FINDING OF NO SIGNIFICANT IMPACT
CUDDEBACKVILLE DAM REMOVAL PROJECT
SECTION 206, ECOSYSTEM RESTORATION
ORANGE COUNTY, NEW YORK

OVERVIEW

The United States Army Corps of Engineers has evaluated the removal of a segmented dam in the Neversink River upstream of the state highway Route 209 Bridge in Cuddebackville, a hamlet within Orange County, New York.

PURPOSE AND SPECIFICATIONS

The goals of the project are to restore historic fish passage in the Neversink River for native migratory species, specifically targeting American shad (*Alosa sapidissima*). In addition, the dam removal will provide an improvement of habitat available to the federally endangered dwarf wedge mussel (*Alasmidonta heterodon*) population, located downstream of the dam. The Neversink River is located within the southeastern portion of New York, traversing Orange, Sullivan, and Ulster Counties, and eventually joining the Delaware River. As a major tributary of the Delaware River, the Neversink is internationally recognized not only as a famous fly-fishing area, but also for the extremely pristine watershed supporting many federally endangered and threatened species.

The Neversink River watershed encompasses 435 square miles, 235 of which are above the Cuddebackville Dam. Cuddebackville Dam is actually two dam segments that cross the Neversink River in Orange County approximately 1-1/4 miles upstream of the state highway Route 209 Bridge. The Southwest Dam segment is a 107-foot long concrete pier stop log dam with its spillway 4.5 feet above the apron. The Northeast Dam segment is a 188.5-foot long concrete gravity dam with a notched sill 6.6 feet above the downstream apron and a water control intake structure on the right bank. An approximately 170-foot wide island separates the dam segments, both built in the early 1900s. Both dams are within the Delaware and Hudson (D&H) Canal County Park and are owned by Orange County and operated and maintained by the Orange County Parks Department. Currently, the Cuddebackville dam prevents fish from accessing upstream waters.

As part of this proposed project, only the Southwest Dam will be removed. The removal of the Southwest Dam will require construction of a permanent roadway through the surrounding forest, starting where the D&H Canal Park's pathway stops and ending at the bank of the project site. A permanent road was selected in lieu of a temporary road for future monitoring and restoration purposes of the project site. The designed road configuration will minimize any impacts to wetlands in the project area. The planned course of the roadway, previously surveyed for the presence of wetlands, will be used in transporting materials and heavy equipment to and from the dam site. The designed road configuration will minimize any impacts to wetlands in the project area (<0.10 acre). As part of the removal project a temporary bridge will be constructed to cross the Neversink River downstream of the Northeast Dam. Cofferdams will be installed before the dam removal to dry out the area around the dam and limit any downstream movement of sediment. Minor explosives will be used to fracture the dam into large pieces, which will then be

removed with an excavator and hauled to an appropriate local disposal site. After the dam removal is complete, the temporary bridge will be removed, as well as, a section of the access road (approximately 650 feet). Any disturbed areas will be replanted.

COORDINATION

The project was developed by the U.S. Army Corps of Engineers and The Nature Conservancy and was coordinated with the U.S. Fish and Wildlife Service, U.S. Geological Survey, National Marine Fisheries Service, U.S. Environmental Protection Agency, and the N.Y. State Department of Environmental Conservation. The draft Environmental Assessment (EA) for the project has been forwarded to these agencies and all other known interested parties for review and comment.

ENDANGERED SPECIES IMPACT

The Environmental Assessment has determined that the selected plan, if implemented, would not jeopardize the continued existence of any species or the critical habitat of any fish, wildlife or plant, which is designated as endangered or threatened pursuant to the Endangered Species Act of 1973, as amended by P.L. 96-159.

In 1990, the world's largest and healthiest population of federally listed dwarf wedge mussel was discovered, with the Cuddebackville Dam being their upstream habitat limit. Due to their delicate habitat requirements and the freshwater mussels' specific dependence on smaller resident fish species, their numbers have been steadily dwindling throughout the country. The U.S. Fish and Wildlife Service reports impoundments as being a primary cause for population decline. Dams significantly alter the surrounding ecosystem and could result in further population degradation in the Neversink River.

Another freshwater mussel, the brook floater (*Alasmidonta varicosa*), a New York State listed species, also inhabits the waters surrounding the project area. It is thought that by restoring the Neversink River to its historic conditions, the resident dwarf wedge mussel and other freshwater mussel beds will experience greater health and population growth.

WATER QUALITY COMPLIANCE

Pursuant to Section 401 of the Clean Water Act, a 401 Water Quality Certificate will be obtained from the New York Department of Environmental Protection prior to the dam removal. The Nature Conservancy, the project's non-federal sponsor, will obtain a State Water Quality Certificate for this project through the state permit process.

CULTURAL IMPACTS

Project designs will also have considerations to maintain the flow of the Delaware & Hudson Feeder Canal, a historically significant waterway feeding off the Neversink River that supplies water to the historically significant Delaware & Hudson (D&H) Canal. The historic Delaware and Hudson Canal, used in transporting coal and other materials for 70 years, has been a significant economic and cultural addition to the Pennsylvania and New York area. Constructed by 1828, sections of this man-made waterway are listed on the National Register of Historic Places. The D&H Canal connects to the Neversink River through a feeder canal located just south of Cuddebackville, though still in the canal County Park. A project requirement has been to remove the dam so that only minimal alterations in flow to the feeder canal occur. The proposed

project will maintain sufficient flow to the feeder canal and thus not diminish either the feeder or the D&H Canal's cultural or aesthetic integrity. The plan has been designed to avoid archaeologically and historically sensitive areas, and is therefore not expected to impact any cultural resources.

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.

_____
Date

_____
Timothy Brown
Lieutenant Colonel, Corps of Engineers
District Engineer

DRAFT
ENVIRONMENTAL ASSESSMENT
CUDDEBACKVILLE DAM REMOVAL PROJECT
SECTION 206, ECOSYSTEM RESTORATION
ORANGE COUNTY, NEW YORK

PREPARED BY:
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MAY 2002

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1.0 Project Location

The Cuddebackville Dam Removal Project site is shown in Figure 1. The project site is located in the Town of Deerpark within the hamlet of Cuddebackville, Orange County, about 10 miles from Port Jervis, New York and consists of two dam segments that cross the Neversink River in Orange County approximately 1 ¼ miles upstream of the state highway Route 209 bridge (Figure 2).

2.0 Study Authority

The study authority for the Cuddebackville Dam Removal Project is Section 206 of the Water Resources Development Act of 1996, which is used for aquatic ecosystem restoration that will improve environmental quality and is in the public interest.

3.0 Purpose and Need for Action

The two dam segments (Figure 3), now in disrepair after being abandoned one-half century ago, block the movement of anadromous fish such as American shad (*Alosa sapidissima*) and mark the upstream limit of a population of the federally endangered dwarf wedge mussel (*Alasmidonta heterodon*) on the Neversink River. The Southwest Dam (Figure 4), which is the focus of this removal, is 107 feet long between abutments (125 feet total length) with its sill 4.5 feet above the downstream apron. This dam is referred to as a pier stop log dam since it consists of eight concrete piers with nine 8' 8" sluiceway slots for timber stop logs which were once used to raise the head of the dam above the level of the currently exposed ogee sills. All the stop logs that once raised the head of this dam have been long since removed or have washed downstream.

The Northeast Dam, which currently diverts water into the feeder canal, is a 188.5-foot long concrete gravity dam with a notched sill 6.6 ft. above the downstream apron. The Northeast Dam will not be removed or altered as part of this project. The dams are separated by a 170 foot-wide island in the Neversink River.

The Cuddebackville Dam Removal Project would provide access to spawning and rearing habitat for migrating fish with benefits to populations that historically spawned and foraged in the Neversink River and its tributaries including: American shad and striped bass (*Morone saxatilis*). Removing the Cuddebackville Southwest Dam will allow fish to access approximately 30 miles of mainstem riverine habitat. In addition to anadromous species, the populations of resident fish and macroinvertebrates will benefit from the expanded habitat available to them as a result of the dam removal.

The world's largest population of the federally endangered dwarf wedge mussel is also restricted by the Cuddebackville dam due to its reliance on host fish to transport mussel larvae upstream to new areas (U.S. Fish and Wildlife Service 1997). The particular host fish of the mussel includes smaller species such as the mottled sculpin (*Cottus bairdi*), tessellated darter

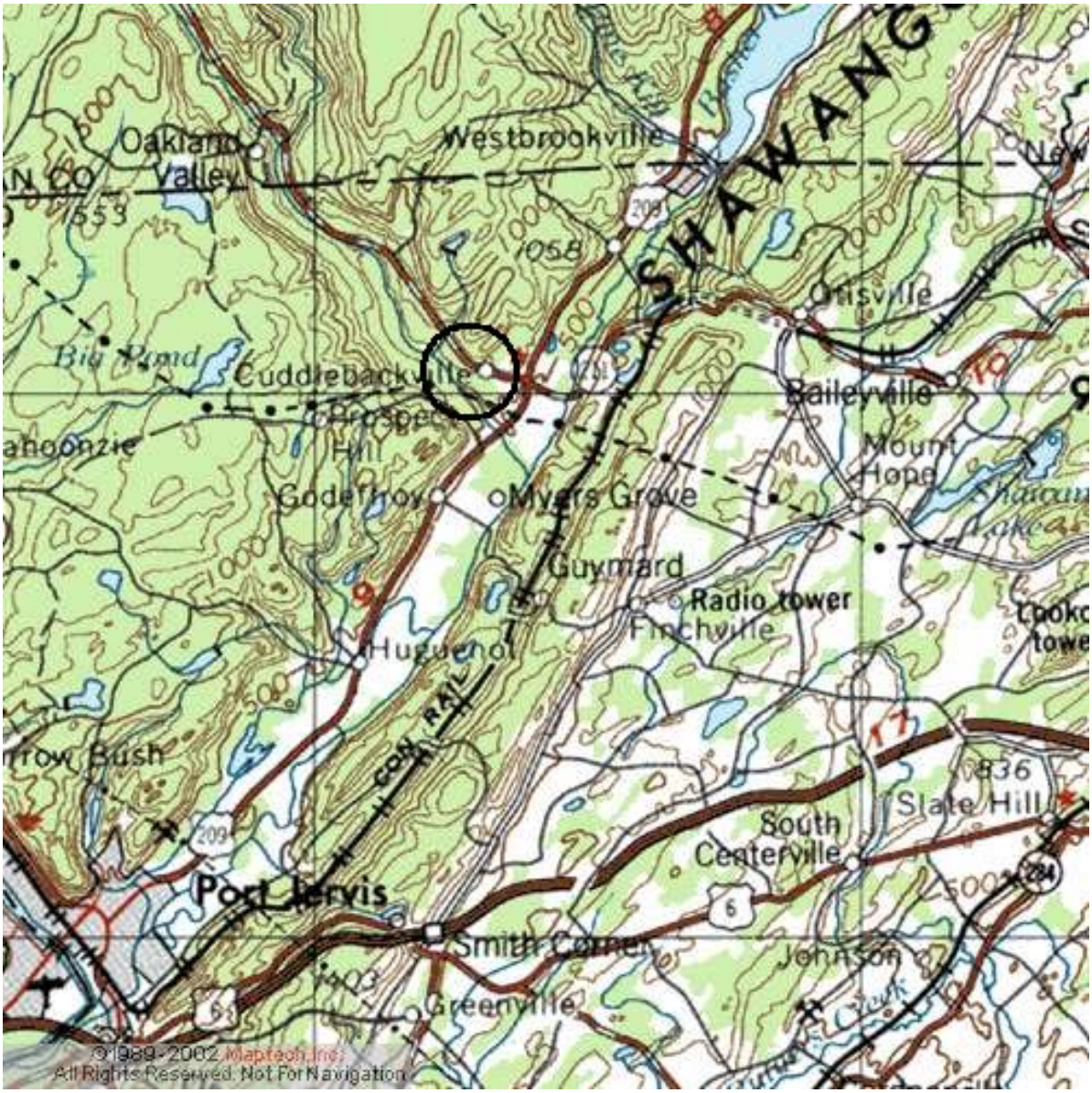

Figure 1. The Cuddebackville Dam removal project area.

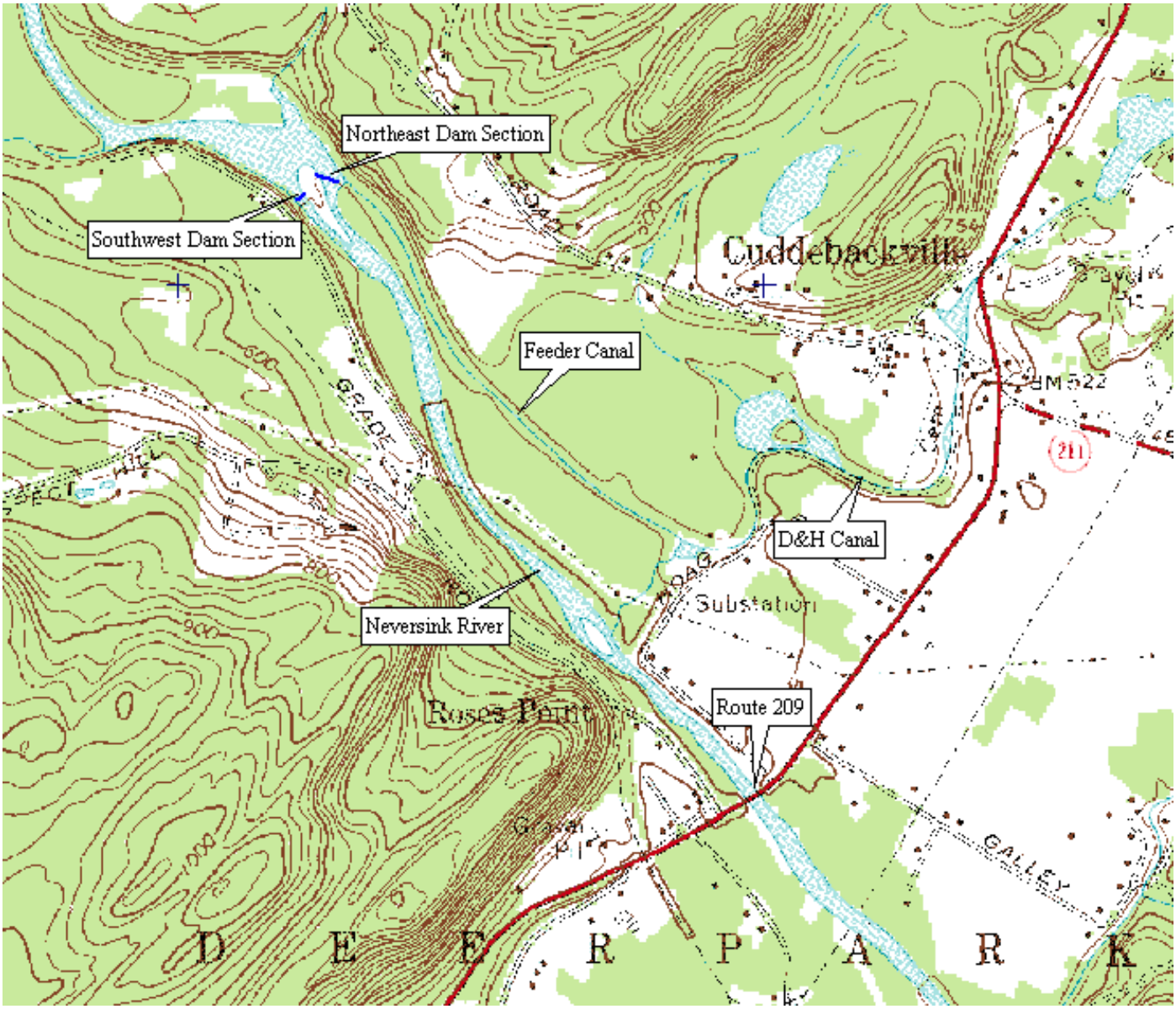

Figure 2. Cuddebackville Dam removal project site

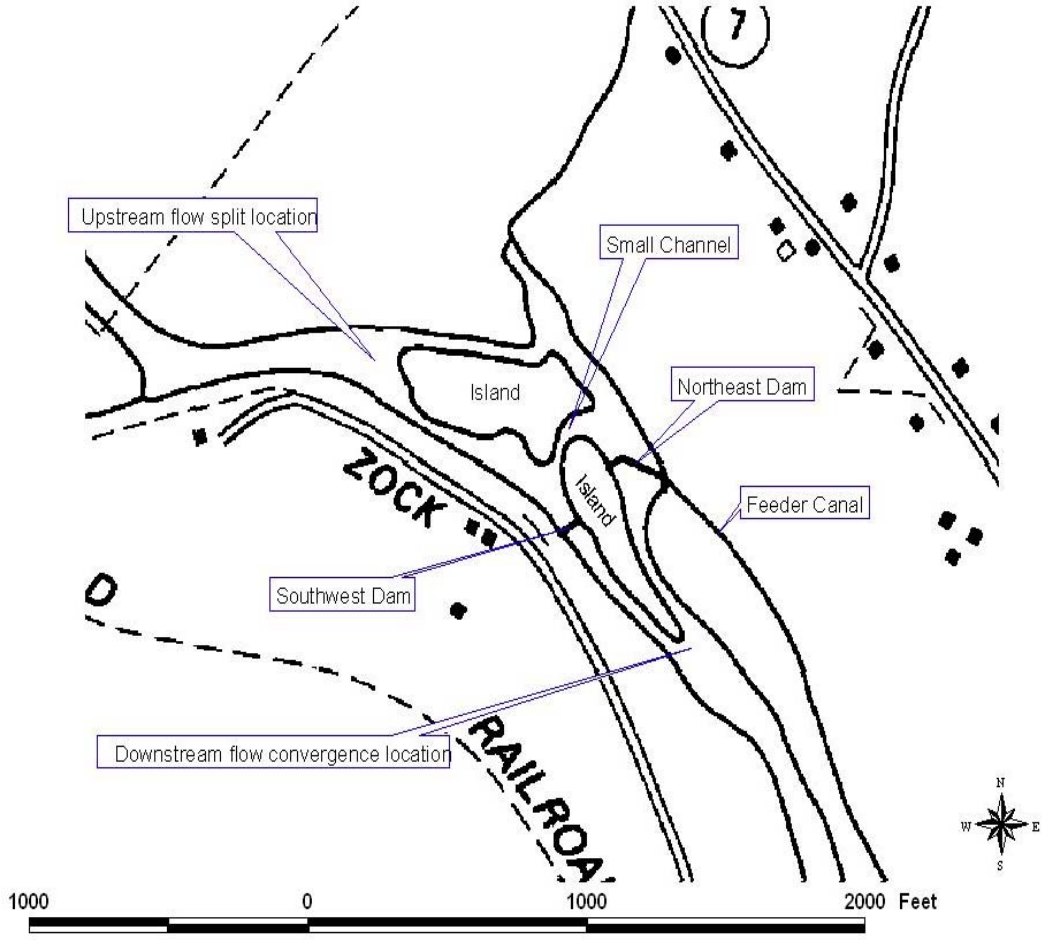

Figure 3. Site map showing the Southwest Dam (proposed for removal) and its relation to the Northeast Dam (to remain in place).

Statistics on the Dams

Latitude: 41° – 28’

Longitude: 74° – 36’

Watershed Area Above Dams: 235 square miles

NY State ID #: 164B-89

Corps #: NY 493

Recent New York State Inspections: 1973 inspection, 1988 site check

Hazard classification: “A” (low hazard to downstream community)

Figure 4. Cuddebackville Southwest Dam, Cuddebackville, NY.

(*Etheostoma olmstedi*), and johnny darter (*Etheostoma nigrum*), without which the mussel could not complete its life cycle. The mussel population is clearly impeded by human interference.

Another benefit of the project will be restoring the river to a more natural condition. The impoundment behind the Southwest Dam has caused slightly higher water levels and lower flow, with sediment depositional areas covering the riverbed and reducing habitat for macroinvertebrates. Removal of the dam will not only restore the water to its original level, but it will also provide a complete riverine system consisting of riffles and pools, which is more beneficial for fisheries migration and spawning (U.S. Army Corps of Engineers 2001). Exposing the gravel river bottom will lead to increases in macroinvertebrate diversity due to more substrate complexes and subsequent riffle and pool sequences. If possible, rocky substrate islands and subsurface rock piles, obtained by recycling the structural stones from the dam, will also be used to construct habitat for adult and juvenile resident fish species.

The dam owner, Orange County, has stated that one of the needs of the project is to remove the dam without impacting the water level in the historic Delaware & Hudson (D&H) Canal through the adjacent feeder canal. Numerous residents live adjacent to the canal and enjoy the aesthetics of the canal. In addition, the water in the canal needs to be available for fire emergencies. Furthermore, a lowering of the water level could impact the historic integrity of the D&H Canal.

Project success will be measured by an increased use of the river upstream of the dam by migratory fish (i.e., shad runs), an increase in the aquatic biodiversity, and an enhancement of the health and quality of the Neversink River riparian system. Table 1 provides a list of species specific benefits that would result from the project.

Table 1. Expected Project Benefits to Specific Species.

Species	No Action (Dam in Place)	With Dam Removal	Future (With Dam Removal)
American Shad	Upstream passage will continue to be obstructed.	Increased habitat availability. Elimination of upstream barriers.	Can become established in upstream areas and tributaries. Restoration of historic runs on the Neversink River.
Blueback Herring	Upstream passage will continue to be obstructed.	Increased habitat availability.	Restoration of historic runs on the Neversink River.
Brook Floater	State listed population dependent on resident fish as larvae host.	Increased habitat availability.	Improved population due to increased habitat range of host species. Population more stable.
Dwarf Wedge Mussel	Federally listed population dependent on resident fish as larvae host. Population range is limited by the dam.	Increased habitat availability.	Potential for increased range. Population more stable with greater available habitat.
Striped Bass	Upstream passage will continue to be obstructed.	Increased habitat availability to the fish.	Success of migratory fish population will improve. The Neversink River's recreational fishing will improve.
Trout	Upstream passage will continue to be obstructed.	Increased habitat availability to the fish.	Success of resident fish population will improve the Neversink River's recreational fishing potential.
Alewife Floater	Population restricted, dependent on anadromous fish as host.	Increased habitat availability.	Reverse decline of species. Should have population growth due to increased range of host species.

4.0 Alternatives

Due to the nature of this project, a limited number of alternatives are available to achieve the goals of fish passage while being sensitive to engineering, environmental, and historical criteria. The alternatives include no-action and removal of one or both of the Cuddebackville Dams.

4.1 No-action

The no action alternative would leave the current stream conditions as they exist and no upstream fish access would be established. The health of the fishery populations in the Neversink River would stagnate as access to additional foraging and spawning areas would continue to be limited by both the Northeast and Southwest dams. The New York State Department of Environmental Protection (NYDEC) reports that large runs of American shad have been observed in the Neversink in schools of 100 to 1,000 that move up the river before being blocked from their migration by the Cuddebackville Dam. Additionally, with the inability of smaller fish to circumvent the dam, freshwater mussels in their parasitic larval stage, the glochidium, would not disperse enough and its habitat would continue to be limited to below the dam. This type of confined habitat could negatively affect the health of the dwarf wedge mussel population, and, with this specific New York population being the largest and healthiest in the world, it would thus be jeopardizing the existence and genetic variability of the species (NYDEC 1998). In addition, by limiting an endangered mussel population to a confined reach of the Neversink River, this makes the mussel population more susceptible to harm from a pollution accident or localized disease.

4.2 Removal of the Southwest and Northeast Dams

This alternative involves removing both dams. With complete removal of the dams, the entire riverine ecosystem would benefit, including migratory fish and the dwarf wedge mussel. However, the owner of the dams, Orange County, requested that removal of the dams not influence the hydrology of the D&H Feeder Canal that provides water to the D&H Canal. Orange County expressed concern over the potential reduction in water volume in the canal as a result of this project. Using HEC-RAS computer models, a thorough analysis of the hydraulic information was completed to determine the affects of removal on the water levels of the D&H Canal. The results demonstrated that the removal of the Northeast Dam would have significant impacts on maintaining water levels in the D&H Canal. A complete removal of the Northeast Dam would result in the drying out of the D&H Feeder Canal for stream flows equal and below the 2-year flow. Due to these hydraulic constraints, this alternative is not considered a viable option for the project.

4.3 Removal of the Southwest Dam

The removal of the Southwest Dam (Figure 4) would allow migratory fish passage and expansion of the dwarf wedge mussel range upstream into the Neversink River. In addition, the hydrologic analysis demonstrated that the removal of the Southwest Dam will not affect the water-surface elevations upstream of the Northeast Dam for low flows, which conversely would not impact the water levels found in the D&H Canal. Therefore, this alternative meets the purpose and need for the project and is considered the selected alternative. The following is a detailed description of the proposed project plan (see Appendix C for plan drawings):

1. Improve the existing road (place geotextile, place stone, compact, as needed) after installing

erosion control measures.

Before and during construction of the access road and improvement of the existing road, measures will be employed that minimize soil erosion and storm water runoff from the site. As the existing and proposed access roads are close to the river, existing vegetation cannot be relied upon to control soil erosion into the river from disturbed ground. Silt fence and straw bales will be installed along the down slope edge of the low, "wet areas" of the existing road in order to limit sediment runoff in areas in which this runoff is most likely to occur (see Appendix C). Silt fencing will not be used along the entire section of the existing road since there will be limited disturbance in upgrading this road. In the area of new construction, both sides of the construction area will be bounded by silt fence and a number of sediment traps will be created in locations of likely runoff (see Appendix C). A drawing of the silt fence/sediment trap system can be seen in Appendix C. Additionally, the shoulders of the access road will be kept as flat as possible to discourage erosion and will be hydroseeded. The access road itself will be finished with a layer of well-sorted crushed rock and geotextile fabric, as needed, such that fines are minimized. This will minimize the amount of sediment finding its way to the river.

2. Construct a new road (clear, grub, grade, place geotextile, place stone, compact) from existing road to dam site.

Standard construction sediment and erosion control measures will be followed during road construction. This must be done prior to accessing the dam site and will include the installation of one culvert that will remain permanent (adjacent to the D&H Feeder Canal outfall) (see Appendix C), and a temporary bridge structure to cross the Neversink River and access the Southwest Dam.

In order to minimize the impact on the environment of the actual construction of the access road, only those trees that are in the right-of-way of the road will be removed. Care will be taken to avoid damage of other vegetation. The access road itself will be finished with a layer of well-sorted crushed rock; however, both the existing and proposed access roads traverse softer low areas so a geotextile fabric will be used as part of the road base to minimize the use of a gravel base. Additionally, edges of the access road will be kept as flat as possible to discourage erosion and will be hydroseeded. This will minimize the amount of sediment finding its way to the river. For both the existing and new road sections, the width of the road will be kept to a minimum based on the contractor's requirements for access. This width will not exceed 15 feet (the width shown on the plans) and will be built narrower, if possible, in order to minimize disturbance to the environment.

A temporary bridge system (minimum 50 feet span) will be employed to cross the river and side channel to reach the midstream island from which the demolition will take place (see Appendix C). Use of a temporary bridge will limit disturbance to the stream bed while providing safe access for equipment. The specific design of the temporary bridge is being determined in coordination with NYDEC.

The contractor will employ standard road building equipment (excavators, dozers, compactors,

etc.). The contractor will construct the road according to the final design drawings. Before the actual road is built, only the road area will be cleared of vegetation. Some topsoil will be removed prior to road construction since the majority of the road is to be permanent. This topsoil will remain on site and be available for future use by the Orange County Parks Department or will be used in site restoration.

Two staging areas (see Appendix C) will be set up in order that equipment can be stored safely and conveniently overnight and during construction operations. These will be located in areas with even grades that require little to no clearing in order to limit their environmental impact. A stockpiling area, with its tentative location indicated in Appendix C, will be used for the temporary placement of concrete and coarse river sediment materials that are excavated during the dam removal process while they are awaiting shipment off-site. The stockpiling area will be surrounded by straw bales and a silt fence to limit runoff. The new road and existing road improvements will be permanent, according to Orange County's request and the potential need for future site access. A small section (approximately 200 feet) of the access road nearest the river (see Appendix C) will be removed after dam removal is completed, the remaining access will remain permanent.

3. Installation of two water-filled cofferdams to limit possible downstream sediment movement in the river during demolition of the dam.

The cofferdams will be placed at the upstream flow split location in front of the section of the channel that flows over the Southwest Dam (see Figure 5) and across the small channel between the two mid-stream islands where the low dike will be built after dam demolition. The nature of the split channel makes using a cofferdam quite simple since no bypass will need to be created. Only a small section of channel (no more than 350 meters) will need to be temporarily dewatered. Before, and then again during dewatering, this section of river will be cleared by The Nature Conservancy (TNC) of mussels and fish to the extent possible. These mussels and fish will be relocated to areas of suitable habitat upstream of the dam area or on the other side of the midstream islands.

Water-filled cofferdams have been used in a number of other dam removals around the country. They are preferable to traditional sandbag cofferdams due to their portability, ease of deployment, and low risk to the environment. They work by providing a stable barrier of water to divert the flow of the river. The primary cofferdam placed at the upstream flow split would likely be 4 x 150 feet consisting of industrial grade vinyl coated polyester. A water filled cofferdam of this size will not only be able to divert typical flows, but can handle once in two-year frequency storm flows, enhancing flexibility in the timing of the project. Shorter water-filled cofferdams will be placed in the small channel between the two impoundments and approximately 50 meters downstream of the Southwest Dam. No heavy equipment should be necessary for installation of the cofferdams, so a road will not be needed on the upstream island. The only required equipment should be a 2-3" portable water pump that will allow for installation in less than one day. The sump pump will be placed near the location of the upstream cofferdam to catch any leakage that could develop behind the cofferdam. Any leakage

will be pumped back to the river side keeping the working area dry.

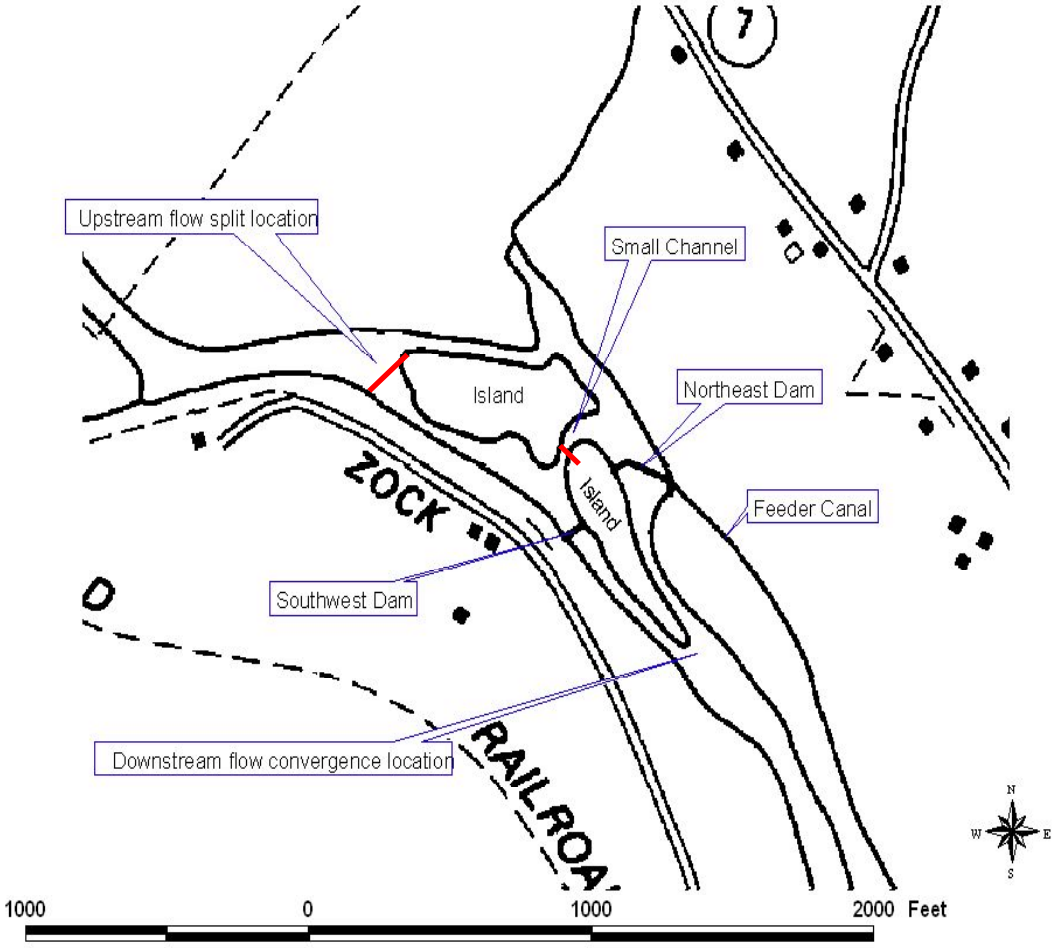

Figure 5. Approximate locations of the two water-inflatable cofferdams to be used in the project.

4. Smoothing and grading of the impounded sediments to allow the equipment (excavator and loader) to access the dam and right abutment.

Before any work is done to the dam structure the coarse sediments behind the dam will be regraded by moving the material with the backhoe into the scour hole directly behind the dam. This scour hole, currently approximately 3 to 4 feet deep, needs to be leveled off to the elevation of the spillway to allow the equipment (excavator and wide tire/tracked truck) safe access to the dam and right abutment. Once this area is graded and accessible, work can begin on stabilizing a portion of the right abutment and then removing the dam structure and left abutment.

5. Stabilize the right abutment of the dam.

The steep slope above the right (southwest) abutment to the dam requires particular attention as part of this project. Without stabilization of the slope or abutment, significant erosion of the bank or a slope failure could follow the removal of the dam. To deal with this threat, a portion of the right abutment will remain in place but will be rock reinforced on the river side (see Appendix C). In addition, a drain will be placed on the slope side to limit the pressure on the abutment from the water table. Thus, the first step in this process, before the dam is fragmented, is to use a drill to install the drain. This drain will move water from the slope and out the downstream side and should require minimal, if any, excavation to install.

On the river side, large stone rip rap will be placed at the toe of the abutment. This riprap (R1500 24", rounded river stone <9") will be covered by large river stone to give a more natural look. The rip rap support for the abutment will likely begin 8 feet below the top of the abutment and wingwalls and extend to the riverbed at a consistent slope (i.e. 1.5 to 1). The design will have as little of the river intruded upon as possible (approximately 15 feet measured from the toe of the riprap to the abutment face) in order to avoid the creation of eddies or scour problems, to ensure adequate fish passage, and to improve aesthetics. Furthermore, about one-half of this length will be under water during typical flow conditions. Once stabilization of the right abutment is complete, demolition of the dam can proceed.

6. Demolish the dam and remove the concrete and rebar to a landfill.

Blast-fracturing will be used to initially fragment the concrete of the dam and apron. An excavator equipped with a lifting device will further fragment and then move the material to a truck for disposal off-site. If, after presentation of the full dam removal plans to the community and appropriate regulatory authorities, there are significant objections to the plan to use explosives, conventional demolition techniques (i.e., using a hydraulic excavator with hammer attachment to fragment the dam) can be employed under the current project plan. Similarly, if initial seismic/acoustic effects from blasting are not in accordance with specifications then blasting will be discontinued and all demolition will be done by conventional methods. However, it should be noted that eliminating the use of small explosives will extend the construction period and may raise the costs. It will also likely lead to additional environmental impacts due to the extended period of time a portion of the channel would be dewatered. Note that, although the dam demolition description below includes the use of explosives in the dam removal process, conventional demolition of the dam can be substituted without substantially changing any other aspects of the dam removal plan.

The broken sections of the dam, abutments, and apron will be removed from the river utilizing a hydraulic excavator. The contractor will load all pieces of concrete into dump trucks which will move the material to an appropriate landfill (tentatively a construction and debris landfill outside Middletown, NY approximately 20 miles from the site) utilizing the newly constructed access road.

7. Construct a 2 ft high dike between the adjacent island and an upstream island.

The selected plan includes the construction of a permanent 2-foot high stone dike connecting the island between the dams with an upstream island to ensure continual flow in the canal. The dike will be placed in a location behind (Southwest Dam side) where the water-filled cofferdam is installed, but will not be constructed until the dam is removed. The planned dimensions of the stone dike are 109 feet long, 16 ft wide at the base, 8 ft wide at the top, and at a 2 to 1 slope.

With both dams in place, the small artificial channel between the two islands allows mixing of their upstream pools for pool elevations higher than 525.8 feet NAVD, the maximum elevation of the small channel bottom. The flow direction through the small channel depends on which pool elevation is greater. With the Southwest Dam removed, the northeast pool elevation will always be higher than the elevation on the southwest side of the small channel. Therefore, water could move through the small channel from the northeast pool to the southwest channel, especially at higher flows. This would be unlikely to effect the water level in the historic section of the D&H Canal due to the existence of the overflow weir on the feeder canal that already returns water to the river during periods of higher flow. However, since water leaving the northeast pool will lower the water-surface elevations upstream of the Northeast Dam and in the canals under certain circumstances, under this plan the channel bottom will be raised using this dike to the elevation of the feeder canal entrance. Only a localized area of the small channel will be raised and the small channel will still contain water for most flows. For further discussion of this issue see the Hydrologic and Hydraulic Analysis in Appendix A. Construction of the dike will take place after dam removal is complete and will be done in the dry behind the water-filled cofferdam that will be in place during the removal process.

8. Regrade the stream.

Sediments nearest the dam will be regraded in order to limit erosion and improve fish passage up the restored channel. Simply removing the dam without regrading and limited sediment excavation would likely create a hydraulic jump that would be difficult for fish to pass. The channel will be graded to an approximate 3 to 5% slope to allow a wide variety of fish to pass through this area at almost all flow conditions. The goal will be to develop a consistent grade from the end of the existing apron to a point approximately 30 feet upstream of the dam, where grading and excavation will cease. This process will involve first moving sediment from the access area behind the dam into a portion of the downstream scour hole. Then the rest of the channel will be regraded back from this point to ensure fish passage and limited channel readjustment and erosion. The graded channel will have a slightly concave cross section with the center 1-2 feet lower than the edges to help reduce bank erosion and assist fish passage. The low flow channel, created by concave cross section, will be located so as to match up with the existing low flow channel above and below the site to be graded. Onsite boulders (picked up during the regrading and from nearby) will be placed in the channel with their long axis perpendicular to the flow to help break up the tendency for sluiceway-type linear flow. These boulders (roughly 12 to 24 inch in diameter) will be arranged in groups of three in order to create

pocket (slack) water to serve as sheltered resting areas for fish.

Larger cobbles (nine inches and above in diameter) will be sorted out during the grading process and will be stockpiled for use in stabilizing the bed and banks. Unless pockets of very fine sediment (e.g., clay deposits) are found during the grading process, no impounded sediments should be required to be moved off-site. Instead, an armoring layer of large rounded cobbles, both sorted from the grading process and imported from local sources, will be place over the graded sediments to ensure a relatively stable channel. This armored layer (approximately 1 foot thick), will not only blend with the stream habitat upstream and downstream of the work area, but will allow for some degree of channel adjustment over time. The result will not be an elimination of sediment mobilization over time, but this work should ensure that any sediment that is mobilized will be deposited in a thin layer relatively near to the dam (within the first 2,500 feet, primarily in the remaining scour hole) where there are few mussels (none of which are federally endangered- see Appendix A). Any fine material excavated during this work and not used in the channel will be stockpiled for use on site in restoration, by Orange County Parks, or for reuse at The Nature Conservancy's Neversink Preserve.

8. Stabilize the left abutment slope (on the island) with small riprap (rounded river stone 9" and greater in diameter) topped with rounded river stone.

9. Removal of the temporary road segment (see Appendix A) and the temporary bridge crossing the river to the island. Restoration work at the upland island portion of project site (e.g., seeding, planting, and bank stabilization with river stone) including the road area.

10. Removal of the cofferdams.

11. Schedule

The estimated time for each component of the project is as follows:

- Mobilization.....2 weeks
- Road Construction .....5 weeks
- Cofferdam Installations……1/2 week
- Dam Demolition, Bank Stabilization, and Dike Construction.....6 weeks
- Demobilization and Final Erosion Control Measures.....2 weeks

The total estimated time to complete the project is 15 ½ weeks; however, factors such as weather and construction delays could affect the time schedule.

5.0 Existing Environment

The Neversink River's high quality waterways and uninterrupted riparian zones allow for an

abundance of species and natural communities to flourish. The large expanses of successional and hardwood mixed forests contain few anthropomorphic disturbances and thus support many healthy populations of disturbance-sensitive species and their specific habitat requirements. Great interest has also been taken to protect an area spanning over 200 acres, called the Neversink Preserve.

5.1 Air Quality

The air quality of the project area and the Neversink River is good. Since the watershed is largely forested with some agricultural development, the air quality would be expected to be high. The closest industrial area to the project area is Port Jervis, NY, which is located approximately 10 miles to the south.

5.2 Noise Environment

The Cuddebackville area is a rural village with very limited industrial activity. The project site is located adjacent to the Neversink Valley Historical Museum, which is visited by residents and local schools. Ambient noise level would be expected to be low to moderate.

5.3 Water Quality

The Neversink River begins in the Catskill Mountains of New York and flows south into the Delaware River at Port Jervis. The watershed is largely forested; however, the middle and lower parts contain some agricultural industry and residential development. Approximately 30% of the watershed flow is controlled by the Neversink Reservoir, which supplies drinking water to New York City (Strayer and Ralley 1993).

Due to the presence of healthy populations of native freshwater mussels, the water quality in the Neversink River would have to be of a high level. Data taken from the NYDEC in 1993 at a sample location approximately 5 miles downstream of the project site confirms this fact (see Appendix C for more detailed sampling results) (NYDEC 1993). Dissolved solids ranged from 37 – 78 mg/l, well below the State standard of 200 mg/l. Most turbidity levels ranged from 0.3 – 2.3 nephelometric units (N.T.U.), well below the State standard of 5 N.T.U.; however two samples at 13 N.T.U. did exceed the standard. The pH for the Neversink River ranged from 6.6 – 7.2, well within the State standard range of 6.5 – 8.5 (NYDEC 1993).

5.4 Sediment Quality

During July 2001 a field investigation was completed by TNC to characterize the sediment located behind the Southwest Dam. The amount of sediment located behind the Southwest Dam was estimated to be 200 cubic yards and consisted mostly of cobble with minor areas of coarse sand. A more detailed review of the sediment characterization can be found in Appendix A.

Impounded sediment sampling and testing was completed in the summer of 2001 in accordance

with the plan approved by the NYDEC. Field investigations using sediment probes were incorporated into a GIS database to estimate the volume of impounded sediments behind each dam. A description of the sediment characterization and sampling is included as Appendix A. This document includes a map of sampling locations and a description of conditions in the field. In addition, it was estimated that 200 cubic yards of fine-grained, sandy material is present within the impounded area in between the Southwest Dam spillway and the upstream riffle. A particle size analysis was completed based on a sediment sample taken from below and between the armored cobble layer of the impoundments and is submitted as Appendix A. It shows that the sample from the Southwest Dam (SW3a) had a maximum particle size of 25mm and was generally fairly coarse. Approximately 5% of the sample (by weight) could be considered silt. The bulk of the sample consisted of coarse sand and gravel.

The following chemical analyses were completed on the impounded sediments:

1. Mass-based analysis of metals identified as parameters of concern in Neversink River sediment by the 1996 DEC report: Lead, Manganese, and Zinc.
2. Mass-based analysis of metals identified in the scientific literature as potentially harmful to freshwater mussels and other benthic organisms and included in the DEC's "Technical Guidance for Screening Contaminated Sediments": Arsenic, Cadmium, Chromium, Copper, Iron (%), Mercury, and Nickel.
3. Pesticides (including endrin and methoxychlor)
4. Total Polychlorinated Biphenyls (PCBs)

This testing of three samples from above the Southwest Dam (performed by Severn Trent Laboratories of Newburgh) found all metals to be below the lowest effect level included in NYDEC's "Technical Guidance for Screening Contaminated Sediments" with one exception. One sample above the Southwest Dam had levels of manganese at 592 ppm. This is above the lowest effect level (460 ppm), but well below the severe effect level (1100 ppm) of the "Technical Guidance". The other two samples from above the Southwest Dam were well below the lowest effect level for all metals. Note that manganese, which acts as a micro-nutrient, has not been found to be harmful to mussels or other aquatic life at the moderate levels found in the one sample above the Southwest Dam. In addition, all samples were below detection limits for pesticides and PCBs. For more information on the sampling results see Appendix A.

5.5 Wetlands

Wetlands are common in the Neversink watershed. Within the project area, their presence is patchy. Small wetland areas have been identified in the proposed project area. Tree species found in the project area include red maple (*Acer rubrum*), sugar maple (*Acer saccharum* Marsh), green ash (*Fraxinus pennsylvanica*), black locust (*Robinia pseudoacacia*), and black birch (*Betula lenta*). Additional plant species found in the area include river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), basswood (*Tilia* species), and silver maple (*Acer saccharinum*) (TNC, personal communication, 2002).

5.6 Macroinvertebrates and Fisheries

Waters in New York State commonly have the following orders of macroinvertebrates, and though a survey was not actually conducted, it is likely that these orders occur in the general vicinity of the project: Hymenoptera, Hemiptera, Odonata, and especially shredders within the orders Ephemeroptera, Diptera, Plecoptera, Trichoptera, and Coleoptera. The densely forested riparian zones surrounding the Neversink River more than likely result in an adequate supply of leaf litter nutrients available to macroinvertebrates. This terrestrial leaf litter, also considered coarse particulate organic material, the predominate source of energy for shredders and detritivores, has allowed for visible populations of these species and further contributed towards healthy trophic interactions.

Some of the resident fish species found in the Neversink River include: smallmouth bass (*Micropterus dolomieu*), slimy sculpin (*Cottus cognatus*), golden shiner (*Notemigonus crysoleucas*), spottail shiner (*Notropis hudonius*), fallfish (*Semotilus corporalis*), tessellated darter, redfin pickerel (*Esox americanus americanus*), yellow perch (*Perca flavenscens*), and brook trout (*Salvenlinus fontinalis*). Migratory fish found in the project area include: American shad, blueback herring (*Alosa aestivalis)*, and striped bass.

5.7 Wildlife Resources

The extensively secluded and relatively unfragmented terrestrial habitat within and surrounding the project area, makes the Neversink watershed rich in species diversity. Ecological communities found in the southeastern sections of New York consist mostly of high-successional deciduous forests, though floodplain forests are present within the project area.

Although surveys of the wildlife were not actually taken, the following mammals are typical of southern New York woodlands having freshwater rivers: muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), woodchuck (*Marmota monax*), chipmunk (*Tamias striata*), gray squirrel (*Scirus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), black bear (*Ursus americanus*), and bobcat (*Lynx rufus*).

Reptile and amphibian species commonly found in these forested areas are: blue-spotted salmander (*Ambystoma laterale*), spotted salmander (*Ambystoma maculatum*), four-toed salamander (*Hemidactylium scutatum*), eastern hognose snake (*Heterodon platirhinos*), wood turtle (*Clemmys insculpta*), and the eastern box turtle (*Terrapene c. carloina*).

Indigenous birds will be more common to these forested areas of the Neversink River than migratory species. The following species of bird are commonly observed within the project area: turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), barred owl (*Strix varia*), pileated woodpecker (*Dryocopus pileatus*), American crow (*Corvus brachynrynchos*), robin (*Turdus migratorius*), northern cardinal (*Richmondena cardinalis*), blue jay (*Cyanocitta*

cristata), and various species of sparrows.

5.8 Threatened and Endangered Species

The Neversink River contains the world's largest known population of the federally listed endangered dwarf wedge mussel (U.S. Fish and Wildlife Service 1997). Due to their filtration feeding method, these freshwater mussels are indicator organisms of water quality, with their continued existence indicative of the health and quality of the Neversink River's aquatic resources. The dwarf wedge mussel specifically requires a low turbidity environment without impediments that block interactions with its host fish. Freshwater mussel glochidia, the larvae, are generally species-specific and will only live if they find the correct host. With dwarf wedge mussels, the right hosts are small bottom-dwelling fish, like the tessellated darter and the mottled sculpin (NYDEC 1998). Without harming its host, the larval mussel attaches to the gills of the fish, seemingly exploiting it as a means of dispersal (see Figure 6).

Two additional species of concern, both freshwater mussels, were identified within the general project vicinity (New York Natural Heritage Program 2001). The brook floater (*Alasmidonta varicosa*) is a state-listed threatened species, and the alewife floater (*Amodonta implicata*) is currently unprotected, though factors exist making it very vulnerable in New York, having possible state status pending. The brook floater inhabits medium size streams and rivers. It prefers clean, swift waters with stable gravel, or sand and gravel substrates. Identified fish hosts include blacknose dace (*Rhinichthys atratulus*), golden shiner, longnose dace (*Rhinichthys cataractae*), margined madtom (*Noturus insignis*), pumpkinseed (*Lepomis gibbosus*), slimy sculpin and yellow perch. It is thought that by restoring the Neversink River to its historic conditions, the resident dwarf wedge mussel and other freshwater mussel beds will experience greater health and population growth.

With the exception of the dwarf wedge mussel and occasional transient individuals, no other federally listed or proposed threatened or endangered flora or fauna are known to occur within the vicinity of the project (U.S. Fish and Wildlife Service 2001) (see Appendix B for relevant correspondence).

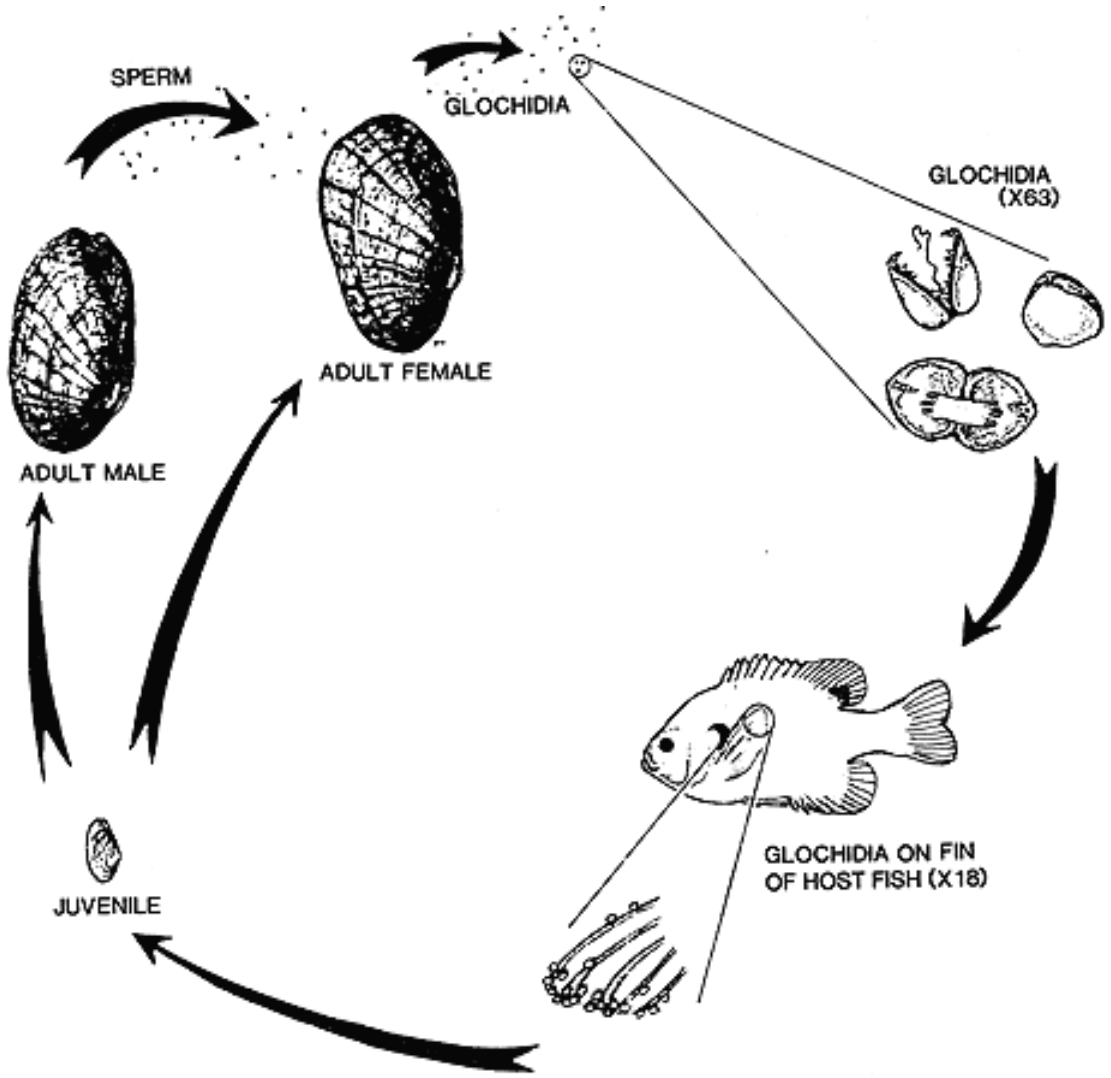

Figure 6. General life cycle of a freshwater mussel (Grace and Buchanan 1981).

5.9 Historic Resources

The Southwest Dam, within the 300 acre Delaware and Hudson Canal County Park, is owned by Orange County. The dam was part of a system to divert water into a feeder canal that was connected to a small hydropower plant until 1948 (after the Delaware and Hudson Canal fell out of use*)*. The Southwest Dam is the product of a 1915 refurbishment of a slightly older stop log dam, during which the eight concrete piers were raised and a concrete apron that extends 21 feet downstream from the base of the spillway was installed. The concrete piers are reinforced with metal plates that are currently exposed due to concrete spalling. Many of the piers have eroded significantly yet they continue to capture a substantial amount of woody debris. The concrete apron installed in 1915 was 18 inches thick and was reinforced with trash rack bars. The concrete apron is now badly eroded and undercut. In some places up to 8 feet of it has been washed away.

Documents have been prepared discussing the history of the Neversink dams (TNC 2000) (see Appendix A). The first dam built at the site was a timber and masonry dam built in the late 1820s by the Delaware and Hudson Company to divert water from the Neversink River into a feeder canal. This feeder canal provided water for the Delaware & Hudson Canal, which served primarily to transport coal from the Delaware River at Honesdale, Pennsylvania to the Hudson River at Kingston, New York. The canal was operational until 1898 when it was abandoned due to its inability to compete with the railroads.

Neversink Light and Power acquired the water rights as well as the properties around the dam and feeder canal and began to build a hydropower plant in 1902. In October 1903, a large flood on the Neversink breached the feeder canal and likely damaged the dam. Soon after the flood, two dams were constructed at the site, one on the northeast side of a small mid-river island and one to the southwest. In place of the original timber and masonry dam in the northeast channel, a hollow reinforced concrete dam with concrete abutments and head gates was built above the original timber foundation. During construction of this concrete dam, a rock-filled timber cofferdam was built just above the concrete dam stretching from the canal head gates to the mid-river island. Meanwhile, on the southwest side of the center island a reinforced concrete sluiceway with abutments was built soon after the flood. This eight piered stop log dam, which provides the structural basis of the dam currently on site, was apparently never fully completed and was deemed in need of repair by 1914.

Around 1908 the hollow concrete dam in the northeast channel failed (the remains can still be seen today) and was replaced by a dam quickly rebuilt over the cofferdam foundation. This dam was built with A-frames that were 24’ long, 6’ wide at the top, and 8’ wide at the bottom, and were set at an approximately 45^{o} angle. These A-frames were spiked together and filled with rock. A timber crib apron was placed below the dam. By 1914 Orange County Power Company (eventually Rockland Light and Power Company), who had taken over the properties of Neversink Light and Power in 1906, decided to hire an engineer from Philadelphia to rebuild the dam and canal complex after inspectors from the New York State Conservation Commission had

found it lacking. This work, completed in 1915, reinforced the southwest pier stop log dam and made the northeast dam into a concrete gravity dam. These dams, although worse for wear, are what remain at the site currently. The hydropower plant for which these dams were rebuilt had a generating capacity of 1200 KW utilizing an average head of 30.5 feet. With a major breach of the power pool impoundment (once a boat basin for the canal) in 1948 the generating plant was abandoned by Orange and Rockland and their properties were turned over to Orange County.

Since 1948 little has been done with the dams and consequently they have eroded significantly. In 1953, the Neversink Reservoir Dam became operational, diverting a significant portion of the Neversink's original flow to New York City for drinking water. The operation of this reservoir has had the effect of eliminating much of the natural variation in flow and temperatures that existed before the diversions began. During the late 1980s the Rivers Electric Company assembled a plan to attempt to restore the Cuddebackville dam and feeder canal complex in order that it could again assist the generation of hydropower. The project was able to receive a license from the Federal Energy Regulatory Commission in 1987, but was abandoned by 1991 due to financial obstacles.

The Delaware and Hudson Canal was a 108-mile, man-made waterway, an engineering feat of pre-industrial America that brought a new form of energy from the hills of Pennsylvania out to the Hudson River. The Delaware and Hudson Canal Park, within which this project is to take place, is on the National Register of Historic Places. From 1828 to 1898, mules pulled barges laden with anthracite coal along river valleys from Honesdale in northeastern Pennsylvania to Eddyville on the Rondout Creek near the villages of Kingston and Rondout. From here, it was shipped on barges down the Hudson to New York City and up the river to Canada.

The canal was conceived in 1823 by William and Maurice Wurtz, two Philadelphia dry goods merchants who had purchased large tracts of land in northeastern Pennsylvania rich in anthracite coal deposits. Though the British had been supplying America's fledgling industries on the eastern seaboard with bituminous coal, the War of 1812 caused America's supply to be cut off, creating a crisis. The Wurtz brothers recognized New York City's need for a new source of cheap energy and believed that their anthracite coal was the answer to the problem. However, a reliable method of transportation had to be found and a market created, for anthracite had not previously been taken seriously and many doubted its ability to burn efficiently.

They hired Benjamin Wright, Chief Engineer of the newly created 350-mile Erie Canal, to survey and design a canal out to the Hudson. The canal proposed would be four feet deep, 32 feet wide, contain 108 locks, 137 bridges, 26 basins, dams, and reservoirs, and cost an estimated 1.2 million dollars. In contrast to the state-financed Erie Canal, the D & H Canal was begun with private money.

To raise money and interest in the project, the Wurtz brothers arranged for a demonstration. On January 7, 1825, the business leaders of New York City gathered at the Tontine Coffee House on Wall Street to witness for the first time the glow of anthracite fire that was to shape the industrial and domestic development of the city. The stock offered for sale that day was oversubscribed

within a few hours, and the newly-formed Delaware & Hudson Canal Company became America's first million-dollar private enterprise.

The Canal operated successfully until the Delaware & Hudson Canal Company made a unique transition in 1898 into a railroad company, becoming America's oldest continuously operating transportation company (**http://www.canalmuseum.org/history.htm 2001).**

6.0 Environmental Impacts

6.1 Air Quality

The selected project alternative will result in temporary and minor impacts to the air quality of the project area. The impacts will result from the use of heavy equipment to remove the dam, construct the access road, as well as, the use of heavy trucks to transport the dam material off site to a local landfill. During dam demolition, the heavy equipment and trucks will be in use for approximately 8 hours per day. The duration of the project is approximately 15 weeks.

6.2 Noise Environment

Since the dam removal will take place in a County Park away from residential areas, there should be no negative impacts to the community. The demolition of the dam removes a hazard and liability to the citizens of Orange County. There will be an increase in noise, primarily from the brief blast period, which is unlikely to be audible to more than one or two residences. Project-related traffic in Cuddebackville will be isolated to the access road, approximately 2 miles from Hoag Road (a local road), and NY State Route 209 (a primary road). Based on estimates of the amount of material to be removed from the site, it is expected that an average of 4 truckloads a day would move out the access road during a period of approximately 3 weeks for the dam removal. Trucks will occasionally move through the area during the five weeks of road construction. In order that the trucks leave the access road and Hoag Road safely, flag-bearing workers will be on the ground to direct traffic. In addition, all practical measures will be taken to avoid creating noisy or dangerous conditions for the nearby Neversink Valley Area Museum located on 26 Hoag Road. Diverting traffic from the museum area when it is open will be an important step towards protecting the museum and local citizens from unnecessary inconvenience.

6.3 Water Quality

Temporary and minor impacts to the water quality of the Neversink River will result from this project. The amount of sediment that moves downstream is expected to be small based on the previous completed sediment characterization report, working in the dry with cofferdams, and the regrading of the stream channel (TNC 2001). Cofferdams will be used to limit sediment movement downstream of the dam and protect the river's water quality. The duration of the dam removal in-stream channel work will be approximately six weeks.

6.4 Sediment Quality

The results of the July 2001 study showed no significant contaminants in the sediments located behind the dams. No organic compounds were detected in the sediment behind the Southwest Dam. See Appendix A for a detailed list of the organic compound data. There was also no significant metal contamination found in the sediment behind the Southwest Dam. Only one sample (manganese) was above the NY State Lowest Effect Level (Table 2). All other sample results were below the Lowest Effect Level. For more detailed information on the contaminants study, see Appendix A.

6.5 Wetlands

There will be minor and temporary impacts to wetlands as a result of access road construction. There will be a permanent loss of <0.10 acres of wetlands as a result of this project, specifically from the construction of the permanent access road. This loss should not have a significant impact on the quality of habitat in the project area.

6.6 Macroinvertebrates and Fisheries Resources

The selected project alternative will have minor and temporary impacts on the aquatic macroinvertebrates and fish residing near the Southwest Dam in the area that will be dewatered. When cofferdams are installed, all possible care will be taken to relocate mussels and fish to appropriate habitat nearby. We don't anticipate any long term adverse impacts on the macroinvertebrate or fisheries resources of the Neversink River as a result of this project. Once the dam is removed these organisms should benefit from an improved riverine ecosystem.

6.7 Wildlife Resources

The project will result in some temporary impacts to wildlife. During access road construction and dam removal, heavy equipment will be used. This will potentially cause noise disturbance and physical disturbance to wildlife and their habitat. Most of these impacts will be minor and short term. There will be a permanent loss of wildlife habitat as a result of the construction of a permanent access road to the dam site. Due to the extensive nature of habitat available to wildlife in this area, this should not result in a significant impact on the local wildlife populations.

Table 2. Results of Southwest Dam sediment samples for Inorganic Compounds (Severn Trent Services 2001). Criteria is from the NYDEC Technical Guidance for Screening Contaminated Sediments (NYDEC 1999).

Metal	Southwest Dam Sample #1 (ppm)	Southwest Dam Sample #2 (ppm)	Southwest Dam Sample #3 (ppm)	NYS Lowest Effect Level (ppm)	NYS Severe Effect Level (ppm)
Arsenic	2.76	1.12	1.39	6.0	33.0
Cadmium	0.23	0.11	0.11	0.6	9.0
Chromium	5.34	3.62	2.39	26.0	110.0
Copper	5.87	3.88	3.98	16.0	110.0
Iron (%)	1.0%	0.6%	0.4%	2.0%	4.0%
Lead	7.77	4.89	5.19	31.0	110.0
Manganese	495*	115	65.5	460.0	1100.0
Mercury	undetected	undetected	undetected	0.15	1.3
Nickel	10.8	6.33	5.36	16.0	50.0
Zinc	49.5	27.0	27.3	120.0	270.0

*These values are greater than the NYS Lowest Effect Level

6.8 Threatened and Endangered Species

The Nature Conservancy, in conjunction with the staff from the U.S. Geological Survey and the Institute for Ecosystem Studies, completed a survey of 1670 meters of the river to determine the presence or absence of the federally endangered dwarf wedge mussel as well as the New York State threatened swollen wedge mussel or brook floater in the project area. This survey area included areas that could potentially be impacted above the dam (e.g., due to use of cofferdams) as well as a 1400 meter (0.9 miles) reach below the dam that included the two most likely areas of sediment deposition. The surveys, part of the U.S. Fish and Wildlife Service Section 7 consultation process under the Endangered Species Act for the dam removal project, found no federally endangered species in the project area. The state threatened brook floater was found in small numbers in the reach (33 total). However, this mussel's concentration in areas above and well below the dam site should limit its vulnerability to significant disturbance (direct or indirect). All mussels in the dewatered portion of the stream reach will be relocated to suitable habitat upstream or downstream of the project area. The complete survey results are reported in full in Appendix A.

Significant precautions will be taken to minimize any potential impacts on the mussel beds during the dam removal. Some examples of techniques to minimize any potential impact to the dwarf wedge mussel include the use of cofferdams, installing a temporary bridge structure across the stream, and removing the dam during the low-flow time of the year (see Appendix C for more detailed project descriptions). This Environmental Assessment has determined that the selected plan, if implemented, would not jeopardize the dwarf wedge mussel's continued existence in the Neversink River and construction would potentially only produce minimal and temporary downstream disturbances to the beds. The U.S. Fish and Wildlife Service reports impoundments as being a primary cause for dwarf wedge mussel population declines (U.S. Fish and Wildlife Service 1990); and, since the Neversink dwarf wedge mussel population is limited by dams, the continued existence of the Neversink dams could result in a decline in the mussel population.

The Cuddebackville Dam Removal project hopes to restore the Neversink River and thus improve the existing mussel habitat in addition to creating more upstream habitat. This dam has blocked the upstream movement of fish, and in particular, the small host fish the dwarf wedge mussel depends on for the dispersal of its parasitic larval stage. The improvement of a federally endangered dwarf wedge mussel population through dam removal presents a significant project benefit, with every implementation design carefully considered to assess possible impacts to the species. Due to their delicate habitat requirements and the freshwater mussels' specific dependence on migrating fish species, their numbers have been steadily dwindling throughout the country. With dam removal, the pristine waters of the Neversink River could provide up to six additional miles of uninterrupted habitat for the dwarf wedge mussel and brook floater, two mollusk species whose only known concurrent existence of sizeable proportions occurs in this river.

The Corps is currently conducting Section 7 consultation under the Endangered Species Act with the U.S. Fish and Wildlife Service, New York Field Office concerning this project and this will be successfully completed prior to implementation of this project (see Appendix B for correspondence).

6.9 Historic Resources

The Delaware and Hudson Canal Park, within which this project is to take place, is on the National Register of Historic Places. There are canal related features located immediately adjacent to, but outside of, the northern project boundaries. These features include the feeder canal alignment and a feeder canal lift-gate mechanism. This dam removal plan, as detailed above, could potentially cause damage to canal related resources and impact canal water levels. However, it is the District's position that these impacts can be avoided and that measures can be taken to ensure that the project will have no adverse effect on any historic canal features.

Proposed improvements to the existing roadway, construction of a new access road, and proposed dam removal activities are located south of the feeder canal alignment in areas exhibiting no historic canal related features. There may be temporary visual impacts to the area near these historic structures, but they will be rectified once the project is completed. A Hydraulic analysis indicates that proposed dam removal will have no effect on existing water levels in the feeder canal and will not impact the flow of water to the historic Delaware and Hudson Canal segment via the feeder canal.

Proposed existing road improvements and new access road construction are limited to previously disturbed or low floodplain areas exhibiting highly deflated and severely eroded gravel deposits. The likelihood for intact and undisturbed archaeological deposits in these areas is considered extremely minimal.

The Cuddebackville Southwest Dam is not considered a significant historic structure. It is our opinion that the dam does not exhibit significant engineering qualities or historical associations that would qualify it for individual listing on the National Register of Historic Places. In addition, the Southwest Dam, which was initially constructed in 1903 and later refurbished in 1915, is not historically associated with the operation of the D & H Canal and Feeder Canal.

Section 106 consultation with the New York State Historic Preservation Office is on-going and will be concluded prior to commencement of the dam removal project.

7.0 Environmental Justice

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. The selected plan is not

located in close proximity to a minority or low-income community, and no impacts are expected to occur to any minority or low-income communities in the area.

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

The environmental compliance of the project is near complete. The project sponsor, The Nature Conservancy, has applied for all required NY State Permits, including a State Water Quality Certificate. These permits will be issued to them prior to implementation of this project. Compliance with the environmental review requirements of the National Environmental Policy Act (NEPA) will be met with the distribution of this draft EA for review and comment.

TABLE 3. COMPLIANCE WITH APPROPRIATE ENVIRONMENTAL QUALITY PROTECTION STATUTES AND OTHER ENVIRONMENTAL REVIEW REQUIREMENTS

STATUTE	**COMPLIANCE STATUS**
Clean Water Act	Partial*
Endangered Species Act	Partial*
Fish and Wildlife Coordination Act	Full
National Historic Preservation Act	Partial*
National Environmental Policy Act	Partial*
Clean Air 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, coastal zone consistency determination, 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 Cuddebackville Dam Removal Project, Orange County, New York is required by Section 404(b)(1) of the Clean Water Act, as amended (Public Law 92-500).

I. Project Description

A. Location. The project area is located on the Neversink River, Cuddebackville, NY (Figure 1).

B. General Description. The Cuddebackville Dam Removal Project site is shown in Figure 1. The project site is located in the Town of Deerpark within the hamlet of Cuddebackville, Orange County, about 10 miles from the larger town of Port Jervis, New York. The Neversink River, which the dam impounds, is part of a larger watershed whose remote location offers a multitude of recreational opportunities, including proximity to many cultural sites in the area. This project is further recognized for providing habitat to migratory fishes and other freshwater species, including specific ecosystem interactions necessary for the development of the world's largest population of federally endangered dwarf wedge mussels. (see Section 4.3 for a more detailed description of the project plans).

C. Purpose. The Cuddebackville Dam Removal Project would provide access to spawning and rearing habitat for migrating fish with benefits to populations that historically spawned and foraged in the Neversink River tributaries including: American shad, hickory shad, and striped bass. Currently, migratory fish are impeded from reaching historic spawning and foraging areas along the Neversink River. Removing the Cuddebackville Southwest Dam will allow fish to access approximately 34 miles of mainstem riverine habitat.

D. General Description of Dredged or Fill Material.

1. General Characteristics of Material: rock: R1500 (24" diameter), R60 (8"diameter), rounded river stone (various sizes)

2. Quantity of Discharge (estimated):
   Cross dike (riprap – 112 cubic yards (cys)
   Right abutment (riprap – 230 cys, river stone – 79 cys)
   Left abutment (riprap – 166 cys, river stone – 111 cys)
   Stream regrading (armor stone – up to 150 cys, dependent on available natural stream bed stone)
   Access road culvert area (riprap – 20 cys)

3. Source of Material: local quarries

E. Description of Discharge Sites.

   Location: The locations of the discharge sites are the left and right abutment areas of the dam and the area immediately behind the Southwest Dam.

2. Size (acres):
   Cofferdammed area: approximately 1 acre.

3. Type of Sites: cobble/gravel river bottom

4. Type of Habitat: riverine

5. Timing and Duration of Discharge: 8 weeks working in the stream

F. Description of Discharge Method. Stabilization of right and left abutments after dam removal and regrading the stream channel to prevent a migratory fish impediment.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations.

1. Substrate Elevation and Slope:
   521.80 (feet – NAVD88)

2. Sediment Type:
   cobble/gravel

3. Fill Material Movement:
   Not significant.

4. Physical Effects on Benthos:
   Temporary, while rock is being placed and stream channel regraded.

5. Actions taken to Minimize Impacts:
   Installation of cofferdams to minimize sediment movement downstream of the dam. All in-stream work will be completed as quickly as possible to minimize impacts.

B. Water Circulation, Fluctuation and Salinity Determinations.

1. Water:

   a. Salinity - No effect.

   b. Water Chemistry – No significant effect.

   c. Clarity - Short-term increase in suspended particles.

   d. Color - Short-term increase in suspended particles.

   e. Odor – No effect.

f. Taste - No effect.

g. Dissolved Gas Levels – No effect.

h. Nutrients – Short-term increase in nutrients available in the water column.

I. Eutrophication - No effect.

j. Temperature- No effect.

2. Current Patterns and Circulation:

a. Current Patterns and Flow – Temporary, significant effect on flow and patterns when the cofferdams are installed. Stream should recover quickly after cofferdams are removed. After the dam removal, the affected stream reach should recover relatively quickly (approximately one year) and achieve a stabilized equilibrium.

b. Velocity - Temporary, significant effect on flow and patterns when the cofferdams are installed. Stream should recover quickly after cofferdams are removed. After the dam removal, the affected stream reach should recover relatively quickly and achieve a stabilized equilibrium.

c. Stratification - No effect.

3. Normal Water Level Fluctuations – Temporary, significant effect on flow and patterns when the cofferdams are installed. Stream should recover quickly after cofferdams are removed. After the dam removal, the affected stream reach should recover quickly and the area where the dam used to exist will develop a new set of seasonal normal water levels in a relatively short time period.

4. Salinity Gradients - No significant effect.

5. Actions That Will Be Taken To Minimize Impacts: Cofferdams will be used for the minimum time necessary for dam removal, abutment stabilization, and regrading the stream channel.

C. <u>Suspended Particulate/Turbidity Determinations</u>.

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Fill Site: Minor effect. There is the potential for an increase in suspended particles/turbidity levels due to the installation of a temporary bridge over the stream, installing cofferdams, regrading the stream, and removing the Southwest Dam. Cofferdams will be used to limit sediment movement downstream of the project area.

2. Effects on Chemical and Physical Properties of the Water Column:

    a. Light Penetration: Minor effect.

    b. Dissolved Oxygen: Minor effect.

    c. Toxic Metals and Organics: No effect.

    d. Pathogens: No effect.

    e. Aesthetics: Minor adverse and temporary effects limited to the construction period.

    f. Temperature: No effect.

3. Effects on Biota:

    a. Primary Production, Photosynthesis: Minor, short-term effects related to increases in turbidity during dam removal. All effort will be made to relocate biota and other fauna from the cofferdammed area (dry area) to appropriate habitat near the project site.

    b. Suspension/Filter Feeders: Minor, short-term effects related to increases in turbidity during dam removal. All effort will be made to relocate biota and other fauna from the cofferdammed area (dry area) to appropriate habitat near the project site.

    c. Sight feeders: No effect.

4. Actions Taken to Minimize Impacts: Cofferdams will be used to limit sediment movement and turbidity in the Neversink River during the dam removal.

D. Contaminant Determinations.

No significant contaminants were found behind the Southwest Dam and should not have an impact on the project (see Section 6.4 for more details).

E. Aquatic Ecosystem and Organism Determinations.

1. Effects on Plankton: No effect.

2. Effects on Benthos: Major effect on benthos in cofferdammed section. Effect will be temporary, approximately 6 weeks.

3. Effects on Nekton: No effect

4. Effects on Aquatic Food Web: Temporary, minor effect.

5. Effects on Special Aquatic Sites:
   (a) Sanctuaries and Refuges: None.

   (b) Wetlands: Minor Impacts (<0.10 acres) Loss will result from the construction of the access road.

   (c) Tidal flats: None.

   (d) Vegetated Shallows: None.

6. Threatened and Endangered Species: No effect.

7. Other Wildlife: Temporary, minor effect.

8. Actions to Minimize Impacts: All effort will be made to relocate biota and other fauna from the cofferdammed area (dry area) to appropriate habitat near the project site.

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 is being attained by the project

sponsor, The Nature Conservancy, through the NYDEC State Permit Process.

3. Potential Effects on Human Use Characteristics:

a. Municipal and Private Water Supply: No effect.

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

c. Water Related Recreation: Temporary, minor effect.

d. Aesthetics: Temporary, minor effect.

e. Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites, and Similar Preserves: No effect.

G. Determination of Cumulative Effects on the Aquatic Ecosystem.
No significant adverse effects are anticipated.

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 York.

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 will be completed with the U.S. Fish and Wildlife Service prior to the dam removal.

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 - Appropriate steps (as described above) will be taken to minimize potential adverse impacts of discharging material in the aquatic ecosystem.

10.0 References

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11.0 CLEAN AIR ACT STATEMENT OF CONFORMITY

CLEAN AIR ACT STATEMENT OF CONFORMITY
CUDDEBACKVILLE DAM REMOVAL RESTORATION PROJECT
ORANGE COUNTY, NEW YORK

Based on the conformity analysis in the subject report, I have determined that the selected plan conforms to the applicable State Implementation Plan (SIP). The Environmental Protection Agency had no adverse comments under their Clean Air Act authority. No comments from the air quality management district were received during coordination of the draft environmental assessment. The selected plan would comply with Section 176 (c)(1) of the Clean Air Act Amendments of 1990.

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Date

Timothy Brown
Lieutenant Colonel, Corps of Engineers
District Engineer

Appendix A

Appendix B

Appendix C