FINAL
Environmental Assessment

Hughesville Dam Removal
Hunterdon and Warren Counties, New Jersey

United States Fish and Wildlife Service
Sponsor: Musconetcong Watershed Association

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1.0 Purpose for the Proposed Action

The purpose of the proposed action is the restoration of a section of the Musconetcong River in the vicinity of the Hughesville Dam in Pohatcong Township, Warren County and Holland Township, Hunterdon County, New Jersey (Figure 1) for the purpose of restoring diadromous fish passage, improving an impaired aquatic ecosystem, protecting public safety, and reducing maintenance and liability costs for the dam owner.

2.0 Need for the Action

The Musconetcong River flows 42 miles from Lake Hopatcong to the Delaware River through a watershed area of approximately 160 square miles. Although the watershed is predominantly forested, the "Musky," as it is locally known, flows through parts of 25 municipalities in Sussex, Morris, Warren, and Hunterdon counties in New Jersey. More than 30 dams occur along the river, most of which were built for industrial use in the 1900's. Many of the river's tributaries are classified as "Category 1," the highest water quality classification given by the New Jersey Department of Environmental Protection (NJDEP). In addition, portions of the Musconetcong have been designated by the National Park Service as part of the National Wild and Scenic River System (120 Stat. 3363; 16 U.S.C. 1271 *et. seq.*).

In 1992, the Musconetcong Watershed Association was incorporated to protect and enhance the Musconetcong River and its related resources. This non-profit organization also strives to educate the public on the importance of river stewardship and has a strong base of local community volunteers.

The United States Fish and Wildlife Service has been working with federal, state, and local agencies and non-governmental organizations on restoration of ecological functions in the Musconetcong River. These agencies include the National Marine Fisheries Service, Natural Resources Conservation Service, National Park Service, NJDEP's Division of Fish and Wildlife, NJDEP's Bureau of Dam Safety, Musconetcong Watershed Association, American Rivers, Trout Unlimited, and others.

The Hughesville Dam is currently the first dam on the Musconetcong River, located 3.5 river miles upstream from the confluence with the Delaware River. It was originally constructed for a paper mill in 1889 by the Warren Manufacturing Company. The original dam was likely a timber crib or grillage and has been repaired in 1933, 1935, 1962, 1965, and 1981 (NJDEP dam safety records). The downstream face is sloped and constructed of concrete, as is the apron that extends ten feet from the base of the slope. It is identified by NJDEP as a Low Hazard structure (Class III). The dam is approximately 18 feet in height and 150 feet of it spans the river. Its impoundment extends approximately 1,800 feet upstream and has no ability to attenuate flow.

There is considerable need for this project. The Hughesville Dam is listed in the NJDEP's Division of Fish and Wildlife report on migratory impediments to diadromous fish (fish that migrate between fresh and salt water). It is the lowest blockage on the Musconetcong River and, if removed, will provide access to two miles of historic river herring spawning and nursery habitat. Diadromous fish species that will benefit from the proposed project include American

shad (*Alosa sapidissima*), alewife (*A. pseudoharengus*), blueback herring (*A. aestivalis*), American eel (*Anguilla rostrata*), and other fish species. In addition to fish passage, removal of the dam will restore free-flowing conditions to the Musconetcong River; allow passage of vertebrate and invertebrate organisms; improve water quality; restore natural movement of sediments; eliminate a public safety and drowning hazard; and reduce the burden of maintenance on the dam owner.

3.0 Description of Alternatives

Three alternatives were evaluated for Hughesville Dam. These include *No Action, Partial Dam Removal,* and *Full Dam Removal*. The *No Action* alternative includes no proposed change to the existing dam structure or impoundment. *Partial Dam Removal* entails cutting out and removing a portion of the dam on a side or in the middle of the channel so that no water is impounded. In this case, the river would be directed through the dam breach. *Full Dam Removal* entails excavating the entire width of the dam and allowing the channel to return to a free-flowing condition.

One alternative that was eliminated from consideration is installation of a fish ladder, which could result in limited connectivity of the river for specific species. A fish ladder does not allow passage of all fish species. In addition, a fish ladder would not provide passage for bivalves and micro and macro invertebrates, whose populations are critical for a healthy river ecosystem. Fish ladders also do not restore other important river functions such as nutrient cycling, sediment transport, and a natural hydrologic regime. This alternative would neither eliminate dam owner responsibility for operation and maintenance of the structure, nor its liability. Conversely, the dam owner would be required to expend additional funds to “rehabilitate” the dam prior to installation of the fish ladder and would also incur the cost of the fish ladder’s operation and maintenance. Fish ladders are not a permanent solution as they have a life span of 20-50 years. Assuming the majority of the dam structure remains unchanged, public safety would continue to be threatened and stream restoration would not be achieved. A fish ladder alternative was eliminated from further consideration because it does not fully meet the aquatic restoration needs, public safety concerns, and is financially infeasible for the dam owner.

3.1 No Action Alternative

Under the *No Action* alternative, no efforts would be undertaken to improve fish passage at Hughesville Dam. The existing dam would continue to be maintained, as required by law, by the dam owner.

3.2 Partial Dam Removal

Partial removal of the dam would require specialized concrete cutting tools, such as a diamond wire saw, to cut the spillway and remove a portion of the dam. The use of such a saw would create a “cleaner” and neat edge on the remainder of the spillway. Partial dam removal will result in a pinch point where the channel is artificially narrowed by the remnant structure.

3.3 Full Dam Removal Alternative

To completely remove the dam, an excavator would be utilized to break up the entire concrete capped timber dam and spillway into slabs and small manageable pieces that would be hauled off site for disposal. Any separated river stone and rock that is part of the existing dam shall be left on site to be used to stabilize and naturalize the channel.

Bank stabilization techniques would be implemented in the Full Dam Removal alternative. The upstream bank on river right is occupied by a monoculture of *Phragmites* (*Phragmites australis*) that extends approximately 500 feet from the dam. On river left there is a submerged shelf (remnant bank) of fine sediment that extends approximately 700 feet upstream of the dam. These banks would be stabilized with widely used bioengineering practices that employ rock, vegetation, and geotextiles. A riffle, composed of existing cobble and boulder substrate, would emerge in the middle section of the impoundment. The sediment bars on the impoundment margins would be replanted with native trees, shrubs, and herbaceous seed mix to stabilize newly exposed sediment and to inhibit the establishment of nonnative invasive species. The restored areas would provide riparian habitat, storage of flood water, and dissipation of overbank velocities.

4.0 Affected Environment

The following sections describe the environmental and social resources and concerns that have the potential to be affected by the proposed project. These include ecological, cultural, aesthetic, and socioeconomic resources.

4.1 Land Use

The Musconetcong River Valley features an outstanding diversity of farms, towns, villages and secluded natural areas. State, county, and local parklands within the river corridor provide significant opportunities for hiking, fishing, canoeing, camping, nature study, and other outdoor activities. The watershed encompasses four counties and is located within the New Jersey Highlands, an area identified by The New Jersey State Planning Commission as a "Special Resource Area," where "individual decisions may have greater extra-regional impacts than most other areas of the state."

Table 1 shows the acres and percent of the watershed for each of the land use/cover types in the Musconetcong River watershed. Approximately 22 percent of the Musconetcong River watershed is located within urban areas.

Table 1. Musconetcong Watershed Land Use

Land Use/Cover	Acres	Percent of Watershed
Agriculture	15,902	16.5
Barren Land	1,493	1.6
Forest	46,149	48.1
Urban	21,146	22.0
Water	4,376	4.5
Wetlands	7,131	7.3
Total	96,197	100

Source: NJDEP 2002 Land Use/Land Cover Update, Upper Delaware Watershed Management Area, WMA01

The Musconetcong River also offers exemplary natural resources and is often referred to as the best trout fishery in New Jersey (Hamilton 2009). Wild, naturally reproducing brook trout (*Salvelinus fontinalis*) can be found in this Wild and Scenic River's seven main tributaries. Anglers in the region have access to the river from hundreds of acres of publicly owned lands along the river's banks. Paddlers enjoy the river's rapid flows, and hikers trek the miles of hilly trails that flank the river, affording stunning views of the river corridor.

4.2 Air Quality

The Clean Air Act requires the United States Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered to be harmful to the environment and to public health. The State of New Jersey is designated as a moderate nonattainment area for ozone. Nonattainment areas refer to environments where air pollution levels persistently exceed the NAAQS. The project site is in the NY-NJ-CT nonattainment area in New Jersey for the 1997 8-hour Ozone NAAQS. For a map of the existing nonattainment areas of New Jersey, visit http://www.state.nj.us/dep/baqp/images/8hro3map.gif. The project site is designated "in attainment" for carbon monoxide, lead, nitrogen dioxide, particulate matter, and sulfur dioxide.

4.3 Noise

Sensitivity to ambient noise levels differs among land use types. For example, 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 and within the project area are suburban and rural, which generally have a higher sensitivity to ambient noise levels.

There is existing ambient or background noise or sound associated with the operation of the existing dam. Water falling over the structure creates sound that varies depending on the volume of water flow over the structure.

4.4 Water Resources

The 157.6 square-mile Musconetcong River Valley watershed includes parts of Morris, Hunterdon, Warren, and Sussex counties and all or part of 25 municipalities. The Musconetcong River runs 42 miles from Lake Hopatcong to the Delaware River. The Musconetcong River is located in the Highlands, an area that provides the water supply source for the State's major urban areas. The River's recreational and natural resources are important to the local economy.

In addition, this watershed is identified as the New Jersey Trout Unlimited "Home River." On December 22, 2006, the President signed into law the "Musconetcong Wild and Scenic Rivers Act," which designates portions of the Musconetcong River as a component of the National Wild and Scenic Rivers System. The portions of the Musconetcong River that have been so designated do not include the Hughesville Dam vicinity, but are located upstream of this area covering the stream reach upstream of Bloomsbury, New Jersey.

4.4.1 Flooding

A significant portion of land around the Hughesville Dam and the impoundment are mapped as at risk for annual flooding. Figure 2 shows the Federal Emergency Management Agency (FEMA) Flood Map for this vicinity.

4.4.2 Groundwater

All wells within approximately one mile of the dam were considered for potential impacts from dam removal. A total of 388 wells were located within one mile of the site: 363 domestic; five agricultural; ten industrial; four public non-community; four NJDEP public community water supply; and two public non-community water supply wells (Princeton Hydro 2012).

4.5 Fluvial Dynamics

Currently, the site is experiencing erosion along the bank on river right immediately downstream of the dam. At the County Road 519 bridge (located over the current impoundment), the channel is scoured to a depth of between four and six feet. Additional scour of the stream is noted at the toe of the dam. Based on current estimates, there is more than 25,000 cubic yards of impounded sediment behind the dam.

4.6 Vegetation and Wetlands

The portion of the river corridor that lies within the project area and the surrounding community is rural residential land use. Plant communities located in the vicinity of the project area consist of deciduous hardwood upland forests. Wetlands around the project site consist of deciduous forested floodplain, deciduous scrub/shrub, herbaceous, and modified agricultural wetlands.

A large *Phragmites* monoculture has formed within the impoundment on river right as a result of the sedimentation caused by the manmade dam structure. *Phragmites* is a nonnative invasive

species of vegetation that displaces opportunities for native habitat types that provide food and cover for native fauna.

4.7 Wildlife Resources

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 project area consist of common garter snake (*Thamnophis sirtalis*), black racer (*Coluber constrictor*), eastern ribbon snake (*Thamnophis sauritus*), northern water snake (*Nerodia sipedon*), snapping turtle (*Chelydra serpentina*), and painted turtle (*Chrysemys picta*).

Common amphibians to the project area include American bullfrog (*Lithobates catesbeianus*), wood frog (*Rana sylvatica*), American toad (*Anaxyrus americanus*), spring peeper (*Pseudacris crucifer*), pickerel frog (*Rana palustris),* red backed salamander (*Plethodon cinereus*), northern red salamander (*Pseudotriton ruber*), and spotted salamander (*Ambystoma maculatum*).

New Jersey and its water bodies serve a vital role in the Atlantic Flyway. Many species of birds are found throughout this region, including both resident and migratory species ranging from song birds and waterfowl to raptors and wading birds.

4.8 Fish Resources

Several species of diadromous fish are known to have historically spawned (reproduced) or found nursery habitat in the Musconetcong River: American eel, blueback herring, alewife, American shad, and striped bass (*Morone saxatilis*).

4.9 Threatened and Endangered Species

The Landscape Project results indicate several State Threatened and Endangered species in the immediate vicinity of the Hughesville Dam. These include osprey *(Pandion haliaetus)* foraging and nesting habitat, brook snaketail (*Ophiogomphus aspersus*) territory, and bald eagle (*Haliaeetus leucocephalus*) foraging habitat.

There are no documented occurrences of federally listed flora or fauna in the vicinity of the dam. However, the site is located within the geographic range of the federally listed (endangered) Indiana bat (*Myotis sodalis*) and the federally listed (threatened) northern long-eared bat (*Myotis septentrionalis*).

4.10 Cultural Resources

A combined Phase IA Archaeological Survey was conducted by Hunter Research to identify historic resources in the project area (Harshbarger and Lee 2012). The survey revealed that the Hughesville Paper Mill and Raceway is a potentially eligible historic district for the National Register.

4.11 Human Health and Safety

NJDEP has classified the dam as a Low Hazard Potential Structure (Class III), which means failure would cause loss of the dam itself but little or no additional damage to other property. However the dam, and the strength of the current it creates, presents a drowning hazard. The hydraulic condition created at the downstream toe can create "boils," which are situations where water from below the surface moves back towards the dam in a circular motion, entrapping anything that enters the boil. These boils can trap swimmers and anglers particularly, because dams often appear non-threatening from the surface.

4.12 Environmental Justice

Environmental Justice means that, to the greatest extent practicable and permitted by law, all populations are provided an opportunity to comment before decisions are rendered on proposed Federal actions. Furthermore, the principles of environmental justice require that populations are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment.

Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportional high and adverse human health or environmental effects of its programs, policies, and activities on minority populations." New Jersey, under a 2004 directive, has identified five "petitioning neighborhoods" or environmental justice zones (http://www.nj.gov/dep/srp/guidance/public_notification/checklistguide.htm). None of the five "petitioning neighborhoods" were located in the vicinity of the Hughesville Dam.

The EPA's online tool EJ View (formerly known as the Environmental Justice Assessment Tool), shows that the percentage of the local population that is living below the poverty line; is a minority; or does not speak English well is less than ten percent (http://epamap14.epa.gov/ejmap/entry.html).

4.13 Socioeconomic Resources

Currently, the dam owner bears the expense of bringing the dam into compliance with the NJDEP Department of Dam Safety. The dam has no productive purpose; its original intent was to divert water into the nearly 1.5-mile long mill race that fed the Hughesville Paper plant located downstream, which is now out of business.

The nearby town of Finesville is a “community of place” and is an unincorporated rural community in the Township of Pohatcong, Warren County. The dam, while not forming a body of water large enough to be called a lake, does create an area of relatively slack water or a pool, about 100 feet wide and extending upstream for approximately 1,800 feet. This length or reach of the Musconetcong River will be the most effected by either removing or breaching the dam. While no residences front this section of the river, several are in close proximity to it and/or face it.

5.0 Environmental Consequences

The Hughesville Dam Removal as part of the Musconetcong River Restoration Project seeks to restore connectivity and ecological integrity to an additional two miles of the Musconetcong River, from the first obstruction (Hughesville Dam) to the next obstruction upstream, the Warren Glen Dam. An initial evaluation of the issues indicates that Land Use (4.1), Wildlife Resources (4.7) and Environmental Justice (4.13), as described in the previous sections, would not be impacted under the proposed alternatives; as such no further evaluation is considered in the environmental consequences section. The potential environmental consequences of the proposed alternatives are presented in the following sections.

5.1 Air Quality

5.1.1 No Action Alternative

Under the *No Action* alternative, no construction would occur; therefore, there would be no change in air quality.

5.1.2 Partial or Full Dam Removal

The partial or full removal of the dam will require heavy construction equipment, labor, and materials over the anticipated construction period. Construction activities will require the use of equipment such as excavators, loaders, generators, and other heavy equipment. Transportation of labor and materials will require delivery trucks, dump trucks, and pick-up trucks.

The project area is in a nonattainment region for ozone. Nitrogen oxides (NO_x), and volatile organic compounds (VOC’s) are therefore the pollutants of concern. For moderate nonattainment regions, the EPA threshold levels are 100 tons per year and 50 tons per year respectively. The operation of equipment will generate low levels of NO_x and negligible amounts of VOC’s over a period of approximately two to three months. Since the construction time is short and only a few pieces of equipment will be used, the actions would be below conformity *de minimis* levels (the minimum threshold for which a conformity determination much be performed). Any impacts would be short-term, with no long-term increases in air pollutants resulting from the activities.

5.2 Noise

5.2.1 No Action Alternative

Under the *No Action* Alternative, no short-term or long-term noise impacts would occur.

5.2.2 Partial or Full Dam Removal

The ambient noise of the flow over the dam should be replaced by the sound of water moving over and through boulders and rocks.

Temporary impacts caused by construction noise may be experienced by adjacent homeowners during the partial or full 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, the noise from which can be reduced by the use of mufflers and shields. An increase in road traffic may also be anticipated. Construction time is temporary in nature and would be approximately two to three months. Under normal circumstances, noise will only be generated Monday through Saturday during normal working hours. No long-term adverse noise impacts would be associated with construction activities.

5.3 Water Resources

5.3.1 Flooding

5.3.1.1 No Action Alternative

Flood elevations would remain consistent with the existing conditions if the dam is left in place.

5.3.1.2 Partial Dam Removal

Partial removal of the dam will result in a decrease in flood levels associated with more frequent storm events. The extent of the decrease will, in part, depend on the width of the dam removed.

5.3.1.3 Full Dam Removal

Based on Hydrologic Engineering Center's River Analysis System (HEC-RAS) stream modeling, full removal of the Hughesville Dam will result in a lowering of water surface elevations and reduction in flood depths for the entire length of the existing impoundment. For normal base flow and smaller storm events (e.g., 2-yr flow), the reductions are on the order of 2-3 feet near the County Road 519 bridge. Reduction increases downstream, with maximum reductions in the range of 9 to 10 feet at the location of the dam. For larger events (e.g., 50- to 100-yr flows), a similar trend exists, dampened slightly with greater overbank conveyance. During these larger events, reductions at the County Road 519 bridge on the order of 1.5-2 feet with maximum reductions at the dam in the range of 9 to 9.5 feet.

5.3.2 Ground Water

5.3.2.1 No Action Alternative

Under the *No Action* alternative, ground water levels would not be affected.

5.3.2.2 Partial or Full Dam Removal

All wells within one mile of the dam (338) were analyzed for possible impacts caused by the removal of the Hughesville Dam and the lowering of its impoundment. Contour data were compared to the depth of the well to determine if any wells could be impacted by the project.

Based on elevation data, 26 wells were identified as having the potential to be impacted by the lowering of the impoundment that would result from full or partial dam removal. Most of the wells were eliminated from concern because they were outside of the drainage of the Musconetcong River; downstream of the dam; dependent on the Warren Glen impoundment; or the bottom of the well is at the same elevation as the bottom of the dam; therefore these wells are not expected to be impacted by dam removal. The feasibility study indicated that two wells, numbers 49 and 60, could potentially be impacted by dam removal (Princeton Hydro 2012).

Well 49 is a domestic well (serving a single residence) and located on Block 100, Lot 100.10 within Pohatcong Township. The initial concern regarding this well was the fact that it was potentially located below the existing water surface of the Hughesville Dam impoundment. However, a further review of this well's location identified it as nearly 0.3 mile from the impoundment and downstream of the dam, and therefore, the pool elevation influence on this well is considered negligible.

Well 60 is a non-public community well located adjacent to the Musconetcong River and County Route 519 within Pohatcong Township. Again, as with Well 49, the concern was with regard to the depth of the well in relation to the permanent pool elevation of the Hughesville Dam impoundment. However, this well is located up gradient of the impoundment influence of the Hughesville Dam and 0.2 mile to the north of the Musconetcong River. This well is located on property owned by the dam owner and is no longer in service.

5.4 Fluvial Dynamics

5.4.1 No Action Alternative

Currently, the site is experiencing erosion along the bank on river right immediately downstream of the dam; this is a result of the turbulent flow as water passes over the dam. Since the dam structure requires long-term maintenance, there exists the potential for dam failure and a large release of sediment downstream. This potential release would also result in soil erosion impacts along the banks of the impoundment and potentially around the abutments and pier of the upstream bridge on County Road 519.

At the County Road 519 bridge (located over the current impoundment), the channel is scoured to a depth of between four and six feet because of constriction of flow. Additional scour of the stream is noted at the toe of the dam, which will continue to need maintenance under the *No Action* alternative.

Retaining the dam will continue to impound sediment behind the dam. Based on current estimates, there is more than 25,000 cubic yards of impounded sediment behind the dam. The sedimentation is entirely artificial and a result solely of the dam's existence. The natural function of the stream channel is disrupted due to the retention of the sediment in the impoundment, which is also causing the downstream reach to be deprived of sediment. Since the dam structure requires long-term maintenance, there exists the potential for dam failure and a large release of sediment downstream, which will trigger a response by the river in an attempt to re-equilibrate and likely result in downstream instabilities.

5.4.2 Partial Dam Removal

A Soil Erosion and Sediment Control Certification would be obtained for the partial dam removal, so no negative soil erosion impacts are anticipated with this alternative. However, a partial removal of the dam will result in increased potential for long-term scour since sections the dam will remain in place and serve as pinch points in the river. At the County Road 519 bridge (located over the current impoundment), the channel is scoured to a depth of between four and six feet due to a constriction of flow. Scour at the bridge is anticipated upon partial dam removal as well, however, scour protection would be incorporated into the final design plans. Additional scour is possible along the stream banks, but this will be addressed with the incorporation of toe protection in the final engineering design plans.

Sedimentation impacts in the stream corridor upon partial removal of the Hughesville Dam are both positive and negative. Accumulated material within the dam's impoundment would be removed by hydraulic dredging and disposed out of the floodplain of the Musconetcong River. The sediment starved section below the dam would gain some gravel bar formations and adjustment may occur upon partial dam removal while the river transforms to a new equilibrium. Sedimentation may occur immediately upstream of the remnant dam sections and scour below those sections may also occur.

5.4.3 Full Dam Removal

A Soil Erosion and Sediment Control Certification would be obtained for the dam removal; therefore, no negative soil erosion impacts are anticipated with this alternative. At the County Road 519 bridge (located over the current impoundment), the river channel is scoured to a depth of between four and six feet due to a constriction of flow. Scour at the bridge is anticipated upon full dam removal; however, scour protection would be incorporated into the final design plans under this scenario. Additional scour is possible along the stream banks, but will be addressed with toe protection in the final engineering design plans.

All impacts to sedimentation in the stream corridor upon full removal of the Hughesville Dam are anticipated to be positive. Accumulated material within the dam's impoundment would be

removed by hydraulic dredging and disposed out of the floodplain of the Musconetcong River. The sediment starved section below the dam would once again be subject to natural river processes and sediment transport functions. It is anticipated that some gravel bar formations and adjustment may occur upon dam removal while the river transforms to a new equilibrium without the dam in place; however, no deleterious impacts are anticipated with this adjustment.

5.5 Vegetation and Wetlands

5.5.1 No Action Alternative

Leaving the dam in-place will result in no change to the existing riparian habitat or stream corridor. However, the riparian corridor is degraded because of the impoundment caused by the presence of the dam; therefore, under the *No Action* alternative, the opportunity to restore this habitat is lost.

Existing wetlands in and around the dam, including impaired wetlands, will remain the same. A large *Phragmites* monoculture has formed within the impoundment on river right as a result of the sedimentation caused by the manmade dam structure. *Phragmites* is a nonnative invasive species of vegetation that displaces opportunities for native habitat types that provide food and cover for native fauna. By leaving the dam in place, the opportunity to restore this impaired wetland is lost.

5.5.2 Partial Dam Removal

Breaching the dam will allow the stream channel to naturalize more than current conditions as the accumulated sediment will be removed. It is important to note, however, that the riparian corridor created by this alternative may be more prone to invasive species and changes in configuration due to the remaining sections of the dam and the potential for debris and material to accumulate behind those sections.

Existing wetlands in and around the dam would be impacted by breaching the dam. Removal would lower the regional water table and the *Phragmites* wetland would revert to upland riparian habitat, as it was prior to installation of the dam. Restoration of the former *Phragmites* area would be addressed and the area planted with native indigenous forest or meadow species upon dam removal. Initially, there may be a reduction in wetland communities as a result of the removal of the impoundment; however, the *Phragmites* wetland is an artificial and impaired wetland. Therefore, over the long-term, native wetland communities will recover and flourish in the more natural river system that is re-established.

5.5.3 Full Dam Removal

Complete removal of the dam will allow the stream channel to naturalize and the riparian corridor within the impoundment to be enhanced. Invasive species will be controlled as part of the full dam removal plan. Restoration of upland forested communities (e.g., planting riparian vegetation) and wildlife habitat will be incorporated into the final design plans. Full dam removal will result in a restored riparian area which will increase nesting opportunities for

migratory birds, improve travel corridors for native fauna, and improve fish habitat by lowering water temperature through shading.

Existing wetlands in and around the dam would be impacted by removing the dam. Removal would lower the regional water table and the *Phragmites* wetland would revert to upland riparian habitat, as it was prior to installation of the dam. Restoration of the former *Phragmites* area would be addressed and the area planted with native indigenous forest or meadow species upon dam removal. Initially, there may be a reduction in wetland communities as a result of the removal of the impoundment; however, the *Phragmites* wetland is an artificial and impaired wetland. Therefore, over the long-term, native wetland communities will recover and flourish in the more natural river system that is re-established.

5.6 Fish Resources

5.6.1 No Action Alternative

Under the *No Action* Alternative, impacts to aquatic resources would continue because of barriers to fish passage. In addition, resident fish populations in the vicinity of the dam would not benefit from re-establishment of the connectivity of most of the River's biotic and abiotic functions. Diadromous fish are blocked from spawning or nursery habitat beyond the dam. Species that historically spawned or utilized the Musconetcong River for nursery habitat are American eel, blueback herring, alewife, American shad, and striped bass. These species will continue to suffer impacts from lack of access to spawning habitat.

5.6.2 Partial or Full Dam Removal

Full removal of the dam will allow full aquatic resource access both upstream and downstream of the dam site as well as restoration of other natural river ecological functions. Also, dam removal will contribute to the re-establishment of the River's biotic and abiotic functions. Depending on the size of the section of dam removed, a partial breach may allow for partial movement of aquatic resources up and down stream of the dam and restore other natural river ecological functions such as sediment and nutrient transport. Diadromous fish populations will increase with the addition of two river miles of spawning habitat. Piscivorous animals will also benefit from an expanded fishery. Finally, fish and invertebrates will benefit from full dam removal because of the resulting lowered water temperature in the river and the former impoundment once the riparian habitat has been restored.

5.7 Threatened and Endangered Species

5.7.1 No Action Alternative

Under the *No Action* Alternative, no impacts to State or federally threatened or endangered species would occur. However, the brook snaketail is extremely sensitive to sediment releases of any magnitude and leaving the dam in place continues to leave brook snaketail habitat downstream of the sediment in peril. Diadromous fish will continue to be blocked from two river miles of potential spawning habitat. Piscivorous (fishing-eating) birds like the bald eagle and

osprey would continue to suffer from a reduced fish base caused by the fish passage blockage presented by the dam as it exists today.

5.7.2 Partial or Full Dam Removal

There are no documented occurrences of federally listed flora or fauna in the vicinity of the dam. However, the site is located within the geographic range of Indiana and northern long-eared bats. Because tree removal will be minimal and incidental tree damage would be of only small-diameter trees, no impacts to Indiana or northern long-eared bat are anticipated. Conversely, bats will benefit from the restoration of the forested riparian area that will result from dam removal.

The brook snaketail is extremely sensitive to sediment releases of any magnitude; however, included with the full removal of the dam is a sediment removal process that would be an integral part of the design. As proposed, the impounded sediment will be hydraulically dredged from the impoundment so that any sediment release resulting from the removal would be minimal and temporary. In-stream improvements and lowered water temperatures resulting from dam removal will likely benefit brook snaketail by increasing aquatic habitat for the larval life stage of this dragonfly. No deleterious impacts to foraging habitat for osprey and bald eagle are anticipated; rather these fish-eating birds are expected to benefit from full dam removal because the existing fisheries within the Musconetcong River would be expanded. Removal of the dam will fully restore diadromous fish passage, which should increase the presence of water dependent species such as osprey and bald eagle as well as piscivorous (fish-eating) riverine migratory waterfowl.

5.8 Cultural Resources

5.8.1 No Action Alternative

The Hughesville Paper Mill and Raceway is a potentially eligible historic district for the National Register. No significant impacts on the historical features located onsite are anticipated if the dam remains in place as is. However, under this scenario, the dam owner would be required to bring the structure into compliance with current NJDEP Dam Safety regulations, in which case an impact to a historical structure may be realized.

5.8.2 Partial Dam Removal

A partial removal of the dam has the potential to leave in place some historic features of the structure. Other historic resources may be impacted by the need to stabilize the remnant portions of the dam. This approach would involve careful consideration of the structures as the final design plans are prepared. The involvement of an archaeologist and historian during design and construction phases can ensure that impacts to the historic features are minimized.

5.8.3 Full Dam Removal

A complete removal of the dam could have deleterious impacts on the historical aspects of the adjacent structures. Careful consideration of the structures will be made during final design

preparation and will include the involvement of an archaeologist and historian during design and construction phases to ensure that impacts to the historic features are minimized. Furthermore, consultation with the State Historic Preservation Office will identify areas of avoidance, techniques to minimize impacts to historic structures and opportunities to enhance public education of historic resources in the area.

5.9 Human Health and Safety

5.9.1 No Action Alternative

Retaining the dam poses a threat to public safety. NJDEP has classified the dam as a Low Hazard Potential Structure (Class III) which means failure would cause loss of the dam itself, but little or no additional damage to other property. However, the dam and the strength of the current it creates, present a drowning hazard. The hydraulic condition created at the downstream toe can create "boils," which are situations where water from below the surface moves back towards the dam in a circular motion entrapping anything that enters the boil. These boils can trap swimmers and anglers particularly because dams often appear non-threatening from the surface.

5.9.2 Partial Dam Removal

Breaching the dam eliminates the potential drowning hazard caused by "boils" that form at the base of the dam. Some safety hazard will remain with *Partial Dam Removal* because the remaining portions of the dam could become an "attractive nuisance" in which individuals could be injured while climbing or standing on the remnant dam.

5.9.3 Full Dam Removal

Removing the dam eliminates a potential drowning hazard caused by the boils that form at the base of the dam.

5.10 Socioeconomic Resources

The dam and the water it backs up currently serve no major economic purpose: they do not provide power, electricity, irrigation water, municipal or industrial water supply (other than fire protection), flood control benefits, or significant fish and wildlife benefits. From that standpoint, its removal or breaching will cause no economic disruption. Table 2 considers the likely effects for each alternative.

Table 2. Socioeconomic Concerns for Each Alternative.

	Alt 1	Alt 2	Alt 3
Concern	No Action	Partial Dam Removal	Full Dam Removal
Property values and taxes	No effect	None to negligible although reduced flood threat could increase values/taxes	Same as Alternative 2
Flooding/flood insurance	No effect	Reduced flooding, perhaps reducing insurance rates	Same as Alternative 2
Wells	No effect	Potential drop in water table may result in lower water levels for one well that is no longer in service and is located on property owned by the dam owner.	Same as Alternative 2
Septic systems	No effect	Generally benefit/improve operation of septic systems	Same as Alternative 2
Public safety	No effect	Public safety hazard reduced	Same as Alternative 2
Aesthetic value "waterfall effect"	No effect	Minimal effect -as the remaining pools and riffles through this River reach will generate similar sound	Same as Alternative 2
Employment & income	No effect	Short-term increase in employment	Same as Alternative 2
Recreational opportunities	No effect	More diverse fishing, and paddling opportunities	Same as Alternative 2
Dam operation and maintenance	No effect	Considerable operation and maintenance costs	No operation and maintenance costs
Liability risk	No effect	Greatly reduced but some liability remains with dam abutments being an "attractive nuisance", increased during construction	Greatly reduced, increased during construction
Regulatory requirements	No effect	Permits required	Permits required
Environmental justice	No effect	No effect	No effect

6.0 Comparison of Alternatives

If the dam stays in place with no changes proposed, there are several important and immediate impacts. Currently, the dam is the first fish passage barrier upstream from the confluence with the Delaware River and is excluding access to potential spawning habitat for migratory fish.

Leaving the Hughesville Dam in place would require the dam owners to bring the dam into compliance with the NJDEP Department of Dam Safety, which is both an expensive and potentially dangerous undertaking. The dam has no productive purpose; its original intent was to divert water into the nearly 1.5-mile long mill race that fed the Hughesville Paper plant located downstream, which is now out of business.

If portions of the existing dam remain, then long–term maintenance and liability associated with those pieces remains the responsibility of the dam owner. NJDEP Dam Safety may de-regulate the structure; however, any debris or sedimentation that accumulates on or adjacent to these structures requires vigilance on the dam owners' part to conduct long-term maintenance activities at the site.

Full dam removal will meet all of the project goals of restoring diadromous fish passage, improving an impaired aquatic ecosystem, protecting public safety, and reducing cost and liability for the dam owner. Additionally, dam removal will enhance the nature-based recreational opportunities of the area as fisheries will be expanded and fish-eating birds will thrive.

6.1 Preferred Alternative

Full dam removal is the preferred alternative. Full dam removal will meet all of the project goals of restoring diadromous fish passage, improving an impaired aquatic ecosystem, protecting public safety, and reducing cost and liability for the owner. Additionally, dam removal will enhance the nature-based recreational opportunities of the area as fisheries will be expanded and fish-eating birds will thrive. Recommendations offered in consultation with the State Historic Preservation Office will identify techniques to minimize impacts to historic structures. Furthermore, interpretation of the historic resources of the area will be enhanced by creating opportunities for public education of the historic resources of the area.

7.0 Literature Cited

Fairley, B., Williams, R., and McKeithan K. 2004. *Feasibility of Restoring the Tuckasegee River Following the Potential Removal of the Dillsboro Dam*. Protection and Restoration of Urban and Rural Streams: pp. 262-271.

Hamilton, Pat. July 13, 2009. Written communication. Division of Fish and Wildlife. New Jersey Department of Environmental Protection.

Harshbarger, P. and J. Lee. July 2012. *Combined Phase IA Archaeological Survey and Reconnaissance-Level Historic Architectural Survey*. Prepared for Princeton Hydro on behalf of the Musconetcong Watershed Association. Prepared by Hunter Research, Trenton, NJ. 63 pp. plus appendices.

Princeton Hydro, LLC. October 2012. *Feasibility Study Hughesville Dam Removal Part 1 NJ Dam No. 24-4 Musconetcong River*. Prepared for Trout Unlimited. Princeton Hydro, LLC. Ringoes, NJ. 187 pp.

8.0 Finding of No Significant Impact

Finding of No Significant Impact (FONSI)
Environmental Assessment for the Removal of the Hughesville Dam

The enclosed Environmental Assessment presents and evaluates three alternatives for the removal of the Hughesville Dam in Hunterdon and Warren Counties of New Jersey. On the basis of this analysis, I have selected Alternative 3 (full dam removal) for implementation.

Of the three action alternatives, full dam removal will meet all of the project goals of restoring diadromous fish passage, improving an impaired aquatic ecosystem, protecting public safety, and reducing cost and liability for the dam owner. Additionally, dam removal will enhance the nature-based recreational opportunities of the area as fisheries will be expanded and will improve foraging for fish-eating birds.

I find that the implementation of Alternative 3 will not have a significant impact on the quality of the human environment in accordance with Section 102 (2) (c) of the National Environmental Policy Act (NEPA) and conclude that an Environmental Impact Statement is not required.

Eric Schrading, Field Supervisor
U.S. Fish and Wildlife Service

11/16/15
Date

Figure 1. Location Map of the Hughesville Dam removal project area.

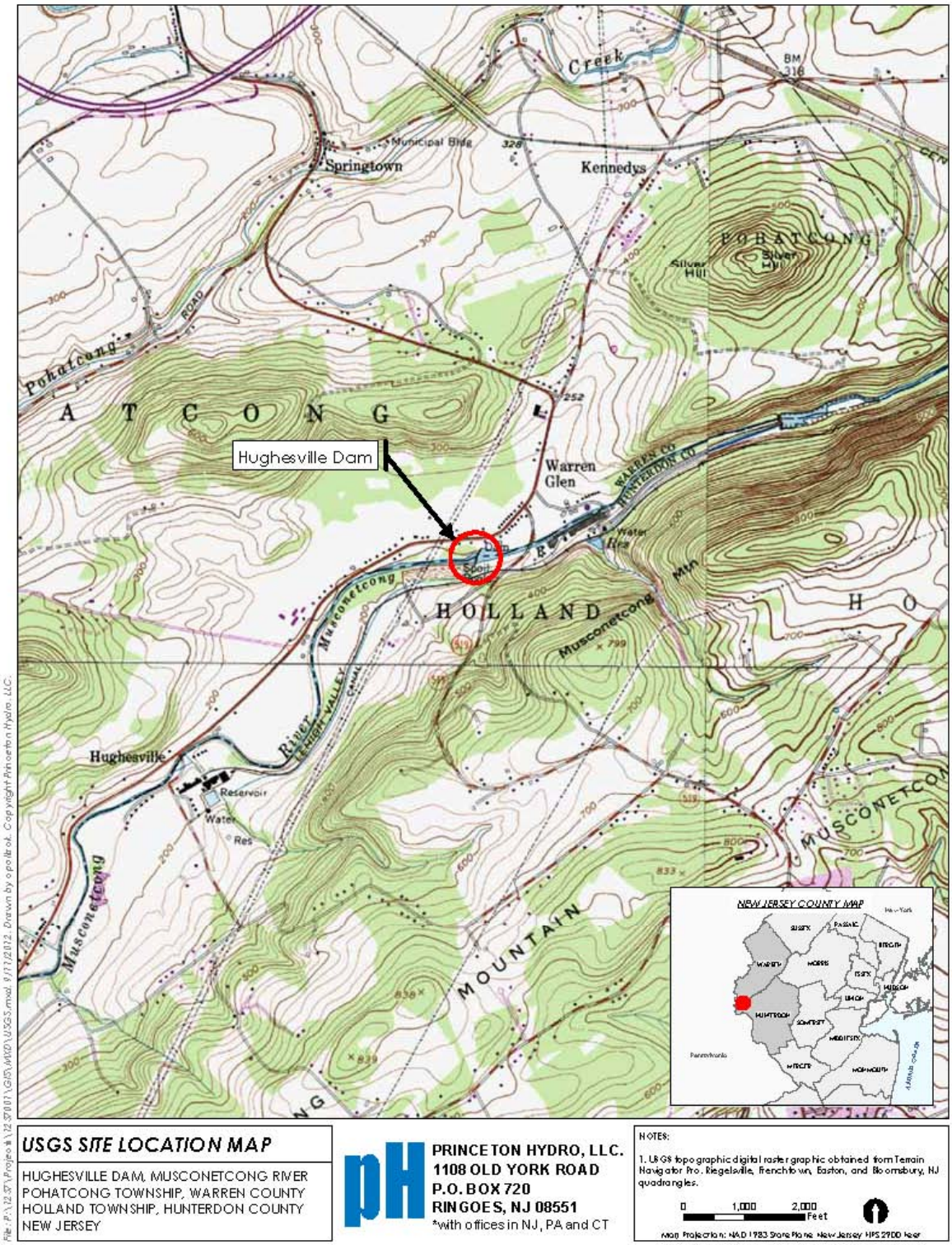
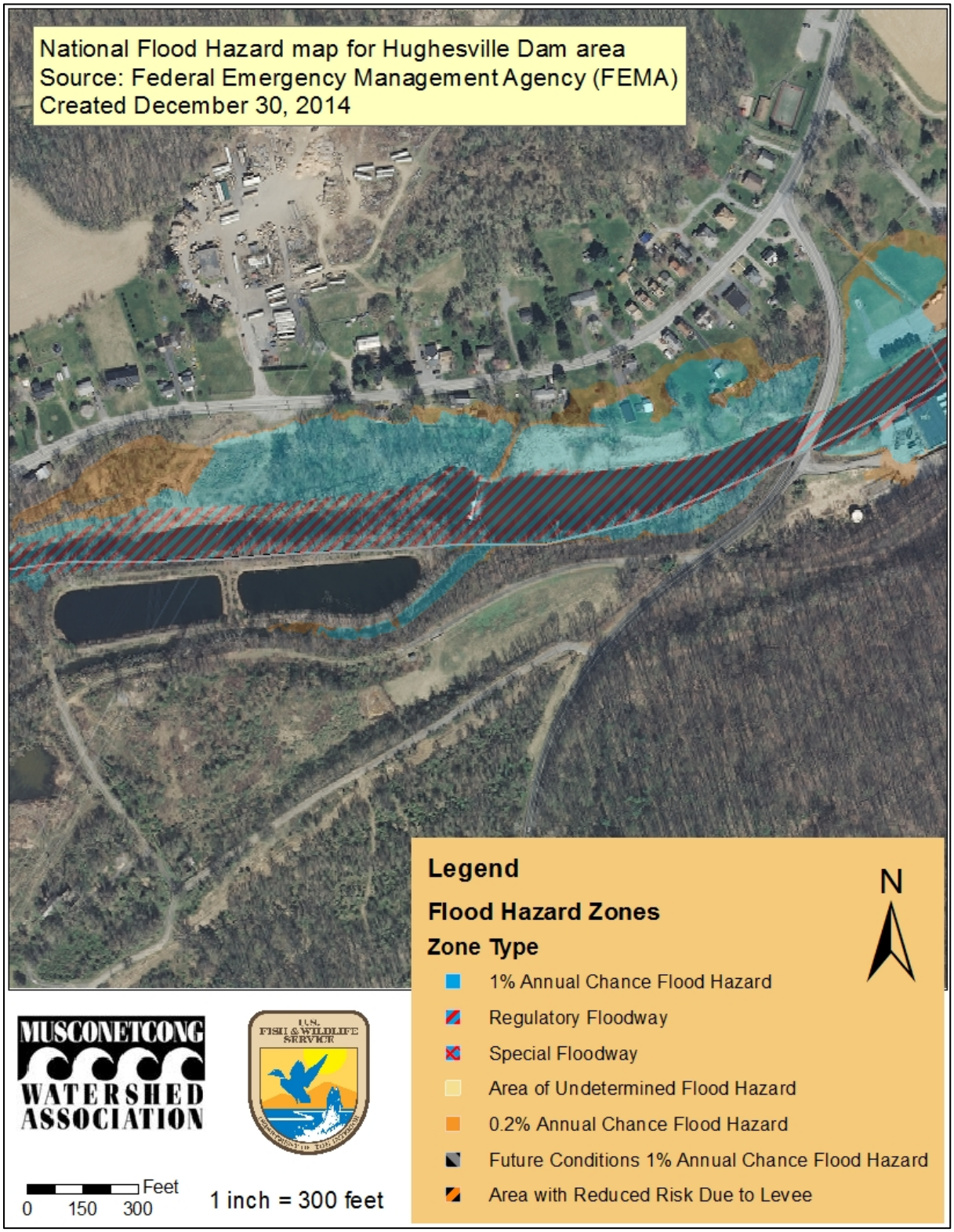


Figure 2. FEMA Flood Hazard Area map for the Hughesville Dam removal project area.



Appendix 1. Public Comments

The Service received one comment: a letter from the National Park Service dated September 8, 2015 inquiring about changes in noise. Fairley *et al.* (2004) found that noise levels at the dam and after removal varied by about 10 dBA and that the sound quickly diminished as you move away from the dam (humans cannot detect changes of less than 3 dBA, according to the study). The noise from the dam and the noise from the riffle habitat that will replace it are within the range of normal sound of a river; therefore, no significant change in noise is anticipated.

United States Department of the Interior
NATIONAL PARK SERVICE
Northeast Regional Office
U. S. Custom House
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(L6015) September 8, 2015

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Acting R5 Partners/Coastal Coordinator
U.S. Fish and Wildlife Service
927 North Main Street, Bldg. D
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RE: Draft EA Comments – Hughesville Dam Removal, Musconetcong NS&RR, NJ

This comment letter is in response to your recently released *Hughesville Dam Removal Draft Environmental Assessment*. The Hughesville Dam crosses the Musconetcong National Scenic and Recreational River in Hunterdon and Warren counties, New Jersey. As mentioned in the Draft EA, the Musconetcong River was designated a National Scenic and Recreational River (P.L.109-452) in 2006. Such a designation places this river in a special category of nationally recognized rivers, whose protection and enhancement of listed values is managed in partnership among the National Park Service (NPS) and local partners. Less than 1% of America's river mileage is protected under the National Wild and Scenic Rivers Act (Act).

Conceptually and practically, the removal of the Hughesville Dam as presented in your Draft EA is consistent with the goals of the *Musconetcong River Management Plan,* and the Act's Section 10(a) protection and enhancement language.

However, the NPS would like Section 4.3 (Noise) of the Draft EA to address the impact of dam removal on the removal site's noise more completely. The NPS is aware that a potential change in noise perceived by local residents was an issue during a proposed dam removal in another part of the Musconetcong River in 2008. The NPS recommends that the Draft EA include baseline dBA levels at the dam removal site. Further, our agency would like to see a description of how the dam removal's impact could be mitigated for noise, if a change in noise proves to be an issue of concern.

The NPS thanks you for the opportunity to comment on the *Hughesville Dam Removal Draft Environmental Assessment*. Should you have any questions about these comments, please contact me at (215) 597-5823, or Paul_Kenney@nps.gov.

Sincerely,

Paul Kenney

Paul Kenney,
River Manager, Musconetcong NS&RR

General File