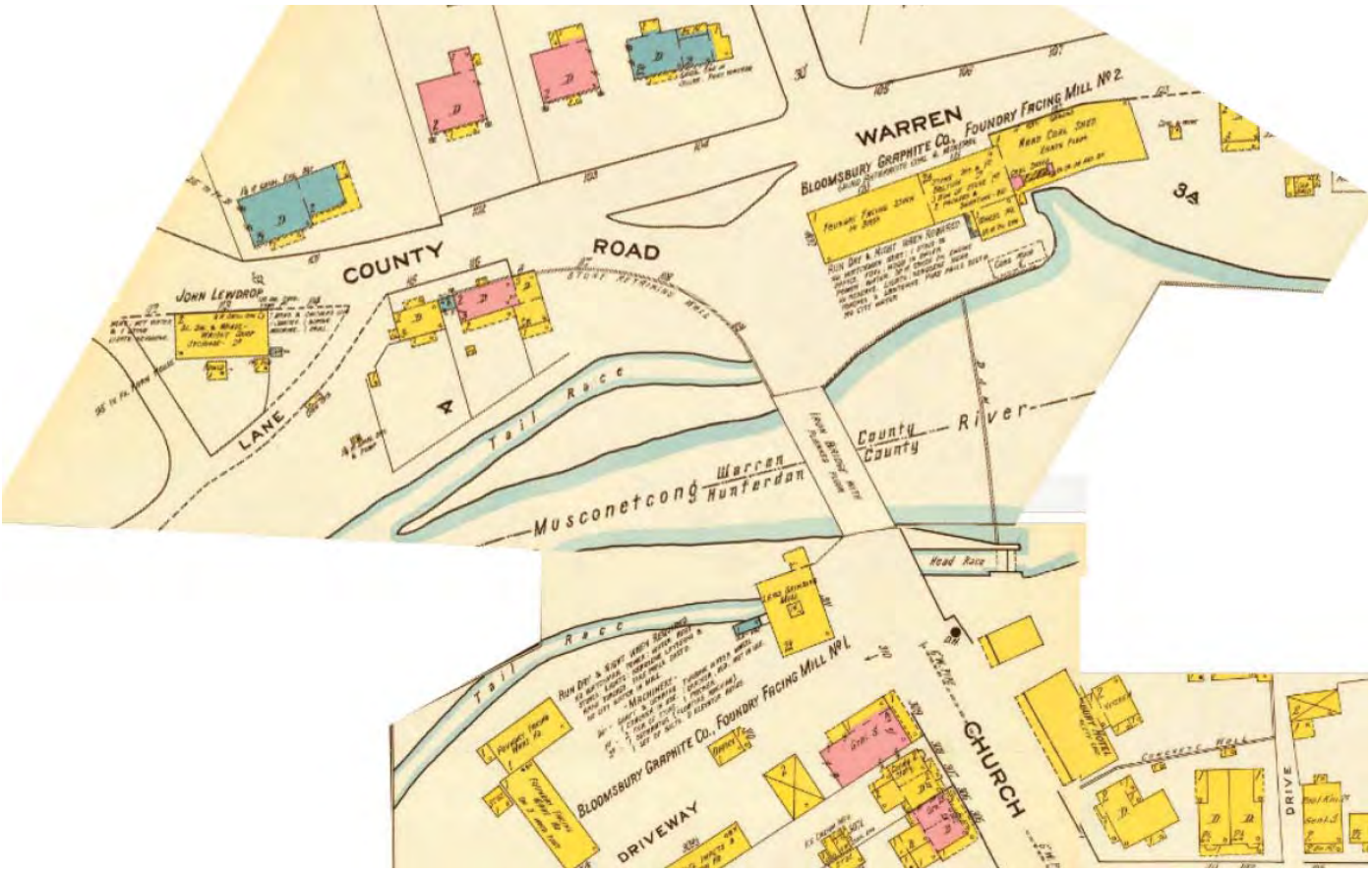

Figure 10. Sanborn Insurance Map (1915) of the project area (A.D. Marble and Company, 2010).

5.7 Hydrology

Existing Stream Condition

The Musconetcong River in the vicinity of Bloomsbury Dam is a low-gradient, low sinuosity stream with bed materials made up of mostly cobbles and gravels. The average bed slope ranges from approximately 0.001 ft/ft to approximately 0.005 ft/ft with some areas upstream of the dam having an even milder slope. These mildly-sloped areas occur upstream from the dam in the vicinity of the State Route 173 road crossing and the Interstate 78 road crossing at approximately 2,650 feet and 3,750 feet upstream of Bloomsbury Dam, respectively. As a result of the mild slopes, the impoundment at base flow extends beyond the upstream road crossings. Despite the long length of the impoundment, it does not appear to be much wider than the width of the natural river, estimated at 90 feet, except in the area just upstream of the dam (see Figure 5).

The impoundment is confined between State Route 173 and Bloomsbury Road on the north and Musconetcong Drive, Bethlehem Avenue and residential areas on the south (Figure 11). In addition, the Church Street bridge defines the stream elevation, width and alignment approximately 90 feet downstream of the dam. Despite the confinement, no significant bank erosion was noted during the site field inspection upstream or downstream of the dam and trees

and other vegetation appear to be present up to the river's edge.

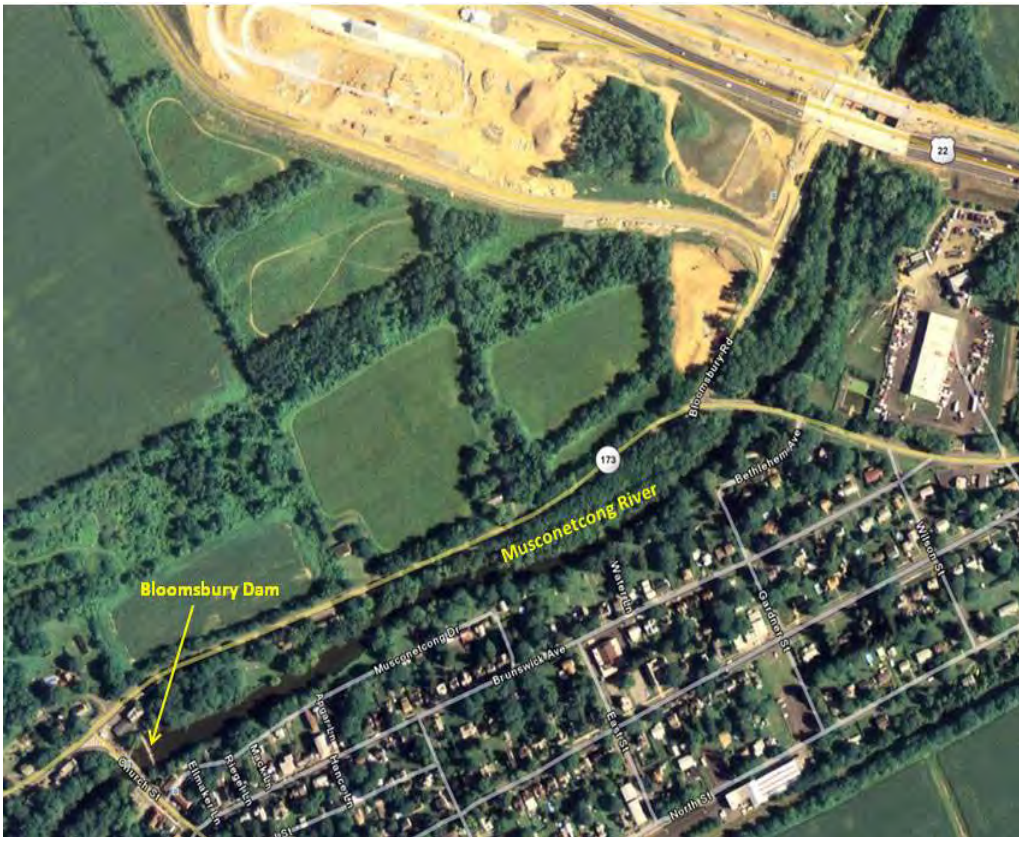

Figure 11. Aerial photograph of the impoundment and the upstream reach of the Musconetcong River.

Ground Water

According to the Environmental Resource Inventory (Greene 2007), the Borough of Bloomsbury has three public community wells supplying the community water system. There are also 7 residences in Bloomsbury that do not use the public water system and most likely utilize private wells. None of these wells that are located in the Borough of Bloomsbury are in the vicinity of the dam or the impoundment.

The Warren County Health Department was contacted to inquire if any of the residences that are located along the north side of the impoundment in Greenwich Township have private groundwater wells. The Department indicated that all of these residences are connected to the public water supply and do not receive water from private wells.

5.8 Recreation

Recreational opportunities in the Musconetcong River Valley are found in the over 5,000 acres of state-owned parks and river access points. There are also several hundreds of acres of county and local municipal parklands along the river. In addition, several property owners lease their

riverfront lands to private fishing and hunting clubs and many riverfront landowners permit public access for fishing.

The Musconetcong is one of the most popular fishing streams in New Jersey and has more miles of stocked waters than any other stream statewide. The Musconetcong River's popularity is growing with the increase of public fishing access sites maintained by the NJDEP. The Green Acres Program, the land acquisition agent for the NJDEP, maintains an aggressive program of land acquisition along the river and these properties are turned over to the NJ Division of Fish and Wildlife. The Division maintains these areas primarily in the form of parking for anglers. The 625 acres owned by New Jersey Division of Fish and Wildlife are scattered along the river, providing almost two dozen access points.

The river is an important source of recreation for boating (primarily canoes and kayaks), and has been identified by the NJDEP Office of Natural Lands Management in its New Jersey Trails Plan as a Waterways Trail. The most frequently canoed sections of the river are between Bloomsbury and Beattystown (approximately 17 miles upstream to the northeast). Swimming and tubing are also common recreational pursuits at various points along the river (Musconetcong Advisory Committee 2003).

The Musconetcong Gorge Preserve is a 425 acre park that is owned by the Hunterdon County Department of Parks and Recreation. It is located along the river, approximately 1.5 miles southwest of Bloomsbury. The Preserve is primarily maintained for recreational hiking and has seven different trails. If the Bloomsbury dam were to be removed, the Preserve would be accessible by canoe or kayak from approximately 7 miles upstream (Hunterdon County 2007).

5.9 Noise

Sensitivity to ambient noise levels differs among land use types. For example, residential areas, libraries, schools, churches, and hospitals are generally more sensitive to noise than commercial and industrial land uses. The majority of land uses along the river in the vicinity of the dam are residential and light commercial which generally have a higher sensitivity to ambient noise levels. The former industrial facility on the north side of the dam that is owned by Asbury Graphite Mills has been shuttered for approximately 50 years and produces no ambient noise.

There is existing ambient noise associated with the existing dam. Water flowing over the structure creates varying levels of noise depending on the volume of water flow over the structure.

6.0 Environmental Impacts

6.1 Air and Water Quality

Air Quality

This project would result in no change to the existing regional air quality conditions. There would be short-term impacts on noise and air quality during demolition of the Bloomsbury Dam; however, there are no long term air quality impacts expected as a result of this project.

General Conformity Review and Emission Inventory
Bloomsbury Dam Removal Project

The 1990 Clean Air Act Amendments include the provision of Federal Conformity, which is a regulation that ensures that Federal actions conform to a nonattainment area's State Implementation Plan (SIP) thus not adversely impacting the area's progress toward attaining the National Ambient Air Quality Standards (NAAQS). In the case of the Bloomsbury Dam Removal Project, the federal action is to remove an obsolete dam. The U.S. Army Corps of Engineers, Philadelphia District would be responsible for the removal of the dam. The Federal action will take place in Warren County, New Jersey which is classified as severe nonattainment for 8-hour ozone (oxides of nitrogen [NOx] and volatile organic compounds [VOC]) and nonattainment for sulfur dioxide (SO_2). Warren County, NJ is included in the New York – North New Jersey – NY-NJ-CT Nonattainment Area for 8-hr ozone and the Northeast Pennsylvania – Upper Delaware Valley Air Quality Control Region (AQCR) Nonattainment Area for sulfur dioxide.

There are two types of Federal Conformity: Transportation Conformity and General Conformity (GC). Transportation Conformity does not apply to this project because the project would not be funded with Federal Highway Administration money and it does not impact the on-road transportation system. GC however is applicable. Therefore, the total direct and indirect emissions associated with the Bloomsbury Dam Removal project must be compared to the GC trigger levels presented below.

Pollutant	General Conformity Trigger Levels (tons per year)
NOx	25
VOC	25
SO_2	100

To conduct a general conformity review and emission inventory for the project, a list of

equipment necessary for construction was identified. Pertinent pieces of equipment include: a dewatering pump, bulldozers (various), front loaders, cranes (various), and welders. Table 1 (Appendix B) lists these pieces of equipment along with the number of engines, engine size (hp), and duration of operation. A Load Factor (LF) was also selected for each engine, which represents the average percentage of rated horsepower used during a source's operational profile.

Table 1 of the Clean Air Assessment (Appendix B) shows the estimated hp-hr required for each equipment/engine category. Hp-hr was calculated using the following equation:

hp-hr = # of engines*hp*LF*hrs/day*days of operation

The second calculation is to derive the total amount of emissions generated from each equipment/engine category by multiplying the power demand (hp-hr) by an emission factor (g/hp-hr). The following equations were used:

emissions (g) = power demand (hp-hr) * emission factor (g/hp-hr)

emissions (tons) = emissions (g) * (1 ton/907200 g)

Table 2 of Appendix B provides the NOx, VOC, SO_2 emission factors selected for each equipment/engine category. Tables 3 and 4 of Appendix B present the emission estimates for NOx, VOC, and SO_2 respectively. Table 5 of Appendix B calculates worker transportation to and from the project site. These tables present the emissions from each individual equipment/engine category and the combined total.

The total estimated emissions that would result from the removal of the Bloomsbury Dam are 0.82 tons of NOx, 0.24 tons of VOC, and 0.01 tons of SO_2. These emissions are well below the General Conformity trigger levels of 25 tons of NOx, 25 tons of VOC, and 100 tons of SO_2 per year. General Conformity under the Clean Air Act, Section 176 has been evaluated for the project according to the requirements of 40 CFR 93, Subpart B. The requirements of this rule are not applicable to this project because the total direct and indirect emissions from the project are below the conformity threshold values established at 40 CFR 93.153 (b) for ozone (NOx and VOC) in a severe Nonattainment Area. The project is not considered regionally significant under 40 CFR 93.153 (i).

Water Quality

Significant impacts to water quality are not anticipated from implementation of any of the components to the selected plan. Short-term, temporary and localized impacts to water quality in the form of turbidity are anticipated to occur from sediment redeposition by natural processes during the dam removal. Potential effects would be short-lived and localized. As discussed in Section 5.2, sediment testing indicated that most of the sediment behind the dam is sand and gravel, so the turbidity associated with the demolition of the dam should be minimal. Best Management Practices will be used and may be mandated by conditions contained in State approvals (i.e., 401 Water Quality Certificate) would minimize water quality impacts during project implementation. Therefore, no long-term adverse impacts are anticipated.

In many cases the short-term impacts caused by construction activities would be outweighed by long-term improvements to water quality resulting from the completed restoration. For example, a free flowing stream typically has better water quality than an artificial impoundment.

6.2 Sediment

The sediment volume estimates revealed that 6,000 cubic yards of sediment has accumulated behind Bloomsbury Dam including the former Mill Race area located along the right hand side of the river (looking downstream) adjacent to the Asbury Graphite property (Versar 2011).

Contaminant testing of the accumulated sediments indicated that with the exception of cyanide none of the inorganics, pesticides, semi-volatile organics, and aroclor PCBs were over NJDEP soil clean up criteria for residential and non-residential uses. In addition, none of the values exceeded the Ecological Screening Values indicating that releasing the sediment behind the dam during dam removal would not impact human health or harm aquatic resources. Total cyanide was over the 0.0001 mg/kg Lowest Effects Level guideline at all four upstream stations averaging 0.08 mg/kg. NJDEP has not established a Severe Effects Level guideline concentration for total cyanide. Cyanide was not detected at the downstream station (Versar 2011). Additional information on the sediment testing can be found in Appendix D.

Similar contaminant testing was conducted at Finesville Dam five miles below Bloomsbury dam on the Musconetcong River for two sediment samples collected from the accumulated sediments behind the dam. None of the semi-volatile organics or inorganics assayed in that study were over Ecological Screening Levels or NJDEP residential soil clean up criteria. Total cyanide was not included in the Finesville sediment tests (Princeton Hydro 2009).

6.3 Wetlands

An unmapped, emergent wetland area approximately 0.02 acres in size lines the head race that enters the Asbury Graphite Mills property on the north side of the impoundment. When the dam is removed and the water level in the impoundment is lowered, the water level in the head race will also be lowered. This alteration of the hydrology is likely to convert this fringe wetland to upland. However, once the river adjusts to absence of the dam and a new river/land interface is established, it is expected that a new fringe wetland will establish along the bank of the river. Therefore, no net loss of wetlands is expected to occur as a result of the project.

When the dam is removed and the elevation of the water surface in the impoundment is lowered, it will expose banks and sediments that are currently under water. The Service has volunteered to oversee planting any exposed river banks with native vegetation to stabilize the banks and provide habitat. The riparian stabilization and restoration plan will involve planting trees and shrubs on unconsolidated exposed mudflats and banks upstream of Bloomsbury Dam to create riparian habitat and provide erosion control upstream of the dam.

Approximately 200 trees and shrubs per acre will be planted within the project area. Shrubs and trees that will be planted within the riparian area may include, but are not limited to, black

willow (*Salix nigra*), shadbush (*Amelanchier canadensis*), black gum (*Nyssa sylvatica*), elderberry (*Sambucus canadensis*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), winterberry (*Ilex verticillata*), buttonbush (*Cephalanthus occidentalis*), red chokeberry (*Pyrus arbutifolia*), and spicebush (*Lindera benzoin*). In addition, the current plan is to seed the exposed river banks with a native wetland seed mix. This will hasten the establishment of new native vegetation and help prevent colonization by non-native species. Furthermore, there will be some revegetation within the riparian area that will be accomplished through natural revegetation. Migratory birds and the existing trees within the riparian area will provide an adequate seed source to revegetate and naturally restore the riparian area. In addition, upland edges of the riparian buffer will be seeded with warm season grasses to provide additional habitat diversity. The warm-season grass mixture (certified seed) would include, but is not limited to: little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorgastrum nutans*), big bluestem (*Andropogon gerardi*), or switchgrass (*Panicum virgatum*). These new riparian areas will function as a valuable buffer that will help to enhance water quality, slow floodwaters, stabilize the banks, and regulate the temperature of the river. All plantings will be contingent upon the Corps being able to acquire appropriate Real Estate conservation easements from local landowners.

6.4 Fish and Wildlife Resources

Removal of the dam would reconnect 7.8 miles of the Musconetcong River and would restore natural river ecological functions such as sediment and nutrient transport. It would also re-establish the free passage of aquatic species including resident fish, amphibians, freshwater crustaceans, and macroinvertebrates. Increased movement opportunities will help to improve river-wide populations of all species because it will allow them to "weather" problems such as local pollution through avoidance. Species will also have more opportunities to reach optimum habitat.

The reconnection of this portion of the river could also potentially result in some negative impacts on the resident aquatic species. These impacts could include increased competition for limited resources, increased predation, and the introduction of invasive species from the downstream segment to the upstream segment.

The impoundment would revert to its original lotic (flowing) condition and no longer be a lentic (lake-like) system. The impoundment would no longer function as a low-velocity portion of the river where sediments and nutrients are accumulated, oxygen is depleted, and water temperatures are raised due to increased solar exposure. These changes would eliminate the current conditions that favor algal blooms in the impoundment. The transformation would also restore the riffle/run habitat that is so critical for many riverine species.

As discussed previously, sediment behind the dam has been tested and the results concluded that there were no contaminant concerns. NJDEP has reviewed the testing data and concurred that it would be acceptable to allow the sediment to gradually flow downstream during the removal (sediment redeposition by natural processes). It is likely that this method will result in temporary temperature, turbidity, and chemistry changes within the river water during the dam removal. It is also likely that the sediment will temporarily cover the substrate of the channel downstream of

the dam. This could degrade downstream benthic habitat for a short period of time until the natural sediment transport processes of the river can restore the pre-dam conditions. The temporarily increased turbidity could also result in increased mortality and stress for downstream resident fishes. In addition, the benthos community in the immediate vicinity of the dam will be destroyed during removal. This community will likely re-colonize the area and recover in the short term (<1 year) once construction is completed.

The frequency of large storms and flood events following dam removal will play a large role in determining how much and how fast the sediment will be transported. During the Design and Implementation phase of the project, a sediment transport analysis will be performed to more accurately forecast the movement of sediment following the dam removal. Information collected in the physical analysis of the sediments (i.e. grain-size classes) will be used to predict how much will move as bedload and how much will move as suspended load when certain hydrologic conditions are met.

Key native fish species that would benefit from the project would include brook trout and American eel (*Anguilla rostrata*). In addition, trout would also benefit because dam removal would reduce summer stream temperatures and the water course above dam would change from lentic (lake-like) to lotic (riverine) environment above dam. Other fishes that would benefit once the Bloomsbury dam is removed and "run of the river" is restored would be white suckers (*Catostomus commersonii*), a variety of cyprinds [blacknose dace (*Rhinichthys atratulus*), longnose dace (*Rhinichthys cataractae*), tesselated darter (*Etheostoma olmstedi*) , fallfish (*Semotilus corporalis*), creek chub (*Semotilus atromaculatus*), common shiner (*Luxilus cornutus*), cutlip minnow (*Exoglossum maxillingua*), spottail shine (*Notropis hudsonius*)], warmwater fish that prefer cooler water [smallmouth bass (*Micropterus dolomieu*) & rock bass (*Ambloplites rupestris)*] and redbreast sunfish (*Lepomis auritus*) (P. Hamilton, NJDEP, Personal Communication 2010). There is also the potential of this removal eventually benefitting American shad (*Alosa sapidissima*) and river herring once the Hughsville and Warren Glen dams downstream are removed.

Furthermore, as discussed previously, the USFWS will oversee planting any exposed river banks with native vegetation to stabilize the banks and provide habitat for fish and wildlife resources. This should provide for the restoration of high quality riparian habitat for local species in a short time period. Furthermore, the removal of the dam will have no negative impacts on wildlife species in the vicinity of the project. Any of these species that use the river for feeding, drinking, resting, or migrating will benefit from the increased water quality and expanded riparian habitat in the area of the impoundment.

6.5 Threatened and Endangered Species

It is anticipated that the selected alternative will not adversely affect federally listed species. The Service is project partner and in an Intra-Service Section 7 Consultation dated February 2, 2011, concluded a no effect determination on federally listed species for the project (Appendix A). In a letter dated October 15, 2009, the National Marine Fisheries Service indicated their support for the project and that no resources under their jurisdiction are found in the project area (Appendix A).

6.6 Cultural Resources

A Phase IA Cultural Resources survey was performed in early 2010 to identify potential historic, architectural, and archaeological constraints that could impact the proposed alternatives plans. The results of the survey indicated that the dam could be considered a contributing feature of the Black Mill or the Borough of Bloomsbury if either was determined to be eligible for the National Register of Historic Places. The survey also determined that there is a high potential for historic archaeological resources related to the eighteenth and nineteenth-century industrial activities, but a low potential for prehistoric resources because of previous disturbance from historic industrial activities (A.D. Marble and Company 2010).

The results of the cultural resources survey will be provided to the New Jersey State Historic Preservation Office (NJ SHPO) to determine if they concur with the conclusions. If NJ SHPO requests that a Phase IB investigation be performed on the project site, it will be conducted in the Design and Implementation Phase. In addition, pursuant to 36 CFR 800.14(1)(ii), the USACE will negotiate a programmatic agreement, in consultation with the Advisory Council, the local Sponsor, Federally Recognized Tribes and the State Historic Preservation Office to govern the implementation of the Section 106 process, since the effects on historic properties cannot be fully determined prior to the finalization of the NEPA document.

6.7 Hydrology

Preliminary Hydrologic and Hydraulic Analyses:

New Jersey's Dam Safety Standards (NJAC 7:20) define the need to quantify the upstream and downstream impacts resulting from complete or partial dam removal. Any dam removal will result in increases in velocity and decreases in flow depth upstream of the dam. Hydraulic analyses were performed as part of this study to quantify these upstream changes for each alternative. Although this is a run-of-the-river dam and its removal is not expected to result in any negative downstream impacts, both hydrologic and hydraulic analyses will be conducted in accordance with NJAC 7:20 to determine any potential downstream effects. These analyses will be conducted in the design phase in conjunction with the removal design and will examine any potential increases in 10-year, 50-year, or 100-year flooding due to the dam removal alternatives.

The upstream hydraulic analysis included herein was performed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Centers' River Analysis System (HEC-RAS), Version 4.0. An existing hydraulic model for the Musconetcong River, dated May 8, 1980, and performed using HEC-2 software, was obtained from the Bureau of Dam Safety and Flood Control, New Jersey Department of Environmental Protection. The model reach extends from a railroad crossing approximately 8,800 feet downstream of Bloomsbury Dam to approximately 15,000 feet upstream of the dam. This hydraulic model is identical to the Federal Emergency Management Agency (FEMA) effective model for this reach of the flooding source. The HEC-2 hydraulic data was imported into HEC-RAS and adjusted for conversion errors. The resulting HEC-RAS model is used to represent the existing condition for this reach of the Musconetcong

River.

The 10-year, 50-year, 100-year and 500-year peak discharges used in the FEMA HEC-2 model were used in the HEC-RAS model as well as the 100-year + 25% discharge used as a regulation tool by NJDEP. In addition, an extrapolation of the FEMA flows was performed to estimate the 1-year and 2-year peak discharges, representing a range of discharges typically thought of as channel-forming discharges. The mean daily discharge at USGS 01457000 Musconetcong River near Bloomsbury, NJ from 91 years of record is approximately 300 cfs. This mean daily discharge was also included in the HEC-RAS model to represent an average flow condition. Discharges used in the model are provided below in Table 2.

Table 2. Modeled Discharges at the Bloomsbury Dam.

Frequency	**Discharge (cfs)**
Mean Daily	300
1 - year	2,010
2 - year	2,500
10 - year	4,010
50 - year	7.040
100 - year	8,690
100 – year + 25%	10,865
500 - year	13,630

The selected alternative (partial dam removal) is represented in the model by removing a 100-foot section from the dam at the dam cross section. The natural channel from just downstream to approximately 500 feet upstream of the partially-removed dam has the same dimensions and roughness coefficients as used for the full dam removal alternative. Figures 12 and 13 show the revised dam cross section and invert profile changes for the partial dam removal. The removed section will cause a constriction at higher flows; however, lower flows would flow freely in the natural channel.

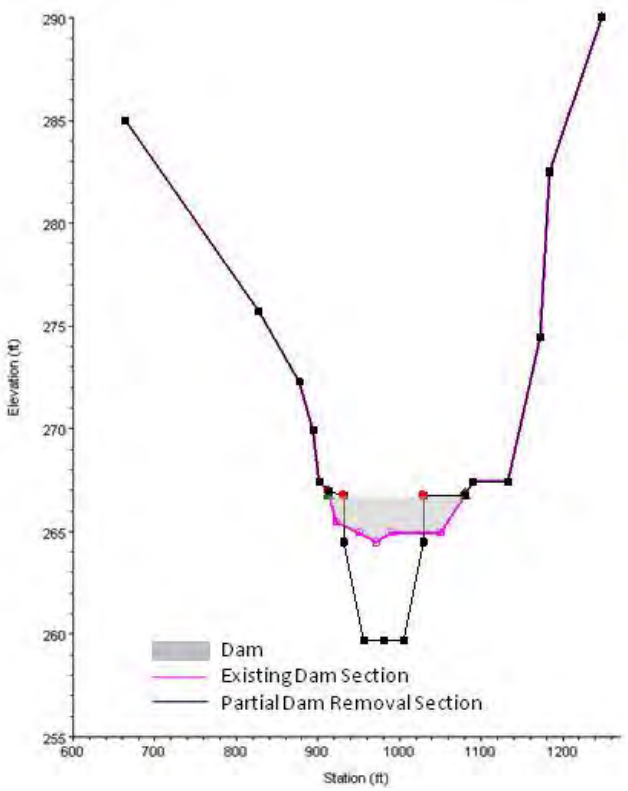

Figure 12. The selected alternative (partial dam removal) cross section.

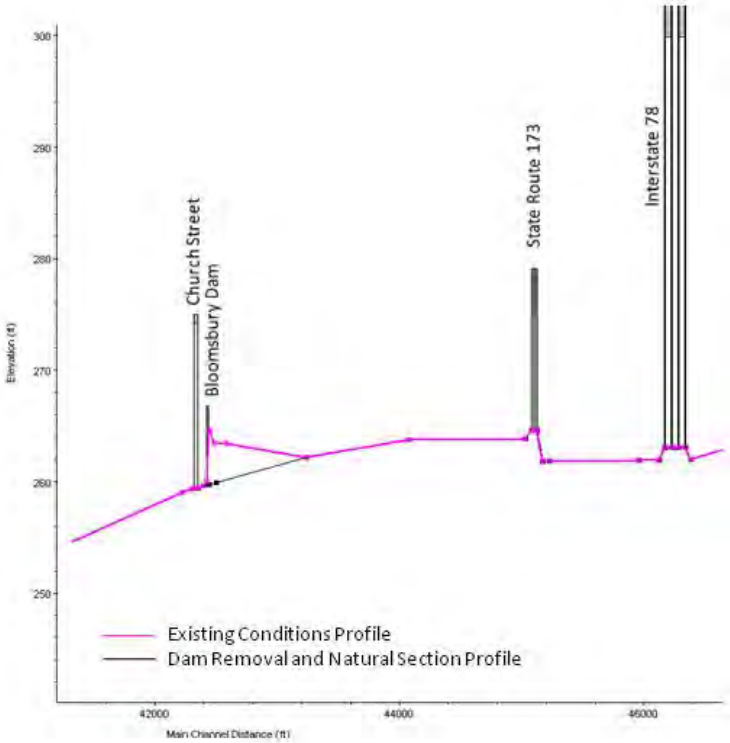

Figure 13. The selected alternative (partial dam removal) profile.

For the range of flows from mean daily flow to the NJDEP regulatory flow, the selected alternative resulted in increases in water surface elevations compared to the existing conditions just downstream of the dam. These increases at this cross section are minor and do not greatly increase the top width of the floodplain. The increases are likely due to changing the roughness coefficient to reflect a more vegetated condition. Site survey information collected during the design phase will help to provide a more accurate prediction of the water surface elevation changes in the project area that would follow a removal.

Upstream of the dam, the selected alternative decreases water surface elevations compared to existing conditions. At the dam, the decrease in water surface elevation is as much as 6 feet for the mean daily flow but only about 1 foot for the NJDEP regulatory flow. The magnitude of the changes in water surface elevation decreases at cross sections further upstream. Just downstream of the State Route 173 bridge, the water surface elevation decreases are less than 0.5 foot for all flows except the mean daily flow (Figure 14).

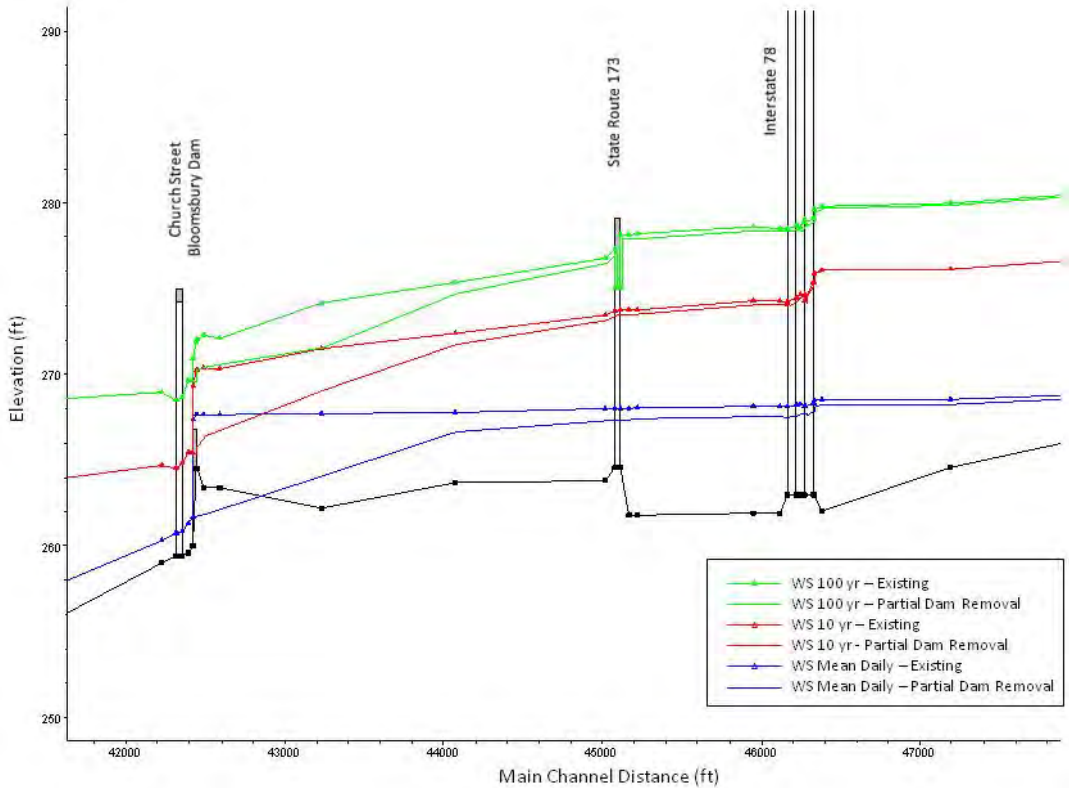

Figure 14. Comparison of water surface profiles for the existing condition and the selected alternative.

The selected alternative will result in velocity increases immediately upstream of the dam location. In particular, velocities immediately upstream of the dam may be as high as 10 feet per second for some flows. Large rip rap, boulders or dam remnants may be used to stabilize this

section. Natural sections of the river will be used as a guide in selecting vegetation and in-stream features to insure stability throughout this reach. In addition the Service will plant any exposed bank after the dam removal with native vegetation (see Section 6.4). Further upstream, the velocities will be more similar to the existing condition velocities.

Ground Water

Given that there are no groundwater supply wells located near the impoundment, the removal of the dam and the lowering of the water level in the impoundment is not expected to impact the water supply of any local residents.

6.8 Recreation

As noted in Section 5.8, the Musconetcong River valley has a wide variety of recreational resources. The resources which are most directly adversely impacted by the dam, kayaking/canoeing and fishing, would see the greatest benefits from the removal of the dam. The reconnection of approximately 7.8 miles of river and the removal of a drowning hazard would allow longer and safer kayaking/canoeing experiences. In addition, the free passage of resident fish and improved water quality would increase the likelihood of anglers catching fish.

One potential impact that may be viewed as a negative one by some would be the loss of the impoundment as a fishing area. If there are local anglers who use the impoundment as a favorite fishing hole, the removal of the dam would eliminate this flat-water resource that they utilize. However, given that the removal of the dam is likely to improve the movement and reproduction of all resident fish species in this section of the Musconetcong River, the loss of this area is likely to be offset by the overall increase in river-wide angling opportunities. Restoring free flowing water along the Musconetcong River at Bloomsbury will improve angling opportunities for coolwater fisheries (i.e., trout) while decreasing angling opportunities for warmwater fisheries (i.e., carp).

As noted in Section 5.4, the NJDEP Division of Fish and Wildlife stocks the river with trout at the Bloomsbury Dam. The Corps will work closely with the Division of Fish and Wildlife to determine if the removal of the dam will require a change in the stocking and management strategy for trout in the vicinity of Bloomsbury.

6.9 Noise

Temporary impacts due to increased construction noise may be experienced by adjacent homeowners during the full or partial removal of the dam. Construction activities will require the use of heavy construction equipment including but not limited to excavators, loaders, and dump trucks. Concrete cutting equipment may require the use of a generator during operation, however this noise could be reduced by the use of mufflers and shields. An increase in road traffic can also be anticipated. Construction time is temporary in nature and would be approximately one month. Under normal circumstances, noise will only be generated Monday through Friday during normal working hours.

No long-term adverse noise impacts would be associated with construction activities. The ambient noise of the flow over the dam should be replaced by the sound of water moving over and through boulders and rocks. A study done at the Dillsboro Dam on the Tuckaseigee River in North Carolina found that the decibel levels of sound do not change significantly with flow, except right at the dam. The study determined that sound levels diminish quickly as you move away from the dam and that riffles on the river were louder than the dam under both high and low flow conditions. In fact, the riffles were determined to generate a more constant sound than the dam (Hooper 2002).

6.10 Cumulative

A partnership of federal and state agencies and non-profit organizations is currently conducting feasibility studies for the removal of the downstream Hughesville and Warren Glen Dams. These two dams are the only remaining impediments located between the Bloomsbury Dam and confluence of the Musconetcong River and the Delaware River. When these two dams and the Bloomsbury Dam are removed, it will restore 13.3 miles of the Musconetcong River to its natural, free-flowing condition. This will allow migratory fish, including shad, herring, alewife, striped bass, and American eel to access spawning habitat which they have not been able to reach for over 200 years. This will result in positive cumulative effects of this project on the Musconetcong River Watershed.

7.0 Environmental Justice

The Bloomsbury Dam Removal is expected to comply with Executive Order 12898, which requires that "each Federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations."

All of the alternatives, including the selected plan, identified in this Environmental Assessment are expected to comply with Executive Order 12989 - Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994. No negative impacts are expected to occur to any minority or low-income communities in the area, as a result of this project. In addition, this project is in compliance with Executive Order 13045 - Protection of Children from Environmental Health Risks and Safety Risks.

8.0 Relationship of Selected Plan to Environmental Requirements, Protection Statutes, and Other Requirements

Compliance with environmental quality protection statutes and other environmental review requirements is ongoing. Table 3 provides a listing of compliance with environmental statutes. The Corps will apply for the necessary state approvals, including a Section 401 State Water Quality Certificate from NJDEP prior to project construction.

Table 3. Compliance with Appropriate Environmental Quality Protection Statutes and other Environmental Review Requirements.

STATUTE	COMPLIANCE STATUS
Clean Water Act	Partial*
Coastal Zone Management Act	N/A
Endangered Species Act	Full
Fish and Wildlife Coordination Act	Partial*
National Historic Preservation Act	Partial*
National Environmental Policy Act	Full
Clean Air Act	Full
Wild & Scenic Rivers Act	Full

NOTE:
Full Compliance: Having met all requirements of the statute, E.O., or other environmental requirements for the current stage of planning.
Partial Compliance: Some requirements of the statute, E.O., or other policy and related regulations remain to be met.
*All applicable laws and regulations will be fully complied with upon completion of the environmental review, obtaining state water quality certification, and concurrence with our determination on cultural resources.
Noncompliance: None of the requirements of the statute, E.O., or other policy and related regulations remain to be met.

9.0 Section 404(b)(1) Analysis

A review of the impacts associated with discharges to waters of the United States for the Bloomsbury Dam Removal Project in Hunterdon and Warren Counties, New Jersey is required by Section 404(b)(1) of the Clean Water Act, as amended (Public Law 92-500).

I. Project Description

A. Location. The Bloomsbury Dam (LAT - 40.655595
LON -75.088648) is situated within the Musconetcong River between the Borough of Bloomsbury in Hunterdon County, New Jersey and Greenwich Township in Warren County, New Jersey. It is located approximately 7.8 miles up-river from the confluence of the Musconetcong River with the Delaware River.

B. General Description. The Musconetcong River flows for approximately 42 miles from Lake Hopatcong to the Delaware River in a northeast to southwest direction. It drains a 158 square mile, mostly rural, watershed area in northwestern New Jersey. The watershed is primarily forested and is located in parts of 25 municipalities in Sussex, Morris, Warren and Hunterdon Counties in New Jersey. Approximately 15 percent of the watershed's 100,864 acres are permanently preserved as open space or farmland.

C. Purpose. The goal of the project is to remove the Bloomsbury Dam. Objectives that would be accomplished with the removal of the dam include: restore free-flowing conditions and increase connectivity of the Musconetcong River; allow free passage of fish and other aquatic organisms in the location of the dam; restore riverine habitat and improve water quality in the impoundment area; restore the natural movement of materials (sediment, nutrients, woody debris) down the river; eliminate the existing public safety hazard and reduce the risk of accidental drowning; and eliminate risk of future catastrophic failure.

D. General Description of Dredged or Fill Material.

There are two types of discharges associated with this project: the existing sediment behind the dam being released downstream during/after demolition of the dam; and the placement of rock in the river to stabilize the remaining dam abutments.

1. General Characteristics of Material:
   A. Existing sediment located behind the dam: 98% of the material behind the dam is sands/gravels/cobbles.
   B. Stabilization of dam abutments: rock: R1500 (24" diameter), R60 (8" diameter), rounded river stone found on site (various sizes)

2. Quantity of Discharge (estimated):
   A. Existing sediment located behind the dam: 6100 cys.
   B. Left abutment stabilization (riprap or river stone – 75 cys)
   Right abutment stabilization (riprap or river stone – 75 cys)

3. Source of Material:
   A. Existing sediment located behind the dam and
   B. Two abutment stabilization: onsite material or local quarries

E. Description of Discharge Sites.

1. Location:
   A. Existing sediment located behind the dam and
   B. The remaining left and right abutments of the dam.

2. Size (acres):
   A. Existing sediment located behind the dam: 2 acres
   B. Two abutments: 0.04 acres

3. Type of Sites: cobble/gravel river bottom

4. Type of Habitat: riverine

5. Timing and Duration of Discharge:
   A. Existing sediment located behind the dam: most should move downstream within the first week of dam removal, if not, the first big >10

yr. event should move the material.
B. Abutments: 4 weeks working in the stream channel.

F. Description of Discharge Method. Stabilization of the left and right abutments after dam removal and regrading the stream channel to prevent any impediments to fish movements.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations.

1. Substrate Elevation and Slope: 0.001 ft/ft to approximately 0.005 ft/ft with some areas upstream of the dam having an even milder slope.

2. Sediment Type: sand/cobble/gravel/river stone

3. Fill Material Movement: Sediment redeposition by natural processes The sediment behind the dam will move quickly downstream after removal and will stabilize itself somewhere downstream.

4. Physical Effects on Benthos: Temporary, major effect on the benthos during demolition of the dam; however, it's likely the benthos will quickly re-colonize the area after removal is completed.

5. Actions taken to Minimize Impacts: The dam removal will occur as quickly as possible to minimize the amount of time equipment will need to be in the stream channel.

B. Water Circulation, Fluctuation and Salinity Determinations.

1. Water:

a. Salinity – No effect

b. Water Chemistry – Temporary, minor effect.

c. Clarity – Temporary, major effect.

d. Color - No effect

e. Odor – Temporary, minor effect.

f. Taste - No effect.

g. Dissolved Gas Levels – Permanent, major positive effect.

h. Nutrients – No effect

I. Eutrophication – Permanent, major positive effect.

j. Temperature- Positive effect after dam removal. Area of impoundment will be a free flowing stream with cooler water temperatures.

2. Current Patterns and Circulation:

a. Current Patterns and Flow – Temporary, major effect on flow and patterns during the dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

b. Velocity - Temporary, major effect on flow and patterns when the dam is being removed. In addition, a permanent change in the flow velocities as a result of the new stream morphology.

c. Stratification – Temporary, major effect during dam removal.

3. Normal Water Level Fluctuations – No effect

4. Salinity Gradients – No effect

5. Actions That Will Be Taken To Minimize Impacts: N/A

C. Suspended Particulate/Turbidity Determinations.

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Fill Site: Temporary, major effect during the dam removal. 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.

3. Effects on Biota:

a. Primary Production, Photosynthesis: Temporary, minor effect on production due to increases in turbidity during dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

b. Suspension/Filter Feeders: Temporary, major effect on production due to increases in turbidity during dam removal and subsequent release of sediment downstream. The area should reach a stabilized equilibrium in a relatively short time period.

c. Sight feeders: Temporary, minor effect on production due to increases in turbidity during dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

4. Actions Taken to Minimize Impacts: The dam removal will occur as quickly as possible to minimize the amount of time equipment will need to be in the stream channel.

D. Contaminant Determinations.

No significant contaminants were found behind the dam that would impact this project (see Section 6.2).

E. Aquatic Ecosystem and Organism Determinations.

1. Effects on Plankton: Temporary, minor effect on production due to increases in turbidity during dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

2. Effects on Benthos: Temporary, minor effect on production due to increases in turbidity during dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

3. Effects on Nekton: N/A

4. Effects on Aquatic Food Web: Temporary, minor effect on production due to increases in turbidity during dam removal. The area should reach a stabilized equilibrium in a relatively short time period.

5. Effects on Special Aquatic Sites:

(a) Sanctuaries and Refuges: The Musconetcong River has been federally designated as a National Wild and Scenic River that has outstanding ecological value in free-flowing condition. Removing the dam will have a potential positive impact on that designation.

(b) Wetlands: None anticipated.

(c) Tidal flats: None.

(d) Vegetated Shallows: temporary, major effect. Vegetated shallows within the impoundment will likely re-establish at a lower elevation along the riverbank once the dam is removed.

6. Threatened and Endangered Species: No effect.

7. Other Wildlife: Temporary, minor effects during construction.

8. Actions to Minimize Impacts: The dam removal will occur as quickly as possible to minimize the amount of time equipment will need to be in the stream channel.

F. Proposed Disposal Site Determinations. N/A

1. Mixing Zone Determinations:
   a. Depth of water:
   b. Current velocity:
   c. Degree of turbulence:
   d. Stratification:
   e. Discharge vessel speed and direction:
   f. Rate of discharge:
   g. Dredged material characteristics:

2. Determination of Compliance with Applicable Water Quality Standards: A section 401 Water Quality Certificate will be obtained from NJDEP prior to construction of the project.

3. Potential Effects on Human Use Characteristics:

   a. Municipal and Private Water Supply: No anticipated effect.

   b. Recreational and Commercial Fisheries: Temporary, minor effect during construction.

   c. Water Related Recreation: Positive, major effect.

d. Aesthetics: Temporary, minor effect.

e. Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites, and Similar Preserves: Temporary, minor effect.

G. Determination of Cumulative Effects on the Aquatic Ecosystem.
As noted in Section 6.9, a partnership of federal and state agencies and non-profit organizations is currently conducting feasibility studies for the removal of the downstream Hughesville and Warren Glen Dams. These two dams are the only remaining impediments located between the Bloomsbury Dam and confluence of the Musconetcong River and the Delaware River. When these two dams and the Bloomsbury Dam are removed, it will restore 13.3 miles of the Musconetcong River to its natural, free-flowing condition. This will allow migratory fish, including shad, herring, alewife, striped bass, and American eel to access spawning habitat which they have not been able to reach for over 200 years.

H. Determination of Secondary Effects on the Aquatic Ecosystem.
No significant secondary effects are anticipated.

III. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Adaptation of the Section 404(b)(1) Guidelines to this evaluation - No significant adaptation of the guidelines were made relative to this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem - The selected plan was determined from a detailed evaluation of alternatives to have the least amount of environmental impacts.

C. Compliance With Applicable State Water Quality Standards - The selected plan is not expected to violate any applicable state water quality standards in New Jersey.

D. Compliance With Applicable Toxic Effluent Standards or Prohibition Under Section 307 of the Clean Water Act - The proposed discharge is not anticipated to violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. Compliance With Endangered Species Act of 1973 -The selected plan will comply with the Endangered Species Act of 1973. Informal Section 7 consultation has been completed with the U.S. Fish and Wildlife Service and National Marine Fisheries Service on this project.

F. Compliance With Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 - No Marine Sanctuaries, as designated in the Marine Protection, Research, and

Sanctuaries Act of 1972, are located within the project area.

G. Evaluation of Extent of Degradation of Waters of the United States - The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, and recreational and commercial fishing, plankton, fish and shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and wildlife will not be adversely affected. Significant adverse impacts on aquatic ecosystem diversity, productivity and stability, and recreation, aesthetics and economic values will not occur as a result of the project.

H. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – The dam removal will occur as quickly as possible to minimize the amount of time equipment will need to be in the stream channel.

10.0 References

A.D. Marble and Company. 2010. *Cultural Resource Investigations – Bloomsbury Dam*. Conshohocken, PA.

Greene, Amy S. 2007. *Environmental Resource Inventory Prepared for Bloomsbury Borough, Hunterdon County, New Jersey*. Amy S. Greene Environmental Consultants, Inc., Flemington, NJ.

Hooper, Rose. June 27, 2002. How river would look, sound without Dillsboro Dam. The Sylva Herald. Sylva, North Carolina.

Hunterdon County 2007. *Musconetcong Gorge Preserve Trail Map and Guide*. Department of Parks and Recreation. Flemington, NJ.

Minnesota Department of Natural Resources 2010. *Reconnecting Rivers: Natural Stream Channel Design in Dam Removal and Fish Passage*. Ecological Resources Division, Fergus Falls, Minnesota.

Musconetcong Advisory Committee, Musconetcong Watershed Association, Heritage Conservancy, and National Park Service. 2003. *Musconetcong River National Wild and Scenic Rivers Study, River Management Plan*. Musconetcong Watershed Association, Heritage Conservancy, and National Park Service.

Natural Resource Conservation Service 2010. *Environmental Assessment for Lower Musconetcong River Restoration Project, Finesville Dam Vicinity*. USDA, Natural Resource Conservation Service, Somerset, New Jersey.

New Jersey Department of Environmental Protection. 2011. Website: http://www.nj.gov/dep/wms/bwqsa/c1upgrades.htm. Water monitoring and standards web page. Round 5 Category One Adoption, June 16, 2008.

New Jersey Department of Environmental Protection. 2012. Letter response to the draft Environmental Assessment for the Bloomsbury Dam Removal Project, May 22, 2012.

Versar, Inc. 2011. *Sediment Quality Testing for the Bloomsbury Dam Removal Project*. Columbia, MD.

11.0 CLEAN AIR ACT STATEMENT OF CONFORMITY

CLEAN AIR ACT STATEMENT OF CONFORMITY
REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER
HUNTERDON AND WARREN COUNTY, NEW JERSEY

Based on the conformity analysis in the environmental assessment, I have determined that the selected plan conforms to the applicable State Implementation Plan (SIP). The selected plan would comply with Section 176 (c)(1) of the Clean Air Act Amendments of 1990.

14 JUN 2012
Date

Philip M. Secrist, III
Lieutenant Colonel, Corps of Engineers
District Engineer

Appendix A

Relevant Correspondence

WARREN COUNTY PLANNING DEPARTMENT
WAYNE DUMONT, JR. ADMINSTRATION BUILDING
165 COUNTY ROAD 519, SOUTH
BELVIDERE, NEW JERSEY 07823-1949

DAVID K. DECH
PLANNING DIRECTOR

Telephone: (908) 475-6532
Fax: (908) 475-6537
planningdept@co.warren.nj.us

October 13, 2009

Mark Eberle
Department of the Army
Environmental Resources Branch
Philadelphia District, Corp of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

Dear Mr. Eberle:

I am in receipt of a letter from Minas M. Arabatzis dated October 5, 2009, concerning the project to remove the dam in Bloomsbury, NJ.

I consulted with the County Engineer and have the following comments:

1. An in depth hydraulic analysis of the river needs to be prepared to determine potential impacts on the downstream bridge and scouring of the channel.

2. Additional scour protection of the bridge abutments, wing walls, and adjacent retaining walls need to be considered.

3. The Warren County Engineer and the Hunterdon County Engineer need to be added to the coordination list. The Warren County Engineer is David Hicks and can be reached at 165 County Route 519, Belvidere, NJ 07823.

In addition, the Bloomsbury dam is adjacent to the North Bloomsbury Historic District for which the NJ Historic Preservation Office rendered an opinion on December 9, 1999. The dam should be assessed to determine if it is a contributing element to district.

Sincerely Yours,

David K. Dech
Planning Director

njd
c: David Hicks, County Engineer
Steve Marvin, County Administrator

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service
220 Davidson Ave., 4th Floor
Somerset, NJ 08873

www.nj.nrcs.usda.gov

October 8, 2009

Mr. Mark Eberle
Environmental Resources Branch
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear ~~Mr. Eberle~~ mark:

This is to follow-up your letter of October 5, 2009 regarding the Bloomsbury Dam. We have reviewed the Scoping Summary for the Bloomsbury Dam Removal, Bloomsbury, New Jersey and our comments are given below.

The last sentence of paragraph one should read: "The Natural Resources Conservation Service is currently preparing an environmental assessment for improvement of aquatic life passage at the Finesville Dam. Alternatives under consideration are no action, partial dam removal and full dam removal under the Wildlife Habitat Incentive Program (WHIP). Concurrently, a feasibility study for dam removal has been conducted by Princeton Hydro, LLC under an American Rivers-NOAA Community Restoration Program grant."

Other issues, in addition to the need for river restoration, relate to the existing barrier include public safety (a 29 year old woman lost her life drowning at the Bloomsbury Dam in August 2003) as well as dam owner operation, maintenance and liability costs, etc. In addition to these issues, other socio-economic issues that were identified at the Finesville Dam location may be relevant at Bloomsbury Dam. These issues include impacts on property values/taxes, flooding/flood insurance, private well water supply, septic systems, fire protection water supply, and aesthetic value "waterfall effect."

Please let me know of any questions or comments. Thanks for the opportunity to provide our input. We look forward to working with you as the planning process continues.

Gregory J. Westfall
Water Resource Planner/Environmental Compliance Coordinator

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
James J. Howard Marine
Sciences Laboratory
74 Magruder Road
Highlands, NJ 07732

October 15, 2009

Minas M. Arabatzis, Chief
Planning Branch
U.S. Army Corps of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

ATTN: Mr. Mark Eberle

Dear Mr. Arabatzis:

This responds to your letter dated October 5, 2009 requesting our participation in the scoping process for alternatives for the removal of the Bloomsbury Dam in Bloomsbury, NJ. The dam is located on the Musconetcong River in Hunterdon and Warren Counties. This portion of the Musconetcong River does not provide habitat for NOAA trust resources. Currently, three dams exist downstream of the Bloomsbury Dam that preclude passage of resources under our jurisdiction. Due to our limited staff and the lack of resources in the project area, we are unable to participate in the scoping process for this project.

Although NOAA resources do not occur in the project area, we support the efforts of the Army Corps to remove the Bloomsbury Dam as well as the efforts of other non-governmental organizations in their efforts to remove the lower dams. The lower, free-flowing portions of the Musconetcong River provide habitat for a variety of resources under our jurisdiction including American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*) and American eel (*Anguilla rostrata*). Any efforts to restore fish passage, improve aquatic habitat and re-establish the sediment transport cycle in this section of the Musconetcong River will have downstream benefits. Also, NOAA resources may use this area in the future as the downstream dams are removed or breached. Currently, staff from NOAA's Restoration Center are assisting some non-governmental organizations in their efforts to removed or breach these lower dams. They are also available to provide technical assistance to the Corps if requested.

Thank you for the opportunity to participate in the scoping process for this project. If you have any questions, please contact Karen Greene at 732 872-3023.

Sincerely,

Stanley W. Gorski
Field Offices Supervisor

cf: PRD – J. Crocker
RC- B. Bearmore

HPO- J2009-178
10-0067-1, -2 VM

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

NATURAL & HISTORIC RESOURCES, HISTORIC PRESERVATION OFFICE
PO Box 404, Trenton, NJ 08625
TEL: (609) 984-0176 FAX: (609) 984-0578
www.state.nj.us/dep/hpo

MARK N. MAURIELLO
Acting Commissioner

October 27, 2009

Mr. Mark Eberle
Department of the Army
Philadelphia District, Corps of Engineers
Environmental Resources Branch
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

Dear Mr. Eberle:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published with amendments in the Federal Register on 6 July 2004 (69 FR 40544-40555), I am providing **Consultation Comments** for the following proposed undertakings:

Hunterdon County, Bloomsbury Borough
Warren County, Greenwich Township
Bloomsbury Dam Fish Passage Project
Department of the Army, Corps of Engineers

800.4 Identification of Historic Properties

The Bloomsbury Dam is located adjacent to the North Bloomsbury Historic District (SHPO Opinion December 9, 1999). Therefore, this undertaking will need to assess if the Bloomsbury Dam and impoundment is individually eligible for listing on the National Register of Historic Places or a contributing element of the North Bloomsbury Historic District.

In consequence, pursuant to 36 CFR § 800.4, an intensive level architectural survey will be necessary to assess the National Register eligibility of the Bloomsbury Dam and impoundment, as well as, architectural properties over 50 years in age that could be visually impacted by the proposed project. In addition, a Phase IA archaeological survey is necessary to assess the potential for archaeological properties within the area of potential effects (including any staging areas, river access points, and temporary access roads), and assess the necessity for a Phase IB archaeological survey.

Historic Architecture

The purpose of the intensive level architectural survey is to allow the Historic Preservation Office (HPO) to assess impacts to historic properties and historic landscapes, and to determine appropriate avoidance, minimization and/or mitigation of impacts for this undertaking.

This will necessitate preparation of intensive level architectural survey forms and analysis of historic landscapes, viewsheds, and architectural properties older than 50 years both on the subject site and in its vicinity that may be impacted by construction of the project and associated ambient impacts. For properties recommended as National Register eligible, recommendations must be provided for avoidance of impacts. If impacts cannot be avoided alternatives analyses must be provided to explore alternatives to avoid, minimize and/or mitigate impacts together with the associated costs and considerations.

Survey and reporting must be in keeping with the Office's 1999 *Guidelines for Architectural Survey*. HPO architectural guidelines are available on our website at: http://www.nj.gov/dep/hpo/1identify/survarcht.htm. Evaluations to determine the National Register eligibility of historic properties must be in keeping with the National Park Service's National Register Bulletin, *How to Apply the National Register Criteria for Evaluation.* The *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* are available on the National Park Service web site: http://www.cr.nps.gov/local-law/arch_stnds_0.htm. The firm(s) conducting the work will need to meet the relevant National Park Service Professional Qualifications Standards for architectural history.

Please note that the project cultural resources consulting firm must contact local historic preservation commissions, historic societies, and persons knowledgeable about local history and architecture for their views on potential impacts to historic and architectural properties as the result of the project and for information that they may provide. This will necessitate providing these contacts with specific information about the location and nature of the project.

Archaeology

The Phase IA reconnaissance level archaeological survey is intended to assess the potential for National Register eligible resources within the area of potential project impact prior to conducting subsurface testing. Consequently, it will require careful analysis of the project plans and specifications as well as the project site or corridor.

The Phase IA archaeological survey should consist of background research and a visual reconnaissance of the project area. Included should be collection of information on the environment and physical condition of the project site; and the land use, history, and prehistory of the project area using, primarily, secondary sources. Repositories should include the Historic Preservation Office (HPO); the New Jersey State Museum and Library; local libraries and historical societies; the county cultural and heritage commission; and lprofessional people with knowledge of cultural resources in and around the project area. Research should focus on the

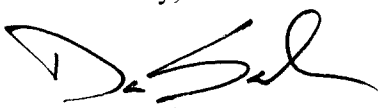
project site. However, analysis and discussion of the greater project environment should be included for the purpose of discussing the cultural resource potential of the project site.

All phases of the archaeological survey and reporting will need to be in keeping with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation*, and the HPO's *Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources* and *Guidelines for Preparing Cultural Resources Management Archaeological Reports Submitted to the Historic Preservation Office*. These guidelines can be obtained through the HPO's web page at: (http://www.nj.gov/dep/hpo/1identify/survarkeo.htm). Reasoning and documentation for areas excluded from testing must be included in the technical report. Evaluations to determine the National Register eligibility of archaeological sites must be in keeping with the National Park Service's 2000 National Register Bulletin, *Guidelines for Evaluating and Registering Archeological Properties*. The individual(s) conducting the work will need to meet the relevant Secretary of the Interior's Professional Qualifications Standards for archaeology.

Additional Comments

Thank you again for providing this opportunity for review and comment on the potential for this project to affect historic and archaeological resources. We look forward to receiving the requested surveys discussed above. If you have any questions, please feel free to contact my staff members Vincent Maresca (609) 633-2395 with questions regarding archaeology or Meghan MacWilliams Baratta (609-292-1253) with questions regarding historic architecture, historic districts, or historic landscapes.

Sincerely,



Daniel D. Saunders
Deputy State Historic
Preservation Officer

c. Joseph Corleto, NJDEP-Office of Permit Coordination

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625-0400
Dave Chanda, Director
Tel: (609) 292-2965
Fax: (609) 984-1414
www.njfishandwildlife.com

November 17, 2009

Mark Eberle
Department of the Army
Philadelphia District, Corps of Engineers
Environmental Resources Branch
Wanamaker Bldg., 100 Penn Square East
Philadelphia, PA 19107

Dear Mr. Eberle:

We have received correspondence from your agency requesting the Division of Fish and Wildlife's participation in a scoping study for the removal of the Bloomsbury Dam, in Bloomsbury, NJ.

As you are probably aware, there is already a collaborative effort underway (the Musconetcong River Restoration Partnership) to remove dams on the main stem of the Musconetcong River. This partnership involves non-governmental organizations (Musconetcong Watershed Association, Trout Unlimited, American Rivers, and North Jersey RC&D), federal/state agencies (NRCS, USNPS, USFWS NOAA, NJ Div. Fish & Wildlife), and consultants (Princeton Hydro, LCC. and Joseph Urbani & Associates, Inc.). Last year, the partnership was successful in removing two dams on the upper Musconetcong River and now is actively pursuing removal of four dams on the lower Musconetcong River.

Unfortunately our current involvement in the removal of these dams on the river (two of which are partially owned by the Division), along with staffing and fiscal constraints, precludes our involvement in another dam removal/river restoration project on the Musconetcong River at this time.

Sincerely,

Dave Chanda
Director, DFW

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Environmental Regulation
Office of Permit Coordination and Environmental Review
401 East State Street
P.O. Box 423
Trenton, New Jersey 08625-0423
Phone: (609) 292-3600 Fax: (609) 777-1330

JON S. CORZINE
Governor

MARK N. MAURIELLO
Acting Commissioner

November 20, 2009

Mr. Mark Eberle
Environmental Resources Branch
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, PA, 19107-3390

RE: Bloomsbury Dam Replacement
NEPA - Scooping Summary
Warren, Hunterdon Counties

Dear Mr. Eberle:

The Office of Permit Coordination and Environmental Review of the New Jersey Department of Environmental Protection (NJDEP) has completed its review of the Scoping Summary for the proposed replacement of the Bloomsbury Dam Replacement. We offer the following comments for your consideration.

COMMENTS:

REGULATORY REQUIREMENTS

Division of Land Use Regulation

This memo is intended to give comments on the proposed removal of the Bloomsbury Dam in Bloomsbury, New Jersey by the U.S. Army Corps of Engineers, Philadelphia District. Please note, no plans were provided for Land Use Regulation so the following comments are limited in nature. The following guidance is provided:

1. The proposed project is located within the Highlands Preservation Area and therefore will require a Highlands Exemption in order to apply for a Freshwater Wetland General Permit No. 18. If the project is determined to be non-exempt, the applicant may apply for a Highlands Preservation Area General Permit No. 1.
2. The applicant shall provide a landscape plan showing vegetative (native) restoration that is proposed.
3. The applicant shall submit plans showing existing and proposed conditions.

Suggested Conditions:

In order to protect the regulated resources of New Jersey, such as Highlands open waters and forests, flood hazard areas, riparian zones, wetlands, and transition areas the following conditions for work within regulated areas are provided in order to insure the continued quality of New Jersey's environmental resources:

1. The following timing restrictions should be followed for any work in channel or in the riparian zone, which may cause sedimentation of the waterbody:

- Trout maintenance or Trout Stocked: 3/15 thru 6/15
- Wood turtle: 11/1 thru 4/1
- Bog turtle: 11/1 thru 4/30, 5/1 thru 10/30 a herpetologist needs to check work area for turtles.
- Timber rattlesnake: 9/15 thru 5/30
- Dwarf wedgemussel: 4/1 thru 6/15, 8/1 thru 11/1
- Brook Floater: 4/1 thru 6/30, 8/1 thru 9/30
- Green Floater: 4/1 thru 6/30, 8/1 thru 9/30
- Yellow Lampmussel: 4/1 thru 6/30, 8/1 thru 10/15
- Eastern Pondmussel: 5/15 thru 7/30, 8/1 thru 9/30
- Please be advised, additional timing restrictions may need to be imposed for barred owl, red-shouldered hawk, and Cooper's hawk.

2. In order to protect Indiana bat (*Myotis sodalis*) a Federally listed endangered species, timing restrictions for tree clearing shall be implemented, in all areas deemed by the U.S. Fish and Wildlife Service (Service). Specifically, the clearing of trees 6 inches dbh or greater may not occur from April 1 to September 30 within the entire project area. However, limited tree clearing may be approved by the Service during the restricted time. The Service notes that clear cutting large areas can impact natural resources, including soil erosion into nearby streams. The Service is available for further coordination to avoid clear cutting and to protect Indiana bat.

3. In order to protect bald eagle (*Haliaeetus leucocephalus*) a state threatened species, timing restrictions for de-watering may be implemented. Specifically, to protect bald eagle foraging habitat the lowering of lakes and other de-watering activities may not occur from January 1 to July 31 within specific project areas. Any sightings of bald eagles must be reported and a sighting report shall be filed with the Division of Fish and Wildlife - Non-Game Program.

4. In areas of known bog and wood turtle occurrence, the applicant is responsible for installing and maintaining a double silt fence sediment barrier around all soils disturbed by construction, which are sufficient to prevent the sedimentation of the stream and wetlands and to prevent turtles from entering the work area. After fence installation, the applicant is responsible for searching the work area and moving all turtles outside of the silt fence prior to the start of construction. All fences must be maintained on a daily basis.

5. In all other areas, the applicant is responsible for installing and maintaining a sediment barrier around all soils disturbed by construction. Prior to the commencement of site clearing, grading or construction, the permittee must

have a silt fence and a construction debris fence erected at the limit of disturbance. These fences shall serve both as a siltation and debris barrier as well as a physical barrier protecting the transition area and wetlands from encroachment by construction vehicles or activities. These fences shall be kept in place and maintained throughout the duration of construction or until such time that the site is stabilized.

6. The applicant is responsible for insuring that clearing of transition areas, wetlands, and riparian zones is minimized, clearing for staging and access should not be done within these areas, and should be located in areas of previous disturbances, where clearing is not required.

7. The applicant is responsible for using jute matting or other erosion control blankets on disturbed wetland areas immediately after project completion to minimize sedimentation, and promptly vegetate areas of temporary disturbance with native species.

8. In order to insure that soil compaction and excessive soil disturbance does not occur within wetlands, the applicant is responsible for insuring that all work in wetlands is done from timber or similar types of mats designed for wetland crossings.

9. Construction equipment shall not be stored, staged or driven within any channel, freshwater wetland or transition area, unless expressly approved by NJDEP as described on the construction plans.

It should be noted that these comments are based on limited information and are thus preliminary in nature and not a NJDEP decision or approval and should not be construed as such now or during any future permit applications or submissions.

The Bureau of Dam Safety

The Bureau of Dam Safety & Flood is aware of the U.S. Army Corps of Engineer's (USACE) work on this project and the Bureau of Dam Safety has attended a meeting with USACE and other interested parties regarding this matter. The removal of the dam will require a dam safety permit from this Bureau and our dam removal regulatory requirements are defined at N.J.A.C. 7:20-1.7(h). The regulations are available on our website. Be advised the Bureau has very little historical or engineering records for this structure.

Division of Fish and Wildlife

This serves to inform you of the Division of Fish and Wildlife's [DFW] comments and concerns about the Removal of the Bloomsbury Dam on the Musconetcong River. Our areas of concern are noted below.

Fisheries:

A time restriction for any in-water disturbance and sediment generating activities is needed from **3/15 thru 6/15**. These waters are classified Trout Maintenance (TM) and are trout stocked waters.

Water Lowering Permit:

A Water Lowering Permit from the Bureau of Freshwater Fisheries (call: 908-236-2118 for application) may be needed to manipulate water levels of the impoundment created by the dam.

Landscape Mapping:

Landscape mapping indicates no T/E or species of concern within the projects area of disturbance.

Historic Preservation Office

See Attached letter dated October 27, 2009.

Thank you for giving the NJDEP the opportunity to comment on the Bloomsbury Dam Replacement Scooping summary.

Sincerely,

Joseph Corleto
Principal Environmental Specialist
Office of Permit Coordination
and Environmental Review

Cc: Darrin Schaffer, NJDEP
Kelly Davis, NJDEP
Jill Neal, NJDEP
Dan Saunders, NJDEP

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Project Name: Bloomsbury Dam Removal **Originating Person:** Brian Marsh
Township: Borough of Bloomsbury and Greenwich Township **Telephone Number:** 609-383-3938 ext. 22
County: Hunterdon and Warren Counties **Date:** February 10, 2011
Shape file at: G:\user\Brian\intra s7 maps\Bloomsbury Dam

I. Region: 5

II. Service Activity (Program)

U.S. Fish and Wildlife Service, Region 5, Ecological Services, New Jersey Field Office (NJFO), *Partners for Fish and Wildlife Program* proposes to assist the U.S. Army Corps of Engineers, Musconetcong Watershed Association, and other partners with the removal of the privately owned Bloomsbury Dam on the Musconetcong River and subsequent restoration of the river channel. The removal would create an approximately 8-mile run of free river and contribute to the eventual opening up of the river to diadromous fish once other dams are removed.

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

Indiana bat summer habitat focus area / potential summer habitat

B. Proposed species and/or proposed critical habitat within the action area:

None

C. Candidate species within the action area:

None

D. Include species/habitat occurrences on a map.

Map attached

IV. Geographic area or station name and action:

The New Jersey Field Office through the *Partners for Fish and Wildlife* program proposes to assist with the removal of the dam and revegetation of the exposed riparian area.

V. **Location (attach map):** map attached and see shape file

A. Ecoregion Number and Name:

Northern Piedmont (64)
Watershed: Musconetcong

B. County and State:

Hunterdon and Warren Counties, New Jersey

C. Section, township, and range (or latitude and longitude):

Borough of Bloomsbury and Greenwich Township

D. Distance (miles) and direction to nearest town:

Within Bloomsbury

E. Species/habitat occurrence:

Indiana bat summer habitat focus area / potential summer habitat

VI. **Description of proposed action (attach additional pages as needed):**

See attached plan outlines.

VII. **Determination of effects:**

A. Explanation of effects of the action on species and critical habitats in items III. A, B, and C (attach additional pages as needed):

B. Explanation of actions to be implemented to reduce adverse effects:

No large trees are being removed. Open water being reduced somewhat but with an improved vegetated riparian corridor.

VIII. Effect determination and response requested: [* = optional]

A. Listed species/designated critical habitat:

Determination	**Response requested**
no effect/no adverse modification (___Indiana bat_____)	__X__ *Concurrence
may affect, but is not likely to adversely affect species/adversely modify critical habitat (species:_____)	_____ Concurrence
may affect, and is likely to adversely affect species/adversely modify critical habitat (species:_____)	____ Formal Consultation

_____ 2-10-11
Project Biologist (Requestor), New Jersey Field Office Date

IX. Reviewing ESFO Evaluation:

A. Concurrence X **Nonconcurrence**_____

B. Formal consultation required_____

C. Conference required_____

D. Informal conference required_____

E. Remarks (attach additional pages as needed):

_____ 2-14-11
Endangered Species Biologist (Reviewer), Date
New Jersey Field Office

_____ 24 Feb 11
Assistant Supervisor, New Jersey Field Office Date

State of New Jersey

MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
PO Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 30, 2011

Minas M. Arabatzis, Chief
Planning Division
United States Army Corps of Engineers
Philadelphia District
The Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear Mr. Arabatzis:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40544-40555), I am providing Consultation Comments for the following proposed undertaking:

Hunterdon County, Bloomsbury Borough
Warren County, Greenwich Township
Phase IA Archaeological Survey
Proposed Bloomsbury Dam Project
United States Department of the Army, Corps of Engineers

Thank you for your submission regarding the proposed Bloomsbury Dam project in Hunterdon and Warren Counties, received at the Historic Preservation Office (HPO) on October 4, 2011. Your consultation letter states that the project will require a United States Army Corps of Engineers (USACE) permit. Therefore, we look forward to the initiation of Section 106 of the National Historic Preservation Act and continued consultation for the above reference undertaking.

800.3 Initiation of the Section 106 Process

Based on previous consultation with dam improvement projects located along the Musconetcong River, the HPO recommends consulting with the following interested parties:

- Bill Leavens – Musconetcong Watershed Association
- Dennis Bertland
- Marion Harris
- Hunterdon County Cultural and Heritage Commission
- Hunterdon County Historical Society
- Hunterdon County Planning Board
- Warren County Cultural and Heritage Commission
- Warren County Historical Society

Please note however, it is the lead federal agency's responsibility to identify and contact all interested parties, applicants, local governments, as well as the public, regarding their involvement with this undertaking, pursuant to 800.3(f).

800.4 Identification of Historic Properties

The consultation comments below are in reply to the following cultural resource survey report received at the Historic Preservation Office (HPO) on October 4, 2011, for the above-referenced undertaking:

Yates, Sharon
2011 *Cultural Resources Investigations, Bloomsburg Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey.* Prepared for United States Army, Corps of Engineers, Philadelphia District, Philadelphia, PA. Prepared by A.D. Marble & Company, Conshohocken, PA.

The above-referenced report states that three alternatives are being considered for the Bloomsbury Dam project. Alternative 1 involves no action being taken regarding the dam. Alternative 2 involves complete removal of the dam structure, while Alternative 3 entails dam removal with partial remnants. If Alternative 1 is chosen, the report recommends that no further cultural resources investigation would be necessary. If Alternatives 2 or 3 is selected, the report recommends further intensive background research be conducted in addition to a Phase IB archaeological investigation. Regarding historic architecture, if Alternative 2 or 3 are chosen, the report recommends further documentation of adjacent properties to assess their eligibility for listing in the National Register of Historic Places, as well as to assess the impacts of the proposed work on any eligible properties. *The HPO concurs with these assessments.*

The Bloomsbury Dam is located adjacent to the North Bloomsbury Historic District (SHPO opinion 12/09/1999). As part of the undertaking, the area of potential

effects (APE) needs to be specifically defined for the proposed project. Since the project may involve alteration to the dam structure itself, an archaeological APE must be established for all areas of proposed ground disturbance, access roads, and lay down areas. The purpose of the archaeological APE is to assess the impact any ground disturbance will have on potential archaeological historic properties. In addition, due to the project's location adjacent to the historic district, intensive level architectural survey to assess the National Register of Historic Places eligibility of the dam, viewshed analysis, and assessment of effects for Alternatives 2 and 3, will be required.

Archaeology

The HPO understands that as part of the undertaking, Alternatives 2 and 3 involve the complete or partial removal of the dam structure. If either Alternative 2 or 3 is chosen, due to the high sensitivity for both historic and Native American historic properties, a Phase IB archaeological survey, and as necessary Phase II archaeological survey, must be conducted within the project's area of potential affects (APE) to identify the presence or absence of archaeological resources within the APE pursuant to 36 CFR § 800.4.

Phase I survey will allow identification of the presence or absence of archaeological properties within the APE. If identified, Phase II survey will provide for evaluation of the National Register eligibility of the site(s) and assessment of project impacts. For properties on or eligible for National Register inclusion, recommendations must be provided for avoidance of impacts. If impacts cannot be avoided, analyses must be provided exploring alternatives to minimize and/or mitigate impacts. Means to avoid, minimize and/or mitigate impacts to National Register eligible properties will need to be developed and undertaken prior to project implementation.

All phases of the archaeological survey and reporting will need to be in keeping with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation*, and the HPO's *Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources* and *Guidelines for Preparing Cultural Resources Management Archaeological Reports Submitted to the Historic Preservation Office*. These guidelines can be obtained through the HPO's web page (http://www.nj.gov/dep/hpo/1identify/survarkeo.htm). Evaluations to determine the National Register eligibility of archaeological sites must be in keeping with the National Park Service's 2000 National Register Bulletin, *Guidelines for Evaluating and Registering Archeological Properties*. The individual(s) conducting the work will need to meet the Secretary of the Interior's *Professional Qualifications Standards for Archaeology* (48 FR 44738-9).

Historic Architecture

Based upon the documentation submitted, an intensive level architectural survey will be necessary to assess the National Register eligibility of the Bloomsbury Dam and

impoundment, as well as architectural properties over 50 years in age that could be visually impacted by the proposed project.

Please be aware, the Bloomsbury Dam was not included as part of the 1999 survey for the North Bloomsbury Historic. The studies of the Bloomsbury dam should address whether the dam itself is individually eligible, a contributing element of the North Bloomsbury Historic District, or eligible as part of a larger, as yet identified historic district relating to the historic industrial use of the Musconetcong River.

The intensive level architectural survey will necessitate preparation of Intensive Level architectural survey forms and analysis of historic landscapes, viewsheds, and architectural properties older than 50 years both on the subject site and in its vicinity that may be impacted by construction of the project and associated ambient impacts. For properties recommended as National Register eligible, recommendations must be provided for avoidance of impacts. If impacts cannot be avoided alternatives analyses must be provided to explore alternatives to avoid, minimize and/or mitigate impacts together with the associated costs and considerations.

Architectural survey must be in keeping with the Office's 1999 Guidelines for Architectural Survey (http://www.nj.gov/dep/hpo/1identify/survarcht.htm). For projects requiring a Freshwater Wetlands permits issued through the Department's Land Use Regulation program, reporting must conform to the guidelines at N.J.A.C. 7:4-8.6 (http://www.nj.gov/dep/hpo/2protection/register_historic_places09_29_08.pdf). Evaluations to determine the National Register eligibility of historic properties must be in keeping with the National Park Service's National Register Bulletin, How to Apply the National Register Criteria for Evaluation. Recommendations for avoidance of impacts to historic properties must conform to The Secretary of the Interior's *Standards for the Treatment of Historic Properties*. The individual(s) conducting the work will need to meet the relevant Secretary of the Interior's *Professional Qualifications Standards for Architectural History*.

Please note that the project cultural resources consulting firm must contact local historic preservation commissions, historic societies, and persons knowledgeable about local history and architecture for their views on potential impacts to historic and architectural properties as the result of the project and for information that they may provide. This will necessitate providing these contacts with specific information about the location and nature of the project.

Additional Comments

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. The HPO looks forward to continued consultation for the restoration of the Musconetcong River and the proposed Bloomsbury Dam project, pursuant to Section 106 of the National Historic Preservation Act. If additional consultation with the HPO is needed for this undertaking, please reference the HPO project number 10-0067 in any future calls, emails, or written

correspondence to help expedite your review and response. Please do not hesitate to contact Vincent Maresca (609-633-2395) of my staff with any questions regarding archaeology or Jonathan Kinney (609-984-0141) with questions regarding historic architecture.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

Cc: Nikki Minnichbach – USACE
Bill Leavens – Musconetcong Watershed Association
Dennis Bertland
Marion Harris
Hunterdon County Cultural and Heritage Commission
Hunterdon County Historical Society
Hunterdon County Planning Board
Warren County Cultural and Heritage Commission
Warren County Historical Society

DDS/VM/JWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

In Reply Refer to:
HR-11/058

JAN 4 2012

LTC Philip M. Secrist, III
District Engineer, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear Colonel Secrist:

This is the draft letter of the U.S. Fish and Wildlife Service (Service) on anticipated impacts to fish and wildlife resources from the U.S. Army Corps of Engineers, Philadelphia District (Corps) Removal of the Bloomsbury Dam on the Musconetcong River in Warren and Hunterdon Counties, New Jersey. This letter was prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

The conclusions and recommendations in this draft FWCA letter are based on project plans and information as provided in the Corps' Environmental Assessment dated January 2012. The Service assisted in the planning of the subject restoration project and provided technical assistance in assessing impacts on fish and wildlife resources.

A. PROJECT DESCRIPTION

The purpose of the project is to remove the Bloomsbury Dam. The objectives include restoring free-flowing conditions and increase connectivity of the Musconetcong River, allowing free passage of fish and other aquatic organisms in the location of the dam, restoring riverine habitat and improving water quality in the impoundment area, restoring the natural movement of materials (sediment, nutrients, woody debris) down the river, eliminating the existing public safety hazard and reducing risk of accidental drowning, and eliminating risk of future catastrophic failure.

B. METHODS AND PROCEDURES

The information and findings presented in this letter are based on review of the Removal of Bloomsbury Dam on the Musconetcong River Draft Environmental Assessment (EA) (U.S.

Army Corps of Engineers, 2012) and review of additional information made available to the Service by the Corps. The content of this letter is also based on the following: review of Service files and library material; coordination with the New Jersey Division of Fish and Wildlife (NJDFW), including the Endangered and Nongame Species Program (ENSP), and the National Marine Fisheries Service (NMFS); and several site visits conducted by a Service biologist in 2011.

C. FISH AND WILDLIFE RESOURCES

The Corps completed a review of fish and wildlife resources that use the Musconetcong River and areas around the Bloomsbury Dam in the Draft Environmental Assessment. Fish and wildlife resources inhabiting the project area include a variety of benthic organisms, finfish, waterfowl, raptors, and water-dependent mammals. The primary native species benefiting from this project are brook trout (*Salvelinus fontinalis*), American eel (*Anguilla rostrata*), blueback herring (*Alosa aestivalis*), and alewife (*Alosa pseudoharengus*).

D. IDENTIFICATION OF BENEFITS, IMPACTS, AND MITIGATIVE MEASURES

1. Benefits

A number of benefits will be derived from the removal of the Bloomsbury Dam as described in the subject Draft EA. Primarily, the removal of this dam will allow upstream migration of anadromous and catadromous fish species and allow upstream and downstream movement of brook trout in a section of river that is classified as trout production waters by New Jersey Department of Environmental Protection. Additionally, restoring riverine habitat and the natural movement of materials (sediment, nutrients, woody debris) down the river will benefit a variety of fish and wildlife resources and enhance benthic organisms.

2. Impacts

Deconstruction of the dam will temporarily impact habitats in riverine and shallow water wetlands within the project area. This adverse impact to shallow water wetlands and impacts on water quality will be temporary during removal. In addition, construction equipment may temporarily result in some benthic material compaction and may introduce some contaminants into the project area. These impacts are considered to be temporary and not significant.

3. Mitigative Measures

The Service recommends coordination with the New Jersey Division of Fish and Wildlife (NJDFW) regarding potential timing restrictions of in-water work to avoid adverse impacts to trout production waters. In-stream construction activities will likely be prohibited between March 15 and June 15.

E. CONCLUSIONS AND RECOMMENDATIONS

The Service and the NJDFW support the removal of the Bloomsbury Dam as a means to provide fish passage to brook trout and migratory fish species. This project will provide fish passage for 5.5 miles upstream on the Musconetcong River to the Asbury Graphite Dam.

A draft copy of this letter was forwarded to the NJDFW for concurrence and the Service is currently awaiting the NJDFW's response. A copy of the Service's letter to the NJDFW is enclosed.

Additional information regarding Service comments can be provided by contacting Eric Schrading at 609-646-9310, Ext. 46. The Service would appreciate any written comments on this letter within 30 days.

Sincerely,

J. Eric Davis Jr.
Supervisor

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Project Name: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Ms. Tamara Francis-Fourkiller
Cultural Preservation Director
The Delaware Nation
31064 State Highway 281
P.O. Box 825
Anadarko, Oklahoma 73005

Dear Ms. Francis-Fourkiller:

The U.S. Army Corps of Engineers (USACE), pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), its implementing regulations 36 CFR § 800, and in accordance with the USACE Tribal Consultation Policy, 1 November 2012, has enclosed for your review: 1) a draft feasibility report (Enclosure 1); 2) a cultural resources report (Enclosure 2); and, 3) a draft Programmatic Agreement (Enclosure 3) for the proposed Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, New Jersey. These documents are presented to you as part of our ongoing Government to Government consultation process, providing the Delaware Nation an opportunity to review the proposed project scope, as well as comment on the proposed undertaking.

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

A Phase IA cultural resource investigation was conducted, and the findings are in the enclosed report titled, *Cultural Resources investigations, Bloomsbury Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey* prepared for the USACE by AD Marble & Company and dated March 19, 2010. Research has found that the proposed project area is of moderate to high potential for intact archaeological deposits as well as having the potential for a strong historic period sensitivity as well. Depending on the selected alternative, additional investigations will be required.

Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any comments on the attached documents, questions about the proposed project or any other requests, please feel free to contact me within 30 days of the date of this letter via email nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543, or by letter to the above address. We greatly appreciate your interest and input regarding this proposed undertaking.

Respectfully,

Nicole Cooper Minnichbach
Cultural Resource Specialist and Tribal Liaison

Enclosures
1. Draft Feasibility Report
2. Phase IA Report
3. Draft Programmatic Agreement

Copies Furnished:

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Project Name: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Brice Obermeyer, PhD
Tribal Historic Preservation Officer
The Delaware Tribe
1200 Commercial Street
Roosevelt Hall, Room 212
Emporia State University
Emporia, KS 66801

Dear Dr. Obermeyer:

The U.S. Army Corps of Engineers (USACE), pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), its implementing regulations 36 CFR § 800, and in accordance with the USACE Tribal Consultation Policy, 1 November 2012, has enclosed for your review: 1) a draft feasibility report (Enclosure 1); 2) a cultural resources report (Enclosure 2); and, 3) a draft Programmatic Agreement (Enclosure 3) for the proposed Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, New Jersey. These documents are presented to you as part of our ongoing Government to Government consultation process, providing the Delaware Tribe an opportunity to review the proposed project scope, as well as comment on the proposed undertaking.

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

A Phase IA cultural resource investigation was conducted, and the findings are in the enclosed report titled, *Cultural Resources investigations, Bloomsbury Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey* prepared for the USACE by AD Marble & Company and dated March 19, 2010. Research has found that the proposed project area is of moderate to high potential for intact archaeological deposits as well as having the potential for a strong historic period sensitivity as well. Depending on the selected alternative, additional investigations will be required.

Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any comments on the attached documents, questions about the proposed project or any other requests, please feel free to contact me within 30 days of the date of this letter via email nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543, or by letter to the above address. We greatly appreciate your interest and input regarding this proposed undertaking.

Respectfully,

Nicole Cooper Minnichbach
Cultural Resource Specialist and Tribal Liaison

Enclosures
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3. Draft Programmatic Agreement

Copies Furnished:

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Project Name: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Ms. Robin Dushane
Cultural Preservation Director
The Eastern Shawnee Tribe of Oklahoma
12705 S. 705 Road
Wyandotte, Oklahoma 74370

Dear Ms. Dushane:

The U.S. Army Corps of Engineers (USACE), pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), its implementing regulations 36 CFR § 800, and in accordance with the USACE Tribal Consultation Policy, 1 November 2012, has enclosed for your review: 1) a draft feasibility report (Enclosure 1); 2) a cultural resources report (Enclosure 2); and, 3) a draft Programmatic Agreement (Enclosure 3) for the proposed Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, New Jersey. These documents are presented to you as part of our ongoing Government to Government consultation process, providing the Eastern Shawnee Tribe an opportunity to review the proposed project scope, as well as comment on the proposed undertaking.

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

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Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any comments on the attached documents, questions about the proposed project or any other requests, please feel free to contact me within 30 days of the date of this letter via email nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543, or by letter to the above address. We greatly appreciate your interest and input regarding this proposed undertaking.

Respectfully,

Nicole Cooper Minnichbach
Cultural Resource Specialist and Tribal Liaison

Enclosures
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2. Phase IA Report
3. Draft Programmatic Agreement

Copies Furnished:

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Project Name: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Ms. Sherry White
Tribal Historic Preservation Officer
Stockbridge-Munsee Community of Mohican Indians
W13447 Camp 14 Road
P.O. Box 70
Bowler, Wisconsin 54416

Dear Ms. White:

The U.S. Army Corps of Engineers (USACE), pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), its implementing regulations 36 CFR § 800, and in accordance with the USACE Tribal Consultation Policy, 1 November 2012, has enclosed for your review: 1) a draft feasibility report (Enclosure 1); 2) a cultural resources report (Enclosure 2); and, 3) a draft Programmatic Agreement (Enclosure 3) for the proposed Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, New Jersey. These documents are presented to you as part of our ongoing Government to Government consultation process, providing the Stockbridge-Munsee Community of Mohican Indians an opportunity to review the proposed project scope, as well as comment on the proposed undertaking.

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

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Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any comments on the attached documents, questions about the proposed project or any other requests, please feel free to contact me within 30 days of the date of this letter via email nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543, or by letter to the above address. We greatly appreciate your interest and input regarding this proposed undertaking.

Respectfully,

Nicole Cooper Minnichbach
Cultural Resource Specialist and Tribal Liaison

Enclosures
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3. Draft Programmatic Agreement

Copies Furnished:

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
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PO Box 420
Trenton, NJ 08625-0420

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Project Name: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Mr. Jesse Bergevin
Tribal Historic Preservation Officer
The Oneida Indian Nation
2037 Dream Catcher Plaza
Oneida, New York 13421

Dear Mr. Bergevin:

The U.S. Army Corps of Engineers (USACE), pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), its implementing regulations 36 CFR § 800, and in accordance with the USACE Tribal Consultation Policy, 1 November 2012, has enclosed for your review: 1) a draft feasibility report (Enclosure 1); 2) a cultural resources report (Enclosure 2); and, 3) a draft Programmatic Agreement (Enclosure 3) for the proposed Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, New Jersey. These documents are presented to you as part of our ongoing Government to Government consultation process, providing the Oneida Indian Nation an opportunity to review the proposed project scope, as well as comment on the proposed undertaking.

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

A Phase IA cultural resource investigation was conducted, and the findings are in the enclosed report titled, *Cultural Resources investigations, Bloomsbury Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey* prepared for the USACE by AD Marble & Company and dated March 19, 2010. Research has found that the proposed project area is of moderate to high potential for intact archaeological deposits as well as having the potential for a strong historic period sensitivity as well. Depending on the selected alternative, additional investigations will be required.

Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any comments on the attached documents, questions about the proposed project or any other requests, please feel free to contact me within 30 days of the date of this letter via email nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543, or by letter to the above address. We greatly appreciate your interest and input regarding this proposed undertaking.

Respectfully,

Nicole Cooper Minnichbach
Cultural Resource Specialist and Tribal Liaison

Enclosures
1. Draft Feasibility Report
2. Phase IA Report
3. Draft Programmatic Agreement

Copies Furnished:

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

Proposed Bloomsbury Dam Project, Hunterdon County, Bloomsbury Borough, Warren County, Greenwich Township, New Jersey HPO Project #10-0067-3

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

Dear Mr. Saunders:

The U.S. Army Corps of Engineers, Philadelphia District has enclosed for your review a draft Programmatic Agreement for the above referenced project in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

If you have any questions regarding the proposed project or the document please contact Nicole Cooper Minnichbach, Cultural Resource Specialist and Tribal Liaison via email nicole.c.minnichbach@usace.army.mil, or by phone (215) 656-6556.

Sincerely,

C. MacIntosh

Charles MacIntosh
Acting Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Branch

FEB 2 1 2013

Proposed Bloomsbury Dam Project, Hunterdon County, Bloomsbury Borough, Warren County, Greenwich Township, New Jersey

John T. Eddins, Ph.D.
Historic Preservation Specialist/Archaeologist Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW, Suite 809
Washington, D.C. 20004

Dear Dr. Eddins:

The U.S. Army Corps of Engineers, Philadelphia District (USACE), in consultation with the New Jersey Historic Preservation Office (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii) to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) for the proposed Bloomsbury Dam Project in Warren and Hunterdon Counties, New Jersey. We have enclosed for your review a draft Programmatic Agreement for the above referenced project (Enclosure 1).

The proposed federal undertaking would be carried out under the authority of Section 206 of the Water Development Resource Act (WRDA) of 1996 (Public Law 104-303). The project site is located 7.5 miles upriver from the confluence of the Musconetcong River and the Delaware River, with the dam spanning the Musconetcong River between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey. This project is part of an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition, allowing for fish passage and overall improvement of water quality. A more in depth discussion of the project can be found in the draft feasibility report.

A Phase IA cultural resource investigation was conducted, and the findings are in the enclosed report titled, *Cultural Resources investigations, Bloomsbury Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey* prepared for the USACE by AD Marble & Company and dated March 19, 2010. Research has found that the proposed project area is of moderate to high potential for intact archaeological deposits as well as having the potential for a strong historic period sensitivity as well. Depending on the selected alternative, additional investigations will be required (Enclosure 2).

Several alternatives are being investigated by the USACE during the feasibility phase of the project. In order to demonstrate compliance with Section 106, while allowing for the

completion of the Section 106 process during the Design and Implementation phase, the USACE, in consultation with the New Jersey State Historic Preservation Officer (SHPO) and the non-federal sponsor, agree with the development and execution of a Programmatic Agreement in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii).

Please let us know if you wish to be a party to the execution of the Programmatic Agreement for the proposed federal undertaking. If you have any questions regarding the proposed project or the document please contact Nicole Cooper Minnichbach, Cultural Resource Specialist and Tribal Liaison via email nicole.c.minnichbach@usace.army.mil, or by phone (215) 656-6556.

Sincerely,

C. MacIntosh

Charles MacIntosh
Assistant Chief, Planning Division

Enclosures

DRAFT

PROGRAMMATIC AGREEMENT REGARDING COMPLIANCE WITH SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT FOR REMOVAL OF BLOOMSBURY DAM ON THE MUSCONETCONG RIVER SECTION 206, AQUATIC ECOSYSTEM RESTORATION HUNTERDON AND WARREN COUNTIES, NEW JERSEY AMONG THE U.S. ARMY CORPS OF ENGINEERS, PHILADELPHIA DISTRICT, THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE AND THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF NATURAL RESOURCE RESTORATION

WHEREAS, the U.S. Army Corps of Engineers, Philadelphia District (USACE) has authority to perform investigations on the feasibility and environmental impacts of the proposed removal of the Bloomsbury Dam (undertaking) were provided under Section 206 of the Water Resources Development Act of 1996 (PL 104-303) entitled "Aquatic Ecosystem Restoration"; and

WHEREAS, the USACE has determined that the proposed undertaking may have an effect on properties eligible for inclusion in the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C § 470) (NHPA) and its implementing regulation, "Protection of Historic Properties" (36 CFR § 800); and

WHEREAS, the New Jersey Department of Environmental Protection, Office of Natural Resource Restoration (NJDEP) is the non-federal partner with the USACE for this undertaking and is providing all lands, easements, rights-of-way, and other areas needed for the proposed project; and

WHEREAS, the USACE has consulted with the New Jersey State Historic Preservation Office (SHPO) to advise and assist the USACE in the identification of NRHP eligible and listed properties within the Area of Potential Effect (APE) pursuant to 36 CFR § 800.3(c); and

WHEREAS, the USACE, in consultation with the SHPO, has determined the APE to include all areas within which the undertaking may directly or indirectly alter the character defining features of historic properties, if any such properties exist; and

WHEREAS, the USACE has invited the Delaware Nation, the Delaware Tribe, the Eastern Shawnee Tribe of Oklahoma, the Oneida Indian Nation and the Stockbridge-Munsee Community of Mohican Indians into formal Government to Government consultation; and

WHEREAS, the USACE has conducted a Phase IA cultural resource investigation within the APE of the undertaking and has coordinated the results of the investigation with the SHPO and the Tribes pursuant to 36 CFR § 800.4; and,

WHEREAS, the USACE, the SHPO and the NJDEP agree that it is advisable to accomplish compliance with Section 106 of the NHPA through the development and execution of this Programmatic Agreement (PA) in accordance with 36 CFR § 800.6 and § 800.14 (b)(1)(ii); and

WHEREAS, the USACE has invited the Advisory Council on Historic Preservation (Council) to determine whether or not the Council wishes to enter into the Section 106 process in a letter dated [date], and the Council declined to participate in the consultation process in a letter dated [date]; and

NOW, THEREFORE, the USACE, the SHPO, and the NJDEP agree that the proposed undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties and to satisfy the USACE Section 106 responsibilities for all individual aspects of the undertaking.

Stipulation I

Identification, Evaluation, Effect Determination and Resolution

A. *Scope of Undertaking*. This PA shall be applicable to all construction activities related to the proposed undertaking's selected alternative. The Area of Potential Effects (APE) shall be established by the USACE in consultation with the SHPO and shall include all areas within which the undertaking may directly or indirectly alter the character defining features of historic properties, if any such properties exist.

B. *Qualifications and Standard*s. The USACE shall ensure that all work conducted in conjunction with this PA is performed in a manner consistent with the Secretary of Interior's "Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register 44716-44740; September 23,1983), as amended, or the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR § 68), as appropriate. The USACE shall ensure that the all cultural resource investigations and reviews carried out pursuant to this agreement are carried out by or under the direct supervision of a person or persons meeting at a minimum, the appropriate standards set forth in the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-44739).

C. *Definitions.* The definitions set forth in § 800.16 are incorporated herein by reference and apply throughout this PA.

D. *Identification of Historic Properties*. Prior to the initiation of any irretrievable commitment of construction funds, the USACE shall make a reasonable and good faith effort to identify historic properties located within the APE. These steps may include, but are not limited to, background research, consultation, oral history interviews, sample field investigation, field survey, phased archaeological survey, and intensive level architectural survey. The level of

effort for these activities shall be determined in consultation with the SHPO and any Tribe that attaches religious and cultural significance to identified properties. If no historic properties are identified within the APE, the USACE shall document this finding pursuant to § 800.11(d) and retain this documentation in USACE files for at least seven (7) years.

E. *Evaluation of National Register Eligibility*. If potential historic properties are identified within the APE, the USACE shall determine their eligibility for listing on the National Register of Historic Places in accordance with the process described in § 800.4(c) and criteria established in 36 CFR § 60. The determination of cultural significance shall be conducted in consultation with the SHPO and Tribes that attach religious and cultural significance to identified properties. Should the USACE and the SHPO agree that a property is or is not eligible, such consensus shall be deemed conclusive for the purpose of the PA. Should the USACE and SHPO not agree regarding the eligibility of a property, the USACE shall obtain a determination of eligibility from the Keeper of the National Register pursuant to 36 CFR § 63.

F. *Assessment of Adverse Effects*.

1. *No Historic Properties Affected*. The USACE shall make a reasonable and good faith effort to evaluate the effect of each undertaking on historic properties within the APE. The USACE through consultation may conclude that no historic properties are affected by an undertaking if no historic properties are present in the APE, or the undertaking will have no effect as defined in §800.16(i). This finding shall be documented in compliance with § 800.11(d) and the documentation shall be retained by the USACE for at least seven (7) years and provided to the SHPO upon request. The USACE shall provide information on the finding to the public upon request, consistent with the confidentiality requirements of § 800.11(c).

2. *Finding of No Adverse Effect*. The USACE, in consultation with the SHPO and Tribes that attach religious and cultural significance to identified historic properties, shall apply the criteria of adverse effect to historic properties within the APE in accordance with § 800.5. The USACE may propose a finding of no adverse effect if the undertaking's effects do not meet the criteria of § 800.5(a)(1) or the undertaking is modified to avoid adverse effects in accordance with 36 CFR § 68. The USACE shall provide to the SHPO documentation of this finding meeting the requirements of § 800.11(e). The SHPO shall have 30 calendar days in which to review the findings and provide a written response to the USACE. The USACE may proceed upon receipt of written concurrence from the SHPO. Failure of the SHPO to respond within 30 days of receipt of the finding shall be considered agreement with the finding. The USACE shall maintain a record of the finding and provide information on the finding to the public upon request, consistent with the confidentiality requirements of § 800.11(c).

3. *Resolution of Adverse Effect***.** If the USACE determines that the undertaking will have an adverse effect on historic properties as measured by criteria in § 800.5.(a)(1), the agency shall consult with the SHPO and the Tribes that attach religious and cultural significance to identified historic properties, to resolve adverse effects in accordance with § 800.6.

a. For historic properties that the USACE and SHPO agree will be adversely affected, the USACE shall:

1) Consult with the SHPO to identify other individuals or organizations to be invited to become consulting parties. If additional consulting parties are identified, the USACE shall provide them copies of documentation specified in § 800.11(e) subject to confidentiality provisions of § 800.11(c).

2) Afford the public and interested parties an opportunity to express their views on resolving adverse effects in a manner appropriate to the magnitude of the project and its likely effects on historic properties.

3) Consult with the SHPO, the NJDEP, the Tribes, and other consulting parties which have indicated an interest in the undertaking to seek ways to avoid, minimize, or mitigate adverse effects.

4) The USACE, in consultation with SHPO, the Tribes, and other consulting parties as appropriate, shall prepare an historic property treatment plan which describes mitigation measures the USACE proposes to resolve the undertaking's adverse effects and provide this plan for review and comment to the SHPO, the Tribes and other consulting parties that have indicated an interest in the undertaking. All parties shall have 30 calendar days in which to provide a written response to the USACE.

b. If the USACE and SHPO fail to agree on how adverse effects will be resolved, the USACE shall request that the Council join the consultation and provide the Council with documentation pursuant to § 800.11(g).

1) If the Council agrees to join the consultation, the USACE shall proceed in accordance with § 800.9.

2) If, after consulting to resolve adverse effects pursuant to Stipulations I or II of this PA, the Council, USACE, SHPO or Tribes determines that further consultation will not be productive, then any party may terminate consultation in accordance with the notification requirement and process prescribed by § 800.7.

Stipulation II

Post Review Changes and Discoveries

A. *Changes in the Undertaking*. If construction on the undertaking has not commenced and the USACE determines that it will not conduct the undertaking as originally coordinated, the USACE shall reopen consultation pursuant to Stipulation I D – F.

B. *Unanticipated Discoveries or Effects*. Pursuant to § 800.13(a)(2), if historic properties are discovered or unanticipated effects on historic properties are found after construction on an undertaking has commenced, the USACE shall ensure that all operations with the potential to

effect an historic property are immediately ceased, develop a treatment plan to resolve adverse effects, and notify the SHPO and the Tribes within 48 hours of the discovery. The notification shall include the USACE assessment of National Register eligibility of affected properties and proposed actions to resolve the adverse effects. Comments received from the SHPO and Tribes which have expressed an interest in the undertaking within 48 business hours of the notification shall be taken into account by the USACE in carrying out the proposed treatment plan. The USACE may assume SHPO concurrence in its eligibility assessment unless otherwise notified by the SHPO. The USACE shall provide the SHPO and the Tribes which have expressed an interest in the undertaking a report of the USACE actions when they are completed.

Stipulation III

Curation and Disposition of Artifacts and Records

The USACE shall ensure that all archeological materials and associated records owned by the State which are recovered and conserved as a result of the identification, evaluation, and treatment efforts conducted under this PA, shall be transported and accessioned into a suitable university, museum, or other scientific or educational institution that meets the standards of 36 CFR § 79. Copies of associated archaeological records and data shall be made available to the SHPO and the Tribes upon request. Archeological items and materials from privately-owned lands shall be returned to their owners upon completion of analyses required for Section 106 compliance under this PA.

Stipulation IV

PA Amendments, Disputes and Termination

A. *Amendments*. Any party to this PA may propose to the other parties that it be amended, whereupon the parties will consult in accordance with § 800.6(c)(7) to consider such an amendment.

B. *Disputes.* Disputes regarding the completion of the terms of this agreement shall be resolved by the signatories. If the signatories cannot agree regarding a dispute, any one of the signatories may request the participation of the ACHP in resolving the dispute in accordance with the procedures outlined in § 800.9.

C. *Termination of PA.* Any party to this PA may terminate it by providing sixty (60) days notice to the other parties, provided that the parties will consult during the period prior to the termination to seek agreement on amendments or other actions that will avoid termination. In the event of termination of this PA by the SHPO, the USACE shall comply with the provisions of § 800 Subpart B.

Stipulation V

Termination of Consultation

If, after consulting to resolve adverse effects pursuant to Stipulation I or II of this PA, the USACE or SHPO determines that further consultation will not be productive, then either party

may terminate consultation in accordance with the notification requirements and process prescribed by § 800.7

Stipulation VII
Term of this Agreement

This PA remains in force for a period of five (5) years from the date of its execution by all signatories. Sixty (60) days prior to the conclusion of the five (5) year period, the USACE will notify all parties in writing of the end of the five year period to determine if they have any objections. If there are no objections received prior to expiration, the PA will continue to remain in force for a new five (5) year period.

U.S. ARMY CORPS OF ENGINEERS, PHILADELPHIA

Charles MacIntosh, Acting Chief of Planning Division **Date**

NEW JERSEY STATE HISTORIC PRESERVATION OFFICER

Daniel D Saunders, Deputy State Historic Preservation Officer **Date**

THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Date

State of New Jersey
MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 9, 2013

Nikki Minnichbach
Cultural Resources Specialist
United States Army Corps of Engineers
Philadelphia District
The Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear Ms. Minnichbach:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40544-40555), I am providing continuing Consultation Comments for the following proposed undertaking:

Hunterdon County, Bloomsbury Borough
Warren County, Greenwich Township
Proposed Bloomsbury Dam Project
United States Department of the Army, Corps of Engineers

Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the draft Programmatic Agreement, received at our office on February 25, 2013, for the above-referenced undertaking. Based on our review, the HPO has the following comments:

- Stipulation I-B should reference that the person or persons should meet, at a minimum, the appropriate standards set forth in the Secretary of the Interior's Professional Qualifications Standards in the relevant disciplines.
- The HPO requests that Stipulation I-F(1) be revised to include consultation with our office on determinations of No Historic Properties Affected for this undertaking. If the United States Department of the Army, Corps of Engineers (the Corps) would like to include in this stipulation certain actions in which they have preliminarily assessed as

having no potential to have an effect on historic properties, the HPO would be willing to consult further on the development of such a list.

The HPO looks forward to further consultation with the Corps regarding the development and implementation of this agreement document.

Additional Comments

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. Please do not hesitate to contact Jesse West-Rosenthal of my staff at (609) 984-6019 with any questions regarding archaeology. Please reference the HPO project number 10-0067, in any future calls, emails, or written correspondence to help expedite your review and response.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

Stockbridge-Munsee Tribal Historic Preservation Office

Sherry White - Tribal Historic Preservation Officer
W13447 Camp 14 Road
P.O. Box 70
Bowler, WI 54416

Date 3/15/13
Project Number Removal of Bloomsbury Dam
TCNS Number
Company Name Department of Army

We have received your letter for the above listed project. Before we can process the request we need more information. The additional items needed are checked below.

Additional Information Required:

___ Site visit by Tribal Historic Preservation Officer
___ Archeological survey, Phase 1
___ Colored maps
___ Pictures of the site
___Any reports the State Historic Preservation Office may have
___ Review fee of $300.00 must be included with letter
___ Has site been previously disturbed, please explain what the use was and when it was disturbed

After reviewing your letter:

___ We are in the process of gathering more information on this site and will respond to your project request once all information has been gathered.
___ This project has the potential to affect a Mohican cultural site, please contact us
___This project is not within Mohican area of interest
_X_ This project is within Mohican territory, but we are not aware of any cultural site within the project area.

Additional comments

Should this project inadvertently uncover a Native American site, we require you to halt all construction and notify the Stockbridge-Munsee Tribe immediately.

Please do not resubmit projects for changes that are not ground disturbance

Sherry White, Tribal Historic Preservation Officer

Sherry White

(715) 793-3970 *Email: sherry.white@mohican-nsn.gov*

Delaware Tribe Historic Preservation Office
1200 Commercial St
Roosevelt Hall, RM 212
Emporia State University
Emporia, KS 66801
(620) 341-6699
bobermeyer@delawaretribe.org

February 26, 2013

Department of the Army
Philadelphia District Corps of Engineers
Attn: Nicole Cooper Minnichbach
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

Re: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Dear Nicole Cooper Minnichbach:

Thank you for providing the survey report for the above referenced project. Our review also indicates that there are no religious or culturally significant sites in this project area and we have no objection to the proposed project. We defer comment to your office as well as to the State Historic Preservation Office and/or the State Archaeologist.

However, we ask that if any human remains are accidentally unearthed during the course of the project that you cease development immediately and inform the Delaware Tribe of Indians of the inadvertent discovery.

If you have any questions, please feel free to contact this office by phone at (620) 341-6699 or by e-mail at bobermeyer@delawaretribe.org

Sincerely,

Brice Obermeyer

Brice Obermeyer
Delaware Tribe Historic Preservation Office
1200 Commercial St
Roosevelt Hall, RM 212
Emporia State University
Emporia, KS 66801

The Delaware Nation
Cultural Preservation Office
P.O. Box 825 - 31064 State Highway 281- Anadarko, OK 73005
Phone: 405/247-2448 – Fax: 405/247-8905

NAGPRA ext. 1180
Section 106 ext. 1181
Museum ext. 1181
Library ext. 1196
Clerk ext. 1182

April 2, 2013

RE: Proposed Removal of Bloomsbury Dam, Warren and Hunterdon Counties, New Jersey

Dear Ms. Nicole Cooper Minnichbach,

Thank you for consulting with the Delaware Nation. We appreciate your willingness to conduct proper consultation with our nation. We received your letter regarding the above referenced Project on April 2, 2013. Upon examination this project lies within the Delaware Nation area of interest for the state of Oklahoma. Therefore, we will be a consulting party. Please send further project plans along with cultural resource surveys to our offices.

Should you have any questions regarding this email or future consultation feel free to contact our offices at 405-247-2448 or by email tfrancis@delawarenation.com.

Sincerely,

Mrs. Tamara Francis Fourkiller
Cultural Preservation Director

CC: Nikki Ahtone (Assistant Director)
nahtone@delawarenation.com

Appendix B

Clean Air Assessment

General Conformity Analysis

Table 1. Project Emission Sources and Estimated Power
Table 2. Emission Estimates (NOx)
Table 3. Emission Estimates (HC)
Table 4. Emission Estimates (SO_2)
Table 5. Pollutant Emissions from Employee Vehicles

General Conformity Review and Emission Inventory for the Bloomsbury Dam Removal Project
Table 1. Project Emission Sources and Estimated Power

hp-hr = # of engines*hp*LF*hrs of operation

Load Factor (LF) represents the average percentage of rated horsepower used during a source's operational profile

Equipment/Engine Category	# of engines	hp	LF	hrs of operation	hp-hr
Hydraulic Excav., crawler, 43,400#, 1.75 cy bkt.	1	138	0.59	210	17098
Trk, HWY 8,600GVW 4 x4 suburban	1	165	0.59	202	19665
Trk, Off-HWY, R-Dump, 6 x 4, 18 CY, 75T	1	400	0.59	210	49560
Ldr, Backhoe, Wheeled, 0.8 cy frt end bkt	1	67	0.21	71	999
Dozer Crawler, D-7G, w/blade	1	200	0.59	105	12390
Post Hole Drill, up to 8" diam., 30" deep	1	3	0.43	46	59
Concrete saw, 6-5/8" depth, 18"blade	1	20	0.59	53	625

Load Factors taken from Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling
Report No. NR-005c, revised April 2004, EPA420-P-04-005. Environmental Protection Agency, Office of Transportation and Air Quality.

Table 2. Emission Estimates (NOx)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)
NOx Emissions Factor for Off-Road Construction Equipment is 6.9 g/hp-hr*

Equipment/Engine Category	hp-hr	EF (g/hp-hr)	Emissions (tons)
Hydraulic Excav., crawler, 43,400#, 1.75 cy bkt.	17098	6.90	0.13
Trk, HWY 8,600GVW 4 x4 suburban	19665	6.90	0.15
Trk, Off-HWY, R-Dump, 6 x 4, 18 CY, 75T	49560	6.90	0.38
Ldr, Backhoe, Wheeled, 0.8 cy frt end bkt	999	6.90	0.01
Dozer Crawler, D-7G, w/blade	12390	6.90	0.09
Post Hole Drill, up to 8" diam., 30" deep	59	6.90	0.00
Concrete saw, 6-5/8" depth, 18"blade	625	6.90	0.00
	Total NOx Project Emissions (tons) =		0.76

*Emission Factor taken from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition
Report No. NR-009c, Revised April 2004, Assessment and Standards Division EPA, Office of Transportation and Air Quality.

Table 3. Emission Estimates (VOC)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)
VOC Emissions Factor for Off-Road Construction Equipment is 1.0 g/hp-hr

Equipment/Engine Category	hp-hr	EF (g/hp-hr)	Emissions (tons)
Hydraulic Excav., crawler, 43,400#, 1.75 cy bkt.	17098	1.00	0.02
Trk, HWY 8,600GVW 4 x4 suburban	19665	1.00	0.02
Trk, Off-HWY, R-Dump, 6 x 4, 18 CY, 75T	49560	1.00	0.05
Ldr, Backhoe, Wheeled, 0.8 cy frt end bkt	999	1.00	0.00
Dozer Crawler, D-7G, w/blade	12390	1.00	0.01
Post Hole Drill, up to 8" diam., 30" deep	59	1.00	0.00
Concrete saw, 6-5/8" depth, 18"blade	625	1.00	0.00
	Total VOC Project Emissions (tons) =		0.11

*Emission Factor taken from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition
Report No. NR-009c, Revised April 2004, Assessment and Standards Division EPA, Office of Transportation and Air Quality.

Table 4. Emission Estimates (SO_2)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)

Equipment/Engine Category	hp-hr	BSFC* g/hphr	EF** (g/hp-hr)	Emissions (tons)
Hydraulic Excav., crawler, 43,400#, 1.75 cy bkt.	17098	197	0.138	0.00
Trk, HWY 8,600GVW 4 x4 suburban	19665	170	0.119	0.00
Trk, Off-HWY, R-Dump, 6 x 4, 18 CY, 75T	49560	170	0.119	0.01
Ldr, Backhoe, Wheeled, 0.8 cy frt end bkt	999	188	0.132	0.00
Dozer Crawler, D-7G, w/blade	12390	197	0.138	0.00
Post Hole Drill, up to 8" diam., 30" deep	59	187	0.131	0.00
Concrete saw, 6-5/8" depth, 18"blade	625	187	0.131	0.00
	Total SO2 Project Emissions (tons) =			0.01

* Average NONROAD fuel consumption for equipment type and horsepower category
** Emission factor based on offroad diesel fuel sulfur content of 350 ppm.

Table 5. Pollutant Emissions from Employee Vehicles

Assumptions:

Average trip distance (1 way) is 25 miles.
Average NOx vehicle emission factor is 1.4 g/mile.
Average VOC vehicle emission factor is 2.8 g/mile.
Work crew comprised of 10 people
Every member of the work crew drives their own vehicle.
Project construction period is 3 months.
Project construction occurs 5 days per week.
There are 3 holidays in the work period.
There are 4 weather days (no work).

Actual days = 120 days - 32 weekend days off - 2 holidays off - 4 weather days off

Actual work days = 82 days

NOx Calculation: 10 workers * 2 trips/work day * 82 work days * 25 miles/trip * 1.4 g of NOx/mile* (1 ton/907200 g)

Total NOx resulting from employee vehicles = 0.06 tons.

VOC Calculation: 10 workers * 2 trips/work day * 82work days * 25 miles/trip * 2.8 g of VOC/mile* (1 ton/907200 g)

Total VOC resulting from employee vehicles = 0.13 tons.

Pollutant emissions associated with employee vehicles derived from:
Emission Facts: Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks, EPA420-F-00-013, April 2000.

Total (construction and employess) NOx Project Emissions (tons) = 0.82

Total (construction and employees) VOC Project Emissions (tons) = 0.24

Total SO_2 Project Emissions (tons) = 0.01

Appendix C

Phase 1A Archaeological Assessment of the Bloomsbury Dam Removal Project

A.D. MARBLE & COMPANY
Environmental, Cultural & Engineering Services
SINCE 1985

March 19, 2010

Philadelphia District Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107

Attn: Nicole Minnichbach, District Cultural Resources Specialist

Re: Cultural Resources Investigations
Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey
Contract No. W912BU-08-D-0005 – Delivery Order #0010

Dear Ms. Minnichbach:

On March 10, 2010, A.D. Marble & Company cultural resources professionals conducted a field survey centered on the Bloomsbury Dam, the Bloomsbury Bridge, and the surrounding buildings and landscape of Bloomsbury, Hunterdon County; and a portion of Greenwich Township, Warren County, New Jersey. The Bloomsbury Dam measures 125 feet in length and stretches across the Musconetcong River, which divides the Borough of Bloomsbury and Greenwich Township. The Borough of Bloomsbury is on the south side of the river and Greenwich Township is on the north side. The Bloomsbury Dam is a concrete overflow dam with a maximum height of 7 feet and is situated just upstream from the bridge (Figure 1).

The cultural resources reconnaissance was done for the U.S. Army Corps of Engineers (USACE), Philadelphia District, in order to identify potential historic architectural and archaeological constraints during the selection, design, and construction stages of the best alternative for a proposed alteration or removal of the Bloomsbury Dam. An initial list of three alternatives has been developed for the feasibility phase of the project: No Action, Complete Dam Removal, and Dam Removal with Partial Remnants.

Preliminary cultural resources findings are based on the field survey and limited background research. The background research conducted to date included a review of regionally specific

cultural resources reports (Kraft 1983; Rue 2000; Zug-Gilbert 2000) and documentation at the New Jersey State Historic Preservation Office (NJ SHPO); archaeological site files at the New Jersey State Museum; published archives from the New Jersey State Library (Nelson 1898); dam records held by the New Jersey Department of Environmental Protection (NJDEP), Bureau of Dam Safety and Flood Control; historic maps and atlases from the eighteenth, nineteenth, and twentieth centuries (Faden 1777; Gordon 1833; McCarty 1852; Walling 1860; Beers, Comstock & Cline 1873; Sanborn 1909, 1915); local and regional histories (Wacker 1968; Bertland 1976); and online visual source material.

The project proposed by the USACE is part of an overall effort to restore the lower Musconetcong River to its natural free-flowing condition by removing four dams closest to the river's confluence with the Delaware River. The Bloomsbury Dam is the farthest upstream dam slated for alteration or removal. The current dam was rebuilt from an earlier dam ca. 1912 to help provide water power for the Bloomsbury Graphite Company (NJDEP Bureau of Dam Safety and Flood Control 1918). A Hunterdon County historic atlas shows that some form of dam existed across the river as early as 1873 (Beers, Comstock & Cline 1873). Sanborn Insurance maps from 1909 and 1915 also show a dam crossing the Musconetcong River that matches the current position of today's dam. The earliest map examined for this study, the Faden map of 1777, depicts an impoundment (a crude dam) and a pond-like body of water within the river on the upstream side of the road/bridge crossing the Musconetcong. The Faden map (1777) also shows a symbol in the northeast quadrant of the project area that likely represents an iron forge or furnace.

Some researchers have interpreted a 1761 newspaper advertisement as the earliest known reference to a furnace/forge in Bloomsbury; the furnace/forge would likely have been associated with the dam or impoundment mentioned above. In the advertisement from the *New York Mercury*, Samuel Johnston lists a furnace, coal (charcoal) house, support residences, and 3,000 acres of timber for sale but does not state emphatically that the property

is in Bloomsbury (Nelson 1891:637-38). The advertisement does demonstrate, however, that iron mines and furnaces are operating in New Jersey during the mid-eighteenth century.

Based on the historic atlases, maps and other references, it is apparent that the current dam represents a continuum, likely over several centuries, of water diversion into raceways that fed historic industrial operations on the north and south sides of the Musconetcong River. Portions of the raceways associated with each industrial operation still exist within today's landscape.

In addition to the dam, A.D. Marble & Company staff investigated other historic architecture resources within and adjacent to the project area. They also investigated the prevalence and nature of known archaeological resources within the project area and within the immediate region. Results from those investigations are discussed below.

HISTORIC ARCHITECTURE

A.D. Marble & Company staff performed a reconnaissance survey of the project area in and around the Bloomsbury Bridge and Bloomsbury Dam in order to identify aboveground properties of 50 years or more in age. The reconnaissance was also necessary to provide preliminary assessments of integrity and significance that will guide future efforts within the project area. The architectural reconnaissance project area for the Bloomsbury Dam project includes those areas of direct or indirect (visual) potential impact associated with the proposed removal of the dam.

Historic Architecture Screening Results

A comparison of historic and current mapping, as well as a field survey, indicates that six properties within the project area were constructed 50 years ago or more (Figure 2). Of these six properties, two have been previously surveyed as part of the North Bloomsbury Historic District, which is located on the north side of the river and was determined eligible for listing in the National Register of Historic Places (National Register). The Bloomsbury Bridge was

determined to be a contributing feature, and the Asbury Graphite Mills were determined to be non-contributing features of the National Register-eligible historic district. The Bloomsbury Bridge was also determined to be individually eligible through the New Jersey Bridge Survey. These two properties and the North Bloomsbury Historic District in the immediate area have not significantly changed since the previous documentation. They retain the same levels of significance and integrity that led to the previous determinations regarding National Register eligibility and/or contributing status. No other properties within the project area have been previously surveyed.

Four additional properties that appear to have been constructed 50 years or more ago were identified in the project area but have no previous determinations of eligibility (Table 1). In addition, the Borough of Bloomsbury, south of the Musconetcong River, may constitute a National Register-eligible historic district. The potential historic district within the project area could include the Bloomsbury Black Mill, 30 Church Street, Famiglia Pizza, and the dwelling on Musconetcong Street.

Table 1. Reconnaissance Survey Results – Historic Architecture.

Property Name	Notes	Approximate Date of Construction	Previous Documentation	Preliminary NR Eligibility Recommendation	Recommendations for Future Work
Bloomsbury Black Mill	Includes the mill building on the north side of Church Street, as well as the Bloomsbury Dam and the mill race along the Musconetcong River	ca. 1760, ca. 1860	None	Potentially Eligible—Criterion A	Evaluate individually and as part of Borough of Bloomsbury Historic District.
Dwelling, 30 Church Street	South side of Church Street	ca. 1930	None	Not Eligible—Lack of Significance	Evaluate as part of Borough of Bloomsbury Historic District.

Property Name	Notes	Approximate Date of Construction	Previous Documentation	Preliminary NR Eligibility Recommendation	Recommendations for Future Work
Bloomsbury Dam	Concrete, run of the river dam on the Musconetcong River	ca. 1760, ca. 1860, ca. 1912	None	Potential contributing feature	Evaluate as part of Borough of Bloomsbury Historic District and as a contributing feature to the Bloomsbury Black Mill.
Dwelling, Musconetcong Rd	Along river, off of Musconetcong St	ca. 1915-1930	None	Not Eligible—Lack of Significance and Integrity	Evaluate as part of Borough of Bloomsbury Historic District.
Bloomsbury Bridge	Carries Church Street over the Musconetcong River	1892	Contributing Feature of National Register-eligible North Bloomsbury Historic District; Individually eligible	Contributing--Retains Significance and Integrity	None.
Famiglia Pizza	Commercial building on south side of Church Street. May be modern building on the foundation of an older structure.	ca. 1930, ca. 1990	None	Potentially Not Eligible—Lack of Significance and Integrity	Evaluate as part of Borough of Bloomsbury Historic District.
Asbury Graphite Mills	Industrial building on Asbury Road, north side of river	ca. 1914, 1923	Non-Contributing Feature of National Register-eligible North Bloomsbury Historic District	Not Eligible, Non-contributing--Lack of Significance and Integrity	None.
Borough of Bloomsbury Historic District	Borough of Bloomsbury, south of the Musconetcong River	19th and 20th C.	None	Potentially Eligible	Evaluate as potential Historic District

Recommendations: Historic Architecture

The project area for the Bloomsbury Dam project includes a National Register-eligible historic district (North Bloomsbury Historic District), a non-contributing feature of the historic district (Asbury Graphite Mills), an individually eligible and contributing feature of the historic district (Bloomsbury Bridge), and five properties with no previous determinations that are located in a potential historic district associated with the Borough of Bloomsbury (Table 1; Figure 2). If the first alternative is selected and no action would be taken at this location, no additional work would be necessary. However, if Alternative 2 - Complete Dam Removal or Alternative 3 - Dam Removal with Partial Remnants are selected, documentation of the adjacent properties would be recommended and the impacts of the proposed work on any properties determined eligible for listing in the National Register would need to be considered. It is recommended that additional background research be conducted at local and state repositories, including the local historical societies and the Hunterdon County tax assessment files and deed records in order to more accurately determine the dates of construction and significance of each property. A New Jersey survey form should be completed the Bloomsbury Black Mill, and each of the five properties with no prior determinations should be evaluated for contributing status in the context of a larger potential Bloomsbury historic district. The documentation of the Bloomsbury Black Mill should include the Bloomsbury Dam, headrace, and mill race.

Preliminary survey indicates that out of the five properties recommended for further research and documentation, only the Bloomsbury Black Mill has the potential for individual listing in the National Register. The Bloomsbury Dam would likely be a contributing feature of the mill property. If it is determined that the Borough of Bloomsbury comprises a National Register-eligible historic district, the Bloomsbury Black Mill, the Bloomsbury Bridge, and the Bloomsbury Dam would likely be contributing features of the district. The remaining three properties in the southeast quadrant would likely be non-contributing features.

In addition to the previously determined eligible North Bloomsbury Historic District, the impacts of the proposed project on the Bloomsbury Black Mill and the Bloomsbury Historic District, if determined eligible, would need to be considered under both Alternative 2 and Alternative 3.

ARCHAEOLOGY

An A.D. Marble & Company archaeologist performed a pedestrian reconnaissance to identify any areas that have been impacted by modern and historic disturbances and to identify areas where ground slopes and soil drainage characteristics may preclude the need for subsurface archaeological testing. Particular attention was paid to the historical development documented within the project area and the existing landscape. The project area reconnaissance, coupled with historic map comparison while in the field, assisted in identifying archaeologically sensitive areas.

Archaeology Survey Results

Based on the field view, background research, and historic map and atlas assessment, there is a high potential for historic archaeological resources within the physical APE. This sensitivity covers the entire project area. For the most part, the archaeological sensitivity is related to the eighteenth- and nineteenth-century industrial activities that included a forge/foundry, a grist mill, and later in time, a graphite mill. Remains from the foundry associated with the firm Herbert & Benward (Figure 3) may exist as an archaeological site in the northeast quadrant of the project area based on historic atlases and previous documentation (Faden 1777; Thomas 1833; Zug-Gilbert 1999) and depicted in Figure 4. The Bloomsbury Black Mill still stands in the southwestern portion of the APE. Assessment of historic photography (Raub-and-more website, accessed March 15, 2010) indicates that the mill structure had smaller additions attached to it at different times. Possible foundation remains from those additions may still exist in the landscape adjacent to the mill. It would not be unexpected to find artifacts and archaeological features from both industrial areas. Such items would likely be related to the individuals who worked there or representative of the industrial processes that took place.

Portions of earlier raceways for each operation still exist in today's landscape, but other portions are no longer visible and are likely filled in. These features are now potential archaeological deposits that could contribute to the integrity of the former industrial operations evident on historic maps (Figure 5). Clearly, archaeological sensitivity for historic resources exists within the APE.

Archaeological sensitivity for prehistoric resources in the general area of the Musconetcong River drainage is moderate to high; however, the potential is considered low because of previous disturbance from historic activities within the footprint of the APE. Overall, many sites have been identified in the region during state-wide site surveys conducted in the early and mid-twentieth century (Kraft 1983:6-10). One of the more important New Jersey sites ever investigated is a Paleo-Indian site located near Asbury, a town about 5 miles north of the project area that borders the Musconetcong River.

Records at the State Museum indicate one Native American site (28WA634) exists within a 1-mile radius of the project area (Table 2). It was identified and evaluated by Archaeological and Historical Consultants (A&HC) in 2000 during a Phase I archaeological survey associated with the proposed truck weigh station. That survey concluded that the scattered isolated finds found in one large area of the overall 60-acre project represented ephemeral prehistoric occupation episodes that were not eligible for listing in the National Register (Rue 2000:18-30). The isolated artifacts were bunched together and designated as a site by A&HC for recording purposes, but no further work was recommended.

Table 2. Archaeological Sites Near the Project Area.

Site Number	Site Name	Distance to Water	Distance to Project Area	Cultural Period	Site Type
28WA634	I-78 Weigh Stations	100 ft	3,000 ft	Unknown	Lithic Scatter
28WA602	Beagle Club Site	500 ft	8,700 ft	Unknown	Lithic Scatter
28WA604	N/A	100 ft	10,500 ft	Unknown	Rockshelter
28HU522	N/A	<50 ft	10,300 ft	No Data	No Data

Three additional sites are found within a 2-mile radius (28HU522, 28WA602, and 28WA604). These sites contained low artifact counts typical of short-term hunting and gathering activities that took place in the region's upland settings away from the river margins. These sites are surface finds and were recorded prior to the 1950s (Kraft 1983:8). Six sites exist within 2.5 miles of the project area, but those site forms contain no data and were recorded in the early part of the twentieth century when recording efforts were much less precise than the standards followed today.

Normally a setting such as the Bloomsbury Dam project area, located on the banks of the Musconetcong River, would be considered a high potential area for prehistoric Native American archaeological artifacts and sites. However, the extent of the historic-period industrial development discussed previously coupled with evidence in the landscape today has likely reduced the archaeological sensitivity to low to no potential for contextually intact prehistoric archaeological remains or deposits. The construction activities over two centuries that include dam building and rebuilding, mill and foundry construction, raceway construction, likely flood events, and bridge construction have almost assuredly disturbed or destroyed any prehistoric Native American archaeological deposits within the footprint of the APE.

Recommendations: Archaeology

A portion of the physical APE for the Bloomsbury Dam project falls within a National Register-eligible historic district that includes the area where a historic forge/foundry once operated. The APE also includes an extant structure that once functioned as a grist mill and graphite mill that is a National Register-eligible resource. This resource was also a part of the industrial history of Bloomsbury. Historic raceways that served both industrial operations still exist within the APE as well. If the USACE decides to take the No Action alternative, no further cultural resources investigation would be necessary. However, if Alternative 2 - Complete Dam Removal or Alternative 3 - Dam Removal with Partial Remnants is selected, documentation of the historic properties through archaeological investigation and evaluation

would be required. Impacts or effects of the proposed work on any properties determined eligible for listing in the National Register would need to be considered.

If Alternatives 2 or 3 of the dam removal project is chosen, A.D. Marble & Company recommends that additional intensive background research be conducted at local and state repositories. In-depth research at local historical societies as well as a review of tax assessment files and deed records of Warren County and Hunterdon County is highly recommended in order to accurately determine the dates of construction and significance of each property. A.D. Marble & Company also recommends that a geomorphology study be undertaken following the background and deed research in order to determine if intact archaeological deposits exist within the physical APE. A.D. Marble & Company believes that in order for this task to be successful, backhoe trenching monitored by an A.D. Marble & Company archaeologist is the best approach to quickly understand the nature of the soils in the APE and their archaeological integrities. Following the background research and the geomorphology study, a strategically planned Phase IB investigation can be conducted within the APE to identify any deposits directly associated with the known and unknown resources.

Summary

A.D. Marble & Company has conducted a preliminary review of available archival resources and documentation and conducted a field view for the Bloomsbury Dam project. Our findings indicate that the project area has a strong historic period sensitivity that could be adversely affected by proceeding with Alternatives 2 or 3. A.D. Marble & Company highly recommends additional studies if either of those alternatives becomes the Preferred Alternative.

Please do not hesitate to contact me if you have any questions regarding the initial findings of our research.

Sincerely,

Sharon Yates

Senior Project Manager

Enclosures:
Bibliography
Figures:

Figure 1. Project Location
Figure 2. Historic Architectural Screening Results
Figure 3. Gordon's 1833 *Map of the State of New Jersey* Showing the Bloomsbury Area
Figure 4. Beers, Comstock & Cline 1873 Atlas of Hunterdon County
Figure 5. 1915 Sanborn Insurance Map – Bloomsbury, New Jersey

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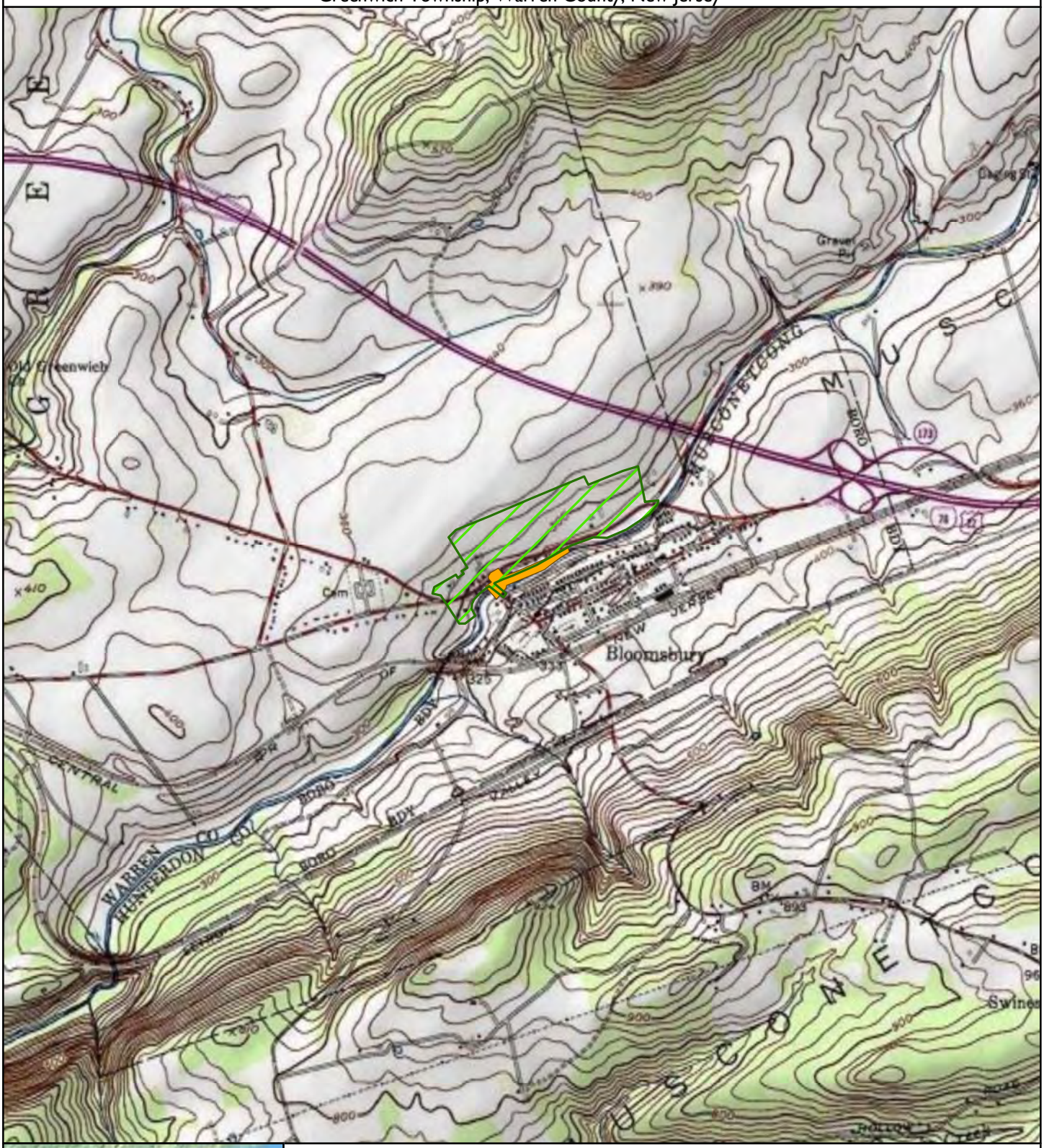
Figures

Figure 1
Project Location

Cultural Resources Investigations, Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey



2,000 0 2,000 Feet

North Bloomsbury Historic District

Project Area

Map Source:
© 2009 National Geographic Society.

Map Document: (X:\Projects\P1202A\Mapping\Fig1ProjLoc.mxd)
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Figure 2
Historic Architectural Screening Results

Cultural Resources Investigations, Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey

National Register Status

- Contributing
- Non-Contributing
- Requires Further Investigation

- North Bloomsbury Historic District (Eligible)
- Project Area

Map Source:
© 2009 i-cubed.

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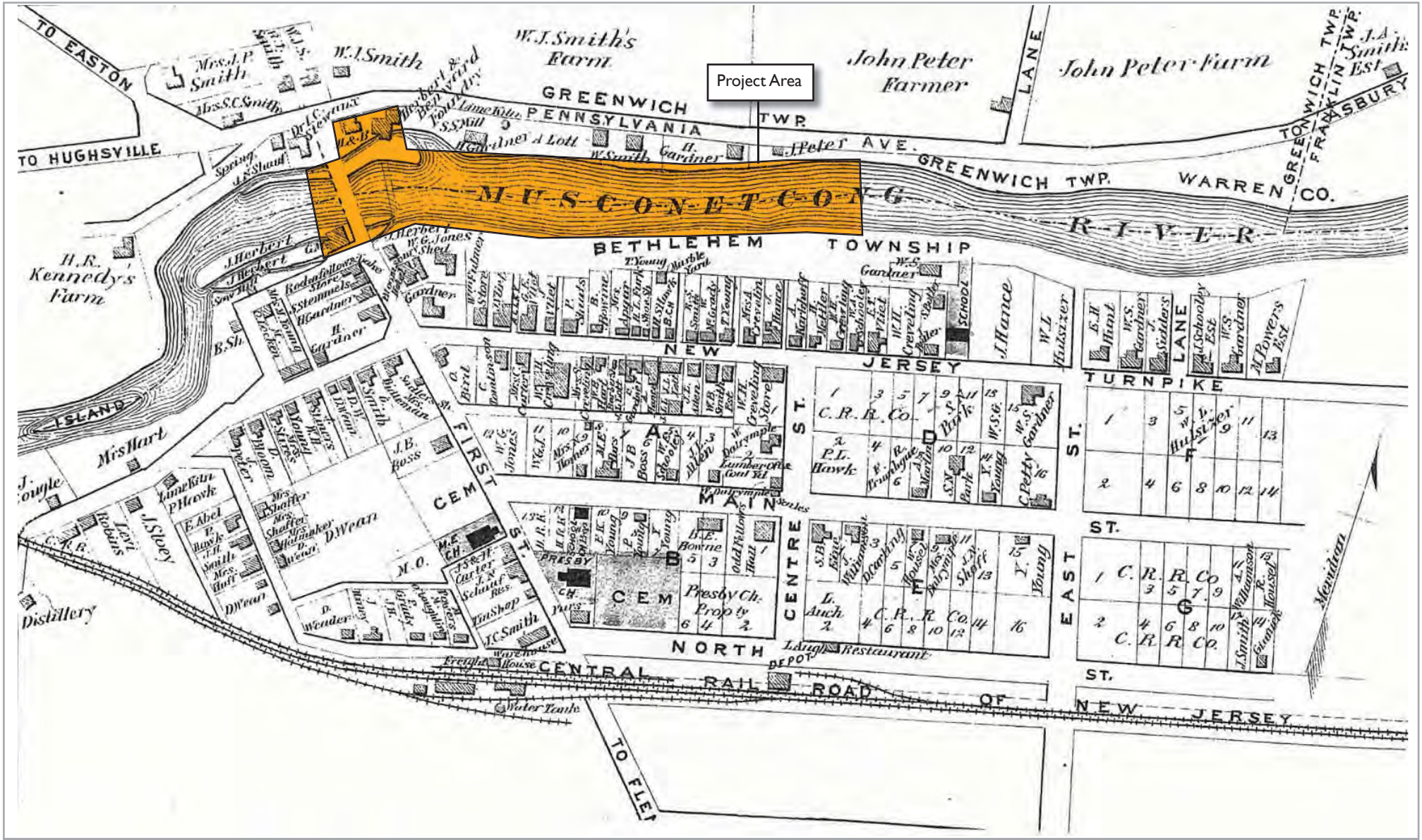

Project Area

Not to Scale

Figure 3
Gordon's 1833 *Map of the State of New Jersey*
Showing the Bloomsbury Area

Cultural Resources Investigations, Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey

Source: Gordon 1833

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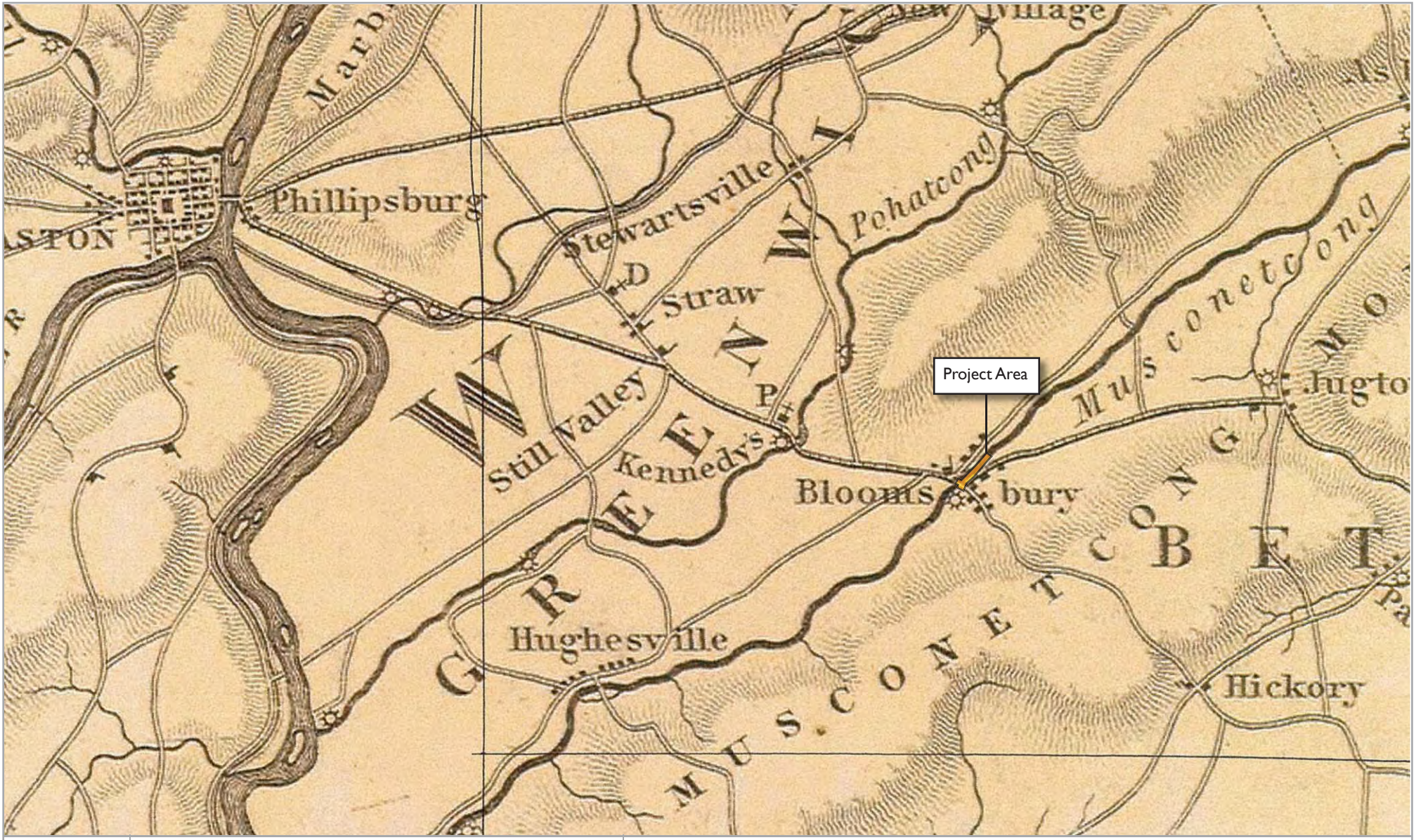

Project Area

Not to Scale

Figure 4
Beers, Comstock & Cline 1873 *Atlas of Hunterdon County* Showing Bloomsbury

Cultural Resources Investigations, Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey

Source: Beers, Comstock & Cline 1873

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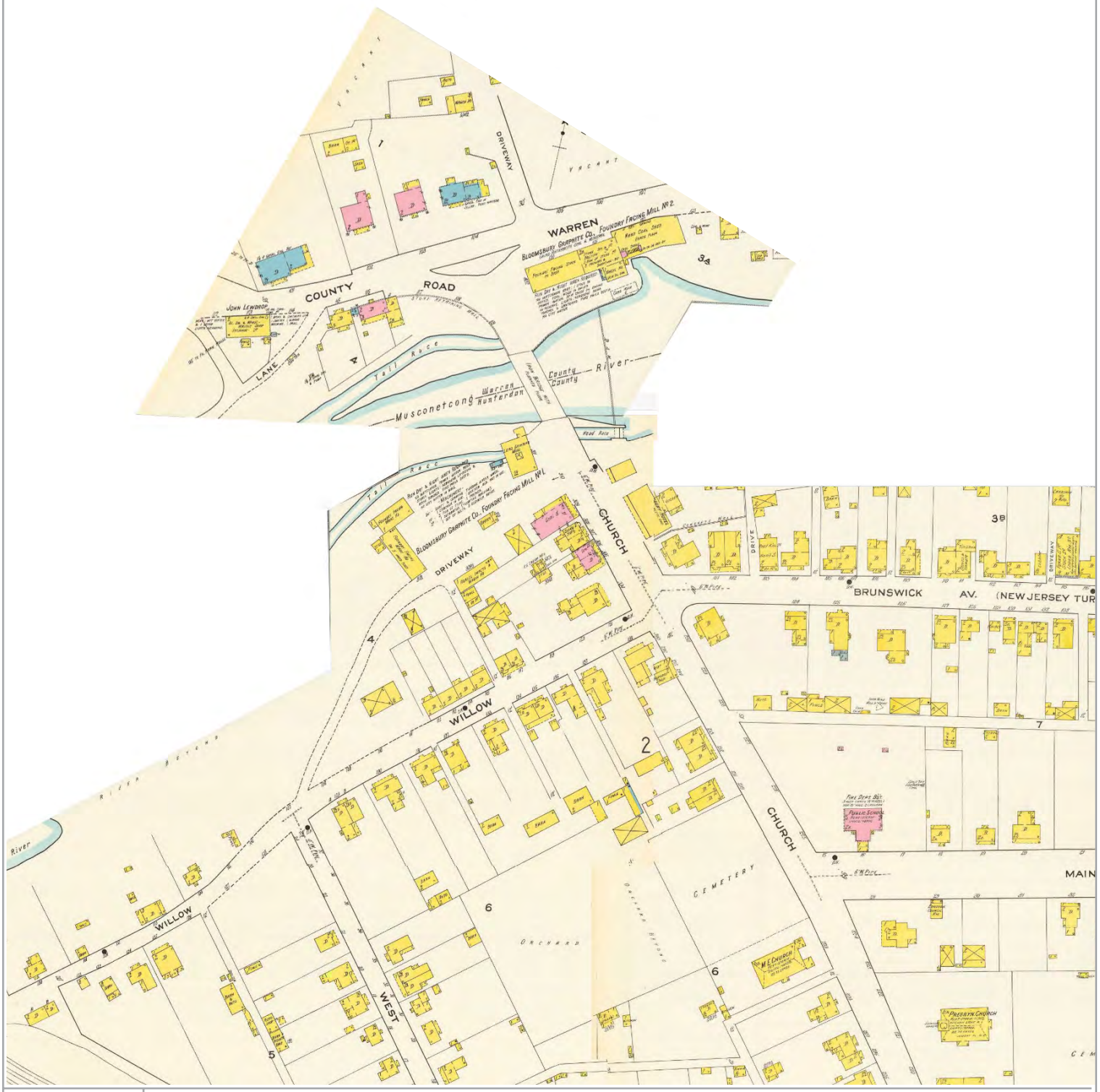
Figure 5
1915 Sanborn Insurance Map - Bloomsbury, New Jersey

Cultural Resources Investigations, Bloomsbury Dam
Borough of Bloomsbury, Hunterdon County, New Jersey
Greenwich Township, Warren County, New Jersey



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Scale in Feet

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Source: Sanborn 1915

Appendix D

Sediment Quality Testing for the Bloomsbury Dam Removal Project

SEDIMENT QUALITY TESTING FOR THE BLOOMSBURY DAM REMOVAL PROJECT BLOOMSBURY, NJ

Prepared for

Mark Eberle
U.S. Army Corps of Engineers
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Philadelphia, PA 19103

Prepared by

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Prepared Under the Supervision of
Principle Investigator

_____

William H. Burton

July 2011

TABLE OF CONTENTS

22\phila06\bloomsbury

1.0 INTRODUCTION

The Philadelphia District of the U.S. Army Corps of Engineers (USACE) is conducting a feasibility study for a habitat restoration of a freshwater tributary of the Delaware River in the Bloomsbury, NJ area (Figure 1-1). The project entails the potential removal of the Bloomsbury Dam located between the Borough of Bloomsbury and Greenwich Township (Figure 1-2). Bloomsbury Dam is an impediment to fish passage on the Musconetcong River. This project involves determining the most desirable method to remove the Bloomsbury Dam while also taking into account potential cultural resource, contaminant, and other issues.

The USACE restoration project is investigating the best alternative to re-establish fish passage along the Musconetcong River. The most effective method of restoring fish passage is to remove the stream impediment (a cement dam) and restore the channel to natural conditions. This project is part an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition by removing the four dams that are closest to the confluence with the Delaware River. The removal of all the dams would open approximately 13 miles of the river for the passage of diadromous fish and would significantly improve the water quality, as well as, aquatic habitats within the river. The removal of the Bloomsbury Dam will reconnect approximately 8 miles of the river. However, the chemical composition of built-up sediment behind the dam is of concern to natural resource agencies reviewing USACE's restoration plans. To address the potential environmental impacts of mobilizing contaminants in stream sediments the Philadelphia District tasked Versar, Inc., (Contract No. W912BU-06-D-0003, Task Order 0065) to quantify contaminant concentrations and to estimate the volume of sediment build up behind Bloomsbury Dam.

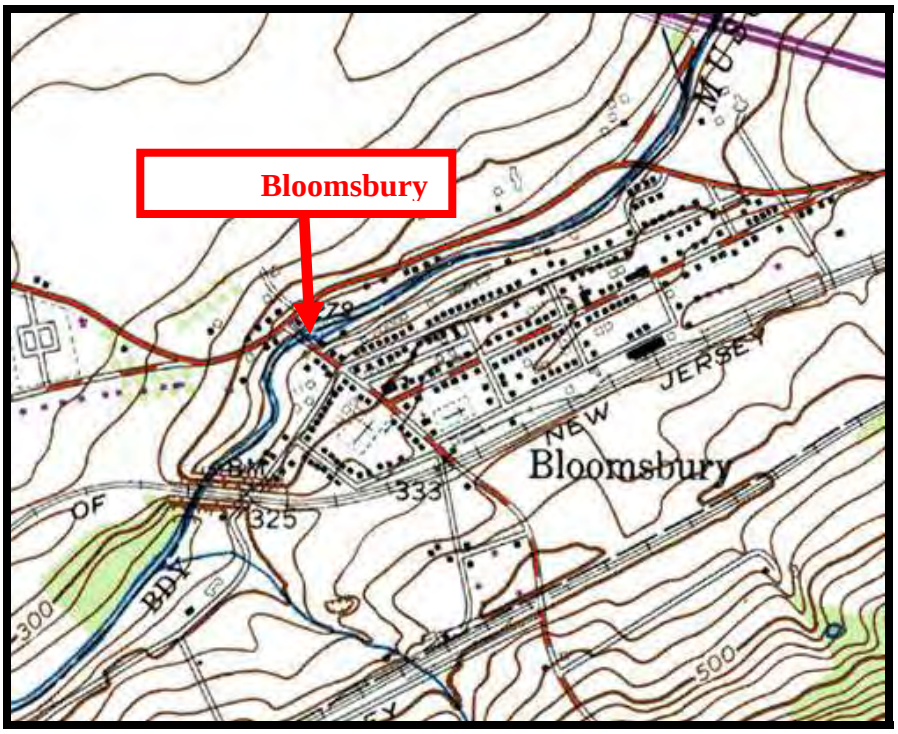


Figure 1-1. USGS Quadrangle depicting the project location. Bloomsbury Dam is blocking fish passage on the Musconetcong River in the Borough of Bloomsbury and Greenwich Township

Figure 1-2. Bloomsbury Dam shown from the southern bank in Hunterdon County, NJ (Photo date: September 2009).

2.0 METHODS

2.1 MEASURING SEDIMENT DEPTH

Sediment volume in the Musconetcong River behind the Bloomsbury dam was estimated using a transect approach. Six transects perpendicular to the river were established behind the dam. For safety reasons, the closest location to the dam for field crews to work was at a distance of 60 feet upstream from the dam. The first transect was sampled here and the remaining transects were then evenly distributed in the 500 linear feet upstream of the dam (Table 2-1).

Table 2-1. Location of six transects across the Musconetcong River in Bloomsbury, NJ where sediment depths were measured.

Transect	Right End Point Distance from Dam (feet)	Right End Point Coordinates	Left End Point Distance from Dam (feet)	Left End Point Coordinates
1	60	Lat: 40.65579 Long: -75.08858	60	Lat: 40.65542 Long: -75.08830
2	143.3	Lat: 40.65595 Long: -75.08815	143.3	Lat: 40.65564 Long: -75.08812
3	226.6	Lat: 40.65561 Long: -75.08810	226.6	Lat: 40.65580 Long: -75.08746
4	309.9	Lat: 40.65603 Long: -75.08765	309.9	Lat: 40.65585 Long: -75.08746
5	393.2	Lat: 40.65611 Long: -75.08730	393.2	Lat: 40.65590 Long: -75.08717
6	476.5	Lat: 40.65625 Long: -75.08706	476.5	Lat: 40.65590 Long: -75.08701

At each transect, total river width was measured, and then divided into six equal portions. At the midpoint of each portion, a sediment depth measurement was taken. At each measuring point, half-inch rebar was placed on top of the river bed, resting on top of any loose sediment material that may have been present. The initial height of the top of the rebar was measured on a demarcated surveyor's stadia rod. The rebar was then forcefully pushed down into the sediment until hard surface was reached and it could not be pushed any further. The rebar was then tamped down three times with a 4 pound sledge hammer to ensure it was reaching refusal. At this point, the height of the top of the rebar was measured a second time on the stadia rod. The difference between the initial reading and the second reading was recorded as the depth of sediment present at that sampling point. This process was repeated at six sampling points along each of six transects. When water depths precluded wading, sediment depth measurements were taken from a canoe.

2.2 SEDIMENT CONTAMINANT TESTING

Sediment samples were collected from five stations; four upstream and one downstream of Bloomsbury Dam (Figure 2-1). Target collections points had to be repositioned slightly to obtain samples of silt due to the presence of bedrock and rock cobble substrate. Sediment samples for bulk chemical analysis were collected with a decontaminated stainless steel ponar grab. Each of the six samples was analyzed for TCL Semi Volatiles, TCL Pesticides and aroclor PCBs, and TAL Inorganics (see Scope of Work in Appendix A). All sediment samples were analyzed for grain size using ASTM Method D422-63. Sieve sizes ranged from 4.75 mm (U.S. Standard Sieve No. 4) to 63 µm (U.S. Standard Sieve No. 230). Sediments were categorized by Wentworth's classifications (Table 2-2).

Figure 2-1. Sediment sampling locations for contaminant analysis at Bloomsbury Dam. Transect lines indicate the locations of the sediment depth measurements.

Sample locations were selected based on coordination with New Jersey Department of Environmental Protection (NJDEP). For the upstream samples, two samples (paired) were taken immediately behind (upstream) the dam and the other two collection points were approximately every 100 feet upstream. For the downstream sample, one was taken approximately 400 feet

below the dam. For all samples, exact locations focused on the areas of apparent fine grain sediment.

The five sample site locations were recorded using Global Positioning System (GPS) units. Sediment contaminant results were compared to NJDEP soil cleanup screening values for residential and nonresidential soils to assess potential human health effects of the dam removal.

Table 2-2. Sieve sizes used for sediment particle distribution and the Wentworth sediment size categories

Sieve Number	Sieve Size	Wentworth Size Category
4	4.75-mm	Pebble
10	2.00-mm	Granule
20	850-µm	Very Coarse Sand
40	425-µm	Coarse Sand
60	250-µm	Medium Sand
140	106-µm	Fine Sand
200	75-µm	Undefined
230	63-µm	Very Fine Sand
	< 63-µm	Silt-Clay

3.0 RESULTS

3.1 SEDIMENT VOLUME BEHIND BLOOMSBURY DAM

3.1.1 Estimating Sediment Volume

Through surveying six points across six transects upstream of the dam, a total of 36 sediment depth measurements were recorded. These 36 depth measurements were assumed to be representative of depths of sediment in 36 polygons upstream of the dam. For Transects 1 through 6, the polygons were rectangular in shape, each 83.3 feet long, with polygon width varying based on the width of the stream at that transect (Figure 3-1).

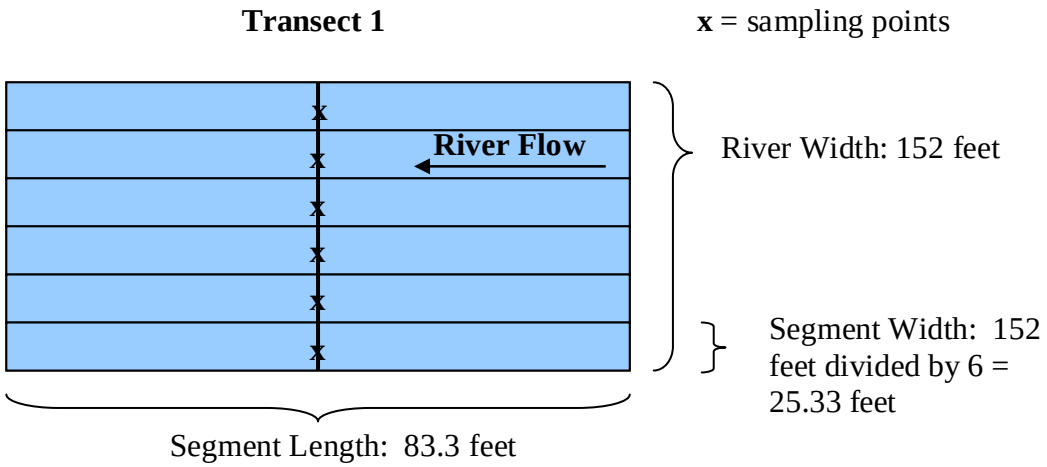


Figure 3-1. Example transect of the Musconetcong River divided into 6 polygons for extrapolating sediment depth measurements. At this location, the river was 152 feet wide. Dividing this width into six equal segments, resulted in each segment having a width of 25.33 feet. Thus, each polygon at this segment was 25.33 feet wide and 83.3 feet long.

Area of each polygon was calculated at each transect by multiplying the width of each segment by the segment length. Each of these areas was then multiplied by the sediment depth corresponding to its representative polygon to estimate total sediment volume present in each polygon (Table 3-1).

Table 3-1. Polygon areas, measured sediment depths, and estimated sediment volumes for Transects 1 through 6 upstream of the Bloomsbury Dam on the Musconetcong River, Bloomsbury, NJ.

Transect	Polygon	Transect Width (feet)	Polygon Width (feet)	Polygon Length (feet)	Polygon Area (sq. feet)	Sediment Depth (feet)	Volume Sediment (cu. feet)
1	1	152	25.33	83.3	2110	4.15	8757.61
	2		25.33	83.3	2110	0.9	1899.24
	3		25.33	83.3	2110	1	2110.27
	4		25.33	83.3	2110	2.3	4853.61
	5		25.33	83.3	2110	4.95	10445.82
	6		25.33	83.3	2110	6.75	14244.30
2	1	115	19.17	83.3	1597	3.25	5188.90
	2		19.17	83.3	1597	2.45	3911.63
	3		19.17	83.3	1597	1.05	1676.41
	4		19.17	83.3	1597	1.35	2155.39
	5		19.17	83.3	1597	2.5	3991.46
	6		19.17	83.3	1597	0.5	798.29
3	1	113	18.83	83.3	1569	3.7	5804.62
	2		18.83	83.3	1569	3.2	5020.21
	3		18.83	83.3	1569	1.8	2823.87
	4		18.83	83.3	1569	1.8	2823.87
	5		18.83	83.3	1569	2.45	3843.60
	6		18.83	83.3	1569	3.65	5726.18
4	1	108	18.00	83.3	1499	3.7	5547.78
	2		18.00	83.3	1499	2.35	3523.59
	3		18.00	83.3	1499	2.7	4048.38
	4		18.00	83.3	1499	2.3	3448.62
	5		18.00	83.3	1499	2.3	3448.62
	6		18.00	83.3	1499	6.3	9446.22
5	1	110	18.33	83.3	1527	2.85	4352.43
	2		18.33	83.3	1527	2.65	4046.99
	3		18.33	83.3	1527	3.25	4963.29
	4		18.33	83.3	1527	3.45	5268.73
	5		18.33	83.3	1527	3.2	4886.93
	6		18.33	83.3	1527	2.6	3970.63
6	1	115	19.17	83.3	1597	4.6	7344.28
	2		19.17	83.3	1597	1.9	3033.51
	3		19.17	83.3	1597	1.2	1915.90
	4		19.17	83.3	1597	1.8	2873.85
	5		19.17	83.3	1597	1.15	1836.07
	6		19.17	83.3	1597	2.1	3352.83

3.1.2 Former Mill Race Adjacent to Asbury Graphite Area and Volume Estimates

Once on site, field crews identified an additional area of sediment accumulation adjacent to the main channel of the river. This was located along the right hand side of the river, in the former Mill Race adjacent to the Asbury Graphite property, just upstream of the dam. Due to its proximity to the dam and connection to the main channel, this portion would likely contribute to sediment volumes if the dam were to be removed. This adjacent area was approximately triangular in shape, and was partitioned into 4 polygons (numbered below in red) (Figure 3-2). One sediment depth readings were taken in each polygon (1 – 4) following the methods described above. Using geometric and trigonometric relationships, the areas of each polygon were calculated, and each of these areas was then multiplied by the sediment depth corresponding to its representative polygon to estimate total sediment volume present in each polygon (Table 3-2).

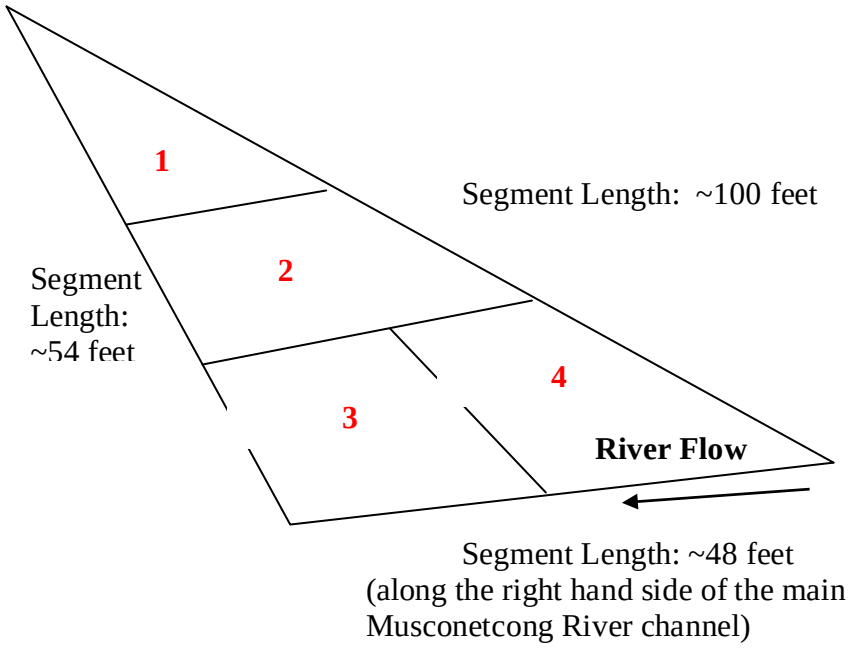


Figure 3-2. Former Mill Race area adjacent to Ashbury Graphite along the right hand side of the Musconetcong River upstream of Bloomsbury Dam. This area was apportioned into four polygons as numbered here for estimation of sediment depths and volume of accumulation.

Table 3-2. Polygon areas, measured sediment depths, and estimated sediment volumes for the former mill race area along the right hand side of the Musconetcong River upstream of the Bloomsbury Dam, Bloomsbury, NJ.

Polygon Number	Polygon Area (sq. feet)	Sediment Depth (feet)	Volume Sediment (cu. feet)
1	55.5	5.2	288.60
2	166.4	2.1	349.44
3	138	5.7	786.60
4	138	3.8	524.40

Total sediment volume was then estimated by adding the volume of sediment from each polygon from each transect (1 through 6) and the volume of sediment in each polygon of the additional area (1 through 4). The volume upstream of the dam was 6,051.5 cubic yards while the volume in the former Mill Race was 72.1 cubic yards. Thus, overall sediment volume present above Bloomsbury Dam was estimated to be 165,333 cubic feet, or 6,123.4 cubic yards. The spatial distribution of sediment build up behind Bloomsbury Dam is presented in Figures 3-3 and 3-4.

3.2 SEDIMENT CONTAMINANT RESULTS

Bulk sediment testing for inorganics (Table 3-3), semi-volatile organics (Table 3-4), pesticides (Table 3-5), and PCB aroclors (Table 3-6) indicated that none of the parameters were over NJDEP residential or nonresidential soil clean up criteria. Contaminant results were also compared to NJDEP's Ecological Screening Values (ESV) for freshwater sediments that include Lowest Effects Level (LEL) and Severe Effects Levels (SEL). With the exception of total cyanide all concentrations were below LEL sediment guidelines.

3.3 SEDIMENT GRAIN SIZE RESULTS

Sediment grain size analysis on the five surface samples taken for contaminant testing indicated that sands and gravel dominated the surface sediment (Table 3-7). Total organic carbon percentages were also low ranging from 1.2 to 5.6. Less than 2% of the surface sediments contained slit/clays.

Figure 3-3. Measured sediment depth at each sampling point behind Bloomsbury Dam and at the Former Mill Race Area.

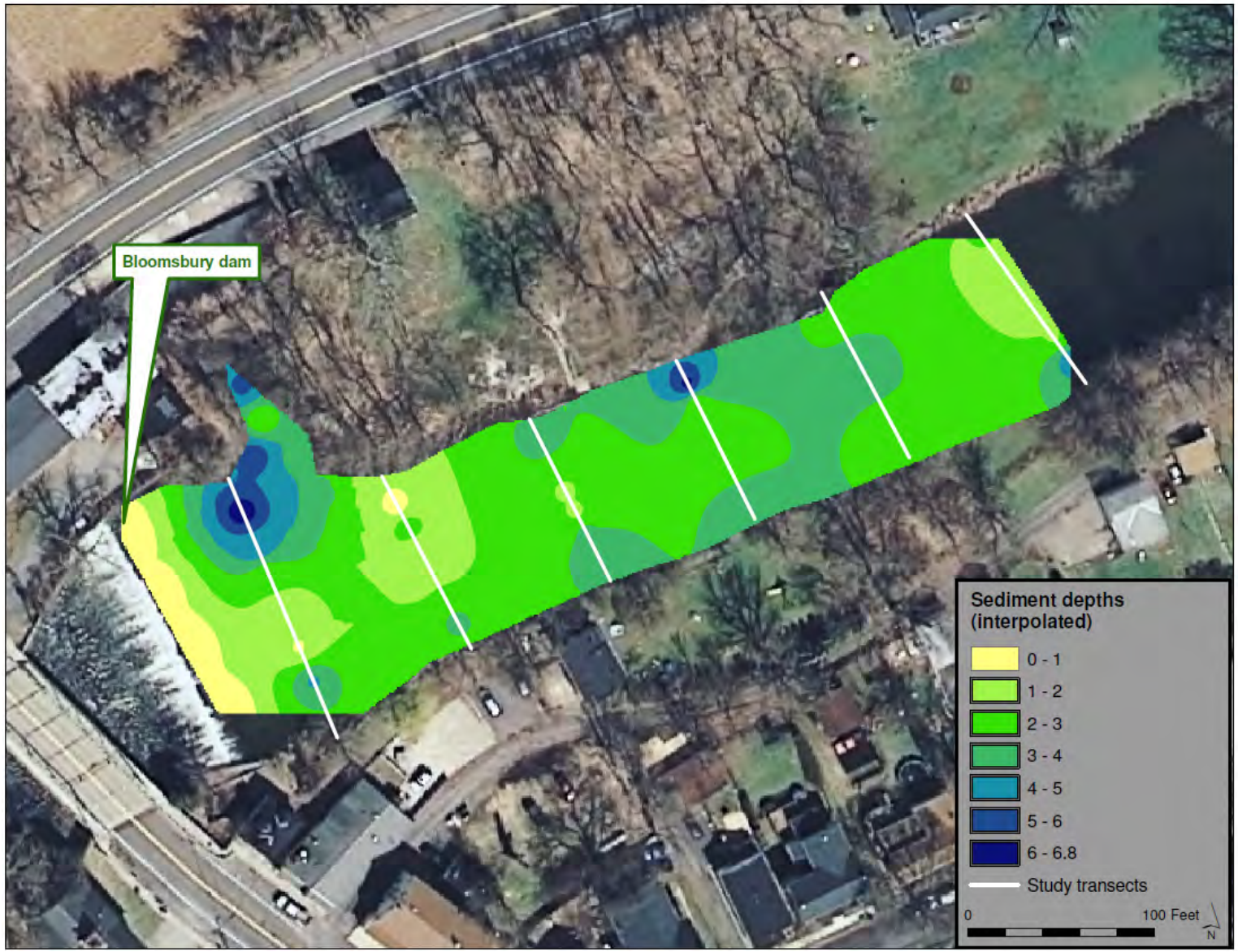


Figure 3-4. Distribution of sediment directly behind Bloomsbury Dam to 500 feet upstream. Sediment measurement transect lines indicate approximate sediment sampling points. This interpolation was performed for visual purposes only and may underestimate the true depth of sediment directly behind the dam. Sediment depth measurements could not be collected directly behind the dam due to safety concerns.

Table 3-3. Bulk sediment inorganic concentrations from sediment samples collected downstream and upstream of Bloomsbury Dam in May 2011. Less than sign indicates non-detects at the sample specific detection limit. Blank values under sediment and soil guidelines indicate no concentration has been established for that parameter.

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
Aluminum	mg/kg	2760	2900	2880	2980	3990	2.55%		78000	
Antimony	mg/kg	0.054	0.051	0.079	0.073	0.094			31	450
Arsenic	mg/kg	2.2	4.2	2.6	3.4	3.1	6	33	19	19
Barium	mg/kg	15.8	16.3	16.5	20.6	17.4			16000	59000
Beryllium	mg/kg	0.29	0.33	0.3	0.31	0.37			16	140
Cadmium	mg/kg	0.18	0.1	0.16	0.15	0.17	0.6	10	78	78
Calcium	mg/kg	3900	603	10400	692	2050				
Chromium	mg/kg	6.9	7.5	6.8	6.2	11				
Cobalt	mg/kg	3	3.6	3.5	5.2	4.4	50		1600	590
Copper	mg/kg	5.3	5.6	9	7.9	10.8	16	110	3100	45000
Cyanide, Total	mg/kg	0.09	0.082	0.07	0.086	<0.29	0.0001		1600	23000
Iron	mg/kg	9450	13000	10600	13000	14400				
Lead	mg/kg	5	4	3.8	4.8	23.4	31	250	400	800
Magnesium	mg/kg	2220	1360	1330	1470	2550				
Manganese	mg/kg	324	230	208	353	192	630	1100	11000	5900
Mercury	µg/kg	7.4	6.2	6.9	8.7	9.6	200	2000	23000	65000
Nickel	mg/kg	4.4	5	4.2	6	9.5	16	75	1600	23000
Potassium	mg/kg	237	267	284	242	293				
Selenium	mg/kg	0.32	0.27	0.26	0.38	0.42			390	5700
Silver	mg/kg	0.02	0.013	0.013	0.016	0.019	0.5		390	5700
Sodium	mg/kg	59.4	40.3	121	52.9	50.6				
Thallium	mg/kg	0.026	0.028	0.026	0.025	0.024			5	79
Vanadium	mg/kg	6.5	9.2	8.1	8	9			78	1100
Zinc	mg/kg	29.7	30.2	28.9	35.9	56.2	120	820	23000	110000

Table 3-4. Bulk sediment semi-volatile organic concentrations from sediment samples collected downstream and upstream of Bloomsbury Dam in May 2011. Less than sign indicates non-detects at the sample specific detection limit. Blank values under sediment and soil guidelines indicate no concentration has been established for that parameter.

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
1,1-Biphenyl	µg/kg	<85	<100	<98	<40	<95			3100000	34000000
1,2,4-Trichlorobenzene	µg/kg	<17	<20	<20	<8.1	<19	5062		73000	820000
1,2-Dichlorobenzene	µg/kg	<17	<20	<20	<8.1	<19	294		5300000	59000000
1,2-Diphenylhydrazine	µg/kg	<17	<20	<20	<8.1	<19			700	2000
1,3-Dichlorobenzene	µg/kg	<17	<20	<20	<8.1	<19	1315		5300000	59000000
1,4-Dichlorobenzene	µg/kg	<17	<20	<20	<8.1	<19	318		5000	13000
2,4,5-Trichlorophenol	µg/kg	<85	<100	<98	<40	<95			6100000	68000000
2,4,6-Trichlorophenol	µg/kg	<85	<100	<98	<40	<95	208		19000	74000
2,4-Dichlorophenol	µg/kg	<17	<20	<20	<8.1	<19	81.7		180000	2100000
2,4-Dimethylphenol	µg/kg	<85	<100	<98	<40	<95			1200000	14000000
2,4-Dinitrophenol	µg/kg	<440	<520	<510	<210	<490	6.21		120000	1400000
2,4-Dinitrotoluene	µg/kg	<85	<100	<98	<40	<95	14.4		700	3000
2,6-Dinitrotoluene	µg/kg	<85	<100	<98	<40	<95			700	3000
2-Chloronaphthalene	µg/kg	<17	<20	<20	<8.1	<19	417			
2-Chlorophenol	µg/kg	<85	<100	<98	<40	<95	31.9		310000	2200000
2-Methylnaphthalene	µg/kg	3.1	3.6	<20	<8.1	3.7	20.2		230000	2400000
2-Methylphenol	µg/kg	<85	<100	<98	<40	<95			310000	3400000
2-Nitroaniline	µg/kg	<440	<520	<510	<210	<490			39000	23000000
2-Nitrophenol	µg/kg	<85	<100	<98	<40	<95				
3,3-Dichlorobenzidine	µg/kg	<85	<100	<98	<40	<95			1000	4000
3-Nitroaniline	µg/kg	<440	<520	<510	<210	<490				
4,6-Dinitro-2-methylphenol	µg/kg	<440	<520	<510	<210	<490			6000	68000
4-Bromophenyl phenyl ether	µg/kg	<85	<100	<98	<40	<95				
4-Chloro-3-methylphenol	µg/kg	<85	<100	<98	<40	<95				
4-Chloroaniline	µg/kg	<85	<100	<98	<40	<95				
4-Chlorophenyl phenyl ether	µg/kg	<85	<100	<98	<40	<95				
4-Methylphenol	µg/kg	<85	<100	<98	<40	<95			31000	340000
4-Nitroaniline	µg/kg	<440	<520	<510	<210	<490				
4-Nitrophenol	µg/kg	<440	<520	<510	<210	<490	13.3			
Acenaphthene	µg/kg	6.8	5.3	<20	1.1	3.7	6.71		3400000	37000000
Acenaphthylene	µg/kg	15	92	11	5.9	12	5.87			300000000

Table 3-4. (Continued)

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
Acetophenone	µg/kg	<85	<100	<98	<40	<95			2000	5000
Anthracene	µg/kg	37	62	9.3	5.3	23	220	370000	17000000	30000000
Atrazine	µg/kg	<85	<100	<98	<40	<95			210000	2400000
Benzaldehyde	µg/kg	<85	<100	<98	<40	<95			6100000	68000000
Benzidine	µg/kg	<1700	<2000	<2000	<810	<1900			700	700
Benzo(a)anthracene	µg/kg	120	220	20	20	71	320	1480000	600	2000
Benzo(a)pyrene	µg/kg	130	220	37	22	77	370	1440000	200	200
Benzo(b)fluoranthene	µg/kg	120	220	110	23	84	10400		600	2000
Benzo(ghi)perylene	µg/kg	74	130	63	18	55	170	320000	380000000	30000000
Benzo(k)fluoranthene	µg/kg	72	100	48	12	38	240	1340000	6000	23000
bis(2-Chloroethoxy)methane	µg/kg	<85	<100	<98	<40	<95				
bis(2-Chloroethyl) ether	µg/kg	<17	<20	<20	<8.1	<19	3520		400	2000
bis(2-Chloroisopropyl) ether	µg/kg	<17	<20	<20	<8.1	<19			23000	67000
bis(2-Ethylhexyl) phthalate	µg/kg	16	180	27	89	28	182	750	35000	140000
Butyl benzyl phthalate	µg/kg	<85	<100	<98	<40	<95	1970		1200000	14000000
Caprolactam	µg/kg	<440	<520	<510	<210	<490			31000000	340000000
Carbazole	µg/kg	13	11	8.5	2.1	9.4			24000	96000
Chrysene	µg/kg	130	240	44	22	87	340	460000	62000	230000
Di-n-butyl phthalate	µg/kg	<85	<100	<98	<40	<95	1114	110	6100000	68000000
Di-n-octyl phthalate	µg/kg	<85	<100	<98	<40	<95			2400000	27000000
Dibenz(a,h)anthracene	µg/kg	16	30	13	3.3	12	60	130000	200	200
Dibenzofuran	µg/kg	<85	<100	<98	<40	<95				
Diethyl phthalate	µg/kg	<85	<100	<98	<40	<95	295		49000000	550000000
Dimethyl phthalate	µg/kg	<85	<100	<98	<40	<95				
Fluoranthene	µg/kg	260	430	35	37	160	750	1020000	2300000	24000000
Fluorene	µg/kg	17	19	<20	<8.1	10	190	160000	2300000	24000000
Hexachlorobenzene	µg/kg	<17	<20	<20	<8.1	<19	20	24000	300	1000
Hexachlorobutadiene	µg/kg	<17	<20	<20	<8.1	<19	26.5		600	25000
Hexachlorocyclopentadiene	µg/kg	<85	<100	<98	<40	<95	901		45000	110000
Hexachloroethane	µg/kg	<85	<100	<98	<40	<95	584		35000	140000
Indeno(1,2,3-cd)pyrene	µg/kg	58	110	63	13	46	200	320000	600	2000

Table 3-4. (Continued)

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
Isophorone	µg/kg	<85	<100	<98	<40	<95	432		510000	2000000
N-Nitrosodi-n-propylamine	µg/kg	<17	<20	<20	<8.1	<19			200	300
N-Nitrosodimethylamine	µg/kg	<17	<20	<20	<8.1	<19			700	700
N-Nitrosodiphenylamine	µg/kg	<17	<20	<20	<8.1	<19			99000	390000
Naphthalene	µg/kg	<17	<20	<20	<8.1	<19	176		6000	17000
Nitrobenzene	µg/kg	<17	<20	<20	<8.1	<19	145		31000	340000
Pentachlorophenol	µg/kg	<85	<100	<98	<40	<95	23000		3000	10000
Phenanthrene	µg/kg	160	190	11	22	93	560	950000		300000000
Phenol	µg/kg	<17	<20	<20	<8.1	<19	49.1	48	18000000	210000000
Pyrene	µg/kg	210	400	35	33	140	490	850000	1700000	18000000

Table 3-5. Bulk sediment pesticide concentrations from sediment samples collected downstream and upstream of Bloomsbury Dam in May 2011. Less than sign indicates non-detects at the sample specific detection limit. Blank values under sediment and soil guidelines indicate no concentration has been established for that parameter.

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
4,4-DDD	µg/kg	<2.7	0.53	1.4	0.97	<2.4	8	6000	3000	13000
4,4-DDE	µg/kg	<2.7	<2.5	1.3	<2.5	<2.4	5	1900	2000	9000
4,4-DDT	µg/kg	<2.7	<2.5	<2.5	1.1	<2.4	8	71000	2000	8000
Aldrin	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	2	8000	40	200
alpha-BHC	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	6	10000	100	500
alpha-Chlordane	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4			200	1000
beta-BHC	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	5	21000	400	2000
Chlordane (technical)	µg/kg	<27	<25	<25	<25	<24	7	6000	200	1000
delta-BHC	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4				
Dieldrin	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	2	91000	40	200
Endosulfan I	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4			470000	6800000
Endosulfan II	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4			470000	6800000
Endosulfan sulfate	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	34.6		470000	6800000
Endrin	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	3	130000	23000	340000
Endrin aldehyde	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	480			
Endrin ketone	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4				
gamma-BHC (Lindane)	µg/kg	1.1	0.76	<2.5	<2.5	1.1			400	2000
gamma-Chlordane	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4			200	1000
Heptachlor	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	0.6	10	100	700
Heptachlor epoxide	µg/kg	<2.7	<2.5	<2.5	<2.5	<2.4	5	5000	70	300
Methoxychlor	µg/kg	<5.3	<5.0	<5.0	<5.1	<4.8	13.6		390000	5700000
Toxaphene	µg/kg	<110	<100	<99	<100	<96	0.077		600	3000

Table 3-6. Bulk sediment PCB Aroclor concentrations from sediment samples collected downstream and upstream of Bloomsbury Dam in May 2011. Less than sign indicates non-detects at the sample specific detection limit. Blank values under sediment and soil guidelines indicate no concentration has been established for that parameter.

		BD-1	BD-2	BD-3	BD-4	BD-5 (Down-stream)	LEL	SEL	NJDEP Res.	NJDEP Non-res.
Aroclor 1016	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1221	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1232	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1242	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1248	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1254	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000
Aroclor 1260	µg/kg	<5.3	<5.0	<5.0	<5.0	<4.8			490	2000

Table 3-7. Results of Grain Size and Total Organic Carbon (TOC) analysis for composite samples taken near Bloomsbury Dam in May 2011

Station	TOC %	Silt/Clay %	Gravel %	Sand %
BD-1	1.16	0.88	25.75	73.37
BD-2	5.61	1.27	50.33	48.40
BD-3	1.79	0.72	34.61	64.67
BD-4	1.50	0.78	36.39	62.83
BD-5 (Downstream)	1.27	1.17	24.49	74.34

4.0 CONCLUSIONS

The sediment volume estimates revealed that 6,123 cubic yards of sediment has accumulated behind Bloomsbury Dam including the former Mill Race area located along the right hand side of the river (looking downstream) adjacent to the Asbury Graphite property.

Contaminant testing of the accumulated sediments indicated that with the exception of cyanide none of the inorganics, pesticides, semi-volatile organics, and aroclor PCBs were over NJDEP soil clean up criteria for residential and non-residential uses or the Ecological Screening Values indicating that the releasing the sediment behind the dam during dam removal would not impact human health or harm aquatic resources. Total cyanide was over the 0.0001 mg/kg Lowest Effects Level guideline at all four upstream stations averaging 0.08 mg/kg. NJDEP has not established a Severe Effects Level guideline concentration for total cyanide. Cyanide was not detected at the downstream station.

Similar contaminant testing was conducted at Finesville Dam five miles below Bloomsbury dam on the Musconetcong River for two sediment samples collected from the accumulated sediments behind the dam[1]. None of the semi-volatile organics or inorganics assayed in that study were over Ecological Screening Levels or NJDEP residential soil clean up criteria. Total cyanide was not included in the Finesville sediment tests.

[1] Princeton Hydro. LLC. 2009. Feasibility Study Finesville Dam Removal Musconetcong River. Prepared for Musconetcong Watershed Association, Asbury, New Jersey.

APPENDIX A

SCOPE OF WORK

Sediment Quality Testing for the
Bloomsbury Dam Removal Project
Bloomsbury, NJ

SCOPE OF WORK

1.0. PROJECT DESCRIPTION

The project site is located along the Musconetcong River in Warren and Hunterdon Counties, NJ and involves the removal of Bloomsbury Dam. The Bloomsbury Dam (Figures 1-4), located between the Borough of Bloomsbury and Greenwich Township, is an impediment to fish passage on the Musconetcong River. This project involves determining the most desirable method to remove the Bloomsbury Dam while also taking into account potential cultural resource, contaminant, and other issues.

This project is part an overall effort to restore the lower Musconetcong River to its natural, free-flowing condition by removing the four dams that are closest to the confluence with the Delaware River. The removal of all the dams would open approximately 13 miles of the river for the passage of diadromous fish and would significantly improve the water quality, as well as, aquatic habitats within the river. The removal of the Bloomsbury Dam will reconnect approximately 8 miles of the river.

Figure 1. USGS Quadrangle depicting the project location. The Musconetcong River acts as the boundary between the Borough of Bloomsbury in Hunterdon County and Greenwich Township in Warren County, New Jersey.

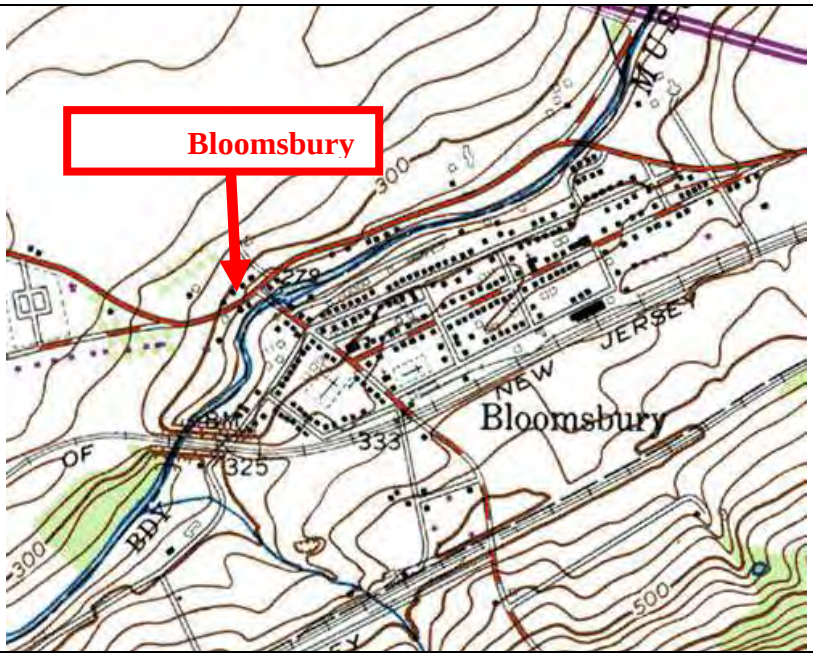


Figure 2: Bloomsbury Dam shown from the southern bank in Hunterdon County. Photo taken September 10, 2009.

Figure 3: Bloomsbury Dam and the upstream impoundment shown from the Church Street bridge (County Road 579) approximately 90 feet downstream of the dam. Photo taken September 10, 2009.

Figure 4: Bloomsbury Dam and the downstream Church Street Bridge. Photo taken September 10, 2009.	

2.0. PROJECT PURPOSE

The objective of this project is to restore free flowing conditions in the river, allow free passage of aquatic organisms, and improve aquatic habitat. In addition, this project will improve fish migration by allowing passage upstream of Bloomsbury Dam to potential foraging and spawning areas. This project is in the information gathering stage so we have a need to acquire quantity and quality data for sediment located upstream of Bloomsbury Dam.

3.0. CORPS OF ENGINEERS POINTS OF CONTACT

U.S. Army Corps of Engineers, Environmental Resources Branch, 100 Penn Square East, Philadelphia, Pennsylvania 19107. Mark Eberle, Project Biologist (215) 656-6562 or Adrian Leary, Project Manager (215) 656-6576.

4.0. TASKS

A. SEDIMENT SAMPLES

Sediment samples will be collected from five stations; four upstream and one downstream of Bloomsbury Dam (Figure 5). Target collections points may need to be repositioned slightly to obtain samples of silt due to the presence of bedrock and rock coble substrate. Sediment samples for bulk chemical analysis will be collected from either a decontaminated stainless steel ponar grab or a decontaminated hand operated Wildco® sediment coring device depending on sediment depth.

Sediments will be collected and appropriately preserved in the field and delivered to a laboratory for analyses. Each of the five samples will be analyzed for some of the constituents of concern listed on the NJDEP Site Remediation Standards (SRS) which include base neutral/acid extractable (BNA) or semi-volatile organic compounds (Low Level SW846-8270C), PCB arochlors (Low Level SW 846-8082), TCL pesticides (Low Level SW846-8081A), TAL inorganics (SW846-6020), total cyanide, hexavalent chromium, grain size (Folk, 1980) distribution, moisture content, and organic matter content. A list of parameters that will be tested for can be found in Appendix A. If sediment grain size is greater than 90% sand then chemical testing will not be completed on that sample.

The sediment analysis results will also be compared to the NJDEP Ecological Screening Values (ESV) for Freshwater Sediment to screen for ecological risk evaluation. It is emphasized that ESV are not cleanup standards or remediation criteria; rather the purpose of ESV is to facilitate decision making regarding whether to pursue advanced-tier ecological risk assessment activities.

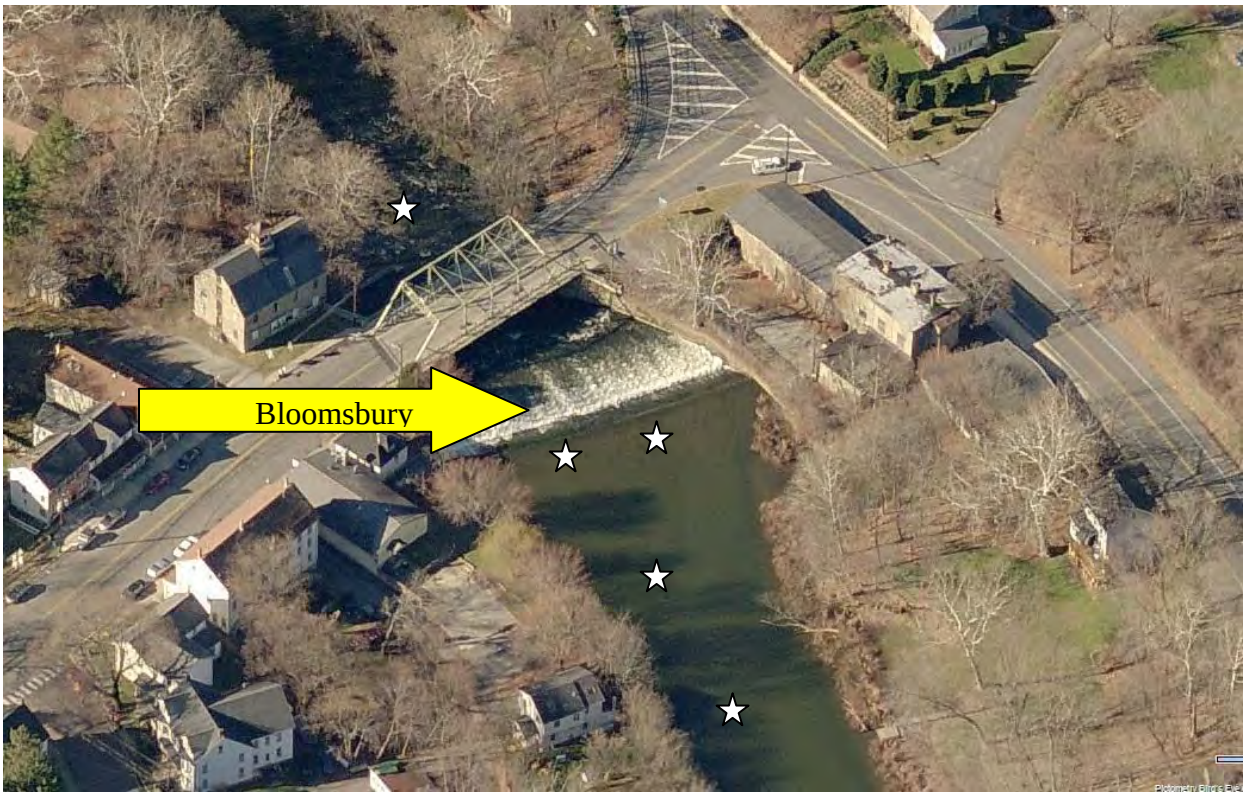


Figure 5. Approximate sample locations on the Musconetcong River.

This sample plan was coordinated with the New Jersey Department of Environmental Protection (NJDEP) and the U.S. Fish and Wildlife Service. One sediment sample will be taken from each location. For the upstream samples, two samples (paired) will be taken immediately behind (upstream) the dam in the deepest portion of the stream and the other two will be taken upstream of the dam determined in the field with a bias towards areas appearing to contain the highest percentage of fine-grained sediment. For the downstream sample, due to large rock immediately downstream of the dam and personal safety issues with the hydraulic roller below the dam, the sample will be taken approximately 100 ft downstream of the dam. For all samples, exact locations will focus on the areas of apparent fine grain sediment.

The five sample site locations will be recorded and mapped in the final report. The Contractor will use this data to produce a table and map identifying each sampling location in latitude and longitude. Storage and preservation procedures for sediment samples should follow the: *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (New Jersey Department of Environmental Protection, 1997). All analyses shall be conducted within the specified holding times. Samples to be analyzed for metals should not come in contact with metal sampling equipment, and samples to be analyzed for organic compounds should not come into contact with plastics. All sample containers should be appropriately cleaned: acid-rinsed (10% nitric acid) for metal analysis, and solvent-rinsed (acetone is preferred; however, other approved solvents such as methanol and hexane can be used as well) for organic analysis. When equipment will be used to take samples for both metal and organic compound analysis, the acid rinse must be conducted first, and the solvent rinse second. Samples should completely fill the storage container, leaving no head space, except for expansion volume required for potential freezing. Samples should be refrigerated or frozen with dry ice immediately after sample collection.

Records. The contractor shall maintain records of all work performed in this contract. These shall be furnished to the COE Point of Contact in the final report.

B. Estimating Sediment Volume behind Bloomsbury Dam

The contractor will conduct a survey to estimate the volume of sediment build up behind Bloomsbury Dam to provide data needed to determine if dredging silt will be necessary before the dam removal phase of the project. The contactor will establish six (6) equally spaced transects that will, in total, extend approximately 500 feet upstream of the existing dam. Sediment depth measurement will be taken at six (6) equally spaced points across the river (river width behind the dam is approximately 170 feet). At each transect a Self-Leveling Rotating Laser Level with tripod will be positioned to provide a reference point above the water's surface. At each position a survey marker will be lowered vertically into the water to the sediment surface. A steel reinforcement rod will be positioned next to the survey marker and pushed into the sediment until bed rock or rock cobble is encountered. Once refusal is encountered, a small sledge hammer will used and 4 blows will be hit to see if the rod can be pushed further into the sediment. The distance the steel rod moves will be recorded for each sampling point to estimate sediment depth. A survey grade GPS with sub-meter accuracy will be used to geo-reference the beginning and end of each transect. Coordinates for points along each transect survey will be calculated using the stream bank to opposite stream bank transect coordinates. Assuming that

each survey position represents a rectangular column of sediment, the total volume of sediment up to 500 feet behind the dam will be calculated. Sediment measurement will be conducted from a canoe or by wading depending on local depths and sediment conditions encountered during the field effort.

5.0. QUALITY ASSURANCE/QUALITY CONTROL

All procedures required under this scope of work will conform to the analytical quality assurance/quality control program identified in the USEPA guidance. In addition, the Contractor will maintain accurate quality control records including at least daily analytical instrument calibration data and appropriate preservation and storage of all excess sediment and water for a period of 60 days subsequent to the initial analyses. This sediment will be used for additional testing, if necessary. The laboratory shall at a minimum be USEPA and NJ State certified.

6.0. REPORTING REQUIREMENTS

A table and detailed map identifying sampling locations, coordinates, and corresponding data collection results will be included in the final report.

The following information shall be included on the laboratory data sheets:

1. test method
2. date sample was collected
3. date of analyses
4. testing result
5. detection level

Draft and final reports must be complete with all figures, tables, and appendices and reflect and report the analyses outlined in this scope of work. The recommended content and format should follow quality assurance and quality control guidelines and shall be structured as follows:

(1) TITLE PAGE - bearing the appropriate title, date, author, and contract number.
(2) EXECUTIVE SUMMARY - a brief description of the study's purpose, findings, and conclusions.
(3) TABLE OF CONTENTS - including a list of all figures and tables presented in the report.
(4) INTRODUCTION - stating the purpose of the study with background information on the project and area.
(5) METHODOLOGY - describes the sampling and analysis equipment and methodologies used.
(6) RESULTS - Each sampling reach shall be represented by individual chapters. Each chapter shall contain the sampling results relative to that sampling reach and at a minimum contain the collected data in tabular and graphic form and details of any applicable statistical analyses used. The resulting sediment data shall be summarized.

(7) DISCUSSION – this is a key section that draws inferences regarding the existing water and sediment quality and the potential for impact to natural resources by the dam removal project. This section will discuss the results of the sampling as they relate to appropriate State and Federal water quality standards.

(8) A LIST OF REFERENCES - includes literature cited and agencies or individuals consulted. The bibliography must be in a format used by professional scientific journals.

(9) APPENDICES - for personnel qualifications, a copy of this scope of work, raw data sheets, record logs, and other pertinent information.

Five electronic copies (cd or DVD) of the final report and report data will be submitted. In addition, all metafiles for sampling information will be provided on cd or dvd.

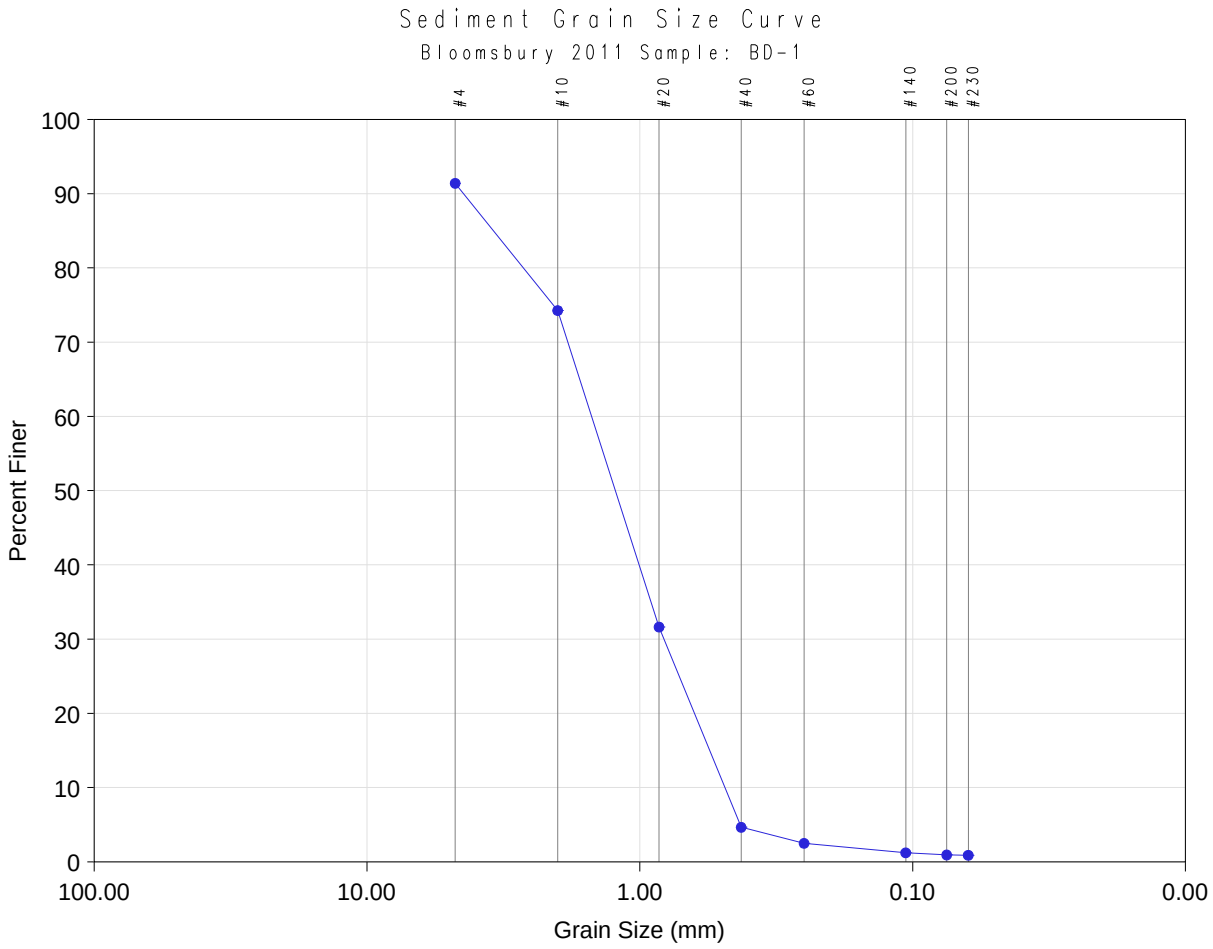
7.0. PERIOD OF PERFORMANCE

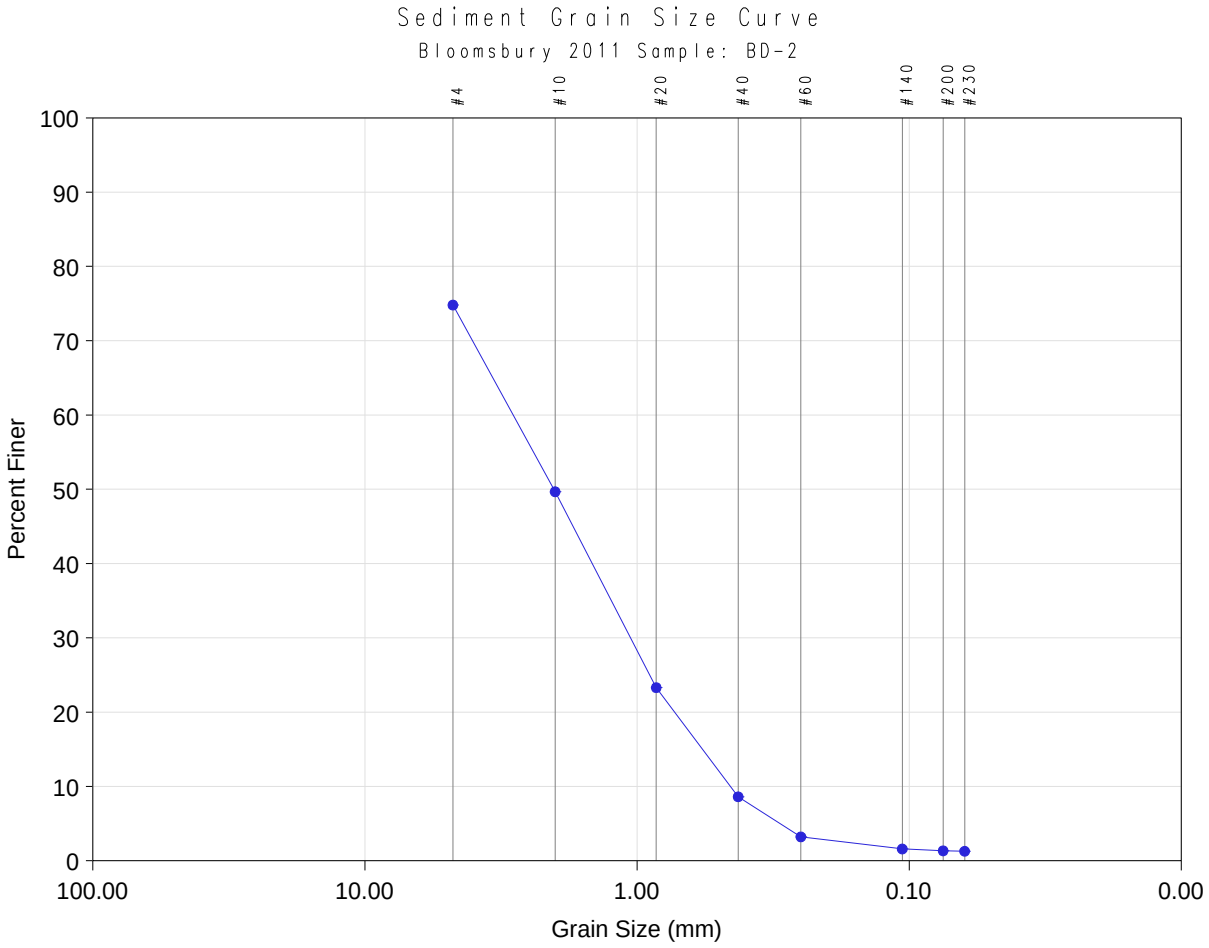
Sediment sampling shall be performed by May 15, 2011. Five hard copies of a draft report, an electronic copy (pdf) (emailed), and 3 cds shall be submitted to the Corps Point of Contact by June 30, 2011. The draft report will be reviewed and returned to the contractor for revision, if necessary, within 45 working days of receipt of the draft. Following the review period, the draft report will be amended, if necessary, and a final report (5 bound, 1 unbound, as well as, 5 cds/DVDs) submitted to the Corps' Point of Contact within 10 working days. This schedule is subject to adjustment by the Corps' Point of Contact for delays on the part of the Government, and for conditions beyond the control of the parties hereto.

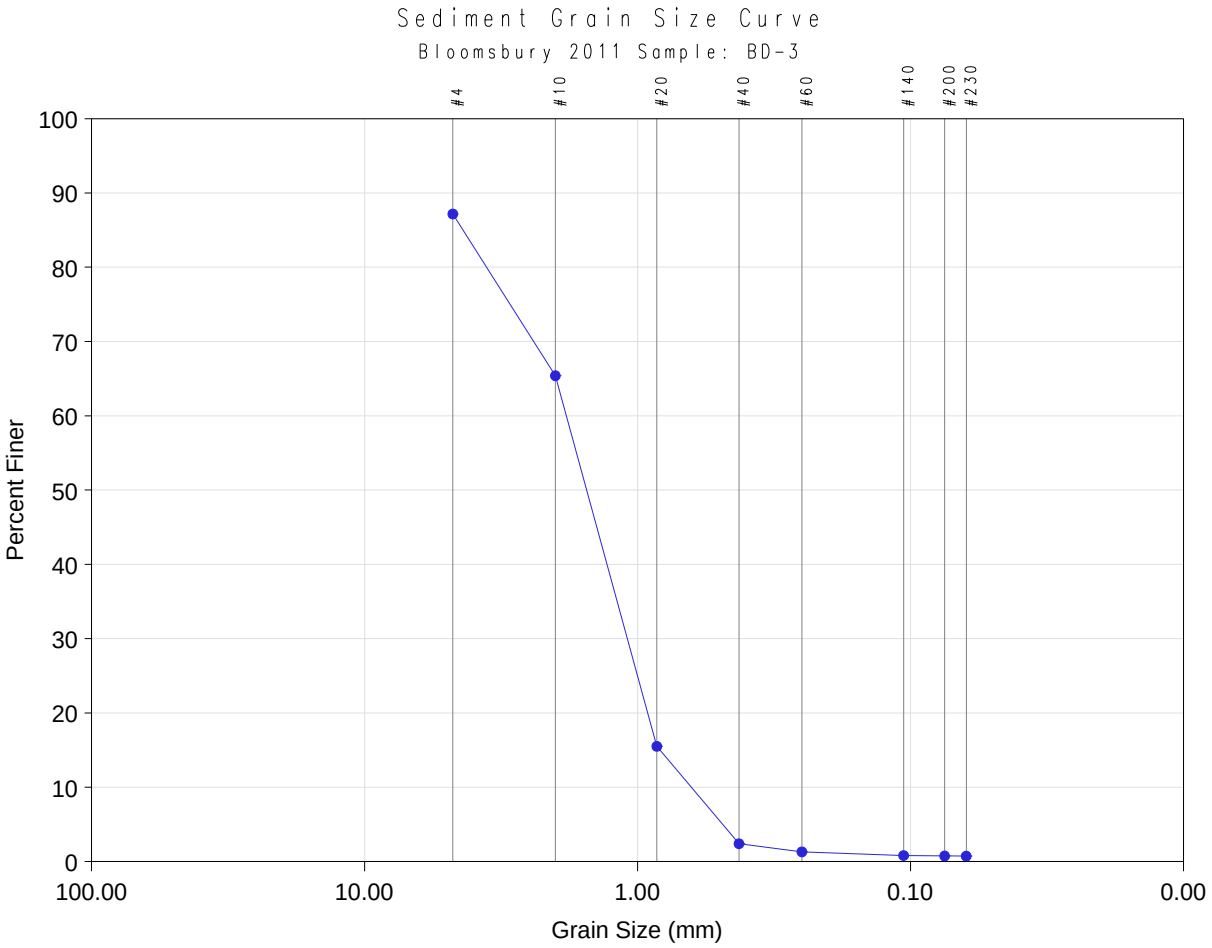
Table 1. List of parameters for contaminant testing of sediment collected upstream and downstream of Bloomsbury Dam in Bloomsbury, NJ.
TCL Semi-volatiles
TCL Pesticides
TCL PCBs
TAL Inorganics
Cyanide
TOC (measured by Loss on Ignition)
Grain Size Analysis

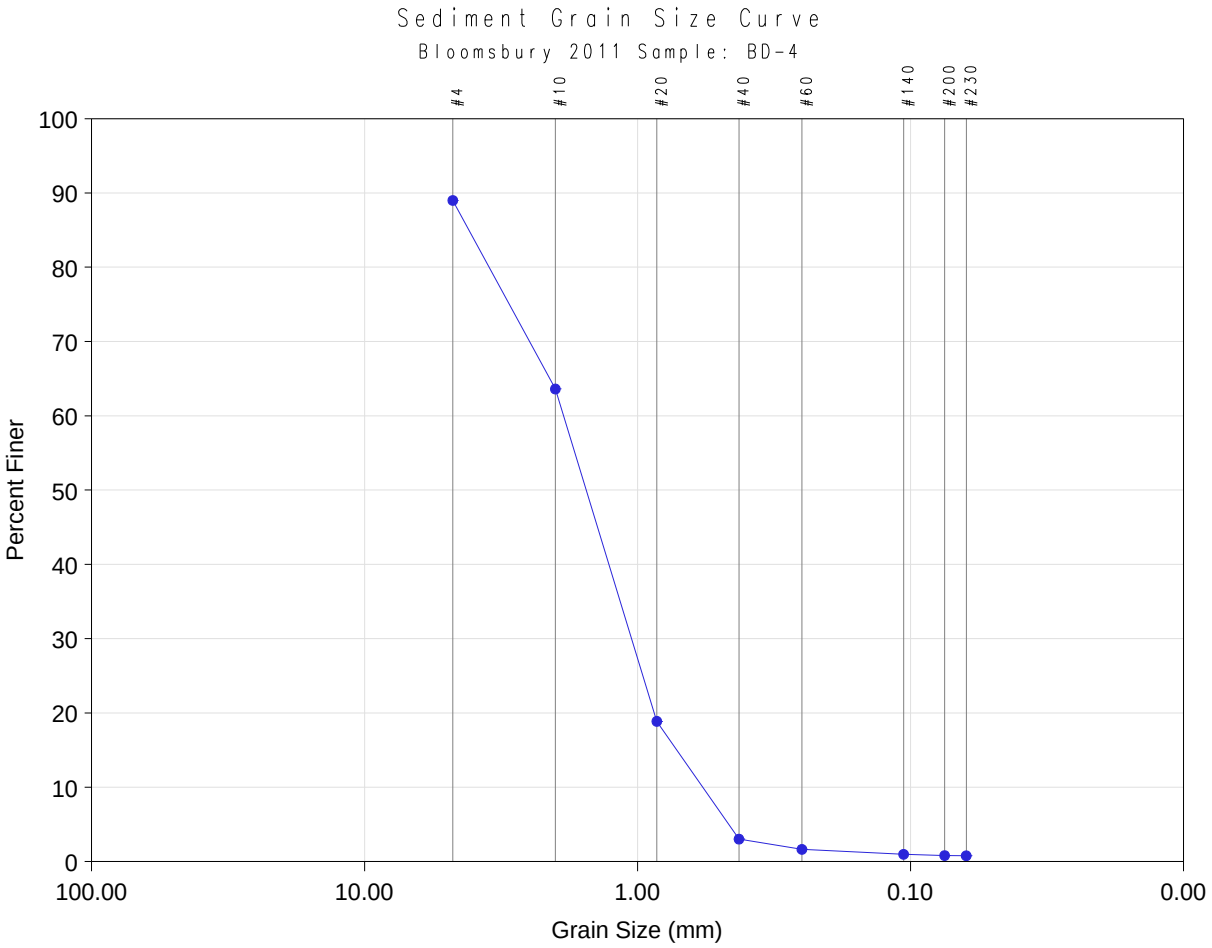
APPENDIX B

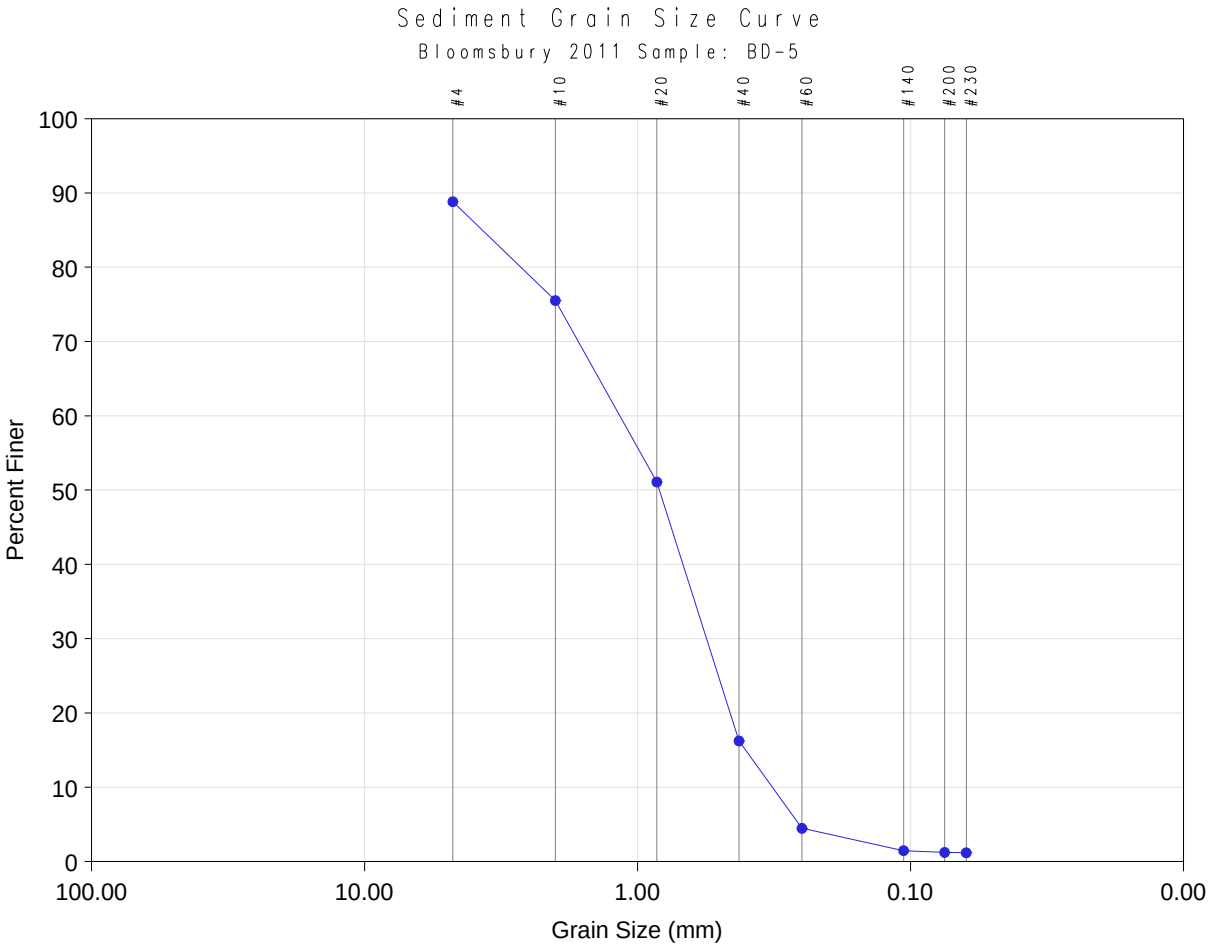
GRAIN SIZE


Sediment Grain Size Curve
Bloomsbury 2011 Sample: BD-1
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)


Sediment Grain Size Curve
Bloomsbury 2011 Sample: BD-2
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)


Sediment Grain Size Curve
Bloomsbury 2011 Sample: BD-3
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)


Sediment Grain Size Curve
Bloomsbury 2011 Sample: BD-4
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)


Sediment Grain Size Curve
Bloomsbury 2011 Sample: BD-5
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)

APPENDIX C

FIELD SAMPLING PHOTOGRAPHS

Versar field crew sampling sediment behind Bloomsbury Dam

Upstream view of Bloomsbury Dam

Left bank of Bloomsbury dam looking downriver at dam crest

Left bank of Bloomsbury Dam looking downriver from impoundment

Typical sandy sediments found in impoundment behind dam

Measuring sediment depth with rebar and staff gauge

APPENDIX D

LABORATORY ANALYSIS CERTIFICATES

(Available Upon Request)

Appendix E

Public / Agency Comments to the draft EA and Corps Responses

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
220 Davidson Ave., 4th Floor
Somerset, NJ 08873

www.nj.nrcs.usda.gov

Mr. Minas M. Arabatzis
Chief
Planning Division
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

April 24, 2012

Dear Mr. Arabatzis:

Thank you for the opportunity to comment on the draft Environmental Assessment (EA) for the Bloomsbury Dam Removal Project in Warren and Hunterdon Counties, New Jersey.

Enclosed is a listing of our comments by page and location. Please let us know if you have any questions. Thank you.

Gregory J. Westfall
Water Resource Planner

NRCS Comments on Bloomsbury Dam Removal Draft EA

Page EA-2 – 2nd paragraph – remove "Finesville" and replace with "Hughesville." There is no longer a dam a Finesville.
Page EA-3 – Under Purpose and Need for Action – would additional bullet such as "Relief of dam owners' liability and maintenance needs" be appropriate?
Page EA-4 – Last bullet – Change bullet to read:

- Prevents the *safe* passage of recreational boats (e.g. kayaks and canoes).

Page EA-11 – Under Bypass channel – Change the last sentence in the first paragraph to read:
..., no further investigation was *given* to this measure.
Page EA-15 – Table 1 Alternatives Analysis - Alternative 4 – under Potential Issues first bullet: Change to read:

- Does not restore stream to a more *natural hydro-geomorphic* state.

Page EA-27 – Air and Water Quality – Air Quality – Delete "Removal Project" on third line.
Page EA-38 – General Description of Dredged or Fill Material "there are two types of discharges *associated* with this project: the existing sediment behind...
Delete the space between "to and "stabilize" in ";and the placement of rock in the river to stabilize the remaining dam abutments."
Page EA-39 – Under Timing and Duration of Discharge: Delete the space between "the" and "first week of dam removal".
Page EA-41 – Under Aquatic Ecosystem and Organism Determinations, Effects on Benthos there are several extra spaces in these two sentences.
Page EA-42 – Effects on Aquatic Food Web. There are several extra spaces in these two sentences.

There appears to be no documentation of public involvement in the development of the draft Environmental Assessment. Here is a link to what NEPA says on this:
http://ceq.hss.doe.gov/nepa/regs/40/30-40.HTM#38

CFR › Title 40 › Chapter V › Part 1506 › Section 1506.6

- **PREV** |
- **NEXT**

40 CFR 1506.6 - PUBLIC INVOLVEMENT.

- CFR
- Currency
- Authorities (U.S. Code)

- Rulemaking

§ 1506.6
Public involvement.
Agencies shall:
(a) Make diligent efforts to involve the public in preparing and implementing their NEPA procedures.
(b) Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or affected.
(1) In all cases the agency shall mail notice to those who have requested it on an individual action.
(2) In the case of an action with effects of national concern notice shall include publication in the *Federal Register* and notice by mail to national organizations reasonably expected to be interested in the matter and may include listing in the *102 Monitor.* An agency engaged in rulemaking may provide notice by mail to national organizations who have requested that notice regularly be provided. Agencies shall maintain a list of such organizations.
(3) In the case of an action with effects primarily of local concern the notice may include:
(i) Notice to State and areawide clearinghouses pursuant to OMB Circular A-95 (Revised).
(ii) Notice to Indian tribes when effects may occur on reservations.
(iii) Following the affected State's public notice procedures for comparable actions.
(iv) Publication in local newspapers (in papers of general circulation rather than legal papers).
(v) Notice through other local media.
(vi) Notice to potentially interested community organizations including small business associations.
(vii) Publication in newsletters that may be expected to reach potentially interested persons.
(viii) Direct mailing to owners and occupants of nearby or affected property.
(ix) Posting of notice on and off site in the area where the action is to be located.
(c) Hold or sponsor public hearings or public meetings whenever appropriate or in accordance with statutory requirements applicable to the agency. Criteria shall include whether there is:
(1) Substantial environmental controversy concerning the proposed action or substantial interest in holding the hearing.
(2) A request for a hearing by another agency with jurisdiction over the action supported by reasons why a hearing will be helpful. If a draft environmental impact statement is to be considered at a public hearing, the agency should make the statement available to the public at least 15 days in advance (unless the purpose of the hearing is to provide information for the draft environmental impact statement).
(d) Solicit appropriate information from the public.
(e) Explain in its procedures where interested persons can get information or status reports on environmental impact statements and other elements of the NEPA process.

(f) Make environmental impact statements, the comments received, and any underlying documents available to the public pursuant to the provisions of the Freedom of Information Act (5 U.S.C. 552), without regard to the exclusion for interagency memoranda where such memoranda transmit comments of Federal agencies on the environmental impact of the proposed action. Materials to be made available to the public shall be provided to the public without charge to the extent practicable, or at a fee which is not more than the actual costs of reproducing copies required to be sent to other Federal agencies, including the Council.

USACE Response: Concur with all comments, except Pages EA-3 and EA-15. For EA-3, relief of owner's liability and maintenance needs is a secondary benefit of the project after the primary purpose of restoring a free-flowing condition of the river. For EA-15, according to the USACE's Engineer and Research Development Center website, the words hydrogeomorphic is one word and not hyphenated. Also, pertaining to the comment on public involvement in the EA development process, additional information on the public coordination process for this project will be added to the Final EA.

American Rivers
Rivers Connect Us

May 9, 2012

Mr. Minas M. Arabatzis
ATTN: Environmental Resources Branch
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Removal of Bloomsbury Dam on the Musconetcong River, Warren and Hunterdon Counties, NJ

Dear Mr. Arabatzis,

I am writing in support of the Bloomsbury Dam removal project. There are numerous efforts underway in the Delaware River Basin to restore tributary access for diadromous fishes, including river herring, American shad, American eel and striped bass. The Musconetcong River has been the focus of significant attention due to the potential to restore migratory pathways for diadromous fish and free-flowing conditions that support natural river processes. The Bloomsbury Dam is currently the third blockage on the Musconetcong River, which is a direct tributary to the undammed Delaware River; efforts are already underway to remove downstream barriers at Hughesville and Warren Glen. We support the use of dam removal to restore the Musconetcong River; dam removal restores connectivity and lotic conditions, and removes a public safety hazard.

American Rivers is the leading organization working to protect and restore the nation's rivers and streams. Rivers connect us to each other, nature, and future generations. Since 1973, American Rivers has fought to preserve these connections, helping protect and restore more than 150,000 miles of rivers through advocacy efforts, on-the-ground projects, and the annual release of *America's Most Endangered Rivers*™. American Rivers is a recognized leader in removal obsolete dams to improve fish and wildlife, water quality, public safety, and recreation. We are part of a partnership consisting of multiple non-profit organizations, and federal and state agencies – including American Rivers, Musconetcong Watershed Association, Trout Unlimited, National Park Service, Natural Resource Conservation Service, National Oceanic and Atmospheric Administration, US Fish and Wildlife Service, North Jersey Resource & Development Council, and the NJ Division of Fish and Wildlife – that have successfully coordinated the removal of four dams on the Musconetcong River since 2008. Most recently, American Rivers provided funding and technical guidance to the removal of the Finesville Dam in November 2011.

<u>In response to the Environmental Assessment released on April 9, 2012, please consider the following:</u>

With respect to Section 4.3 (Partial Removal of Dam): American Rivers supports the recommendation of partial removal, but there are several concerns regarding the presentation of this option in the EA: 1) If the dam is a concrete-encased timber crib, partial removal may not be an option (i.e, the structure may not be structurally sound), or at the very least, clean edges may not be an option; 2) partial removal may not be less expensive than full removal as noted in the EA. This is especially true if clean cut edges are desired on the exposed ends of the dam. Furthermore, there may be material costs associated with filling the area behind the remaining portions of the dam (as at Finesville); 3) The remaining sections alone may not provide the benefit of redirecting flows towards the center of the channel, as noted in

the EA; 4) We urge you to consider the lessons learned at Finesville regarding the scientific community's misconception of the historic interests. We suggest that USACE consider the motivation behind retaining a portion of the physical structure (e.g., structural support of embankments versus historic resource), and consult the appropriate interested parties (i.e., SHPO, local residents) for their input before making assumptions regarding the desired aesthetics of the post-removal condition. While the removal at Finesville is viewed as a success, several of the project partners agree that more of the structure could have been removed without negative feedback from historic/cultural interest groups. We suggest that the USACE participate in a continuous and open dialogue with all potentially interested parties in order to ensure that the design elements are appropriate and, more importantly, informed by project-specific commentary rather than pre-conceived ideas. Of course, as mentioned in the EA, it is likely that a Phase 1B Cultural Resources Survey will be required at the site – this survey will provide valuable information if dam removal is allowed to proceed. All dam removals are different and we cannot rely on the design of previous removals to set a standardized approach – even if they are recognized as successful. American Rivers has considerable experience with reconciling dam removal and historic preservation and are willing to assist, if needed.

With respect to Section 4.5 (Selected Plan): 1) We suggest that all efforts be made to dispose of non-hazardous material from the demolition on-site. Off-site disposal of non-hazardous material leads to unnecessary increases in construction costs (associated with hauling material); 2) Timber mats may not be required for in-channel work in New Jersey (typically required to protect wetlands from soil compaction).

With respect to Section 6.3 (Wetlands): We recommend that the Corps include plans for banks grading along the upper impoundment, as needed. Often times the exposed banks are steep and/or undercut; revegetation alone cannot address these potential issues. We suggest including these items as tentative in the future design plans; the need for inclusion of these elements can be determined once the channel has stabilized (i.e., several months post-removal).

American Rivers fully supports the removal of the Bloomsbury Dam. I am happy to provide further assistance to the U.S. Army Corps of Engineers as they undertake this important work. Please do not hesitate to contact me by telephone (856.786.9000) or e-mail (lcraig@americanrivers.org) if you require additional information or input.

Sincerely,

Laura Craig, Ph.D.
Associate Director, River Restoration Program (DE-NJ-PA)

Cc: Mark Eberle
Adrian Leary

USACE Response: Section 4.3 (Comments #1-3) - Concur. Additional information to answer these three comments will be gathered during the Design and Implementation Phase of the project.

Section 4.3 (Comment #4) - Concur. The partial removal of the dam is primarily for structural support of the embankments. In addition, the public and dam owners have been coordinated with in regards to the aesthetics of the post removal condition. Thanks to your organization for the offer of assistance in regards to historic issues.

Section 4.5 (Comment #1) - Partial concurrence. If the non-hazardous material can be reused on site in a reasonable, environmentally-acceptable manner, then that will be the case for this project; if not, the material will be properly disposed of according to appropriate state and federal laws.

Section 4.5 (Comment #2) - Concur. The necessity for timber mat use will be confirmed in the design and implementation phase of the project after coordination with NJDEP.

Section 6.3 - Partial concurrence. During the design and implementation phase of the project, we will investigate further the post removal bank grading and planting; however, the possibility of this being implemented will be directly related to Real Estate easements being acquired from private landowners that currently live along the impoundment.

Other - Thanks for your organization's support of this project.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY 9 2012

Minas M. Arabatzis, Chief
Planning Division
U.S. Army ACOE of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

ATTN: Mr. Mark Eberle

SUBJECT: Environmental Assessment for Removal of the Bloomsbury Dam on the Musconetcong River

Dear Mr. Arabatzis:

This responds to your letter dated April 9, 2012, pertaining to ongoing feasibility studies that the Philadelphia District, U.S. Army Corps of Engineers (ACOE) has been authorized to conduct within the Delaware River Basin. Pursuant to Section 404 of the Clean Water Act of 1977 and Section 10 of the Rivers and Harbors Act of 1899, you are proposing the removal of the Bloomsbury Dam in Warren and Hunterdon Counties, New Jersey. The project was developed in partnership with the New Jersey Department of Environmental Protection (NJDEP). In accordance with the National Environmental Policy Act, a draft Environmental Assessment (EA) has been developed for this project which concludes that the proposed action would not have a significant adverse impact on the environment. With your letter, you have solicited agency interest and/or commentary pertaining to existing environmental conditions within the watershed.

The Bloomsbury Dam is a run-of-the-river dam that is approximately 7 feet high and 170 feet long and situated within the Musconetcong River (River) between the Borough of Bloomsbury in Hunterdon County, New Jersey and Greenwich Township in Warren County, New Jersey. The proposed project is located approximately 8 miles up-river from the confluence of the Musconetcong River with the Delaware River. As a major tributary to the Delaware River, it is part of the 12,755 square mile Delaware River watershed.

Alternatives considered for the project included no-action and both partial and complete dam removal. Based on an evaluation of the various alternatives, including the environmental impacts, design elements, and costs, the partial dam removal option was chosen. Partial dam removal most successfully achieves the project goals, which include enhancing the aquatic habitat, improving local/resident fisheries by providing access to additional habitat, restoring the river to a more natural condition, and low future operational / maintenance costs. Partial removal of the dam would involve demolishing and excavating a majority of the dam, but

leaving sections of it in place on both sides of the river. Approximately 20 feet would be left on the south side and 50 feet on the north side.

The development of fluvial features and the exposure of new riparian areas are expected to occur under the partial dam removal plan. When the dam is removed and the elevation of the water surface in the impoundment is lowered, it will expose banks and sediments that are currently under water. Native vegetation will be used to stabilize the banks and provide habitat. The riparian stabilization and restoration plan will involve planting trees and shrubs on unconsolidated exposed mudflats and banks upstream of Bloomsbury Dam to create riparian habitat and provide erosion control upstream of the dam. When implemented, removal of the Bloomsbury Dam would restore the River's 8-mile connectivity to the Federally-designated National Wild and Scenic River as well as re-establish natural river ecological functions such as sediment and nutrient transport and would also re-establish the free passage of aquatic species including resident fish, amphibians, freshwater crustaceans, and macroinvertebrates.

There is also the potential of this removal eventually benefiting American shad (*Alosa sapidissima*) and river herring once the Hughsville and Warren Glen dams downstream are removed. The lower portion of the Musconetcong River at its confluence with the Delaware River provides habitat for a variety of NOAA trust resources including American shad, American eel (*Anguilla rostrata)* blueback herring (*Alosa aestivalis*), white perch (*Morone americana*), gizzard shad (*Dorosoma cepedianum*) and striped bass (*Morone saxatilis)*, which use the waterway downstream of the proposed project area as a migratory pathway. Presently, staff from NOAA's Restoration Center is assisting non-governmental organizations in their efforts to remove these barriers, and Restoration Center staff are available to work with you as well.

We appreciate the opportunity to comment on your EA for the Bloomsbury Dam Removal project as well as participate in the ongoing plan formulation process under the Feasibility Study for the Delaware and Musconetcong River watersheds. Furthermore, we support the your efforts to improve and to restore aquatic habitats throughout the Delaware River watersheds including the Lower Musconetcong River basin.

We look forward to continued coordination with you as subsequent project phases are developed. If you have any questions, please contact Brian May at 732 872-3116.

Sincerely,

Christopher Boelke
Mid-Atlantic Field Office Supervisor

cc: PRD – J. Crocker
RC- B. Bearmore

USACE Response: Thanks to your agency for their offer of assistance and support for this project.

WARREN COUNTY PLANNING DEPARTMENT
WAYNE DUMONT, JR. ADMINSTRATION BUILDING
165 COUNTY ROAD 519, SOUTH
BELVIDERE, NEW JERSEY 07823-1949

DAVID K. DECH
PLANNING DIRECTOR

Telephone: (908) 475-6532
Fax: (908) 475-6537
planningdept@co.warren.nj.us

May 7, 2012

Minas M. Arabatzis
US Army Corp of Engineers
Environmental Resources Branch
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

Dear Mr. Arabatzis:

I have reviewed the Finding of No Significant Impact (FONSI) concerning the Removal of the Bloomsbury Dam on the Musconetcong River. Page 32 of the FONSI discusses the preliminary hydrologic and hydraulic analysis. Having consulted with the County Engineer, the primary concern the County has with the partial removal of the dam is the impacts on the downstream CR 579 Bridge.

The FONSI states that during the design phase, the analysis will be completed in accordance with NJAC 7:20. The analysis should include:

1. An in depth hydraulic analysis of the river needs to be prepared to determine potential impacts on the downstream bridge and scouring of the channel.

2. Additional scour protection of the bridge abutments, wing walls and adjacent retaining walls need to be considered.

The results of the above analysis should be submitted to the Warren and Hunterdon County Engineers for their review and comment before any design is finalized.

Sincerely,

David K. Dech
Planning Director

rph
c: David B. Hicks, P.E., County Engineer
Steve Marvin, County Administrator
\\admin-nas\nasshare\planning\shared1\clerical\dkd\2012\2012 ltr arabatzis-fonsi response.doc

USACE Response: (Comment #1) - Concur. A hydraulic analysis will be completed for this project in the Design and Implementation Phase of this project. This analysis will then be shared with Warren County and other interested parties.
(Comment #2) - Concur. If further project analysis determines that additional scour protection of the bridge abutment is necessary, then that new component will be added to the final designs of the project.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
Phone Number (609) 292-3600
FAX NUMBER (609) 292-1921

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

May 22, 2012

Mr. Minas M. Arabatzis
Environmental Resources Branch
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Removal of the Bloomsbury Dam on the Musconetcong River
Warren and Hunterdon Counties, New Jersey

Comments on the Environmental Assessment

Dear Mr. Arabatzis:

The New Jersey Department of Environmental Protection's (Department) Office of Permit Coordination and Environmental Review (PCER) distributed, for review and comment, the Environmental Assessment (EA) for the proposed removal of the Bloomsbury Dam on the Musconetcong River in Warren and Hunterdon Counties, New Jersey. On behalf of the Department, we offer the following comments for your consideration.

Natural Resources

The Department's Division of Fish and Wildlife (DFW) recommends a time restriction for any in-water and sediment generating activities from 3/15 thru 6/15 to protect trout maintenance waters and trout stocked waters.

The DFW's Bureau of Freshwater Fisheries (BFF) concurs that the sediment behind the dam has no contaminant concerns, there is some concern about the amount of sediment which will move downstream after removal.

The BFF also agrees that restoring riverine habitat and the natural movement of materials (sediment, nutrients, woody debris) down the river will benefit a variety of fish and wildlife resources and enhance benthic organisms when the percentages of inorganic and organic debris

closely match those in a natural riverine habitat. The sediment behind the dam (approx. 6000 cubic yards) is comprised of approximately 98% sand and gravel (EA-21). The contention that "This could degrade downstream benthic habitat for a short period of time until the natural sediment transport processes of the river can restore the pre-dam conditions. "(EA-30, 31) is somewhat subjective.

As suggested in the following paragraph, "The frequency of large storms and flood events following dam removal will play a large role in determining how much and how fast the sediment will be transported...," (EA-31). This means that approx. 2 miles (distance, at present, to Warren Mill Dam) of river could be impacted for quite a long time also.

The DFW looks forward to review of the sediment transport analysis (EA-31) and modeling to be performed to more accurately forecast the movement of sediment following the dam removal.

Cultural Resources

The Department's New Jersey Historic Preservation Office's (HPO) previously had an opportunity to comment on this proposed project when the following cultural resource survey was received by our office on October 4, 2011:

Yates, Sharon
2011 Cultural Resources Investigations, Bloomsburg Dam, Borough of Bloomsbury, Hunterdon County, New Jersey, Greenwich Township, Warren County, New Jersey. Prepared for United States Army, Corps of Engineers, Philadelphia District, Philadelphia, PA. Prepared by A.D. Marble & Company, Conshohocken, PA.

In their letter dated December 30, 2011, the HPO concurred with the assessments for each of the project alternatives outlined in the above-referenced Phase IA report. Please be aware, the Bloomsbury Dam is located adjacent to the North Bloomsbury Historic District (SHPO opinion 12/09/1999). However, an assessment of the Bloomsbury Dam was not included as part of the 1999 survey for the North Bloomsbury Historic District. As part of the undertaking, the area of potential effects (APE) still needs to be specifically defined for the proposed project. Based on the information provided, partial removal of the dam is the proposed action. Since the project will involve alteration to the dam structure itself, an archaeological APE must be established for all areas of proposed ground disturbance, access roads, and lay down areas. The purpose of the archaeological APE is to assess the impacts any ground disturbance will have on potential archaeological historic properties. Therefore, pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulations, 36 CFR §800, identification of historic properties still needs to be completed.

If through consultation, the dam is found to be individually eligible or a contributing element to the historic district, the removal of the dam would constitute an adverse effect on the historic property. To mitigate any adverse effects; the HPO previously recommended one potential option to the United States Army Corps of Engineers (the Corps): the development of a historic waterpower context study on the Musconetcong River, for the identification of National Register eligible elements for future dam projects. The HPO looks forward to further consultation with

the Corps to identify, evaluate, avoid, minimize and/or mitigate project adverse effects on any historic properties, pursuant to Section 106 of the National Historic Preservation Act.

Engineering and Construction

Submission of a Dam Safety permit application, including plans, specifications and a design report will be required. The application should address all items listed at N.J.A.C. 7:20-1.7(h)1-9, with the following exception.

The item below (corresponding to N.J.A.C. 7:20-1.7(h)8) has already been adequately addressed in the EA.

1. A description of the potential effects of the dam removal upon the environment.

It is also noted that the dam is located in the Highlands Preservation Area. Based on prior experience with dam removals in the Highlands, the Department's Bureau of Dam Safety, Flood Control and Flood Plain Management expects that the project will meet Highlands exemption criteria. The Bureau of Dam Safety, Flood Control and Flood Plain Management will confirm this after receipt of the Dam Safety permit application.

N.J.A.C. 7:20 (the NJ Dam Safety Standards) can be found online at http://www.nj.gov/dep/damsafety/rules.htm

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to comment on the EA.

Sincerely,

Scott Brubaker

Scott Brubaker, Director
Office of Permit Coordination
and Environmental Review

C: Ken Koschek, NJDEP - PCER
Donna Mahon, NJDEP - PCER
Shelley Coltrain, NJDEP - Natural & Historic Resources
Jesse West-Rosenthal, NJDEP – HPO
Kelly Davis, NJDEP – DFW

USACE Response: (Natural Resource Comments) - Concur. In addition, when the sediment transport model is completed, this will be shared with NJ Division of Fish and Wildlife.
(Cultural Resource Comment) - Concur. The USACE will complete the Section 106 consultation process with NJSHPO prior to project implementation.
(Engineering and Construction Comment) - Not concur. The final designs for this project will be coordinated with NJDEP Office of Permit Coordination and Environmental Review, as well as, the NJ Dam Safety Section. However, the USACE does not apply for State permits. Being a Federal agency, the USACE uses the National Environmental Policy Act (NEPA) public review process to coordinate the anticipated impacts of the project with the public and appropriate State and Federal agencies. In addition, we use the prepared NEPA document (Environmental Assessment) to request appropriate State and Federal approvals; so a future request will be made to NJDEP's Office of Permit Coordination and Environmental Review for a State 401 Water Quality Certificate to complete this project.

FEASIBILITY REPORT

APPENDIX A

COST ESTIMATES

Bloomsbury Dam Removal (Full)

Estimated by	Harry Steiner
Designed by	Gizella Geissele
Prepared by	Harry Steiner
Preparation Date	1/11/2011
Effective Date of Pricing	1/11/2011
Estimated Construction Time	60 Days

Description **Page**

Designed by
Gizella Geissele
Estimated by
Harry Steiner
Prepared by
Harry Steiner

Design Document	Conceptual Estimate
Document Date	1/11/2011
District	Philadelphia District
Contact	Harry Steiner
Budget Year	2011
UOM System	Original

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	1/11/2011
Escalation Date	1/11/2011
Eff. Pricing Date	1/11/2011
Estimated Duration	60 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB10EB: MII English Cost Book 2010

Labor Region 1: Labor Region 1 -2010
Note: - http://www.wdol.gov/

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP09R01: MII Equipment Region 1 2009

01 NORTHEAST

Sales Tax	5.80
Working Hours per Year	1,360
Labor Adjustment Factor	1.12
Cost of Money	4.88
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.142
Gas	3.010
Diesel Off-Road	3.170
Diesel On-Road	3.710

Shipping Rates

Over 0 CWT	17.42
Over 240 CWT	16.01
Over 300 CWT	13.92
Over 400 CWT	11.96
Over 500 CWT	6.15
Over 700 CWT	6.15
Over 800 CWT	9.14

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Date	Author	Note
1/19/2011	HPS	Summary of Work: This CWE will be based on the following construction process:1. Mobilization of Equipment - Equipment to consist of one Marsh Buggy (Possibly Wilco Brand), two trucks for disposal of material, small miscellaneous equipment.2. Work will be performed in the wet. Marsh Buggy will excavate and remove material as needed on the upstream side of the dam to position equipment for demolition of Wood Crib Dam.3. Material will be excavated and loaded onto either land or truck and then rehandled to area for material to dry before being hauled to disposal site. 4. This CWE will assume a one day wait after initial penetration of dam to allow upstream side of this structure to settle and possibly lower water level.5. After material has been removed and sorted, select excavated rock will be used as riprap around remaining abutments left intact. This CWE will assume that 50% of excavated rock will be left on site for protection of structure left in place.6. Demobilization and Restoration of work area.Note: (1) All material not captured in excavation may wash downstream for purposes of this estimate.(2) It is assumed until further studies can be made that timber crib is embedded under 12" concrete cover and that 1-2 ton rock to be removed is located in timber crib voids.(3) This IGE does not include cost to fill in scour hole.This CWE does not include Environmental Assessment cost.This CWE includes PE&D, S&A, Real Estate and Project Management costs.This CWE includes JOOH, HOOH, Profit, Bond and Contingency.Escalation cost based on a midpoint of construction July 2012.

Direct Cost Markups

Productivity
Overtime

	Days/Week	Hours/Shift	Shifts/Day
Standard	*5.00*	*8.00*	*1.00*
Actual	*5.00*	*8.00*	*1.00*

Day	*OT Factor*	*Working*
Monday	*1.50*	*Yes*
Tuesday	*1.50*	*Yes*
Wednesday	*1.50*	*Yes*
Thursday	*1.50*	*Yes*
Friday	*1.50*	*Yes*
Saturday	*1.50*	*No*
Sunday	*2.00*	*No*

Sales Tax
MatlCost

Category

Productivity
Overtime

TaxAdj

Method

Productivity
Overtime

1st Shift	*2nd Shift*	*3rd Shift*
8.00	*0.00*	*0.00*
8.00	*0.00*	*0.00*

OT Percent	*FCCM Percent*
0.00	*0.00*

Running % on Selected Costs

Contractor Markups

JOOH
HOOH
Profit
Bond

Category

JOOH
HOOH
Profit
Bond

Method

Direct %
Running %
Running %
Running %

Owner Markups

Escalation

StartDate	*StartIndex*	*EndDate*	*EndIndex*	*Escalation*
1/11/2011	*696.60*	*7/11/2012*	*717.65*	*3.02*

Contingency
SIOH

Category

Escalation

Contingency
SIOH

Method

Escalation

Running %
Running %

Currency in US dollars

Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
Project Bare to Direct Report			**598,083**	**0**	**0**	**21,639**	**14,161**	**635,040**
Mobilization/Demobilization	**1.00**	**LS**	**20,475**	**0**	**0**	**74**	**44**	**20,594**
			20,000.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*20,000.00*
RSM 015436500100 Mobilization and demobilization, dozer, loader, backhoe or excavator, above 150 H.P., (Marsh Buggy) equivelant of cat 320.	1.00	EA	20,000	0	0	0	0	20,000
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
			237.66	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*296.96*
RSM 015436501150 Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00	EA	475	0	0	74	44	594
Demolition/Removal	**1.00**	**LS**	**135,545**	**0**	**0**	**16,637**	**10,669**	**163,822**
Concrete and Timber Pile Removal	**1.00**	**LS**	**135,545**	**0**	**0**	**16,637**	**10,669**	**163,822**
			191.60	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*260.72*
RSM 030505100060 Selective concrete demolition, average reinforcing, break up into small pieces, excludes shoring, bracing, saw or torch cutting, loading, hauling, dumping	200.00	CY	38,320	0	0	8,313	5,512	52,145
			26.14	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*34.78*
HNC 312316340600 Rock excavation, dense rock, with air hammer	291.00	BCY	7,607	0	0	1,512	1,003	10,121
			329.93	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*375.77*
USR Floating Excavator (Marsh Buggy Cat 320)	176.00	HR	58,067	0	0	5,005	3,064	66,136
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
			5.30	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*6.20*
RSM 312323203696 Cycle hauling (wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 16.5 CY truck, cycle 10 miles, 45 MPH, excludes loading equipment	571.00	LCY	3,028	0	0	319	192	3,539
(Note: Added 25% for loading in severe conditions. Approximately 145 cy of rock tol be reused at site.)								
			82.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*86.92*
RSM 024119190100 Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only (Concrete)	184.00	TON	15,088	0	0	0	0	15,993
(Note: Based on 200 cy @ .92 tons/cy (Concrete))								
			75.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*79.50*
RSM 024119190200 Selective demolition, dump charges, typical urban city, trees, brush, lumber, includes tipping fees only (Timber Piles only)	7.60	TON	570	0	0	0	0	604

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
(Note: Timber piles estimated @ 225cy. 12" diameter @ 20 lf (221 ea) = 128 cy and 12" diameter @ 15 lf (221 ea) = 97 cy . Based on 2.5# per cf. 225 cy = 6,075 cf *2.5# = 15,187.5 #'s.)								
			32.98	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*37.03*
RSM 313713100100 Rip-rap and rock lining, random, broken stone, machine placed for slope protection	145.00	LCY	4,782	0	0	350	220	5,370
(Note: Used material cost for miscellaneous material cost. Rip rap to be rock from dam removal. Assumed 50% of 290 cy of rock estimated for removal.)								
			3.19	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*3.76*
HNC 312323180240 Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip @ 20 MPH (4.2 cycles/hour), 8 C.Y. truck, highway haulers, excludes loading	146.00	LCY	466	0	0	52	31	549
(Note: Assumed material Rock and sediment from dam will be placed in a nearby area for drying and then rehandled to disposal site. Reduced production rate by 15% for loading.)								
			238.00	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*292.65*
HNC 024119252260 Saw cutting, concrete walls, rod reinforcing, per inch of depth	32.00	LF	7,616	0	0	1,087	648	9,365
			4,000.00	*0.00%*				*4,000.00*
Signage	**1.00**	**EA**	**4,000**	**0**	**0**	**0**	**0**	**4,000**
USR Place Holder for signage	1.00	LS	4,000	0	0	0	0	4,000
(Note: This cost will be adjusted as design progresses.)								
			11,400.72	*0.00%*				*13,460.77*
Regrading of Banks/Seeding	**0.50**	**ACR**	**5,700**	**0**	**0**	**604**	**378**	**6,730**
			0.58	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*0.64*
RSM 329219131100 Seeding, mechanical seeding baron push spreader, includes lime, fertilizer and seed	2,420.00	SY	1,397	0	0	61	38	1,544
(Note: estimate .5 acres)								
			1.78	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*2.14*
RSM 312216101050 Fine grading, fine grade for small irregular areas, to 15,000 S.Y.	2,420.00	SY	4,303	0	0	543	340	5,186
(Note: 1/2 acre.)								
			28.60	*0.00%*				*31.58*
Fence Repair	**100.00**	**LF**	**2,860**	**0**	**0**	**97**	**62**	**3,158**
			28.02	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*30.82*
RSM 323113200500 Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	100.00	LF	2,802	0	0	87	55	3,082
			0.58	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*0.75*
RSM 024113621400 Selective demolition, chain link fences & gates, fence, fabric & accessories, fence rails	100.00	LF	58	0	0	11	7	75

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
			19,502.56	*0.00%*				*26,736.44*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**19,503**	**0**	**0**	**4,226**	**3,008**	**26,736**
			41.80	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*57.31*
FOP FC-ENCGF Hydrogeologist	176.00	HR	7,357	0	0	1,599	1,131	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
			27.21	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*37.29*
FOP FD-SAENG Safety Engineers	176.00	HR	4,789	0	0	1,027	746	6,563
(Note: Assumed a Occupation Code of #29086 Engineer Technician III 30083)								
			41.80	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*57.31*
FOP FC-ENCGF Archeologist	176.00	HR	7,357	0	0	1,599	1,131	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
Surveys	**1.00**	**LS**	**60,000**	**0**	**0**	**0**	**0**	**60,000**
USR Surveys	1.00	LS	60,000	0	0	0	0	60,000
PE&D	**1.00**	**LS**	**205,000**	**0**	**0**	**0**	**0**	**205,000**
USR P, E& D	1.00	LS	205,000	0	0	0	0	205,000
Lands & Damages (Real Estate)	**1.00**	**LS**	**20,000**	**0**	**0**	**0**	**0**	**20,000**
USR Real Estate	1.00	LS	20,000	0	0	0	0	20,000
Project Management	**1.00**	**LS**	**60,000**	**0**	**0**	**0**	**0**	**60,000**
USR Project Management	1.00	LS	60,000	0	0	0	0	60,000
Cultural Resources	**1.00**	**LS**	**65,000**	**0**	**0**	**0**	**0**	**65,000**
USR Cultural Resources	1.00	LS	65,000	0	0	0	0	65,000

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
Project Direct Costs Report				**135,458**	**36,353**	**20,430**	**442,800**	**635,040**
Mobilization/Demobilization	**1.00**	**LS**	**PC Prime Contractor**	**460**	**134**	**0**	**20,000**	**20,594**
				0.00	*0.00*	*0.00*	*20,000.00*	*20,000.00*
RSM 015436500100 Mobilization and demobilization, dozer, loader, backhoe or excavator, above 150 H.P., (Marsh Buggy) equivelant of cat 320.	1.00	EA	PC Prime Contractor	0	0	0	20,000	20,000
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
				229.96	*67.00*	*0.00*	*0.00*	*296.96*
RSM 015436501150 Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00	EA	PC Prime Contractor	460	134	0	0	594
Demolition/Removal	**1.00**	**LS**	**Site Work Subcontractor**	**103,895**	**33,981**	**17,145**	**8,800**	**163,822**
Concrete and Timber Pile Removal	**1.00**	**LS**	**Site Work Subcontractor**	**103,895**	**33,981**	**17,145**	**8,800**	**163,822**
				260.72	*0.00*	*0.00*	*0.00*	*260.72*
RSM 030505100060 Selective concrete demolition, average reinforcing, break up into small pieces, excludes shoring, bracing, saw or torch cutting, loading, hauling, dumping	200.00	CY	Site Work Subcontractor	52,145	0	0	0	52,145
				32.59	*2.19*	*0.00*	*0.00*	*34.78*
HNC 312316340600 Rock excavation, dense rock, with air hammer	291.00	BCY	Site Work Subcontractor	9,484	637	0	0	10,121
				176.52	*149.26*	*0.00*	*50.00*	*375.77*
USR Floating Excavator (Marsh Buggy Cat 320)	176.00	HR	Site Work Subcontractor	31,067	26,269	0	8,800	66,136
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
				3.46	*2.74*	*0.00*	*0.00*	*6.20*
RSM 312323203696 Cycle hauling (wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 16.5 CY truck, cycle 10 miles, 45 MPH, excludes loading equipment	571.00	LCY	Site Work Subcontractor	1,975	1,564	0	0	3,539
(Note: Added 25% for loading in severe conditions. Approximately 145 cy of rock tol be reused at site.)								

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
				0.00	*0.00*	*86.92*	*0.00*	*86.92*
RSM 024119190100 Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only (Concrete)	184.00	TON	Site Work Subcontractor	0	0	15,993	0	15,993
(Note: Based on 200 cy @ .92 tons/cy (Concrete))								
				0.00	*0.00*	*79.50*	*0.00*	*79.50*
RSM 024119190200 Selective demolition, dump charges, typical urban city, trees, brush, lumber, includes tipping fees only (Timber Piles only)	7.60	TON	Site Work Subcontractor	0	0	604	0	604
(Note: Timber piles estimated @ 225cy. 12" diameter @ 20 lf (221 ea) = 128 cy and 12" diameter @ 15 lf (221 ea) = 97 cy . Based on 2.5# per cf. 225 cy = 6,075 cf *2.5# = 15,187.5 #'s.)								
				15.03	*19.88*	*2.12*	*0.00*	*37.03*
RSM 313713100100 Rip-rap and rock lining, random, broken stone, machine placed for slope protection	145.00	LCY	Site Work Subcontractor	2,180	2,883	307	0	5,370
(Note: Used material cost for miscellaneous material cost. Rip rap to be rock from dam removal. Assumed 50% of 290 cy of rock estimated for removal.)								
				2.19	*1.57*	*0.00*	*0.00*	*3.76*
HNC 312323180240 Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip @ 20 MPH (4.2 cycles/hour), 8 C.Y. truck, highway haulers, excludes loading	146.00	LCY	Site Work Subcontractor	320	229	0	0	549
(Note: Assumed material Rock and sediment from dam will be placed in a nearby area for drying and then rehandled to disposal site. Reduced production rate by 15% for loading.)								
				210.16	*74.98*	*7.50*	*0.00*	*292.65*
HNC 024119252260 Saw cutting, concrete walls, rod reinforcing, per inch of depth	32.00	LF	Site Work Subcontractor	6,725	2,399	240	0	9,365
				0.00	*0.00*	*0.00*	*4,000.00*	*4,000.00*
Signage	**1.00**	**EA**	**PC Prime Contractor**	**0**	**0**	**0**	**4,000**	**4,000**
USR Place Holder for signage	1.00	LS	PC Prime Contractor	0	0	0	4,000	4,000
(Note: This cost will be adjusted as design progresses.)								
				7,516.39	*4,251.34*	*1,693.03*	*0.00*	*13,460.77*
Regrading of Banks/Seeding	**0.50**	**ACR**	**PC Prime Contractor**	**3,758**	**2,126**	**847**	**0**	**6,730**
				0.16	*0.13*	*0.35*	*0.00*	*0.64*
RSM 329219131100 Seeding, mechanical seeding baron push spreader, includes lime, fertilizer and seed	2,420.00	SY	PC Prime Contractor	382	316	847	0	1,544
(Note: estimate .5 acres)								
				1.40	*0.75*	*0.00*	*0.00*	*2.14*

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
RSM 312216101050 Fine grading, fine grade for small irregular areas, to 15,000 S.Y.	2,420.00	SY	PC Prime Contractor	3,376	1,809	0	0	5,186
(Note: 1/2 acre.)								
				6.08	*1.12*	*24.38*	*0.00*	*31.58*
Fence Repair	**100.00**	**LF**	**PC Prime Contractor**	**608**	**112**	**2,438**	**0**	**3,158**
				5.41	*1.03*	*24.38*	*0.00*	*30.82*
RSM 323113200500 Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	100.00	LF	Site Work Subcontractor	541	103	2,438	0	3,082
				0.67	*0.09*	*0.00*	*0.00*	*0.75*
RSM 024113621400 Selective demolition, chain link fences & gates, fence, fabric & accessories, fence rails	100.00	LF	PC Prime Contractor	67	9	0	0	75
				26,736.44	*0.00*	*0.00*	*0.00*	*26,736.44*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**PC Prime Contractor**	**26,736**	**0**	**0**	**0**	**26,736**
				57.31	*0.00*	*0.00*	*0.00*	*57.31*
FOP FC-ENCGF Hydrogeologist	176.00	HR	PC Prime Contractor	10,087	0	0	0	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
				37.29	*0.00*	*0.00*	*0.00*	*37.29*
FOP FD-SAENG Safety Engineers	176.00	HR	PC Prime Contractor	6,563	0	0	0	6,563
(Note: Assumed a Occupation Code of #29086 Engineer Technician III 30083)								
				57.31	*0.00*	*0.00*	*0.00*	*57.31*
FOP FC-ENCGF Archeologist	176.00	HR	PC Prime Contractor	10,087	0	0	0	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
Surveys	**1.00**	**LS**		**0**	**0**	**0**	**60,000**	**60,000**
USR Surveys	1.00	LS		0	0	0	60,000	60,000
PE&D	**1.00**	**LS**		**0**	**0**	**0**	**205,000**	**205,000**
USR P, E& D	1.00	LS		0	0	0	205,000	205,000
Lands & Damages (Real Estate)	**1.00**	**LS**		**0**	**0**	**0**	**20,000**	**20,000**
USR Real Estate	1.00	LS		0	0	0	20,000	20,000
Project Management	**1.00**	**LS**		**0**	**0**	**0**	**60,000**	**60,000**
USR Project Management	1.00	LS		0	0	0	60,000	60,000

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
Cultural Resources	**1.00**	**LS**		**0**	**0**	**0**	**65,000**	**65,000**
USR Cultural Resources	1.00	LS		0	0	0	65,000	65,000

Description	Quantity	UOM	DirectCost	Allowance	JOOH	HOOH	Profit	Bond	MiscContract	CostToPrime
Cost to Prime			**635,040.01**	**0.00**	**22,504.00**	**24,754.40**	**27,229.84**	**1,160.69**	**0.00**	**280,285.17**
Mobilization/Demobilization	**1.0000**	**LS**	**20,593.92**	**0.00**	**2,059.39**	**2,265.33**	**2,491.86**	**411.16**	**0.00**	**20,593.92**
Demolition/Removal	**1.0000**	**LS**	**163,821.54**	**0.00**	**16,382.15**	**18,020.37**	**19,822.41**	**0.00**	**0.00**	**218,046.47**
Concrete and Timber Pile Removal	**1.0000**	**LS**	**163,821.54**	**0.00**	**16,382.15**	**18,020.37**	**19,822.41**	**0.00**	**0.00**	**218,046.47**
			4,000.0000							*4,000.0000*
Signage	**1.0000**	**EA**	**4,000.00**	**0.00**	**400.00**	**440.00**	**484.00**	**79.86**	**0.00**	**4,000.00**
			13,460.7660							*13,460.7660*
Regrading of Banks/Seeding	**0.5000**	**ACR**	**6,730.38**	**0.00**	**673.04**	**740.34**	**814.38**	**134.37**	**0.00**	**6,730.38**
			31.5772							*41.7795*
Fence Repair	**100.0000**	**LF**	**3,157.72**	**0.00**	**315.77**	**347.35**	**382.08**	**1.51**	**0.00**	**4,177.95**
			26,736.4393							*26,736.4393*
Water Quality/Safety/Hydrogeologist	**1.0000**	**EA**	**26,736.44**	**0.00**	**2,673.64**	**2,941.01**	**3,235.11**	**533.79**	**0.00**	**26,736.44**
Surveys	**1.0000**	**LS**	**60,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
PE&D	**1.0000**	**LS**	**205,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Lands & Damages (Real Estate)	**1.0000**	**LS**	**20,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Project Management	**1.0000**	**LS**	**60,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Cultural Resources	**1.0000**	**LS**	**65,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	CostToPrime	JOOH_PRM	HOOH_PRM	Profit_PRM	Bond_PRM	ContractCost
Contract Cost			**280,285.17**	**28,028.52**	**30,831.37**	**33,914.51**	**5,595.89**	**788,655.46**
Mobilization/Demobilization	**1.0000**	**LS**	**20,593.92**	**2,059.39**	**2,265.33**	**2,491.86**	**411.16**	**27,821.67**
Demolition/Removal	**1.0000**	**LS**	**218,046.47**	**21,804.65**	**23,985.11**	**26,383.62**	**4,353.30**	**294,573.15**
Concrete and Timber Pile Removal	**1.0000**	**LS**	**218,046.47**	**21,804.65**	**23,985.11**	**26,383.62**	**4,353.30**	**294,573.15**
			4,000.0000					*5,403.8600*
Signage	**1.0000**	**EA**	**4,000.00**	**400.00**	**440.00**	**484.00**	**79.86**	**5,403.86**
			13,460.7660					*18,185.0237*
Regrading of Banks/Seeding	**0.5000**	**ACR**	**6,730.38**	**673.04**	**740.34**	**814.38**	**134.37**	**9,092.51**
			41.7795					*56.4427*
Fence Repair	**100.0000**	**LF**	**4,177.95**	**417.80**	**459.58**	**505.53**	**83.41**	**5,644.27**
			26,736.4393					*36,119.9937*
Water Quality/Safety/Hydrogeologist	**1.0000**	**EA**	**26,736.44**	**2,673.64**	**2,941.01**	**3,235.11**	**533.79**	**36,119.99**
Surveys	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60,000.00**
PE&D	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**205,000.00**
Lands & Damages (Real Estate)	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20,000.00**
Project Management	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60,000.00**
Cultural Resources	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**65,000.00**

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	ContractCost	ProjectCost
Project Cost Summary Report			**788,655**	**906,605**
Mobilization/Demobilization	**1.00**	**LS**	**27,822**	**36,488**
Demolition/Removal	**1.00**	**LS**	**294,573**	**386,332**
Concrete and Timber Pile Removal	**1.00**	**LS**	**294,573**	**386,332**
			5,403.86	*7,087.14*
Signage	**1.00**	**EA**	**5,404**	**7,087**
			18,185.02	*23,849.59*
Regrading of Banks/Seeding	**0.50**	**ACR**	**9,093**	**11,925**
			56.44	*74.02*
Fence Repair	**100.00**	**LF**	**5,644**	**7,402**
			36,119.99	*47,371.23*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**36,120**	**47,371**
Surveys	**1.00**	**LS**	**60,000**	**60,000**
PE&D	**1.00**	**LS**	**205,000**	**205,000**
Lands & Damages (Real Estate)	**1.00**	**LS**	**20,000**	**20,000**
Project Management	**1.00**	**LS**	**60,000**	**60,000**
Cultural Resources	**1.00**	**LS**	**65,000**	**65,000**

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Bloomsbury Dam Removal (Partial)

Estimated by	Harry Steiner
Designed by	Gizella Geissele
Prepared by	Harry Steiner
Preparation Date	1/11/2011
Effective Date of Pricing	1/11/2011
Estimated Construction Time	60 Days

Description **Page**

Designed by
Gizella Geissele
Estimated by
Harry Steiner
Prepared by
Harry Steiner

Design Document	Conceptual Estimate
Document Date	1/11/2011
District	Philadelphia District
Contact	Harry Steiner
Budget Year	2011
UOM System	Original

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	1/11/2011
Escalation Date	1/11/2011
Eff. Pricing Date	1/11/2011
Estimated Duration	60 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB10EB: MII English Cost Book 2010

Labor Region 1: Labor Region 1 -2010
Note: - http://www.wdol.gov/

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP09R01: MII Equipment Region 1 2009

01 NORTHEAST

Sales Tax	5.80
Working Hours per Year	1,360
Labor Adjustment Factor	1.12
Cost of Money	4.88
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.142
Gas	3.010
Diesel Off-Road	3.170
Diesel On-Road	3.710

Shipping Rates

Over 0 CWT	17.42
Over 240 CWT	16.01
Over 300 CWT	13.92
Over 400 CWT	11.96
Over 500 CWT	6.15
Over 700 CWT	6.15
Over 800 CWT	9.14

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Date	Author	Note
1/19/2011	HPS	Summary of Work: This CWE will be based on the following construction process:1. Mobilization of Equipment - Equipment to consist of one Marsh Buggy (Possibly Wilco Brand), two trucks for disposal of material, small miscellaneous equipment.2. Work will be performed in the wet. Marsh Buggy will excavate and remove material as needed on the upstream side of the dam to position equipment for demolition of Wood Crib Dam.3. Material will be excavated and loaded onto either land or truck and then rehandled to area for material to dry before being hauled to disposal site. 4. This CWE will assume a one day wait after initial penetration of dam to allow upstream side of this structure to settle and possibly lower water level.5. After material has been removed and sorted, select excavated rock will be used as riprap around remaining abutments left intact. This CWE will assume that 50% of excavated rock will be left on site for protection of structure left in place.6. Demobilization and Restoration of work area.Note: (1) All material not captured in excavation may wash downstream for purposes of this estimate.(2) It is assumed until further studies can be made that timber crib is embedded under 12" concrete cover and that 1-2 ton rock to be removed is located in timber crib voids.(3) This IGE does not include cost to fill in scour hole.This CWE does not include Environmental Assessment cost.This CWE includes PE&D, S&A, Real Estate and Project Management costs.This CWE includes JOOH, HOOH, Profit, Bond and Contingency.Escalation cost based on a midpoint of construction July 2012.

Direct Cost Markups

Productivity
Overtime

	Days/Week	Hours/Shift	Shifts/Day
Standard	*5.00*	*8.00*	*1.00*
Actual	*5.00*	*8.00*	*1.00*

Day	*OT Factor*	*Working*
Monday	*1.50*	*Yes*
Tuesday	*1.50*	*Yes*
Wednesday	*1.50*	*Yes*
Thursday	*1.50*	*Yes*
Friday	*1.50*	*Yes*
Saturday	*1.50*	*No*
Sunday	*2.00*	*No*

Sales Tax
MatlCost

Category

Productivity
Overtime

1st Shift	2nd Shift	3rd Shift
8.00	*0.00*	*0.00*
8.00	*0.00*	*0.00*

TaxAdj

Method

Productivity
Overtime

OT Percent	FCCM Percent
0.00	*0.00*

Running % on Selected Costs

Contractor Markups

JOOH
HOOH
Profit
Bond

Category

JOOH
HOOH
Profit
Bond

Method

Direct %
Running %
Running %
Running %

Owner Markups

Escalation

StartDate	StartIndex	EndDate
1/11/2011	*696.60*	*7/11/2012*

Contingency
SIOH

Category

Escalation

EndIndex	Escalation
717.65	*3.02*

Contingency
SIOH

Method

Escalation
Running %
Running %

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
Project Bare to Direct Report			**571,108**	**0**	**0**	**17,417**	**11,374**	**600,675**
Mobilization/Demobilization	**1.00**	**LS**	**20,475**	**0**	**0**	**74**	**44**	**20,594**
			20,000.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*20,000.00*
RSM 015436500100 Mobilization and demobilization, dozer, loader, backhoe or excavator, above 150 H.P., (Marsh Buggy) equivelant of cat 320.	1.00	EA	20,000	0	0	0	0	20,000
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
			237.66	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*296.96*
RSM 015436501150 Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00	EA	475	0	0	74	44	594
Demolition/Removal	**1.00**	**LS**	**108,570**	**0**	**0**	**12,415**	**7,882**	**129,457**
Concrete and Timber Pile Removal	**1.00**	**LS**	**108,570**	**0**	**0**	**12,415**	**7,882**	**129,457**
			191.60	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*260.72*
RSM 030505100060 Selective concrete demolition, average reinforcing, break up into small pieces, excludes shoring, bracing, saw or torch cutting, loading, hauling, dumping	118.00	CY	22,609	0	0	4,904	3,252	30,765
			26.14	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*34.78*
HNC 312316340600 Rock excavation, dense rock, with air hammer	171.00	BCY	4,470	0	0	888	589	5,947
			329.93	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*375.77*
USR Floating Excavator (Marsh Buggy Cat 320)	176.00	HR	58,067	0	0	5,005	3,064	66,136
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
			5.30	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*6.20*
RSM 312323203696 Cycle hauling (wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 16.5 CY truck, cycle 10 miles, 45 MPH, excludes loading equipment	307.00	LCY	1,628	0	0	171	103	1,903
(Note: Added 25% for loading in severe conditions. Approximately 145 cy of rock to be reused at site. 452 cy - 145 cy = 307 cy)								
			82.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*86.92*
RSM 024119190100 Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only Concrete	108.56	TON	8,902	0	0	0	0	9,436
(Note: Based on 118 cy @ .92 tons/cy (Concrete))								
			75.00	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*79.50*
RSM 024119190200 Selective demolition, dump charges, typical urban city, trees, brush, lumber, includes tipping fees only (Timber Piles only)	5.50	TON	413	0	0	0	0	437

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Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
(Note: Timber piles estimated @ 163 cy. 12" diameter @ 20 lf (170 ea) = 98 cy and 12" diameter @ 15 lf (150 ea) = 65 cy . Based on 2.5# per cf. 163 cy = 4,401 cf *2.5# = 11,002.5 #'s.)								
			32.98	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*37.03*
RSM 313713100100 Rip-rap and rock lining, random, broken stone, machine placed for slope protection	145.00	LCY	4,782	0	0	350	220	5,370
(Note: Used material cost for miscellaneous material cost. Rip rap to be rock from dam removal. Assumed 50% of 290 cy of rock estimated for removal.)								
			3.19	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*3.76*
HNC 312323180240 Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip @ 20 MPH (4.2 cycles/hour), 8 C.Y. truck, highway haulers, excludes loading	26.00	LCY	83	0	0	9	6	98
(Note: Assumed material Rock and sediment from dam will be placed in a nearby area for drying and then rehandled to disposal site. Reduced production rate by 15% for loading.)								
			238.00	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*292.65*
HNC 024119252260 Saw cutting, concrete walls, rod reinforcing, per inch of depth	32.00	LF	7,616	0	0	1,087	648	9,365
			4,000.00	*0.00%*				*4,000.00*
Signage	**1.00**	**EA**	**4,000**	**0**	**0**	**0**	**0**	**4,000**
USR Place Holder for Signage	1.00	LS	4,000	0	0	0	0	4,000
(Note: This cost will be adjusted as design progresses.)								
			11,400.72	*0.00%*				*13,460.77*
Regrading of Banks/Seeding	**0.50**	**ACR**	**5,700**	**0**	**0**	**604**	**378**	**6,730**
			0.58	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*0.64*
RSM 329219131100 Seeding, mechanical seeding baron push spreader, includes lime, fertilizer and seed	2,420.00	SY	1,397	0	0	61	38	1,544
(Note: Estimate .5 acres)								
			1.78	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*2.14*
RSM 312216101050 Fine grading, fine grade for small irregular areas, to 15,000 S.Y.	2,420.00	SY	4,303	0	0	543	340	5,186
(Note: 1/2 acre.)								
			28.60	*0.00%*				*31.58*
Fence Repair	**100.00**	**LF**	**2,860**	**0**	**0**	**97**	**62**	**3,158**
			28.02	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*30.82*
RSM 323113200500 Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	100.00	LF	2,802	0	0	87	55	3,082
			0.58	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*0.75*
RSM 024113621400 Selective demolition, chain link fences & gates, fence, fabric & accessories, fence rails	100.00	LF	58	0	0	11	7	75

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Description	Quantity	UOM	BareCost	Productivity	MiscDirect	Payroll	WCI	DirectCost
			19,502.56	*0.00%*				*26,736.44*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**19,503**	**0**	**0**	**4,226**	**3,008**	**26,736**
			41.80	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*57.31*
FOP FC-ENCGF Hydrogeologist	176.00	HR	7,357	0	0	1,599	1,131	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
			27.21	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*37.29*
FOP FD-SAENG Safety Engineers	176.00	HR	4,789	0	0	1,027	746	6,563
(Note: Assumed a Occupation Code of #29086 Engineer Technician III 30083)								
			41.80	*0.00%*	*0.00%*	*22.27%*	*18.46%*	*57.31*
FOP FC-ENCGF Archeologist	176.00	HR	7,357	0	0	1,599	1,131	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
Surveys	**1.00**	**LS**	**60,000**	**0**	**0**	**0**	**0**	**60,000**
USR Surveys	1.00	LS	60,000	0	0	0	0	60,000
PE&D	**1.00**	**LS**	**205,000**	**0**	**0**	**0**	**0**	**205,000**
USR P, E& D	1.00	LS	205,000	0	0	0	0	205,000
Lands & Damages (Real Estate)	**1.00**	**LS**	**20,000**	**0**	**0**	**0**	**0**	**20,000**
USR Real Estate	1.00	LS	20,000	0	0	0	0	20,000
Project Management	**1.00**	**LS**	**60,000**	**0**	**0**	**0**	**0**	**60,000**
USR Project Management	1.00	LS	60,000	0	0	0	0	60,000
Cultural Resources	**1.00**	**LS**	**65,000**	**0**	**0**	**0**	**0**	**65,000**
USR Cultural Resources	1.00	LS	65,000	0	0	0	0	65,000

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Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
Project Direct Costs Report				**108,991**	**35,179**	**13,705**	**442,800**	**600,675**
Mobilization/Demobilization	**1.00**	**LS**	**Site Work Subcontractor**	**460**	**134**	**0**	**20,000**	**20,594**
				0.00	*0.00*	*0.00*	*20,000.00*	*20,000.00*
RSM 015436500100 Mobilization and demobilization, dozer, loader, backhoe or excavator, above 150 H.P., (Marsh Buggy) equivelant of cat 320.	1.00	EA	PC Prime Contractor	0	0	0	20,000	20,000
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
				229.96	*67.00*	*0.00*	*0.00*	*296.96*
RSM 015436501150 Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00	EA	PC Prime Contractor	460	134	0	0	594
Demolition/Removal	**1.00**	**LS**	**Site Work Subcontractor**	**77,429**	**32,807**	**10,421**	**8,800**	**129,457**
Concrete and Timber Pile Removal	**1.00**	**LS**	**Site Work Subcontractor**	**77,429**	**32,807**	**10,421**	**8,800**	**129,457**
				260.72	*0.00*	*0.00*	*0.00*	*260.72*
RSM 030505100060 Selective concrete demolition, average reinforcing, break up into small pieces, excludes shoring, bracing, saw or torch cutting, loading, hauling, dumping	118.00	CY	Site Work Subcontractor	30,765	0	0	0	30,765
				32.59	*2.19*	*0.00*	*0.00*	*34.78*
HNC 312316340600 Rock excavation, dense rock, with air hammer	171.00	BCY	Site Work Subcontractor	5,573	374	0	0	5,947
				176.52	*149.26*	*0.00*	*50.00*	*375.77*
USR Floating Excavator (Marsh Buggy Cat 320)	176.00	HR	Site Work Subcontractor	31,067	26,269	0	8,800	66,136
(Note: This item will be equivelant to a Marsh Buggy Cat 320 in cost. Assume 22 production days * 8 hrs per day = 176 hrs. Quote provided on 19 Jan 2011 for rental of a Marsh Buggy (between $35K - 45K per month) from LRHR, LLC Ph# 888-389-4468 out of Mt Laurel, NJ. Also price of 20k for mobilization/demobilization of this equipment which includes setup and breakdown. Equipment capable of operating in water.)								
				3.46	*2.74*	*0.00*	*0.00*	*6.20*
RSM 312323203696 Cycle hauling (wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 30 min load/wait/unload, 16.5 CY truck, cycle 10 miles, 45 MPH, excludes loading equipment	307.00	LCY	Site Work Subcontractor	1,062	841	0	0	1,903
(Note: Added 25% for loading in severe conditions. Approximately 145 cy of rock to be reused at site. 452 cy - 145 cy = 307 cy)								

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Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
				0.00	*0.00*	*86.92*	*0.00*	*86.92*
RSM 024119190100 Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only Concrete	108.56	TON	Site Work Subcontractor	0	0	9,436	0	9,436
(Note: Based on 118 cy @ .92 tons/cy (Concrete))								
				0.00	*0.00*	*79.50*	*0.00*	*79.50*
RSM 024119190200 Selective demolition, dump charges, typical urban city, trees, brush, lumber, includes tipping fees only (Timber Piles only)	5.50	TON	Site Work Subcontractor	0	0	437	0	437
(Note: Timber piles estimated @ 163 cy. 12" diameter @ 20 lf (170 ea) = 98 cy and 12" diameter @ 15 lf (150 ea) = 65 cy . Based on 2.5# per cf. 163 cy = 4,401 cf *2.5# = 11,002.5 #'s.)								
				15.03	*19.88*	*2.12*	*0.00*	*37.03*
RSM 313713100100 Rip-rap and rock lining, random, broken stone, machine placed for slope protection	145.00	LCY	Site Work Subcontractor	2,180	2,883	307	0	5,370
(Note: Used material cost for miscellaneous material cost. Rip rap to be rock from dam removal. Assumed 50% of 290 cy of rock estimated for removal.)								
				2.19	*1.57*	*0.00*	*0.00*	*3.76*
HNC 312323180240 Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip @ 20 MPH (4.2 cycles/hour), 8 C.Y. truck, highway haulers, excludes loading	26.00	LCY	Site Work Subcontractor	57	41	0	0	98
(Note: Assumed material Rock and sediment from dam will be placed in a nearby area for drying and then rehandled to disposal site. Reduced production rate by 15% for loading.)								
				210.16	*74.98*	*7.50*	*0.00*	*292.65*
HNC 024119252260 Saw cutting, concrete walls, rod reinforcing, per inch of depth	32.00	LF	Site Work Subcontractor	6,725	2,399	240	0	9,365
				0.00	*0.00*	*0.00*	*4,000.00*	*4,000.00*
Signage	**1.00**	**EA**	**PC Prime Contractor**	**0**	**0**	**0**	**4,000**	**4,000**
USR Place Holder for Signage	1.00	LS	PC Prime Contractor	0	0	0	4,000	4,000
(Note: This cost will be adjusted as design progresses.)								
				7,516.39	*4,251.34*	*1,693.03*	*0.00*	*13,460.77*
Regrading of Banks/Seeding	**0.50**	**ACR**	**PC Prime Contractor**	**3,758**	**2,126**	**847**	**0**	**6,730**
				0.16	*0.13*	*0.35*	*0.00*	*0.64*
RSM 329219131100 Seeding, mechanical seeding baron push spreader, includes lime, fertilizer and seed	2,420.00	SY	PC Prime Contractor	382	316	847	0	1,544
(Note: Estimate .5 acres)								
				1.40	*0.75*	*0.00*	*0.00*	*2.14*

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Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
RSM 312216101050 Fine grading, fine grade for small irregular areas, to 15,000 S.Y.	2,420.00	SY	PC Prime Contractor	3,376	1,809	0	0	5,186
(Note: 1/2 acre.)								
				6.08	*1.12*	*24.38*	*0.00*	*31.58*
Fence Repair	**100.00**	**LF**	**PC Prime Contractor**	**608**	**112**	**2,438**	**0**	**3,158**
				5.41	*1.03*	*24.38*	*0.00*	*30.82*
RSM 323113200500 Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	100.00	LF	Site Work Subcontractor	541	103	2,438	0	3,082
				0.67	*0.09*	*0.00*	*0.00*	*0.75*
RSM 024113621400 Selective demolition, chain link fences & gates, fence, fabric & accessories, fence rails	100.00	LF	PC Prime Contractor	67	9	0	0	75
				26,736.44	*0.00*	*0.00*	*0.00*	*26,736.44*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**PC Prime Contractor**	**26,736**	**0**	**0**	**0**	**26,736**
				57.31	*0.00*	*0.00*	*0.00*	*57.31*
FOP FC-ENCGF Hydrogeologist	176.00	HR	PC Prime Contractor	10,087	0	0	0	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
				37.29	*0.00*	*0.00*	*0.00*	*37.29*
FOP FD-SAENG Safety Engineers	176.00	HR	PC Prime Contractor	6,563	0	0	0	6,563
(Note: Assumed a Occupation Code of #29086 Engineer Technician III 30083)								
				57.31	*0.00*	*0.00*	*0.00*	*57.31*
FOP FC-ENCGF Archeologist	176.00	HR	PC Prime Contractor	10,087	0	0	0	10,087
(Note: Assumed a Occupation Code of #29086 Engineer Technician V)								
Surveys	**1.00**	**LS**		**0**	**0**	**0**	**60,000**	**60,000**
USR Surveys	1.00	LS		0	0	0	60,000	60,000
PE&D	**1.00**	**LS**		**0**	**0**	**0**	**205,000**	**205,000**
USR P, E& D	1.00	LS		0	0	0	205,000	205,000
Lands & Damages (Real Estate)	**1.00**	**LS**		**0**	**0**	**0**	**20,000**	**20,000**
USR Real Estate	1.00	LS		0	0	0	20,000	20,000
Project Management	**1.00**	**LS**		**0**	**0**	**0**	**60,000**	**60,000**
USR Project Management	1.00	LS		0	0	0	60,000	60,000

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Description	Quantity	UOM	Contractor	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost
Cultural Resources	**1.00**	**LS**		**0**	**0**	**0**	**65,000**	**65,000**
USR Cultural Resources	1.00	LS		0	0	0	65,000	65,000

Description	Quantity	UOM	DirectCost	Allowance	JOOH	HOOH	Profit	Bond	MiscContract	CostToPrime
Cost to Prime			**600,675.37**	**0.00**	**19,067.54**	**20,974.29**	**23,071.72**	**1,160.69**	**0.00**	**234,545.84**
Mobilization/Demobilization	**1.0000**	**LS**	**20,593.92**	**0.00**	**2,059.39**	**2,265.33**	**2,491.86**	**411.16**	**0.00**	**20,593.92**
Demolition/Removal	**1.0000**	**LS**	**129,456.91**	**0.00**	**12,945.69**	**14,240.26**	**15,664.29**	**0.00**	**0.00**	**172,307.14**
Concrete and Timber Pile Removal	**1.0000**	**LS**	**129,456.91**	**0.00**	**12,945.69**	**14,240.26**	**15,664.29**	**0.00**	**0.00**	**172,307.14**
			4,000.0000							*4,000.0000*
Signage	**1.0000**	**EA**	**4,000.00**	**0.00**	**400.00**	**440.00**	**484.00**	**79.86**	**0.00**	**4,000.00**
			13,460.7660							*13,460.7660*
Regrading of Banks/Seeding	**0.5000**	**ACR**	**6,730.38**	**0.00**	**673.04**	**740.34**	**814.38**	**134.37**	**0.00**	**6,730.38**
			31.5772							*41.7795*
Fence Repair	**100.0000**	**LF**	**3,157.72**	**0.00**	**315.77**	**347.35**	**382.08**	**1.51**	**0.00**	**4,177.95**
			26,736.4393							*26,736.4393*
Water Quality/Safety/Hydrogeologist	**1.0000**	**EA**	**26,736.44**	**0.00**	**2,673.64**	**2,941.01**	**3,235.11**	**533.79**	**0.00**	**26,736.44**
Surveys	**1.0000**	**LS**	**60,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
PE&D	**1.0000**	**LS**	**205,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Lands & Damages (Real Estate)	**1.0000**	**LS**	**20,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Project Management	**1.0000**	**LS**	**60,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Cultural Resources	**1.0000**	**LS**	**65,000.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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Description	Quantity	UOM	CostToPrime	JOOH_PRM	HOOH_PRM	Profit_PRM	Bond_PRM	ContractCost
Contract Cost			**234,545.84**	**23,454.58**	**25,800.04**	**28,380.05**	**4,682.71**	**726,863.22**
Mobilization/Demobilization	**1.0000**	**LS**	**20,593.92**	**2,059.39**	**2,265.33**	**2,491.86**	**411.16**	**27,821.67**
Demolition/Removal	**1.0000**	**LS**	**172,307.14**	**17,230.71**	**18,953.79**	**20,849.16**	**3,440.11**	**232,780.92**
Concrete and Timber Pile Removal	**1.0000**	**LS**	**172,307.14**	**17,230.71**	**18,953.79**	**20,849.16**	**3,440.11**	**232,780.92**
			4,000.0000					*5,403.8600*
Signage	**1.0000**	**EA**	**4,000.00**	**400.00**	**440.00**	**484.00**	**79.86**	**5,403.86**
			13,460.7660					*18,185.0237*
Regrading of Banks/Seeding	**0.5000**	**ACR**	**6,730.38**	**673.04**	**740.34**	**814.38**	**134.37**	**9,092.51**
			41.7795					*56.4427*
Fence Repair	**100.0000**	**LF**	**4,177.95**	**417.80**	**459.58**	**505.53**	**83.41**	**5,644.27**
			26,736.4393					*36,119.9937*
Water Quality/Safety/Hydrogeologist	**1.0000**	**EA**	**26,736.44**	**2,673.64**	**2,941.01**	**3,235.11**	**533.79**	**36,119.99**
Surveys	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60,000.00**
PE&D	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**205,000.00**
Lands & Damages (Real Estate)	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20,000.00**
Project Management	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60,000.00**
Cultural Resources	**1.0000**	**LS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**65,000.00**

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Description	Quantity	UOM	ContractCost	ProjectCost
Project Cost Summary Report			**726,863**	**825,565**
Mobilization/Demobilization	**1.00**	**LS**	**27,822**	**36,488**
Demolition/Removal	**1.00**	**LS**	**232,781**	**305,291**
Concrete and Timber Pile Removal	**1.00**	**LS**	**232,781**	**305,291**
			5,403.86	*7,087.14*
Signage	**1.00**	**EA**	**5,404**	**7,087**
			18,185.02	*23,849.59*
Regrading of Banks/Seeding	**0.50**	**ACR**	**9,093**	**11,925**
			56.44	*74.02*
Fence Repair	**100.00**	**LF**	**5,644**	**7,402**
			36,119.99	*47,371.23*
Water Quality/Safety/Hydrogeologist	**1.00**	**EA**	**36,120**	**47,371**
Surveys	**1.00**	**LS**	**60,000**	**60,000**
PE&D	**1.00**	**LS**	**205,000**	**205,000**
Lands & Damages (Real Estate)	**1.00**	**LS**	**20,000**	**20,000**
Project Management	**1.00**	**LS**	**60,000**	**60,000**
Cultural Resources	**1.00**	**LS**	**65,000**	**65,000**

Labor ID: Region 1 EQ ID: EP09R01 Currency in US dollars TRACES MII Version 4.1

FEASIBILITY REPORT

APPENDIX B

LETTER OF INTEREST FROM THE NJDEP OFFICE OF NATURAL RESOURCE RESTORATION

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Green Acres Program
Mail Code 501-01
P.O. Box 420
Trenton, NJ 08625

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 21, 2011

District Engineer
U.S. Army Corps of Engineers, Philadelphia District
100 Penn Square East
Wanamaker Building
Philadelphia, PA 19107-3390

Attn: Project Development Branch

Dear Sir:

Section 206 of the Water Resources Development Act of 1996 authorizes the Federal government to initiate investigations and studies leading to the implementation of projects for aquatic ecosystem restoration and protection. Accordingly, the New Jersey Department of Environmental Protection (NJDEP) hereby makes formal application for a study at the Bloomsbury Dam on the Musconetcong River, in Hunterdon and Warren County, New Jersey for the purpose of implementing ecological restoration through the removal of the obstruction. Dam removal is a priority of the Office of Natural Resource Restoration due to the fact that dam removal provides numerous ecological improvements to waterways and habitat. These improvements would include: better water quality through higher dissolved oxygen and lower water temperature, uninterrupted sediment flow, increased beneficial instream vegetation, beneficial shifts in aquatic dependent wildlife populations, anadromous fish passage, safety and recreation.

The NJDEP understands that the problem will be assessed through the conduct of a Feasibility Study. The Federal government will pay 100 percent of the costs for the Feasibility Study up to the Federal-funding limit of $100,000. If the cost exceeds $100,000, the NJDEP can provide 50 percent of this amount in excess of $100,000 to complete the Feasibility Study. If Federal interest is determined during the Feasibility Study and the project proceeds into the Design and Implementation Phase, then the NJDEP understands that we will be required to share 35% of the Design and Implementation cost.

In addition, the NJDEP will provide the following local cooperation and participation when at all possible:

1. Provide without cost to the Government access to all State owned lands, easements, and rights of way necessary for the construction, operation, and maintenance of the aquatic ecosystem restoration project.

2. Provide during the period of implementation, a cash contribution necessary to make the NJDEP's share equal to 35% of the aquatic restoration project cost. If the value of the contributions provided in (1) above is less than 35% of the aquatic project cost, the local sponsor shall provide an additional cash contribution in the amount necessary to bring its total contribution to 35% of the aquatic restoration project cost.

3. Hold and save the Government free from claims for damages that may result from construction and subsequent maintenance of the ecosystem restoration project, except damages due to the fault or negligence of the Government or its contractors.

4. Operate, maintain, and rehabilitate the project upon completion without cost to the Government, in accordance with regulations and directives prescribed by the Secretary of the Army.

Sincerely,

Richard Boornazian,
Administrator, Green Acres Program
New Jersey Department of Environmental Protection