

**REHABILITATION OF DAMAGED FLOOD CONTROL WORKS
BRODHEAD CREEK LEVEE
EAST STROUDSBURG, MONROE COUNTY, PENNSYLVANIA**

**Draft
ENVIRONMENTAL ASSESSMENT**

1.0. PURPOSE AND NEED OF THE PROPOSED ACTION

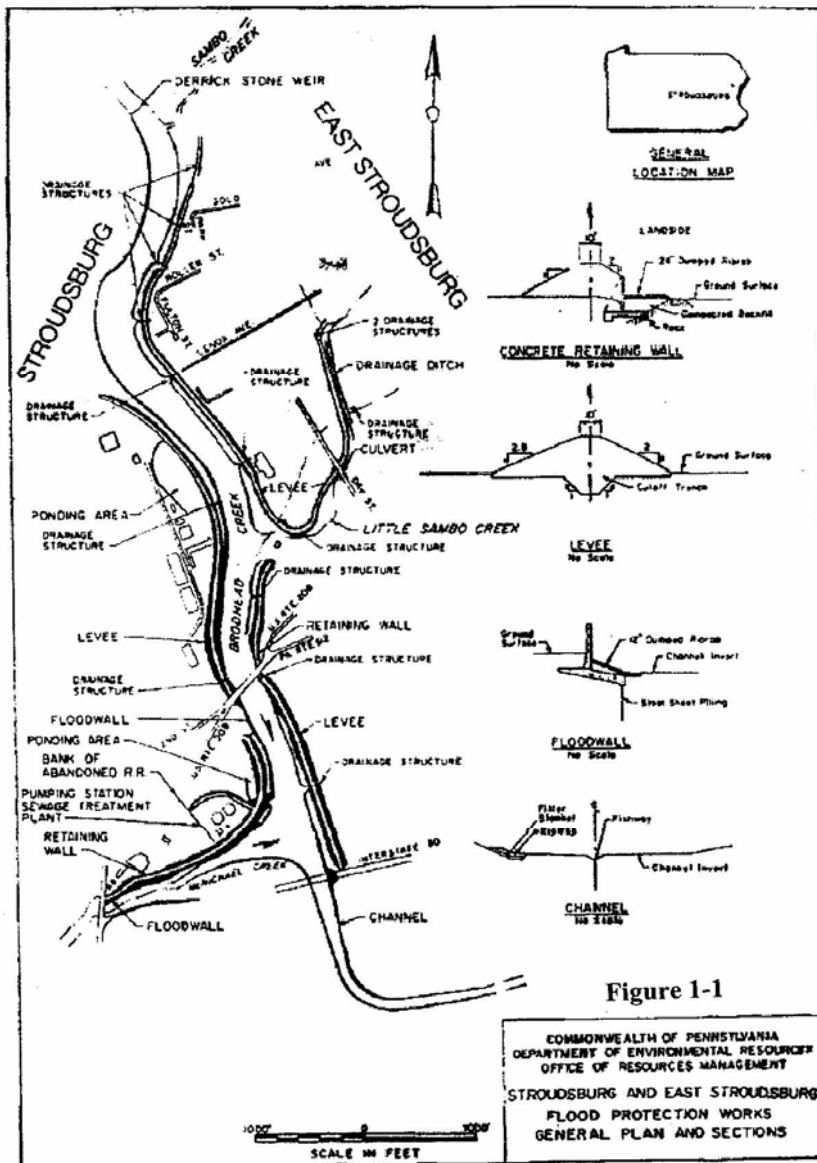
1.1. Property Location

The project is located in the Boroughs of Stroudsburg and East Stroudsburg, Monroe County, Pennsylvania. The project is in the Delaware River Basin and includes structures on Brodhead Creek (which divides the two boroughs) as well as on two of its tributaries: McMichael Creek on the Stroudsburg side, and Little Sambo Creek on the East Stroudsburg side. The damaged area is on the levee's lower slope on Brodhead Creek between the drainage structure outlet at Oakland Avenue and the drainage structure outlet just downstream from the Little League ball field (Figure 1-1).

1.2. Need for Action

The Commonwealth of Pennsylvania constructed the flood protection system in 1960-62 and then turned it over to the Boroughs of Stroudsburg and East Stroudsburg for operation and maintenance. A significant storm passed through the area 2-3 April 2005. The Borough of Stroudsburg's Public Works Superintendent Mark Hoke requested technical assistance from the U.S. Army Corps of Engineers, Philadelphia District to assess flooding that occurred along Brodhead Creek and the impact of the storm on the existing flood protection project. Technical assistance was provided on 21 and 29 April 2005.

A 35-foot reach just upstream from the Oakland Avenue drainage structure outlet lost riprap, as well as a 45-foot reach just downstream from the drainage structure outlet downstream from the Little League ball field. A 110-foot reach between these two affected areas has very little existing riprap, except for an area of very large riprap in the upper portion of the slope. There was no evidence however, that any riprap had been lost within this 110-foot stretch in between the two affected areas.



2.0. DESCRIPTION OF THE PROPOSED ACTION

2.1. Project Authority

The Flood Control Works project includes earthen levees along Brodhead, McMichael, and Little Sambo Creeks; ponding areas, drainage structures, and a pumping station to provide for interior drainage; two concrete floodwalls; two concrete retaining walls; and channel improvements. Portions of the project have been repaired by the U.S. Army Corps of Engineers in 1970, 1974, and 1997 under Public Law 84-99 authority. Another repair along the McMichael Creek levee was performed in late summer 2005.

2.2. National Environmental Policy Act Documentation

This Environmental Assessment was prepared in accordance with National Environmental Policy Act (NEPA) regulations. This EA assesses conditions at the project site and evaluates the potential impacts of the proposed repair plan on existing resources in the immediate and surrounding areas to include: physical, chemical, and biological characteristics of the aquatic and terrestrial ecosystem; endangered and threatened species; hazardous and toxic materials; aesthetics and recreation; cultural resources; and the general needs and welfare of the public. Both individual and cumulative environmental effects were considered for this action. Preparation of this EA has included coordination with appropriate Federal and state resource agencies. A Water Quality Certification, in accordance with Section 401 of the Clean Water Act has been obtained from the Pennsylvania Department of Environmental Protection. A Section 404(b)(1) evaluation has been prepared and is included in Section 9.0. This evaluation concludes that the proposed action would not result in any significant environmental impacts relative to the areas of concern under Section 404 of the Clean Water Act.

2.3. Environmental Permits and Regulatory Compliance

Section 401 Water Quality Certification (Clean Water Act): The Pennsylvania Department of Environmental Protection has issued a Water Obstruction & Encroachment Permit which constitutes approval of a Water Quality Certification under Section 401 of the Federal Water Pollution Control Act [33 U.S.C.A. 134 (a)]. The permit gives consent to:

maintain the existing Stroudsburg Flood Protection Project consisting of earth levees and channel widening in and along Brodhead Creek, McMichael Creek and Little Sambo Creek. The project includes a 1.8 mile section of Brodhead Creek, a 0.4 mile section of McMichael Creek and a 0.5 mile section of Little Sambo Creek in the Boroughs of Stroudsburg and East Stroudsburg and Stroud Township, Monroe County.

Minor and temporary impacts to water quality may result during the construction phase of the project due to the temporary diversion and adjacent riprap repair work. An

approved sediment and erosion control plan will be adhered to, therefore minimizing any impact.

Endangered Species (Endangered Species Act): Based on the project location and the minor and temporary nature of the impacts associated with this action, it has been determined that this action would not jeopardize the continued existence of any Federally listed or proposed listed threatened or endangered species or their critical habitat.

Historic Properties (National Historic Preservation Act): The District has coordinated and received a determination from the State Historic Preservation Office (SHPO) that the project will not affect properties listed or properties eligible for listing in the National Register of Historic Places (see Appendix).

2.4. Description of the Proposed Action

The repair template will reconstruct the two damaged sections of the levee riprap to the existing project design. The existing riprap will be removed temporarily to allow for the placement of geotextile and appropriate bedding (subbase) prior to riprap positioning. Existing riprap will be reused where appropriate. To repair both areas, a 4-foot layer (using 24-inch riprap) with a 5-foot bottom width toe shall be placed. The 110-foot section in between the two damaged sections will not be included in the levee repair (Figures 2-1, 2-2, and 2-3).

3.0. ALTERNATIVES CONSIDERED

3.1. The “No-Action” Alternative

The no-action alternative will presumably perpetuate a state of damaged levee structural integrity. The levee is now susceptible to further loss of riprap downstream of the current damaged area, and the potential exists for breaching of the levee and flood damage to a significant number of the Borough’s residences and ball field. Taking no action to repair the damaged portion of the levee will result in continued degradation of water quality within the stream due to further erosion of the levee and wash out.

(Insert Figure 2-1)

(Insert Figure 2-2)

(Insert Figure 2-3)

Since construction of the flood protection system by the Commonwealth of Pennsylvania on the Brodhead, McMichael and Little Sambo Creeks in 1960-62, various small sections of the earthen levees have been repaired. The most recent levee repair occurred in 2005 on the McMichael Creek. The design templates for these previous repairs as well as the proposed repair have restored the maintained levee system to its original 500-year level of protection. No other alternatives were considered for the proposed project.

4.0. EXISTING ENVIRONMENT

4.1. Project Area Description

The project area is in a suburban area on the earthen levee on Brodhead Creek in East Stroudsburg on the lower slope between the drainage structure outlet at Oakland Avenue and the drainage structure outlet just downstream from the little league ball field. The region surrounding the immediate project area is sparsely wooded on one bank with mowed grassy fields along the opposite bank.

4.2. Geology and Topography

The project area lies within two of the major physiographic provinces of Pennsylvania. These physiographic provinces are characterized by their own unique landscape and a distinctive geologic character. The northern area falls within the Appalachian Plateau Province, a broad area of hilly to low mountainous terrain that extends north and east into New York State and west across the northern tier counties of Pennsylvania. Topography is characterized by high, flat plateaus with elevations between 900-1,800 feet. The southern portion, where the proposed project site is located, lies within the Valley and Ridge Province, characterized by long, parallel, sharp-crested mountain ridges separated by long, narrow valleys. Elevations range from 1,600 feet along ridgetops to 500 feet in the valley bottoms.

Fifteen thousand years ago, Wisconsin glaciers covered this area. Most areas, with the exception of hilltops, are now covered with unconsolidated sediments deposited or reshaped during deglaciation. Ground moraine till, up to several meters thick, covers most of the plateau section. The valley and ridge section is generally covered by thicker glacial deposits. Rock fragments in the glacial sediments are generally similar to the composition of the underlying bedrock and are assumed to be locally derived. Alluvium (sediment deposited by flowing water) consisting of sand, gravel, and cobbles from eroded till deposits is common to many of the streams. Several streams, including the Brodhead, Appenzell, and McMichael have losing reaches immediately downstream of the point where they exit bedrock uplands into thick permeable outwash deposits. The project area is mainly underlain by sedimentary rocks of the Devonian (360 to 408 million years ago) and Silurian (408 to 436 million years ago) ages. Undifferentiated Silurian-Devonian aged rocks are found in a band across the proposed project area.

The Brodhead Creek drains a total surface area of approximately 172 square miles in a small portion of southern Pike County and northern and east central Monroe County. The Brodhead Creek begins at the confluence of several small tributaries in Canadensis, Barrett Township. It then flows southward through the north and eastern portions of the county, joins with the McMichael Creek and then flows eastward into the Delaware River. The headwaters area of these creeks is relatively steep terrain forested primarily with second-growth hardwoods and a streamside canopy of rhododendron. The Brodhead Creek flows for approximately 31 miles.

3.2. Climate

The Delaware River basin climate is continental. The two major air masses that influence the climate move predominately from the interior of North America, being modified by influences of the Great Lakes and the Appalachian Mountains to the west. Low pressure cells originating in the south move along the coast bringing rainfall which can be heavy at times, especially when associated with hurricanes. Canadian high pressure systems bring heavy snowfall and cold temperatures to the upper northwest portions of the watershed. Generally, west to southwest airflow with extended overland travel brings the hot dry weather which is responsible for occasional summer droughts. The average annual temperature is 51 degrees F and temperatures below zero or above 100 degrees F are rare. Precipitation is moderate, about 45 inches per year, and is well distributed through the year.

3.3. Air Quality

Air quality is monitored in Pennsylvania by the Department of Environmental Protection, Bureau of Air Quality. Air quality monitoring is conducted by placing air monitors within high population density areas within the state. The state has been broken down into 13 “air basins” with Monroe County being closest to the Scranton-Wilkesbarre Air Basin. An Air Quality Index (AQI) developed by the U.S. Environmental Protection Agency is published daily for all sites in Pennsylvania as a means of reporting air quality to the general public. The AQI records levels of five common air contaminants: carbon monoxide, sulfur dioxide, particulate matter, ozone and nitrogen dioxide. Air quality within the county is generally good. The site is not listed by EPA as a non-attainment area for criteria pollutants. Air pollution levels do not exceed the national ambient air quality standards in the project area.

3.4. Population and Employment

The Brodhead Creek watershed is contained within 12 municipalities in Monroe and one municipality in Pike County (Greene Township).

Stroudsburg Borough	Paradise Township
East Stroudsburg Borough	Barrett Township
Smithfield Township	Mt. Pocono Borough
Stroud Township	Coolbaugh Township
Middle Smithfield Township	Tobyhanna Township
Price Township	Greene Township
Pocono Township	

The population of Monroe County has nearly doubled since 1980 and is projected to grow by 60 percent by 2020. The county’s population expansion began in the 1960s with the opening of Interstate 80, and this trend continued into the 70s, 80s and 90s. Nearly 140,000 people live in Monroe County today. The urbanized centers of Stroudsburg and East Stroudsburg have a combined population of 60,000.

Many Monroe County jobs are held by people who commute in from other areas. Tobyhanna Army Depot is the county’s largest employer, but fewer than 600 of its 3,600 employees live in Monroe County. The majority of the commuters are coming from the Scranton/Wilkes-Barre area. Some workers in Monroe County commute from Northampton and Carbon Counties to the south. Many Monroe County residents commute to jobs outside the county, such as to the New York-New Jersey metropolitan areas and to the Allentown-Bethlehem-Easton area.

3.5. Water Quality

Groundwater resources in the Delaware River Basin constitute a major source of water supply for users in the region. The Brodhead Creek first drains the rural and mountain areas of Barrett, Paradise, and Price Townships, and continues southward to drain the semi-rural areas of Pocono and Stroud Townships and then finally the semi-rural and urban residents of Stroudsburg and East Stroudsburg. It is a major public resource for receiving permitted discharges, water withdrawals, recreational uses and flood control. The natural recharge of good quality groundwater to aquifers comes primarily from three sources: 1) infiltration of rain water from the ground surface; 2) infiltration of water from a surface stream or lake; and 3) flow from another geologic formation due to pressure gradients between formations.

The Stroudsburg Municipal Authority is the largest Public Water System in Monroe County, serving over 20,000 people in the Borough of Stroudsburg, Stroud Township, and Smithfield Township. The Authority is permitted to withdraw 5.38 million gallons per day from its wells and Brodhead Creek.

Water quality data has been collected in the watershed by a variety of groups including the Monroe County Planning Commission, the Brodhead Watershed Association, as well as the Pennsylvania Department of Environmental Protection. Surface water within the

watershed is considered excellent. However, occasional exceedances of water temperature and dissolved oxygen levels do occur. A significant portion of the McMichael Creek subwatershed is designated Exceptional Value, particularly the upper part of the creek. The watershed is classified by Chapter 93 of state regulations as High Quality Cold Water Fishery. The Stroudsburg Borough sewage treatment plant discharges to the McMichael Creek near its confluence with Brodhead Creek.

Stream flooding and stormwater runoff and streambank erosion typically results in public and private property damages. These problems are more pronounced in more populated areas such as Stroudsburg and East Stroudsburg. Stormwater runoff and degree of development affects water quality. The conversion of forests, wetlands, and meadows to roads, parking lots and buildings creates a layer of impervious cover in the landscape. Water from storm events and melting snow runs rapidly off these surfaces, carrying pollutants to streams and aquifers, instead of slowly percolating into the soil. Research has shown that the amount of impervious cover in a subwatershed can be used to project the current and future quality of streams. In many regions of the country, as little as ten percent watershed impervious cover has been linked to stream degradation, with the degradation becoming more severe as impervious cover increases (DRBC, 2001).

Although water quality is generally high throughout the watershed, human activities appear to be measurably contributing nutrients and increasing conductivity and hardness in surface waters in parts of the watershed. A slight increase in nutrient concentrations over the past two decades has resulted from the rapid increase in population in the area. Population has nearly doubled since 1980 in Monroe County, and is expected to grow by 60 percent by 2020.

4.7. Hazardous, Toxic, or Radioactive Substances

In 2004, Monroe County ranked among the cleanest 20% of all counties in the United States in terms of the number of designated Superfund sites (www.scorecard.org/community/index, Feb 2005). Three Superfund sites in a rural section of Monroe County contribute contamination to drinking water sources. Butz Landfill covers 13 acres along Township Route 601 (RD#5) in Stroudsburg. The privately-owned landfill operated during approximately 1970-75. The owner/operator kept no records regarding the amount or types of wastes deposited at the site. However, the incomplete permit application in 1973 lists garbage, mixed solids, and septic sludge as wastes. In 1986, the Pennsylvania Department of Environmental Resources identified chlorobenzene, trans-1,2-dichloroethylene, vinyl chloride, and trichloroethylene (TCE) in ground water. One private well 1,700 feet east of the site contained 2,600 parts per billion of TCE.

The Tobyhanna Army Depot covers 1,293 acres in Tobyhanna in the Pocono Mountains. Military operations started on the site in 1913. The depot's primary mission is to provide maintenance and supply support to the army. The depot includes 131 buildings. Metal refinishing, electronic fabrication, electroplating, and degreasing operations are conducted on-site. All types of depot wastes, including plating wastes, paints, solvents,

sewage treatment sludge, and solid wastes, were disposed of on-site prior to 1975. Tobyhanna Army Depot is participating in the Installation Restoration Program (IRP), established in 1978. Under this program, the Department of Defense seeks to identify, investigate, and clean-up contamination from hazardous materials. IRP investigations have focused on two areas in the southeastern section of the depot which contain volatile organic compounds (those listed above for Butz Landfill) and polynuclear aromatic hydrocarbons, which have been detected in the soil. Contaminated ground water poses a threat to area residents through ingestion and direct contact with these compounds.

The Brodhead Creek Superfund Site occupies about 12 acres in the Borough of Stroudsburg. The site lies on the west bank of Brodhead Creek between the Route 209 and Interstate 80 bridges. Union Gas Company is a successor to companies which operated a coal gasification plant from approximately 1888 to 1944. Coal tar was the resultant waste product from plant operations. Coal tar contains chemicals that pose a risk to human health and the environment. In 1917 through the 1960s, Pennsylvania Power & Light purchased properties owned by the Union Gas Company. From 1981 through 1984, the U.S. Environmental Protection Agency and the Pennsylvania Department of Environmental Resources studied the site and took actions to contain or eliminate immediate threats of contamination, such as constructing barriers and excavations. Pennsylvania Power & Light removed approximately 8,000 gallons of coal tar from an underground depression on the site in 1982.

4.8. Land Cover

Dominant land covers in Monroe County are forest, pasture, and residential and commercial areas. High density residential and commercial areas cover approximately 1% of the land (Stroudsburg, East Stroudsburg, and Mount Pocono) while less dense residential development encompasses approximately 3% of the county and deciduous, mixed, and evergreen forests dominate land cover (about 80%). Commercial land uses mainly concentrate along major arterial and collector highways such as Routes 611, 209, 191, and 447.

4.9. Plants and Animals

The following vegetation table contains species commonly found in the region and could occur in the project area, however, construction activities will occur directly along the stream bank where riprap occurs and there is minimal vegetation (e.g. grasses). The plant species listed in Table 4-1 are more indicative of habitats occurring in the adjacent wooded corridors.

TABLE 4-1 PLANT SPECIES	
Tree Species	Shrub, Vine & Herbaceous Species
Silver maple (<i>Acer saccharinum</i>)	Spotted touch-me-not (<i>Impatiens capensis</i>)
Sycamore (<i>Platanus occidentalis</i>)	Virginia creeper (<i>Parthenocissus quinquefolia</i>)
Hemlock (<i>Tsuga canadensis</i>)	Wild grape (<i>Vitis spp.</i>)
Pitch Pine (<i>Pinus rigida</i>)	Poison Ivy (<i>Rhus radicans</i>)
River birch (<i>Betula nigra</i>)	Japanese barberry (<i>Berberis thunbergii</i>)
Red Oak (<i>Quercus rubra</i>)	Peat moss (<i>Sphagnum spp.</i>)
Black oak (<i>Quercus velutina</i>)	Sensitive fern (<i>Onoclea sensibilis</i>)
Bitternut hickory (<i>Carya cordiformis</i>)	Cardinal flower (<i>Lobelia cardinalis</i>)
Black cherry (<i>Prunus serotina</i>)	Buttercup (<i>Rannunculus spp.</i>)
Pin oak (<i>Quercus palustris</i>)	Common strawberry (<i>Fragaria virginiana</i>)
White pine (<i>Pinus strobus</i>)	Oxeye daisy (<i>Chrysanthemum leucanthemum</i>)
Black locust (<i>Robinia pseudoacacia</i>)	Plantain (<i>Plantago spp.</i>)
Sassafras (<i>Sassafras albidum</i>)	Pokeweed (<i>Phytolacca americana</i>)
Sumac (<i>Rhus spp.</i>)	Japanese Knotweed (<i>Polygonum cuspidatum</i>)
Northern Catalpa (<i>Catalpa speciosa</i>)	Bull Thistle (<i>Cirsium vulgare</i>)
American beech (<i>Fagus grandifolia</i>)	Autumn Olive (<i>Eleagnus umbellata</i>)
Red maple (<i>Acer rubrum</i>)	Common mullien (<i>Verbascum thapsus</i>)
	Golden rod (<i>Solidago spp.</i>)
	Foxtail (<i>Phleum alpinum</i>)

The following Tables 4-2, 4-3, and 4-4 are lists of both migratory and resident fish and wildlife species that occur in the region and can potentially utilize the project area at various times throughout the year. However, considering the urban nature of the immediate project area, it is likely that only a minimum number of these species visit the area where construction will occur.

TABLE 4-2 BIRD SPECIES	
snowy egret (<i>Egretta thula</i>)	red-eyed vireo (<i>Vireo olivaceus</i>)
Northern harrier (<i>Circus cyaneus</i>)	cardinal (<i>Richmondia cardinalis</i>)
Common merganser (<i>Mergus merganser</i>)	white-breasted nuthatch (<i>Sitta carolinensis</i>)
bufflehead (<i>Bucephala albeola</i>)	Carolina chickadee (<i>P. carolinensis</i>)
canvasback (<i>Aythya balisineria</i>)	turkey vulture (<i>Cathartes aura</i>)
great green heron (<i>Ardea herodias</i>)	red-bellied woodpecker (<i>Centurus carolinus</i>)
green heron (<i>Butorides birescens</i>)	hairy woodpecker (<i>Dendrocopos villosus</i>)
snow goose (<i>Chen caerulescens</i>)	downy woodpecker (<i>Dendrocopos pubescens</i>)
teal (<i>Anas spp.</i>)	common grackle (<i>Quiscalus quiscula</i>)
wood duck (<i>Aix sponsa</i>)	great crested flycatcher (<i>Myiarchus crinitus</i>)
belted kingfisher (<i>Megaceryle alcyon</i>)	Tufted titmouse (<i>Parus bicolor</i>)
sharp-tailed sparrow (<i>Ammospiza caudacuta</i>)	blue jay (<i>Cyanocitta cristata</i>)
ruffed grouse (<i>Bonasa umbellus</i>)	brown thrasher (<i>Toxostoma rufum</i>)
mourning dove (<i>Zenaidura macroura</i>)	rufous-sided towhee (<i>Pipilo erythrophthalmus</i>)
bobwhite quail (<i>Colinus virginianus</i>)	common crow (<i>Corvus brachyrhynchos</i>)
long-eared owl (<i>Asio wilsonianus</i>)	field sparrow (<i>Spizella pusilla</i>)
Northern saw-whet (<i>Cryptoglaux acadica</i>)	chipping sparrow (<i>Spizella passerina</i>)
Eastern phoebe (<i>Sayornis phoebe</i>)	song sparrow (<i>Melospiza melodia</i>)
peregrine falcon (<i>Falco peregrinus</i>)	catbird (<i>Dumetella carolinensis</i>)
bald eagle (<i>Haliaeetus leucocephalus</i>)	red-winged blackbird (<i>Agelaius phoeniceus</i>)
sharp-shinned hawk (<i>Accipiter striatus</i>)	mockingbird (<i>Mimus polyglottos</i>)
American kestrel (<i>Falco sparverius</i>)	house wren (<i>Troglodytes aedon</i>)
Northern harrier (<i>Circus cyaneus</i>)	orchard oriole (<i>Icterus spurius</i>)
red-tailed hawk (<i>Buteo jamaicensis borealia</i>)	eastern kingbird (<i>Tyrannus tyrannus</i>)
Canada geese (<i>Branta canadensis</i>)	common flicker (<i>Colaptes auratus</i>)
American robin (<i>Turdus migratorius</i>)	tree swallow (<i>Iridoprocne bicolor</i>)

TABLE 4-3 MAMMAL SPECIES	
black bear (<i>Ursus americanus</i>)	weasel (<i>Mustela frenata</i>)
white-tailed deer (<i>Odocoileus virginianus</i>)	eastern mink (<i>Mustela vison</i>)
red bat (<i>Lasiurus borealis</i>)	red fox (<i>Vulpus fulva</i>)
eastern chipmunk (<i>Tamias striatus</i>)	gray fox (<i>Urocyon cinereoargenteus</i>)
pine vole (<i>Pitymys pinetorum</i>)	raccoon (<i>Procyon lotor</i>)
cottontail rabbit (<i>Sylvilagus floridanus</i>)	American opossum (<i>Didelphus marsupialis</i>)
Meadow vole (<i>Microtus pennsylvanicus</i>)	red squirrel (<i>Tamiasciurus hudsonicus</i>)
wood chuck (<i>Marmota monax</i>)	gray squirrel (<i>Sciurus carolinensis</i>)
Muskrat (<i>Ondatra zibethicus</i>)	striped skunk (<i>Mephitis mephitis</i>)
white-footed mouse (<i>Peromyscus leucopus</i>)	northern flying squirrel (<i>Glaucomys sabrinus</i>)
eastern mole (<i>Scalopus aquaticus</i>)	little brown bat (<i>Myotis lucifugus</i>)

TABLE 4-4 ECTOTHERMIC SPECIES	
<i>Amphibians</i>	<i>Reptiles</i>
spring peeper (<i>Hyla crucifer</i>)	Northern ringneck snake (<i>Diadophis punctatus</i>)
green frog (<i>Rana clamitans</i>),	eastern box turtle (<i>Terrapene carolina</i>),
Eastern hellbender (<i>Cryptobranchus alleganiensis</i>)	wood turtle (<i>Clemmys insculpta</i>),
mudpuppy (<i>Necturus maculosus</i>)	eastern garter snake (<i>Thamnophis sirtalis</i>),
Jefferson salamander (<i>Ambystoma jeffersonianum</i>)	snapping turtle (<i>Chelydra serpentina</i>)
spotted salamander (<i>Ambystoma maculatum</i>)	Eastern milk snake (<i>Lampropeltis triangulum</i>)
Marbled salamander (<i>Ambystoma opacum</i>)	N. redbelly snake (<i>Storeria occipitomaculata</i>)
red-spotted newt (<i>Notophthalmus viridescens</i>)	Eastern garter snake (<i>Thamnophis sirtalis</i>)
Mt. dusky salamander (<i>Desmognathus ochrophaeus</i>)	E. hognose snake (<i>Heterodon platyrhinos</i>)
Redback salamander (<i>Plethodon cinereus</i>)	Northern black racer (<i>Coluber constrictor</i>)
red-spotted newt (<i>Notophthalmus viridescens</i>)	Black rat snake (<i>Elapha obsoleta</i>)
slimy salamander (<i>Plethodon glutinosus</i>)	Northern water snake (<i>Nerodia sipedon</i>)

4.10. Threatened and Endangered Species

Impacts to state or Federally endangered or threatened species are not expected from this project. Although the bulk of the proposed work will not take place within the creek, it is possible that turbidity may result from earth moving work occurring during periods of heavy rainfall. An appropriate erosion and sedimentation control plan will be prepared and utilized.

The region surrounding the project area is very sparsely wooded. The general region provides nesting, spawning, rearing, resting, feeding, and escape cover for terrestrial

wildlife species that typically utilize urban areas. The specific project area represents a small percentage of the overall aquatic habitat in the area. No known state listed threatened and endangered plant species occur in the project area limits. The levee banks are earthen with grass coverage and some woody scrub vegetation along the creek banks. The creek is within the historic range of the bald eagle and peregrine falcon, both of which were listed as federally endangered. However, it is expected that except for occasional transient species, no federally listed species are known to occur within the project area.

4.11. Cultural Resources

There are no recorded prehistoric or historic archaeological sites in the current project's area of potential effect. There are three National Register of Historic Places properties in the general area, the East Stroudsburg Armory, the East Stroudsburg Railroad Station, and Zion Lutheran Church. All three historic properties fall outside the current project's area of potential effect.

As noted on its National Register of Historic Places registration form, the East Stroudsburg Armory, located at 271 Washington Street, is part of a Multiple Property listing for Pennsylvania National Guard Armories. Constructed in 1928 it is one of at least thirty-seven armories in Pennsylvania laid out on a T plan. Designed by Thomas B. Atherton of Wilkes-Barre, it contains areas typical of T-plan armories such as a drill hall, rifle range, kitchen, locker rooms, storage rooms, and offices. The brick building displays elements of the Tudor Revival style, particularly in the door and window surrounds. Its significance is both historic (criteria A) as part of post-World War I armory construction in Pennsylvania and architectural (criteria C).

The East Stroudsburg Railroad Station on Crystal Street was created as the station stop for Stroudsburg when the Delaware, Lackawanna, and Western Railroad first laid their tracks through Monroe County in 1856. The station was located across the Brodhead Creek from Stroudsburg and not conveniently located to Stroudsburg but the DL&W railroad received the free right-of-way for the tracks from Robert Brown, a prominent settler living on the east side of the Brodhead Creek. The station was rebuilt in 1864 and boasted a fountain and flower beds, which would continue to surround the train station into the early 20th century. The presence of a railroad station stimulated commercial growth in its immediate vicinity and ultimately resulted in the incorporation of East Stroudsburg as a separate town (borough) in 1870. The station's period of greatest historic significance is the latter half of the 19th century. Thousands of summer visitors arrived by train from New York and Philadelphia, and were met at the station by the horse and wagon of each of the many guest houses, boarding houses, and hotels in the area. The station at East Stroudsburg was expanded in 1883 to handle the increasing tourist traffic and soon boasted a larger and more complete facility than many other stops on the route between New York and the Pocono Mountains resorts. The station was again remodeled in 1915. Tourism by train fell off sharply after the First World War and its numerous social and technological changes, particularly the greater reliance on

automobile tourism. Passenger service declined through the 1950's and 1960's and in 1972 all train service through Monroe County halted. The building has remained vacant but intact since that time.

Zion Lutheran Church, located near the borough of East Stroudsburg in Middle Smithfield Township, is a small one-story brick structure in modified Greek Revival Style. According to the date stone in the gable the church was erected in 1851. The church has three bays across the side with two 20 over 20 sash windows flanking the door. There is just one entrance at the gable end and no steeple. The interior is very plain with one large rectangular room with a balcony and altar space and painted wooden pews. The building is set on a steep hill and affords an impressive view of the Delaware River. The church is significant as a well-preserved example of mid-nineteenth century rural church architecture and construction. It is also important to the history of the Lutheran Church in America. The Smithfield Lutheran Congregation is more than a century older than the Zion Church building itself. Lutheran services were held in Smithfield between 1749 and 1754 by Catechist Rudolph Henry Schrenck. The partriarch of the Lutheran Church in America, Henry Melchior Muhlenberg, reported favorably on the work of Schrenck in Smithfield in one of his reports to the Lutheran Missionary Society at the University of Halle in Germany.

5.0 ENVIRONMENTAL EFFECTS

5.1. No Action Alternative

In addition to the value of property continually exposed to risk in a major storm, there is also the risk of continued erosion. Subsequent storms occurring without the necessary repair work will result in further damage to the eroded sections and increase the cost of a future repair if no action is taken to repair the levee.

5.2. Selected Plan and Project Area

The proposed project will restore the levee to its pre-storm condition. No adverse environmental impacts are anticipated to occur in restoring the existing condition of the levee to pre-storm condition. The recommended repair of the levee will extend to two damaged portions where riprap is missing (a 35 foot reach upstream from the Oakland Avenue drainage structure and a 45 foot reach downstream from the little league ball field) and will not include the approximate 110 foot long reach between the two damaged sections. The 110 foot long reach between the two areas of lost riprap also has very little existing riprap, except for an area of very large riprap in the upper section of the slope. No adverse environmental impacts to the project area are expected as a result of the project.

5.3. Geology and Topography

No adverse impact to the geology or existing topography is expected to result from the project.

5.4. Climate

No adverse impact to climate in the region is expected to result from the project.

5.5. Air Quality

Temporary impacts to the aesthetics of the project area may occur during the construction phase. Air quality impacts resulting from the release of carbon monoxide and particulate emissions will occur at the site during project-related activities and may be considered offensive, but are generally not considered far-reaching or at exceeding permissible levels.

The 1990 Clean Air Act Amendments include the provision of Federal Conformity, which is a regulation that ensures that Federal actions conform to a nonattainment area's State Implementation Plan (SIP) thus not adversely impacting the area's progress toward attaining the National Ambient Air Quality Standards (NAAQS). Air quality within the county is generally good. The project area is not listed by EPA as a non-attainment area for criteria pollutants. Air pollution levels in the project area do not exceed the national ambient air quality standards and no evaluation of the project's conformity to an SIP is required.

5.6. Population and Employment

No adverse impacts to the socioeconomic conditions of the area are expected to result from the project. Likewise, the project is not expected to adversely impact any minority or low-income communities. The Boroughs of Stroudsburg and East Stroudsburg are projected to grow by 60% by 2020, thus the proposed project will provide increased flood protection to a more populated community of both private residences and commercial properties downtown.

5.7. Water Quality

Some of the construction activities will have the potential to generate soil runoff that could increase turbidity in the creek during periods of heavy rain. The turbidity will be minimized through sediment and erosion control measures. The contractor will be responsible for preparing and providing a sediment and erosion control plan prior to initiation of construction.

Minor and temporary impacts to water quality would be expected during the construction phase of the project as a result of a temporary diversion and instream work. An approved sediment and erosion control plan will be adhered to, therefore minimizing any impacts. Following project completion, no negative impact to water quality would be expected.

Construction of the project will result in a positive effect on water quality in the area. Repairs to the earthen levee damaged by storm events will reduce the amount of turbidity generated in Brodhead Creek due to washout in the damage zone during rainfall events.

5.8. Hazardous, Toxic, and Radioactive Substances

Based on the historical review of sites containing hazardous substances in the region and their distance from the immediate project area, the likelihood of hazardous substances existing within the project area or adversely affecting the project area due to the proposed construction activities is very low.

5.9. Land Cover

No adverse impacts to land cover are expected as a result of the project. The proposed project will restore the levee to its pre-storm condition. The project is a repair of two small sections of rip-rapped earthen levee separated by a 110 foot long section of very little existing riprap. The proposed project should result in a positive impact to land cover by reducing the potential for additional erosion and levee washout. No wetlands occur within the project limits of construction.

5.10. Plants and Animals

No adverse impact to wildlife or plant species is anticipated to occur. The repairs to the earthen levee will occur directly in the area of the preexisting structure and will not impact surrounding wildlife habitat in the vicinity. Impacts during construction may result from construction noise and diversion of water flow and/or turbidity generated during construction activities in the immediate construction area but these are temporary. Birds, mammals, reptiles and amphibians are capable of moving, and would be expected, if any, to leave the immediate area of the proposed construction and relocated to areas in the immediate vicinity. It is anticipated that due to the amount of adjacent nearby habitat along the stream corridor that no significantly adverse impacts to wildlife species will occur as a result of this project. A Pennsylvania Natural Diversity Index (PNDI) search was performed for a 50 mile radius of the proposed project site. PNDI is a site specific information system which describes significant natural resources of Pennsylvania. This system includes data descriptive of plant and animal species of special concern, exemplary natural communities and unique geological features. PNDI is a cooperative project of the Department of Conservation and Natural Resources, the Nature Conservancy, and the Western Pennsylvania Conservancy. The search indicated no conflicts with ecological resources of special concern known to exist within the specified search area.

5.11. Threatened and Endangered Species

Coordination with various Federal and state natural resource agencies has determined that no threatened or endangered species will be impacted by the proposed project. No significant negative impacts are anticipated for these species or their adjacent habitats.

5.12. Cultural Resources

There are no significant cultural resources in the project's area of potential effect. There are three National Register historic properties in the general area, the East Stroudsburg Armory, the East Stroudsburg Railroad Station, and Zion Lutheran Church. All three fall outside the current project's area of potential effect.

There should be no effect to intact buried prehistoric archaeological deposits given that there will be no earth borrowing or earth disturbing construction in the vicinity of the proposed levee repair. Only new geotextile fabric, gravel, and stone will be added to the existing levee. Pursuant to 36 CFR 800.4 the District Archaeologist requested PA SHPO concurrence that the project will have no impact to significant cultural resources. Section 106 consultation with the Pennsylvania Historical and Museum Commission (PHMC), the designated location of the PA SHPO, was conducted and a letter of concurrence from PHMC (dated 14 September 2005) was received (see Appendix).

5.13. Cumulative Impacts

Cumulative impacts are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes those actions. The proposed plan is conservative in that its objective is to repair a previously established flood protection project in downtown Stroudsburg. Damage due to heavy rainfall and flooding caused missing rip-rap, levee washout, and levee slope subsidence that requires restoration to restore the integrity of the flood protection system. The project was constructed in 1962 and since then has undergone several repairs and other maintenance efforts. It is expected that in combination with other features of the flood protection system (i.e. earthen levees on McMichael Creek and Little Sambo Creek, ponding areas, drainage structures, a pumping station to provide interior drainage, two concrete floodwalls and, two concrete retaining walls) the project will result in positive cumulative effects to the Boroughs of Stroudsburg and East Stroudsburg.

6.0. COORDINATION

Coordination of the proposed project has involved the Delaware River Basin Commission, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the Pennsylvania Department of Environmental Protection, the Pennsylvania Historic and Museum Commission, the Pennsylvania Fish and Boat Commission, the Pennsylvania Game Commission, and the Pennsylvania Department of Conservation and Natural Resources.

7.0. CONCLUSIONS

This Environmental Assessment has evaluated potential environmental impacts associated with implementing the proposed repairs to the Brodhead Creek levee that

resulted from a series of storm events that had occurred prior to the levee damage. The findings herein have been prepared in accordance with the National Environmental Policy Act of 1969, as amended. Potential impacts to environmental and cultural resources resulting from the proposed action have been described and evaluated in this document.

Due to the existence of the previously established flood protection project, any negative effects to the environment are expected to be minor and temporary (i.e. during the construction period only). The positive effect anticipated from this project is increased flood protection by the repaired levee for the Boroughs of Stroudsburg and East Stroudsburg. No permanent environmental change to the project area will occur as a result of the proposed repairs.

8.0. LITERATURE CITED

Bloss Associates, 2002. Brodhead Watershed Conservation Plan.

Delaware River Basin Commission, 2001. Technical Report – Pocono Creek Pilot Study.

Pennsylvania Department of Environmental Protection, 2005. Air Quality Index (www.dep.state.pa.us).

Scorecard. The Pollution Information Site (www.scorecard.org), March 2005.

U.S. Army Corps of Engineers, 2005. Project Information Report, Rehabilitation of Damaged Flood Control Works, Brodhead Creek Levee, East Stroudsburg, PA

U.S. Environmental Protection Agency, 2004. Monroe County Air Quality Report (www.oaspub.epa.gov).

9.0. EVALUATION OF 404(b)(1) GUIDELINES

I. Project Description

A. Location:

The project is located in the Boroughs of Stroudsburg and East Stroudsburg, Monroe County, Pennsylvania in the Delaware River Basin. The damaged area is on the levee's lower slope on Brodhead Creek between the drainage structure outlet at Oakland Avenue and the drainage structure outlet just downstream from the Little League ball field.

B. General Description:

The Commonwealth of Pennsylvania constructed the flood protection system in 1960-62 and then turned it over to the Boroughs of Stroudsburg and East Stroudsburg for operation and maintenance. The project consists of earthen levees along Brodhead, McMichael, and Little Sambo Creeks; ponding areas, drainage structures, and a pumping station to provide for interior drainage; two concrete floodwalls; two concrete retaining walls; and channel improvements. A significant storm passed through the area on 2-3 April 2005. A 35-foot reach just upstream from the Oakland Avenue drainage structure outlet lost riprap, as did a 45-foot reach just downstream from the drainage structure outlet downstream from the Little League ball field. A 110-foot reach between these two affected areas has very little existing riprap, except for an area of very large riprap in the upper portion of the slope.

Portions of the project have been repaired by the U.S. Army Corps of Engineers under Public Law 84-99 in 1970, 1974, 1997 and most recently in 2005 (McMichael Creek levee repair). The proposed plan would provide restoration to the two ends of a 190-foot stretch of the embankment.

C. Purpose

The maintained levee system was constructed to provide a 500-year level of protection. The damaged areas leave the study area susceptible to flooding from a levee failure along Brodhead Creek. The purpose of the project is to restore the levee integrity to its pre-storm condition.

D. General Description of Dredged or Fill Material:

The work consists of constructing approximately 80 linear feet of revetment comprised of geotextile and two gradations of riprap on slope; surveying to confirm contract compliance; and completion of as-built drawings. The proposed placement material is armor stone. The armor stone will range in size from Type A riprap (12"-15") and Type B riprap (15"-18").

E. Description of Placement Method:

The stone will be placed in the work area by crane, loaded from trucks. The construction contractor will determine the most efficient method, based on available equipment, and personnel. All of the existing displaced stone in the damaged area will be re-used for the new construction.

II. Factual Determination

A. Physical Substrate Determinations:

1. Type A riprap (12"-15") and Type B riprap (15"-18"). Geotextile.
2. No other effects are anticipated to occur. Minimal impact to the stream bed. The substrate (riprap and geotextile fabric) are nontoxic materials.
3. Actions taken to minimize impacts include selection of clean, inert stone fill material. In addition, standard construction practices to minimize turbidity and erosion would be employed.

B. Water Circulation, Fluctuation and Salinity Determinations

1. Water. Consider effects on:
 - a. Salinity - No effect.
 - b. Water Chemistry - No significant effect.
 - c. Clarity - Minor short-term increase in turbidity during construction.
 - d. Color - No effect.
 - e. Odor - No effect.
 - f. Taste - No effect.
 - g. Dissolved gas levels - No significant effect.
 - h. Nutrients - Minor short-term effect
 - i. Eutrophication - No effect.
 - j. Others as appropriate - None
2. Current patterns and circulation
 - a. Current patterns and flow - Circulation would not be significantly impacted by the proposed work as placement of riprap on the levee bank will not affect stream circulation.
 - b. Velocity - No effect on velocity.
 - c. Stratification – N/A.
 - d. Hydrologic regime - The regime would not be impacted.

3. Normal water level fluctuations – No effect.

4. Salinity gradients – N/A.

5. Actions that would be taken to minimize impacts - Utilization of clean, inert stone fill will minimize water chemistry impacts.

C. Suspended Particulate/Turbidity Determinations

1. Expected changes in suspended particulate and turbidity levels in the vicinity of the placement site - There would be a short-term, minimal elevation of suspended particulate concentrations during construction phases in the immediate vicinity of the work area. Minimal impact to the stream bed.

2. Effects (degree and duration) on chemical and physical properties of the water column:

a. Light penetration - Short-term, limited reductions would be expected at the stone placement site due to construction activities adjacent to the stream.

b. Dissolved oxygen - There is a potential for a slight decrease in dissolved oxygen levels but the anticipated low levels of organics in the turbidity generated during construction should not generate a high, if any, oxygen demand.

c. Toxic metals and organics - Because the fill material is essentially all clean, inert stone, no toxic metals or organics are anticipated.

d. Pathogens - Pathogenic organisms are not known or expected to be a problem in the project area.

e. Aesthetics - Construction activities associated with the fill site would result in a minor, short-term degradation of aesthetics.

3. Effects on Biota

a. Primary production, photosynthesis - Minor, short-term effects related to turbidity.

b. Suspension/filter feeders - Minor, short-term effects related to suspended particulates outside the immediate deposition zone.

c. Sight feeders - Minor, short-term effects related to turbidity. Mobile organisms will temporary leave the construction site.

4. Actions taken to minimize impacts include selection of clean, inert stone fill. Standard construction practices would also be employed to minimize turbidity and erosion.

D. Contaminant Determinations

The discharge material (stone) is not expected to introduce, relocate, or increase contaminant levels at the placement site. This is assumed based on the characteristics of the materials, the proximity of the placement site to sources of contamination, the area's hydrodynamic regime, and existing water quality.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on plankton -The effects on plankton should be minor and mostly related to light level reduction due to turbidity. Significant dissolved oxygen level reductions are not anticipated.

2. Effects on benthos - There would be minimal disruption of the benthic community adjacent to the placement area due to the potential for elevated temporary turbidity levels. The loss is somewhat offset by the expected rapid opportunistic recolonization from adjacent areas that would occur following cessation of construction activities.

3. Effects on Nekton - Only a temporary displacement is expected as nekton would be temporarily blocked from the active work areas or intentionally avoid the active work areas.

4. Effects on Aquatic Food Web - Only a minor, short-term impact on the food web is anticipated. This impact would extend beyond the construction period until recolonization of the filled area has occurred.

5. Effects on Special Aquatic Sites - No wetlands would be impacted by the project.

6. Threatened and Endangered Species – No threatened or endangered species are anticipated to occur in the project area during the construction period.

7. Other wildlife - The proposed plan would not adversely affect other wildlife. The proposed project is anticipated to provide a positive impact to water quality by reducing washout of the levee and continued erosion into the stream.

8. Actions to minimize impacts – A sediment and erosion control plan will be implemented during construction.

F. Proposed Placement Site Determinations

1. Mixing zone determination

- a. Depth of water - < 5 feet.

- b. Current velocity – Variable depending on season and degree of precipitation.
- c. Degree of turbulence – Minimal during non-storm periods.
- d. Stratification - None
- e. Discharge vessel speed and direction - Not applicable
- f. Rate of discharge – Not applicable
- g. Dredged material characteristics – Not applicable
- h. Number of discharge actions per unit time – Not applicable

2. Determination of compliance with applicable water quality standards - A Section 401 Water Quality Certificate has been obtained from the state of Pennsylvania.

3. Potential effects on human use characteristics

- a. Municipal and private water supply – positive effect by reducing turbidity related to levee washout and erosion.
- b. Recreational and commercial fisheries – temporary negative effect during construction due to the potential for elevated turbidity levels. Positive effect post-construction due to reduced turbidity from further erosion of the levee.
- c. Water related recreation – N/A
- d. Aesthetics - Short-term effect during construction
- e. Parks, national and historic monuments, national seashores, wilderness areas, etc. – N/A.

G. Determination of Cumulative Effects on the Aquatic Ecosystem – Positive impacts are anticipated due to the reduced erosion of the earthen levee and therefore reduced potential for elevated turbidity levels during storm events.

H. Determination of Secondary Effects on the Aquatic Ecosystem – the proposed project offers positive impacts to the entire aquatic ecosystem present in the vicinity of the project and downstream due to the reduced potential for elevated turbidity levels within Brodhead Creek.

III. Finding of Compliance or Non-Compliance with the Restrictions on Discharge

A. No significant adaptation of the Section 404(b)(1) Guidelines was made relative to this evaluation.

B. The alternative measures considered for accomplishing the project are detailed in Section 3.0 of the document of which this 404(b)(1) analysis is part.

C. A water quality certificate was obtained from the Pennsylvania Department of Environmental Protection.

D. The proposed project will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. The proposed project is in compliance with the Endangered Species Act of 1973. Informal coordination procedures have been completed.

F. The proposed project will not violate the protective measures for any Marine Sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

G. The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on life stages of aquatic life and other wildlife dependent on the aquatic ecosystem; aquatic ecosystem diversity, productivity, and stability; and recreational, aesthetic, and economic values will not occur.

H. Appropriate steps to minimize potential adverse impacts of the project on aquatic systems include selection of clean, inert stone fill material, use of an erosion and sedimentation plan during construction, and minimal work within the streambed itself.

I. On the basis of the guidelines, the placement site for the fill material is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

APPENDIX