DEPARTMENT OF THE ARMY
PITTSBURGH DISTRICT, CORPS OF ENGINEERS
WILLIAM S. MOORHEAD FEDERAL BUILDING
1000 LIBERTY AVENUE
PITTSBURGH, PA 15222-4186

REPLY TO
ATTENTION OF

CELRP-BR-E

21 December 2007

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Great Lakes and Ohio River Division, 550 Main Street, Cincinnati, Ohio 45202-3222, ATTN: CELRD-PDS-P

SUBJECT: North Park Lake, Allegheny County PA, Section 206 Revised Detailed Project Report and Integrated Environmental Assessment

1. The purpose of this memo is to forward the subject report and its associated appendices for CELRD review and approval to allow the project to proceed into Plans and Specifications. One hard copy of the report and the appendices are enclosed as requested by Dr. Jarboe.

2. An Independent Technical Review (ITR) team reviewed the revised draft report. All necessary report revisions required by the ITR comments were completed. A copy of the ITR certification sheet is enclosed.

3. Because this project was started several years prior to the latest modifications to APPENDIX F of ER 1105-2-100 (Planning Guidance Notebook), no Feasibility Cost Sharing Agreement (FCSA) was required to initiate the Feasibility Study.

4. If you have any questions about this project, please direct them to the project manager, Ms. Kathleen Anderson, at 412-395-7178.

Enclosures

MICHAEL P. CRALL
Colonel, Corps of Engineers
Commanding

NORTH PARK LAKE, ALLEGHENY COUNTY, PA
SECTION 206 AQUATIC ECOSYSTEM RESTORATION PROJECT
DETAILED PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT

DISTRICT ENGINEER'S QUALITY CONTROL CERTIFICATION

COMPLETION OF QUALITY CONTROL ACTIVITIES

The District has revised the North Park Lake Aquatic Ecosystem Restoration Detailed Project Report and Integrated Environmental Assessment and associated Finding of No Significant Impact. Certification is hereby given that all quality control activities defined in the Quality Control Plan appropriate to the level of risk and complexity inherent in the product have been completed. Documentation of the quality control process is enclosed.

GENERAL FINDINGS

Compliance with clearly established policy principles and procedures, utilizing clearly justified and valid assumptions, has been verified. This includes assumptions; methods, procedures and materials used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and the reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. The undersigned recommends certification of the quality control process for this product.

Brian H. Greene
Chief, Planning and Environmental Branch

21 Dec 2007
Date

QUALITY CONTROL CERTIFICATION

As noted above, all issues and concerns resulting from technical review of the product have been resolved. The project may proceed to the Plans and Specifications Phase.

Michael P. Crall
Colonel, Corps of Engineers
Commanding

12-21-07
Date

Independent Technical Review Certification

FINAL REVISED
DETAILED PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT

NORTH PARK LAKE
SECTION 206 ECOSYSTEM RESTORATION PROJECT
ALLEGHENY COUNTY, PA

Pittsburgh District
Great Lakes and Ohio River Division

The team listed below has performed an Independent Technical Review (ITR) of the Final Revised Detailed Project Report and Integrated Environmental Assessment for the North Park Lake Section 206 Ecosystem Restoration Study prepared by the Pittsburgh District, U.S. Army Corps of Engineers and dated December 2007. Pursuant to the provisions of CELRD-R 1110-1-8, Draft Appendix C, 5 June 2003 (Quality Management of Planning Projects), the team certifies that an ITR appropriate to this juncture in the planning process has been completed. All comments pertinent to the above documents have been addressed to the satisfaction of the ITR team members, and all issues have been resolved. A copy of the comments and responses is attached to this certification.

Nashville District:

Ray D. Hedrick 12/11/2007
Ray D. Hedrick Date
ITR Team Leader
Environmental Compliance & Analysis.

Huntington District:

Kenneth C Halstead 12/10/07
Kenneth C. Halstead Date
ITR Team Member
Hydraulics and Hydrology

Louisville District:

Suzan L. Brewer 12/11/07
Suzan L. Brewer
ITR Team Member
Real Estate

Pittsburg District

Paula G Boren 12/17/07
Paula G. Boren Date
ITR Team Member

NORTH PARK LAKE, ALLEGHENY COUNTY, PA
SECTION 206 AQUATIC ECOSYSTEM RESTORATION PROJECT
DETAILED PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT

CERTIFICATION OF LEGAL REVIEW

The Detailed Project Report and Integrated Environmental Assessment and associated Finding of No Significant Impact for the North Park Lake, Allegheny County, Pa, Section 206 Aquatic Ecosystem Restoration Project has been fully reviewed by the Office of Counsel, Pittsburgh District, and is approved as legally sufficient.

District Counsel

21 Dec 07
Date

COUNTY OF ALLEGHENY

OFFICE OF THE CHIEF EXECUTIVE

101 COURTHOUSE · 436 GRANT STREET
PITTSBURGH, PA 15219
PHONE (412) 350-6500 · FAX (412) 350-6512
WWW.ALLEGHENYCOUNTY.US

DAN ONORATO
CHIEF EXECUTIVE

December 13, 2007

Mr. Curtis Meeder
Acting Deputy for Programs & Project Management
U.S. Army Corps of Engineers, Pittsburgh District
William S. Moorehead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222

Dear Mr. Meeder:

This is a reaffirmation of our earlier letter of intent concerning the North Park Lake Aquatic Ecosystem Restoration Project. In accordance with the provisions of Section 206 of the Water Resources Development Act of 1996, as amended, Allegheny County requests the Corps of Engineers to continue into the implementation phase of this project. We have reviewed the proposed project as described in the "Final Detailed Project Report & Integrated Environmental Assessment" dated December 2007 and concur with the recommended plan.

We acknowledge the total project cost of $7,690,000 and are aware that the federal government is limited to a total contribution of $5,000,000. Allegheny County is capable of providing our cost share contribution, which is a maximum of $2,690,000. The County's contribution will be furnished through a combination of funds from the County Capital Budget and grants from the Commonwealth of Pennsylvania. The County has its entire contribution amount in place, and we are awaiting execution of the Project Cooperation Agreement. We agree to provide all lands, easements, rights-of-way, relocations, and disposal areas necessary for project construction and subsequent operation and maintenance. We understand we will be responsible for the operations and maintenance of the project after completion.

If you have any questions, please contact Allegheny County Deputy Director of Engineering Joe Hrabik at 412-350-2456 or joseph.hrabik@alleghenycounty.us.

Sincerely,

Dan Onorato
Allegheny County Chief Executive

US Army Corps of Engineers®

Pittsburgh District

December 2007

Final Revised Detailed Project Report

And

Integrated Environmental Assessment

North Park Lake

Allegheny County, PA

Section 206 Aquatic Ecosystem Restoration Project

Final Revised
Detailed Project Report
And
Integrated Environmental Assessment

North Park Lake
Section 206
Aquatic Ecosystem Restoration Project

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Finding of No Significant Impact

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North Park Lake
Section 206
Aquatic Ecosystem Restoration Project

EXECUTIVE SUMMARY

1. Authority

The North Park Lake aquatic ecosystem restoration project is being conducted under the authority of Section 206 of the Water Resources Development Act of 1996 (WRDA '96), Public Law 104-303.

2. Local Sponsor

The local sponsor is the County of Allegheny, Pennsylvania.

3. Description of Ecosystem Problem

When first constructed in the 1930's, the surface area of North Park Lake was approximately 75 acres and its depth was approximately 24 feet near the dam face. Uncontrolled surface runoff carrying sediment to the lake from residential and commercial development in the Pine Creek basin in the mid to late 20th Century resulted in a permanent loss of 12 acres of open water and a loss of about half of the lake's original depth. Due to enrichment from the excessive runoff, the lake has become eutrophic and filled with an overgrowth of aquatic vegetation. These factors have not only reduced the size of the original lake but also severely degraded the remaining aquatic habitat. If nothing is done to ameliorate past degradation, the County will eventually lose the lake and the aquatic resources it provides.

4. Alternative Formulation to Restore Aquatic Ecosystem

A number of alternatives were considered during the course of the investigation. Initial alternatives considered ways to reduce the sediment load to maintain what aquatic habitat remains. Studies performed on these alternatives revealed that this approach was infeasible largely because of the lack of sufficient area upstream of the lake to construct properly sized sediment basins. After these alternatives were abandoned, the District decided to explore ways to remove accumulated sediment and increase the lakes habitat complexity and diversity. Based upon the monetary constraints of the Section 206 program, the District determined that the most effective restoration alternative was to remove accumulated sediment to original contours in the North Fork Pine Creek arm of the lake. The restoration of this portion of the lake would restore the greatest amount of lake area (approximately 33 acres) and generate the most ecosystem benefits.

5. Findings and Conclusions

Through detailed investigations, the District determined that sediment removal was feasible and that the most cost effective method would be to drain the lake and use land based equipment to excavate the sediment from the North Fork arm, load it onto trucks, and haul it to the nearby disposal area. In addition to sediment removal, the District will add structure to the North Fork arm of the lake after it is dredged to provide aquatic cover

for fish and benthos; increase wetland habitat around sections of the North Fork arm's perimeter in specific locations.

This integrated Detailed Project Report and Integrated Environmental Assessment fulfills the Corps of Engineers reporting requirements for feasibility level reports as well as its reporting and coordination responsibilities established under the National Environmental Policy Act.

1.0 INTRODUCTION

1.1 Study Authority

The North Park Lake aquatic ecosystem restoration project is being conducted under the authority of Section 206 of the Water Resources Development Act of 1996 (WRDA '96), Public Law 104-303. Under this authority, the Secretary of the Army may carry out aquatic ecosystem restoration projects, if the Secretary determines that:

1. The project will improve the quality of the environment and is in the public interest.
2. The project is cost effective.
3. The project has a willing non-Federal cost-sharing sponsor who shall provide 35% of total project study and construction costs to include the provision of all lands, easements, rights-of-way, and necessary relocations.
4. The cost-sharing sponsor has entered into a binding agreement with the Secretary to pay the non-Federal 35% share plus 100 percent of the cost of operation and maintenance, replacement and rehabilitation.

As is demonstrated in this detailed project report and environmental assessment, the North Park Lake project as proposed will meet the four primary objectives as listed above. The project will improve a degraded aquatic ecosystem in a cost effective manner, and Allegheny County (Sponsor) will cost share the project with the Corps. The Sponsor and Pittsburgh District will execute a legally binding Project Cooperation Agreement after higher Corps authority approves this report and when the next phase of the study (Plans and Specifications) is nearly complete.

1.2 Study Purpose

The purpose of this phase of the project is to produce an integrated, feasibility level, detailed project report and environmental assessment, (DPR&EA) that recommends an effective solution to restore the degraded structure, function and dynamic processes of North Park Lake to a less degraded condition. The DPR&EA considers and describes historic and existing conditions and forecasts future "without-project" and "with-project" conditions. The future without-project conditions form the basis for which alternatives are formulated and impacts are assessed. Evaluation of the formulated alternatives determines which effectively generates the highest level of ecosystem benefits for the least cost. Additionally, the alternative analyses establish which plan minimizes environmental impacts and disruptions to the park during construction. The culmination of the alternative analyses identifies the most cost effective plan, known as the National Ecosystem Restoration (NER) Plan.

1.3 Study Area – General

North Park Lake is located within North Park, a County-operated recreation facility that lies about 10 miles north of the City of Pittsburgh, Pennsylvania within north central Allegheny County in McCandless, Pine and Hampton Townships. Covering over 3,000 acres of diverse habitat, North Park is the largest and most heavily used park in Allegheny County. North Park Lake is located entirely within McCandless Township. The Pine Township/McCandless Township Line divides Marshall Lake, a small lake located upstream of North Park Lake on the North Fork of Pine Creek in the northwestern section of the park. A small portion of the southeastern section of the park located just downstream from North Park Lake lies within Hampton Township. See PLATES 1 and 2 showing the general location of North Park Lake and the primary highway network surrounding the park. PLATE 3 shows North Park Lake on a portion of a USGS Quadrangle map.

PLATE 1 - General Location Map

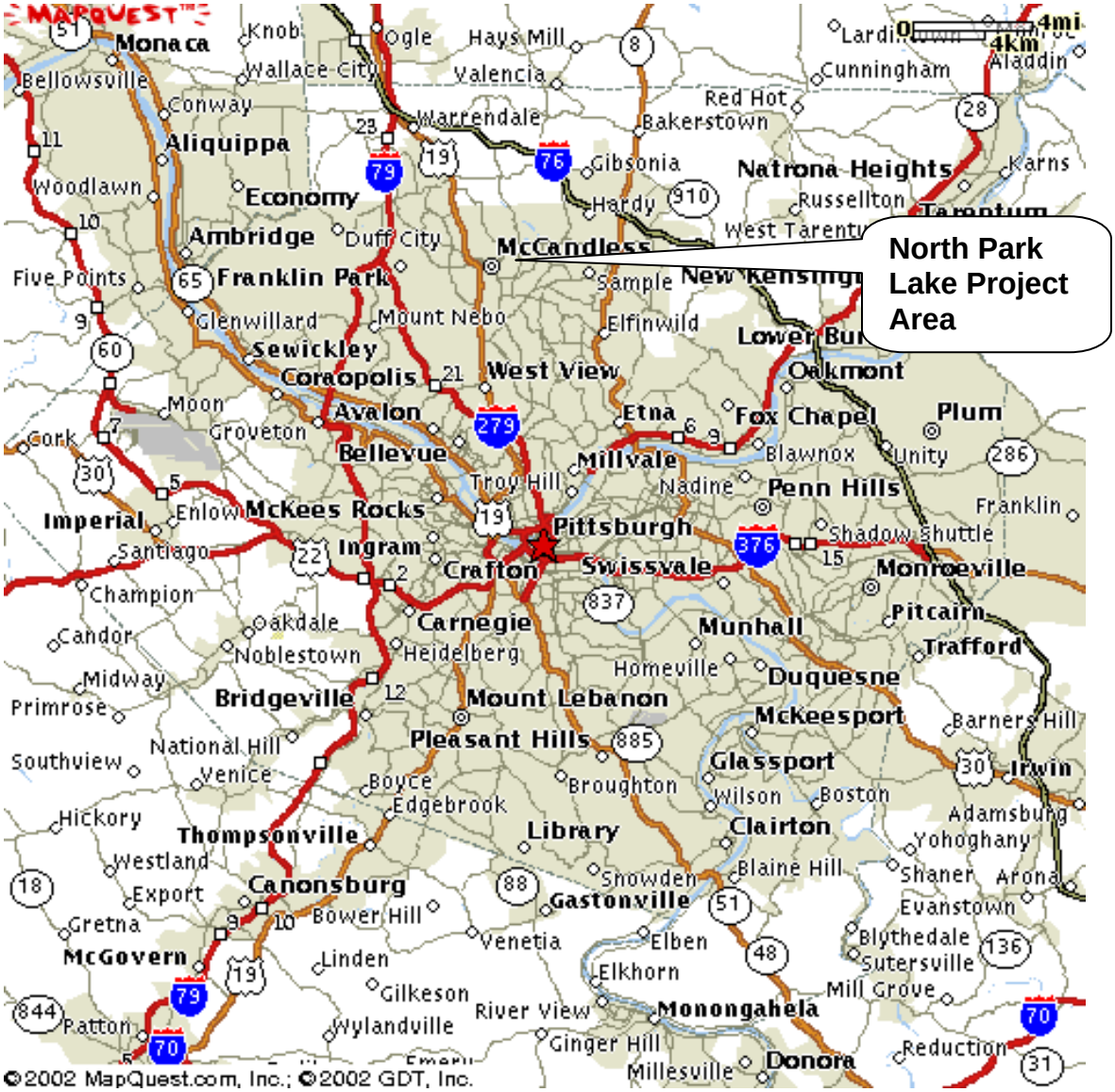


PLATE 2 - Primary Road Network Surrounding North Park Lake

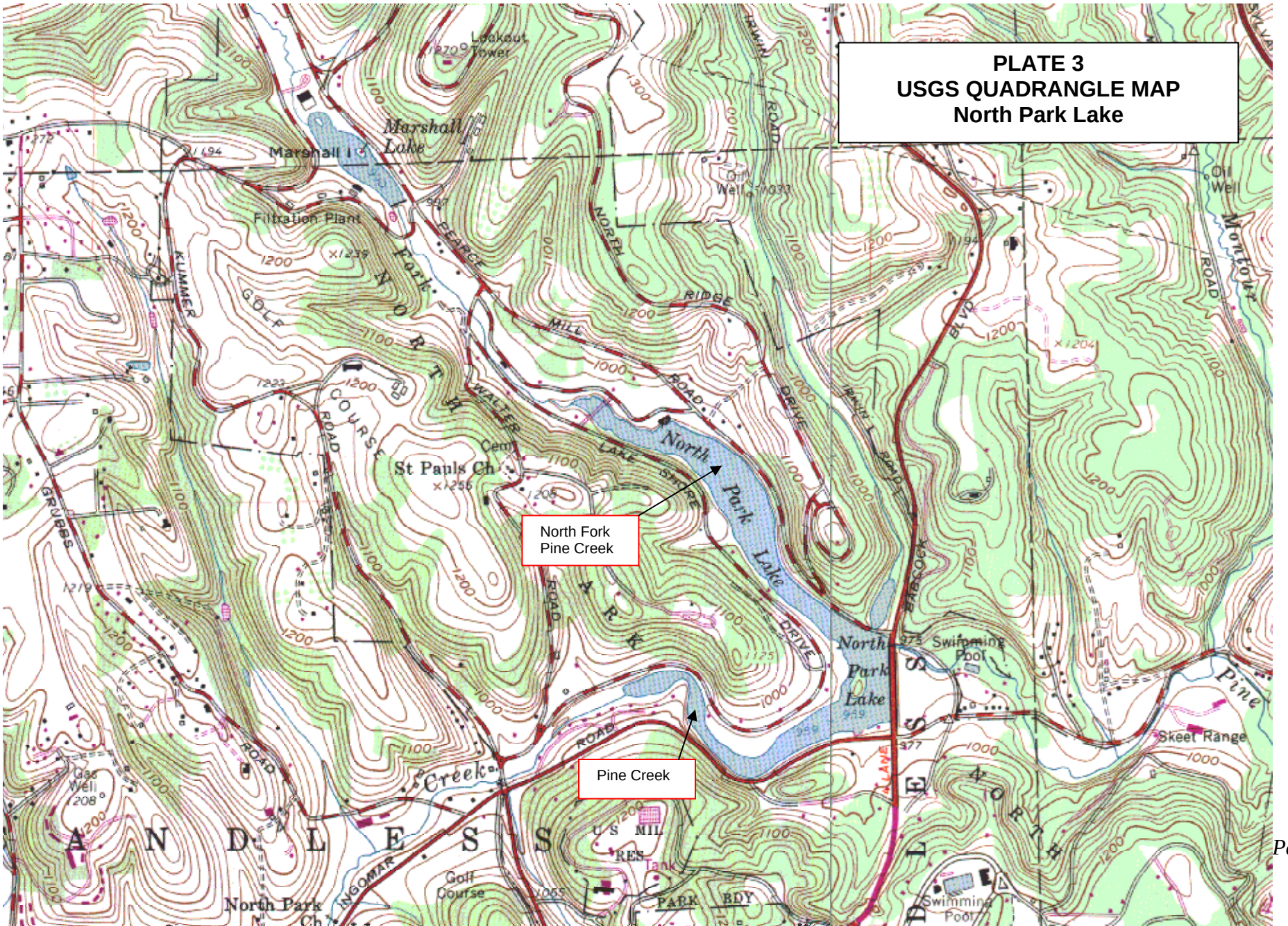


PLATE 3
USGS QUADRANGLE MAP
North Park Lake
North Fork
Pine Creek
Pine Creek
Marshall Lake
Filtration Plant
Lookout Tower
North Park Lake
St Pauls Ch
Swimming Pool
Skeet Range
Golf Course
North Park Ch
U S MIL RES
Oil Well
Gas Well
ANDLESS
NORTH
PARK
NORTH
FORK
PINE
CREEK

1.4 Project Sponsor

As mentioned in paragraph 1.1, the local sponsor for this project is Allegheny County. As indicated in their letter of intent, (see APPENDIX 1 – Letters of Coordination), the County is a willing sponsor in favor of this ecosystem restoration project and will pay for their 35% share of the cost. A Project Cooperation Agreement (PCA) will be executed during the end of the next phase of study (Plans and Specifications). A model of the PCA is presented in APPENDIX 2. The local sponsor will provide their share of the project cost to the District after PCA execution, which occurs sometime towards the end of the next phase of study (Plans and Specifications).

1.5 Prior Studies and Reports

In July 1999, the Pittsburgh District, Corps of Engineers completed a Preliminary Restoration Plan (PRP), prepared under the authority of Section 206 of WRDA '96 that described a proposal to construct a porous rock dike across the Pine Creek arm of the lake. The section of the lake upstream of the dike (approximately one third of the lake area) would have been sacrificed to act as a sedimentation basin to help reduce the sediment load that would otherwise enter and degrade the remainder of the open water habitat within the lake. Hydrologic investigations performed after the PRP was completed revealed that the proposed sedimentation basin would not have been large enough to effectively control lake sedimentation. Consequently, the District and local sponsor decided to pursue other treatment methodologies to restore and enhance the lake's aquatic habitat.

1.6 Agency Coordination and Consultation

For this project, the District consulted with the U.S. Fish and Wildlife Service to meet its responsibilities under the U.S. Fish and Wildlife Coordination Act and Section 7 of the Endangered Species Act. In addition, the District coordinated with the Pennsylvania Department of Conservation and Natural Resources' Bureau of Forestry, the Pennsylvania Fish and Boat Commission, and Pennsylvania Game Commission. Copies of correspondence from these agencies are contained in APPENDIX 1. Earlier in the study, representatives of the Pennsylvania Fish and Boat Commission participated in field investigations at North Park with the District and Local Sponsor. Section 10 of this report, "Public Involvement", contains a mailing list showing which agencies received copies of this report for review and comment.

2.0 AFFECTED ENVIRONMENT – EXISTING CONDITIONS

2.1 General

2.1.1 Eco-Region

Southwestern Pennsylvania, which includes Allegheny County, is located within the Appalachian mixed mesophytic forest eco-region of North America. This region, which includes the moist broadleaf forests that cover the plateaus and hills west of the Appalachian Mountains, includes portions of northwest Alabama, east central Tennessee, eastern Kentucky, western North Carolina, most of West Virginia, southeastern Ohio and finally southwestern Pennsylvania. This eco-region is rich in biodiversity with numerous trees, shrubs, herbaceous plants, and a vast assemblage of birds, reptiles, amphibians, and mammals. It is one of the most biologically diverse temperate regions of the world.

As residential, agricultural, commercial, and industrial development proliferated during the settlement of southwestern Pennsylvania, and specifically, Allegheny County, the original forests disappeared. Within the southwestern section of the Commonwealth, Allegheny County exhibits the densest urban/suburban development. The limited forested areas that remain within the County consist of second and third growth trees that are primarily located in public parks, small private woodlots, and in relatively narrow bands along undeveloped portions of steep stream and river banks. The wide variety of native flora and fauna that was present when the first Europeans settled in the County has now been permanently changed and degraded by heavy and expansive industrial, commercial and residential development and the introduction of exotic species.

2.1.2 Land Use

Over time, as the northern section of Allegheny County was settled, the original forests in the Pine Creek watershed were largely removed to provide lands for farming and lumber. The watershed surrounding North Park Lake, when originally constructed in 1936, consisted primarily of rural agricultural fields, pastures, and isolated woodlots. Subsequent to the completion of North Park Lake in the late 1930's, urbanization quickly progressed outward from the City of Pittsburgh, especially in the latter half of the Twentieth Century. Today, the watershed exhibits the ravages of unhindered suburban expansion where formerly open fields and woodlots have been replaced by dense residential and commercial development and major and secondary highway networks. The intensive development along the highways includes a multitude of outdoor strip malls, a host of individual commercial retail establishments including numerous automobile sales lots, gas stations, commercial office complexes as well as various public and private schools, medical facilities and churches and their associated parking lots.

2.1.3 Pine Creek/North Fork Pine Creek Watershed Characteristics

The watershed of Pine Creek and the North Fork of Pine Creek is relatively hilly. Elevations range from approximately 1,300 feet above National Geodetic Vertical Datum (NGVD) on the ridges to approximately elevation 960 feet above NGVD at North Park

Lake. The total drainage area of Pine Creek at its mouth at the Allegheny River is 67.5 square miles. Pine Creek upstream of North Park Dam (exclusive of the North Fork of Pine Creek drainage) has a drainage area of approximately 14.2 square miles and an average channel slope of 34 feet per mile. The North Fork of Pine Creek drains 10 square miles and has an average slope of 35 feet per mile.

2.1.4 Description of Pine Creek Dam and North Park Lake

Pine Creek dam, which forms North Park Lake, backs up water from Pine Creek flowing from the west and from the North Fork of Pine Creek flowing from the northwest. The dam is about 15 miles upstream of the mouth of Pine Creek, which empties into the Allegheny River near Etna at river mile 4.7. As shown on PLATE 3, the North Fork of Pine Creek flows first into Marshall Lake and then into North Park Lake.

Pine Creek Dam is an earthen embankment approximately 1,130 feet long and 33 feet high; it has a 60-foot wide crest with a two horizontal to one vertical slope on both the upstream and downstream faces. It has an impervious core consisting of a concrete cutoff wall. Over the years, fill has been placed on the eastern (downstream) side of the dam's crest increasing its width approximately 400 feet. A four-lane road (Babcock Boulevard) crosses the crest and is a main thoroughfare through North Park. Completed in 1936, the dam was constructed under the Works Progress Administration Program.

The flood discharge facilities of the dam consist of a combined primary and emergency spillway located near the left abutment (looking downstream). The spillway structures include an arc-shaped ogee crested weir that discharges into a rectangular concrete discharge channel. The crest of the ogee overflow section of the spillway is located at an elevation approximately 10 feet below the lowest point of the dam's crest.

The outlet works consist of an intake tower and a 560-foot long reinforced concrete conduit through the embankment. The conduit is rectangular in cross section with inside dimensions of 5 feet by 5 feet. A manually operated sluice gate located at the intake tower controls flow to the conduit. This outlet system constitutes the emergency draw down facility of the dam.

The lake is maintained at elevation 960 feet NGVD, which is the elevation of the uncontrolled spillway crest. At this elevation, the lake, when initially constructed, was 75 acres in size and approximately 24 feet deep near the face of the dam. Due to sedimentation, the lake now provides about 63 surface acres of open water and has lost approximately half of its depth. The 12 acres lost occurred in the Pine Creek arm of the lake which receives the highest inflow and consequently the highest suspended sediment loads (For more detail about sedimentation and its effect on the lake, see Section 2.10).

2.1.5 Early Development of North Park (Provided by Allegheny County)

In the 1920's, a tide of industrialization swept the Greater Pittsburgh area, and rapid urbanization began to show itself in the rural communities surrounding the business

districts of Allegheny County. One county commissioner, Edward V. Babcock, urged the preservation of rural lands in their natural states. His idea for a two-park system in the north and south regions of the county became the basis for the present system, which he then turned over to the county at cost (a procedure that was to be repeated later when the regional parks were assembled). The Department of Parks was organized on April 14, 1927, in Babcock's phrasing, for "the purpose of establishing, making, enlarging, extending, operating and maintaining public parks within the county and for enforcing rules and regulations established by the county for patrons." It is important to remember that in 1927, the farmlands destined to become parks were not the woodlands and picnic groves we see today. The "people's country clubs," as the parks were called, had to be physically created. Native trees, maples, oaks, beeches, mixed with dogwoods, cherry trees, and pear trees were used to create color and fragrances in the springtime. Behind much of the landscaping was the thinking of the talented Paul B. Riis, who was recruited in 1927 from the Rockford, Illinois, Parks. He had helped develop Yellowstone and other national parks, creating stone lodges and other amenities, and now he was being paid the princely sum of $7,200 per year (a high salary much debated by county officials) to lay the groundwork for North and South Parks. The public enjoys many of his efforts today, including the major landscaping, the road systems, and the golf courses, and North Park Lake.

In December of 1928, plans were made to build outstanding golf courses at both North and South Parks. Spacious and well planned, the golf courses were an immediate success. The year 1929 saw many changes in the parks, including 35 new picnic groves, 14 dance pavilions, and the installation of oven shelters in many of the groves. By 1931, North and South Parks were in the last phase of their early development, which included additional bridal trails, nature trails, groves, horseshoe courts, ball diamonds, and tennis courts. North Park received additional parcels of land that were used to develop a beaver meadow, a bird sanctuary, and a primitive trail.

North Park, at 3,010 acres, is the largest park in the Allegheny County Park system, more than 1,000 acres greater than its sister facility, South Park. North Park Lake, the largest man-made body of water in Allegheny County, originally pooled over 75 surface acres. The idea of North Park Lake, and of fishing in the lake, was advanced by then County Commissioner John J. Kane.

The three historic photos below depict what North Park Lake and Marshall Lakes looked like in 1937.

Historic Photo #1 – View of the Pine Creek arm of the lake looking downstream toward the dam

Historic Photo #2 – View of the North Fork Pine Creek arm of the lake looking downstream. The boathouse is in the center of the photo.

Historic Photo #3 – View of Marshall Lake looking upstream from the lake's lower end.

2.2 Flora and Fauna of North Park

2.2.1 Wetlands – North Park Lake

In 2001, the District conducted a cursory vegetation survey of existing wetlands immediately adjacent to North Park and Marshall Lakes. The first and largest of the wetland areas surveyed was along the isolated upper arm of Pine Creek located between the intersection of Kummer Road and Lake Shore Drive and the J.C. Stone Field along Lake Shore Drive. These wetlands were exceptional, diverse, palustrine, willow dominated wooded wetlands, according to the U.S. Fish and Wildlife Services' wetland classification system. At minimum, 59 species of primarily native obligate, wetland plants were observed. Only a few exotic plant species were located, and they were uncommon. An abundance of wildlife was also noted and included at least 14 species of birds; two frog species; various dragonflies; raccoon; muskrat; and deer. Wood ducks were particularly abundant.

Adjacent to Ingomar Road, Pine Creek exhibits heavy braiding due to ongoing sedimentation. In this area, there were multiple exposed sandbars, which supported exceptional quality wetlands. These wetlands were classified as lacustrine system, marsh purslane, and swamp milkweed dominated emergent wetlands. Sandbar vegetation was immature at the time of the survey (May 2001), indicating that the pool was lower (exposing more shoal) than it had been a few weeks earlier. Shoreline wetlands in this reach were classified as lacustrine system, black willow dominated, wooded wetlands. A

total of 26, primarily obligate, native plant species in this area were observed. APPENDIX 3, photos 18, 19, and 20 contain several photographs of the wetlands around North Park.

2.2.2 Wetlands – Marshall Lake

The upper reaches of North Fork of Pine Creek, located between the North Park Ice Rink and Marshall Lake in the vicinity of Pearce Mill and Brown Roads was also surveyed. This reach is degraded because floodplain wetlands are extensively mowed, sometimes including riparian buffers along shoreline edges. Mowing not only degrades wetlands, compromising wetland functions, such as the attenuation of storm water flows and sediment filtering, but also destabilizes stream banks, resulting in increasing erosion. Shoreline erosion and undercutting is occurring throughout this reach, which can likely be attributed both to changes in the upstream hydrology as a result of rapid new development in the basin and compromised riparian buffers. Mowing also creates preferred Canada goose habitat. Hundreds of geese utilize the lawns adjacent to the stream and Marshall Lake, exacerbating eutrophication problems in the Lake and increasing levels of fecal coliform bacteria. The wetlands in this area that are not mowed were classified as riverine and palustrine, emergent, scrub-shrub, and wooded, wetlands. Again, these unmowed wetlands appeared to be quite diverse (25 plant species minimum), dominated by native species, such as forget-me-not, wing stem, ninebark, alder, arrowwood, elderberry, black willow, and green ash.

2.2.3 Summary of Existing Aquatic Life Resources and Water Quality

In April 1997, the Pennsylvania Fish and Boat Commission prepared a report describing the fishery of North Park Lake, and in 2002 the Commission prepared a report describing angler use, harvest and the results of an opinion survey. The Commission classified the lake as a shallow, eutrophic, turbid lake that suffers from a siltation problem. This description has been confirmed by the District's August 2002 analysis. District biologists also noted that North Park Lake is a warm, shallow, mineralized, nutrient rich, eutrophic impoundment. [Eutrophication is a natural process in which lakes become shallower and excessively productive through the introduction and cycling of nutrients.] Both lakes in North Park suffer from cultural eutrophication, caused by human activity which speeds up the rate of nutrient and sediment loading. During the District's August 2002 survey, significant vertical thermal and chemical stratification patterns developed in North Park Lake and dissolved oxygen was totally depleted in the hypolimnion (bottom) of the lake. Within the chemically reduced environment of the hypolimnion, soluble metals (especially iron and manganese), and chemically reduced nitrogen and sulfur species such as ammonia and hydrogen sulfide had accumulated. (See APPENDIX 10 for more technical water quality details.)

According to the Commission, the lake contains an indigenous population of largemouth bass of above average density, channel catfish and some limited numbers of walleye, smallmouth bass and northern pike. The panfish population consisting of bluegill, pumpkinseed, black crappie, and white crappie is overcrowded and stunted. Also present

in undesirable abundance were gizzard shad, a forage species. The Commission stocked fingerling channel catfish, fingerling walleye, and fingerling muskellunge hybrids (muskellunge x northern pike hybrids, known as tiger musky) to attempt to control the stunted panfish populations. So far, this has not been very successful; it is thought that the turbid waters may interfere with predation. Consequently, in 2005 walleye stocking as a means of panfish control was discontinued. The lake also contains brown bullheads, yellow bullheads, rock bass, white sucker, common carp, golden shiner, and central stoneroller.

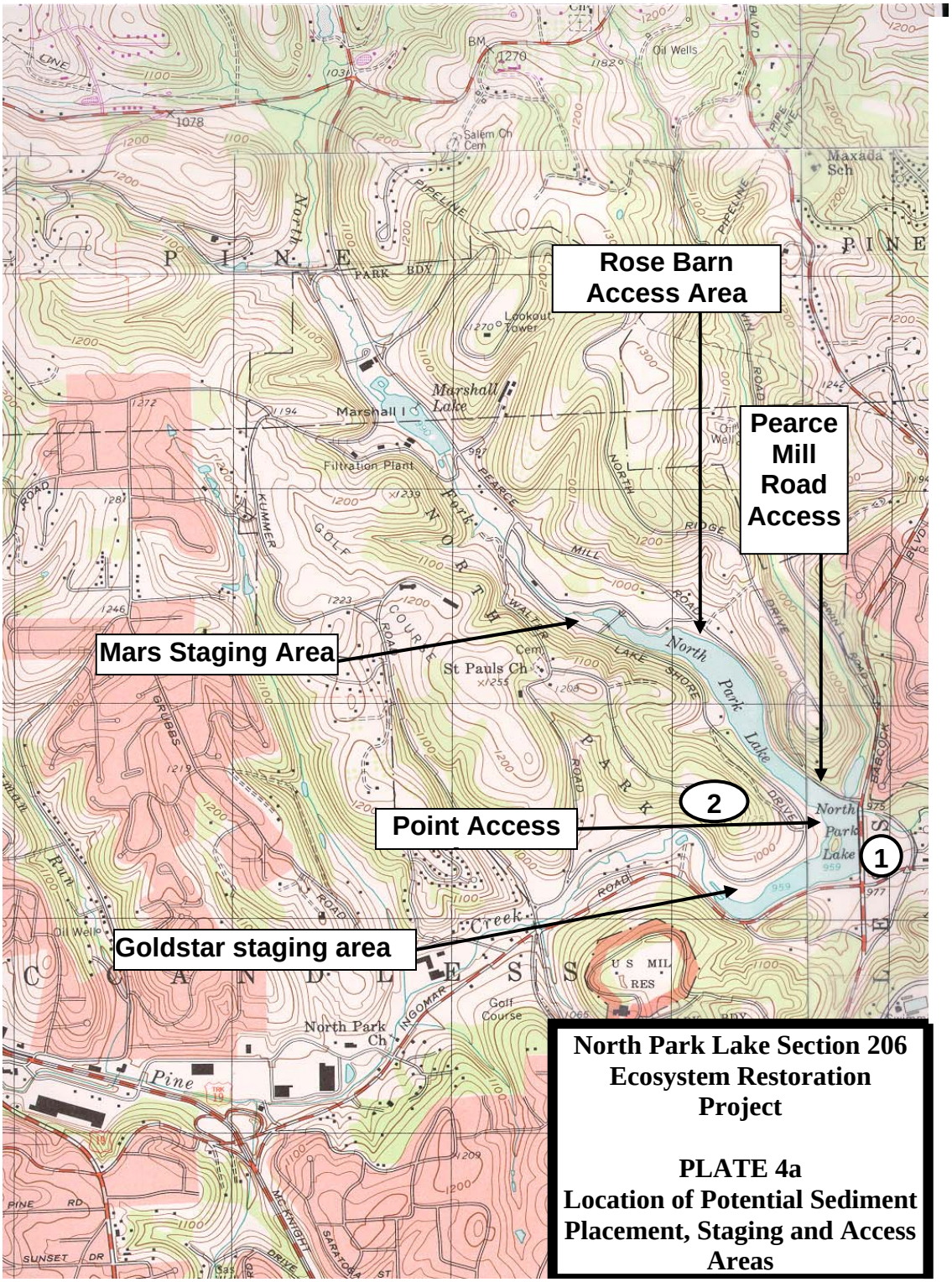
The Commission regularly stocks trout in North Park Lake in the late fall and late winter as a "put and take" trout fishery. Because of the high temperatures reached in the lake during the warmer months of the year, trout cannot survive year-round. Thus, the trout fishery is not a self sustaining resource. Trout are stocked simply to provide local anglers with another recreation experience. Because of the hostile conditions in the lake for trout, and because nothing can be done to improve the aquatic habitat for trout to survive, the put and take trout fishery played no part in the formulation of alternative plans in Chapter 3 or were considered during the benefit analysis in Chapter 5 of this report.

2.2.4 Terrestrial (Upland) Habitat

According to Mr. Joseph Grom, a former naturalist at North Park's Latodomi Nature Center, North Park is the largest of all of the County Parks within Allegheny County and contains a wide variety of habitats that range from very dry upland woods to mud flats and wetlands within and surrounding North Park Lake and Marshall Lake. Above the wetland areas surrounding the lake, the park contains a variety of terrestrial habitat types that range from regularly mown fields located around many picnic groves, to abandoned agricultural fields in various stages of ecological succession, to small groves of hemlock in steep ravines to maturing oak/maple forests.

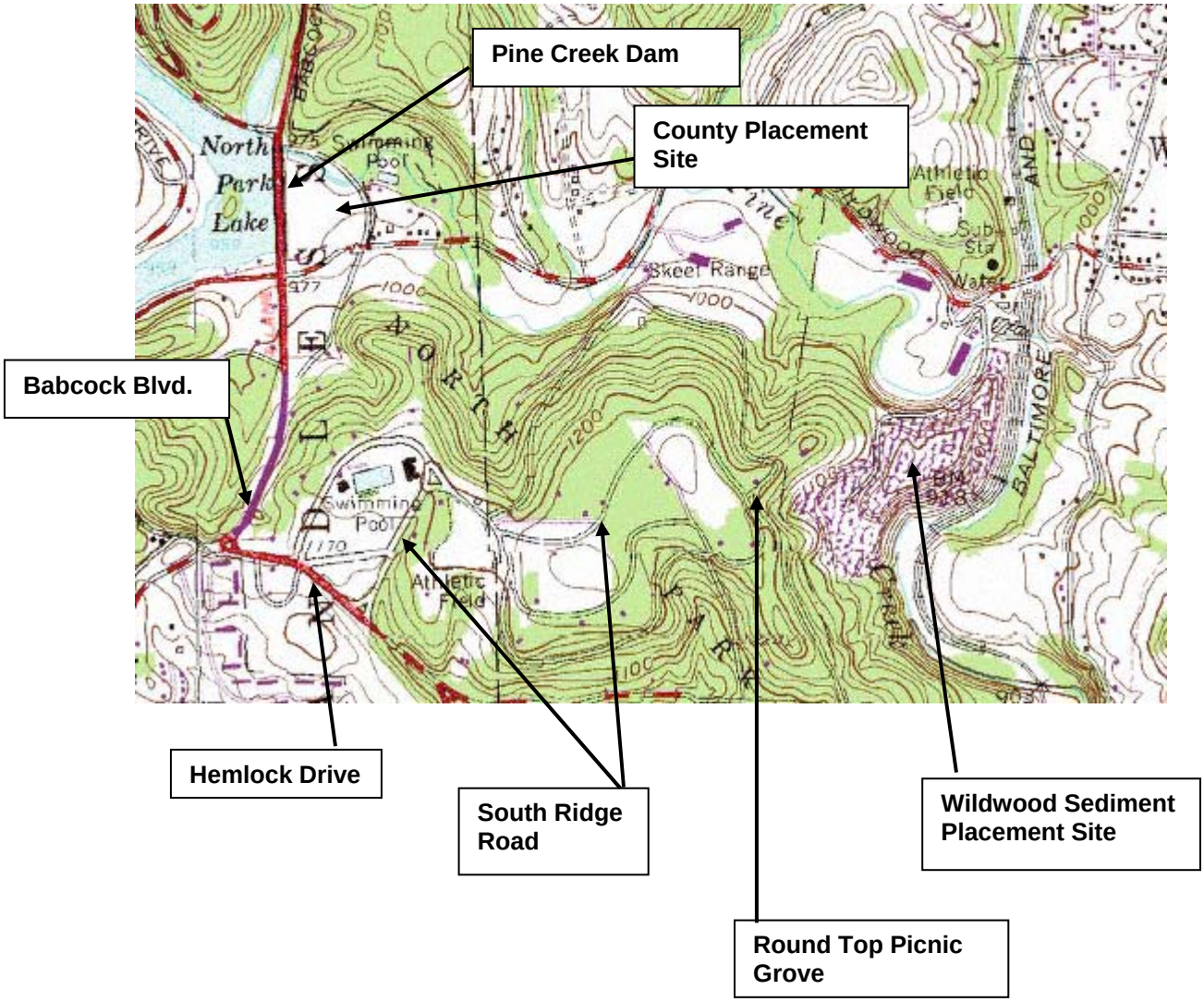
2.2.4.1 Upland Habitat That Could Be Affected By the Proposed Project.

Several sites within North Park have been identified that may be needed to complete an ecosystem restoration project. These areas would be used for heavy equipment staging and access and for possible sediment placement. The location of these upland areas, referred to as "sites", are shown on PLATES 4a and 4b and described below.



Sediment Placement Area Key: 1 – County Site, 2- Bull Pen Site

PLATE 4b
Location of Potential Sediment Placement And Access Areas



2.2.4.2 County Site

The first site is a previously used disposal area, known as the "County" site. It is located immediately east of the Pine Creek Dam crest and is adjacent to Babcock Boulevard. This area was formerly used to dispose sediments that were hydraulically removed from the lake by a "Mudcat," which is a small, self-propelled cutter head dredge. This site is 13.1 acres in size. Currently this site supports a vegetative cover of grasses and forbs typically found on disturbed sites. In wet years, a small poor quality wetland develops within a swale on the site that follows a sewer line that runs across the property.

2.2.4.3 Bull Pen Site

The second area, the "Bull Pen" site, is an 8.13 acre area located on a knoll between the two arms of the lake. Allegheny County currently disposes leaves on this site collected during the fall. A large portion of the site's central area is paved with a thin veneer of asphalt. The remaining area supports grasses and forbs. A very thin band of young sumac and locust trees surrounds the perimeter of the site. Behind this thin band is maturing woodland consisting predominantly of oak, hickory and maple with a sparse understory of various shrubs. This maturing vegetation is typical of many of the forested areas within North Park.

2.2.4.4 Wildwood Road Site

This, the largest disposal site, is 65 acres and is located in the extreme southeastern section of the park near the "Round Top" picnic grove located along South Ridge Road. See PLATE 4b. The Wildwood site is a reclaimed coal waste (gob) pile that was covered with fly ash, heavily fertilized and planted with grass to help prevent surface erosion. Currently, the majority of the site is grass covered. The hillside that extends from the Round Top Picnic grove down to the area of reclaimed gob pile is deciduous woodland.

2.2.4.5 Mars Site (Access/Staging Area)

The Mars site is located on the right descending bank of the North Fork of Pine Creek immediately adjacent to the uppermost reach of the Lake. See PLATE 4a. This potential 2-acre staging area, also adjacent to Lakeshore Drive, is a grassy day-use area that contains picnic benches. It provides limited habitat for wildlife due to regular mowing.

2.2.4.6 Pearce Mill Road Site (Access Area)

The Pearce Mill Road site is a small, 0.16-acre area located just upstream of the Dam on the left descending bank. It currently supports grass, immature trees, such as sumac, and an assortment of weeds and brush. It provide poor habitat due to limited area and is directly adjacent to a heavily traveled park road. See PLATE 4a.

2.2.4.7 Rose Barn Site (Access Area)

The Rose Barn site is located near the handicapped-fishing pier just downstream from the boathouse. It is immediately adjacent to Pearce Mill Road. This 0.2-acres site is regularly mown, and consequently provides little useful wildlife habitat.

2.2.4.8 The Point Site (Access Area)

The last area, called the Point, is located adjacent t to Lakeshore Drive on the right descending bank of the North Fork of Pine Creek just upstream from where Pine Creek and the North Fork of Pine Creek merge within the lake. See PLATE 4a. and APPENDIX 3. This area is a typical picnic area within the park that is regularly mown. The habitat is typical parkland that is heavily disturbed by regular recreational use. The primary use of this 0.2-acre site will be to access the Bull Pen sediment placement area, which is located on top of the hill above it. Access to the Bull Pen would be from a logging road that leads from the Point access site up the hill. This logging road would have to be improved to permit heavy trucks to travel on it.

2.2.4.9 Goldstar (Access /Staging Area)

The one-half acre Goldstar site is located on the left descending bank of the Pine Creek arm of the lake and consists of a paved parking area and an adjacent grove of planted red pine trees with an understory of mowed grass. This picnic area would be used for restoration work in the Pine Creek arm of the lake. This area is also heavily used for recreation, especially fishing access as evidenced by the lack of grass and eroded soils caused by constant foot traffic the along the shoreline area. This area provides very little value as wildlife habitat.

The list below show what each site could be used for during project construction.

Site	Size Acres	Sediment Placement	Equipment Storage and Staging	Lake Access
County	**13.1**	**X**		
Bull Pen	**8.13**	**X**		
Wildwood	**65**	**X**		
Mars	**2**		**X**	**X**
Pearce Mill Road	**0.16**			**X**
Rose Barn	**0.2**			**X**
Point	**0.2**			**X**
Goldstar	**0.5**		**X**	**X**

2.2.5 Vegetation Survey of Sediment Placement Areas

The dominant vegetation cover type at all of the sites was herbaceous rangelands with a mixture of grasses, forbs and scattered shrubs. Cool season grasses and several legume species dominated this vegetation type. Uneven-aged woodlands bordered all sites with an assortment of deciduous trees in the canopy and a moderately diverse understory. A variety of invasive exotic plants are established at all sites, appearing in both herbaceous grasslands and in the surrounding woodlands, especially in the understory. The hillside at the edge of the Round Top picnic grove that leads to down to the Wildwood site was the only area dominated by deciduous woodland cover, consisting primarily of mature trees. Invasive exotic plants are established in this area also, but not to the extent evident at the other potential sediment placement sites. The effect of exotic plant influence on existing wildlife habitat quality was not quantified. However, because of the dominance of exotic vegetation at most sites, it is believed to have significant negative effects on both small mammal and breeding bird populations utilizing the sites. See APPENDIX 10, Vegetation Survey, for more detail.

2.3 Threatened and Endangered Species

According to the June 6, 2006 letter received from the U.S. Fish and Wildlife Service, no Federally listed threatened or endangered species or their habitat would be affected by the proposed project. An April 12, 2006 preliminary search of the Pennsylvania Natural Diversity Index provided by the Pennsylvania Bureau of Forestry on its WEB site revealed that there were was potential for state listed species to be present within the project area. Following this preliminary search of the PNDI Index, the District supplied the Bureau with additional detail, who responded by letter dated May 11, 2006 that the state-listed rare *Trillium nivale* (snow trillium), could be present at the Wildlwood, County and Bull Pen sediment placement areas. Copies of the above correspondence are contained in APPENDIX 1 of this report. They requested that the District examine these areas to determine if the specie was present. Accordingly, the District coordinated with Meg Scanlon, the North Park naturalist who had two recognized expert botanists, Ms. Ester Allen and Ms. Shirley Mutz survey the areas in question. According to these botanists, the habitat required for the snow trillium (rich moist woods) was not present at the sediment placement sites.

2.4 Prime Farmlands

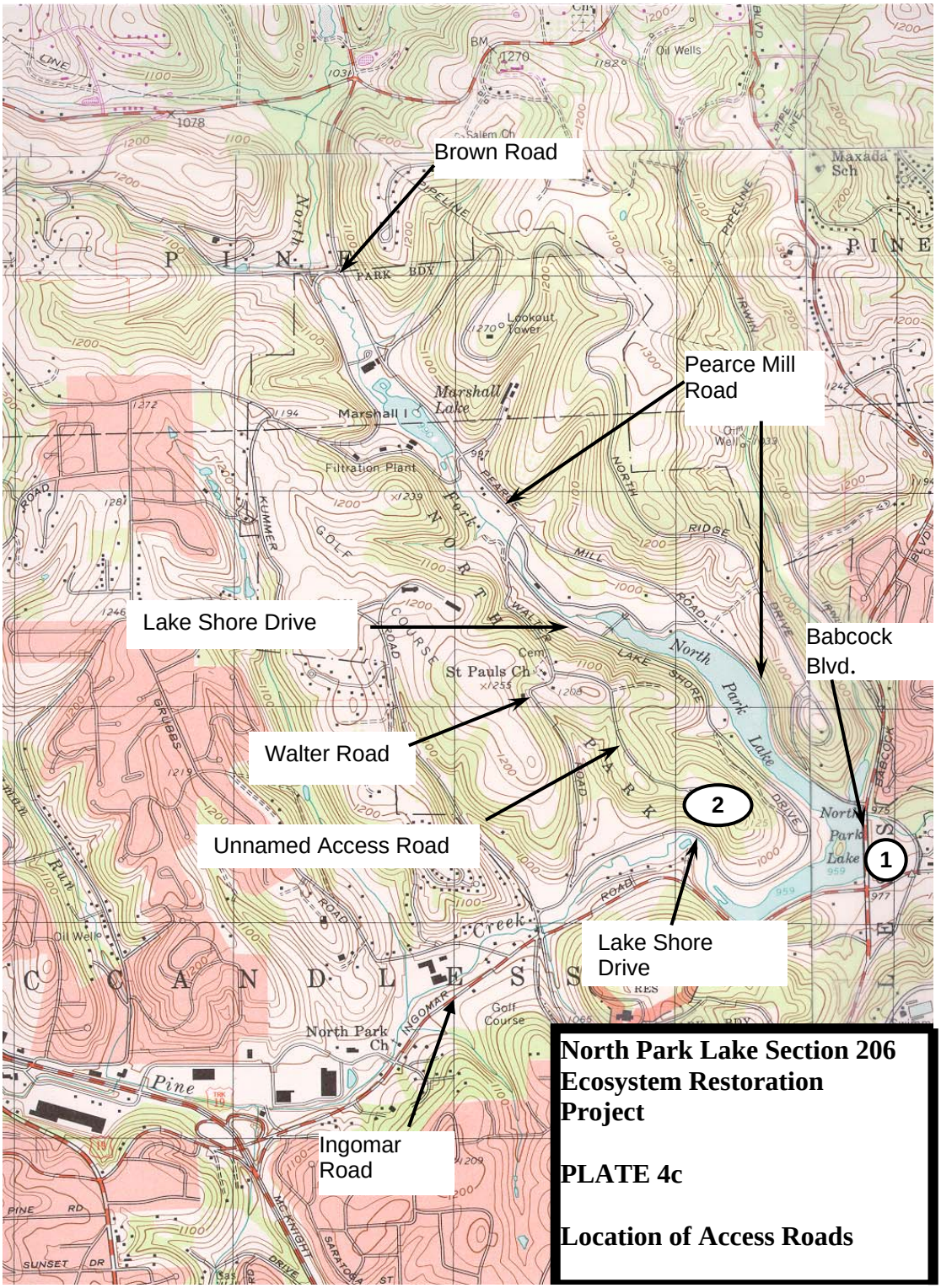
Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land or other land but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable alkalinity, acceptable salt and sodium content and few or no rocks. They are permeable

to water and air and are not excessively erodible or saturated with water for long periods of time and do not flood frequently or are protected from flooding.

The soils survey of Allegheny County was examined and compared with a list of prime farmland soils obtained from the Natural Resources Conservation Office (NRCS) in Beaver County, which also serves Allegheny County. Based upon the soil surveys and information obtained from the NRCS, the Bull Pen contained approximately 6.5 acres of Gilpin Silt Loam soils, which is considered a prime farmland soil type.
Given that this site has been partially paved with asphalt and lies within the boundary of North Park it would never again be used for crop production, and therefore, does not qualify as prime farmland.

2.5 Noise

The noise within North Park is generated primarily by automobile traffic. Within the Park, noise levels near Pine Creek Dam are generally the highest in the vicinity of Ingomar Road and Babcock Boulevard, which crosses over the top of the dam's crest. See PLATES 4b and 4c for road locations. Babcock Boulevard is a heavily used north/south road that local residents use to access the park and other locations within the North Hills of Allegheny County. Ingomar Road, which runs along the park's southern border along the Pine Creek arm of the lake, turns into Wildwood Road at its intersection with Babcock Boulevard. Ingomar/Wildwood Road is a busy east/west access route connecting Route 8 and McKnight Road/Route 19. As would be expected, noise levels from everyday traffic where these routes border the park are high and sustained. Within the park in areas away from these two roads, noise levels reduce due to reduced traffic volumes and speed limits. Obviously during weekends in warm weather, when the park receives its highest use, noise levels from traffic and recreational activities increase throughout the park.



Sediment Placement Area Key: 1- County Site 2- Bull Pen Site

2.6 Air Quality

Allegheny County is in a seven-county area in southwestern Pennsylvania that is classified as a moderate non-attainment area for the U.S. Environmental Protection Agency's 1-hour ozone standard. This area does meet the EPA's ambient air quality standards for all other parameters.

2.7 Hazardous and Toxic and Radiological Waste

In November 2002, the District completed a Phase 1 Environmental Site Assessment (ESA) for lands in North Park that could be used during construction of the North Park Lake project. In February 2004, a Phase 1 ESA was also completed for the Wildwood site, a reclaimed gob pile adjacent to the Park's southern boundary. (The Wildwood site was acquired by the County and formally made part of the park in 2007). Corps policy requires environmental site clearance concerning hazardous, toxic, and radiological waste to prevent future environmental liability through real estate chain of title and worker safety. ESAs identify any environmental contamination that may have occurred or that currently exists in a given project area. To complete an ESA, on-site investigations are conducted and numerous databases and records are consulted to determine the potential for toxic materials to be present on project lands. The Phase 1 ESA for the North Park project concluded that no sources of contamination are present in the project area and that additional HTRW investigations are not warranted. For more detail, consult APPENDIX 5 that contains the text of the final ESA completed for the North Park Lake project.

2.8 Cultural Resources

The District completed preliminary research to determine the presence of previously recorded archaeological sites within the project area including the sediment placement areas. A review of Carnegie Museum archeological site records by District archaeologists revealed that in 1979 Museum staff conducted a survey of North Park. This survey revealed the presence of archeological sites within the Park boundary but not within any of the staging, access or disposal area evaluated in this DPR. Discussions with the Pennsylvania Bureau for Historic Preservation BHP concluded the entire park was most likely surveyed in 1979 and that no further work would be required within the project area. See APPENDIX 8 for more detail.

2.9 Socio-Economic Conditions

2.9.1 Population

According to year 2000 data from the U.S. Census Bureau, Allegheny County had a household population of 1,241,049: 652,911 (53%) females and 588,138 (47%) males. The median age was 39.8 years. Twenty three percent of the population were 65 years and older. For people reporting one race, 86% were White; 12% were Black or African American; less than 0.5 % were American Indian or Alaska Native; 2 % were Asian; less than 0.5% were Native Hawaiian or other Pacific Islander; and less than 0.5% were some

other race. One percent of the people in Allegheny County were Latino or Hispanic. People of Hispanic origin may be of any race. In 2000, there were 530,012 households in Allegheny County. The average household size was 2.34 people.

2.9.2 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations* (Executive Order, 1994), directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority population and low-income populations. When conducting NEPA evaluations, the Corps incorporates environmental justice considerations into both the technical analyses and the public involvement in accordance with EPA and Council on Environmental Quality guidance (CEQ, 1997)

The CEQ guidance defines "minority" as individual(s) who are members of the following population groups: American Indian or Alaskan native, Asian or Pacific Islander, Black, not of Hispanic origin, and Hispanic (CEQ, 1997). The Council defines these groups as minority populations when either the minority population of the affected area exceeds 50% or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis.

Low-income populations are identified using statistical poverty thresholds from the Bureau of the Census Current Population Reports, Series P-60 on Income and Poverty (USBC, 2000). In identifying low income populations, a community may be considered either as a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. The threshold for the 2000 census was an income of $17,761 for a family of four (USBC, 2000). This threshold is a weighted average based on family size and ages of the family members.

The two Tables 1a and 1b below show the percentage of population by race and percent of families below the poverty level for the country, state, county and local townships near North Park Lake

TABLE 1a – Percentage of Population by Race

	PERCENTAGE OF POPULATION BY RACE							
Location	**White**	**Black or African American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander**	**Some other race**	**Two or more races**	**Total**
United States	75.14%	12.32%	0.88%	3.64%	0.14%	5.46%	2.43%	100.00%
Pennsylvania	85.37%	9.97%	0.15%	1.79%	0.03%	1.53%	1.16%	100.00%
Allegheny County	84.33%	12.41%	0.12%	1.69%	0.03%	0.34%	1.07%	100.00%
Hampton Township	97.66%	0.67%	0.05%	1.23%	0.01%	0.12%	0.27%	100.00%
McCandless Township	94.58%	1.29%	0.05%	3.19%	0.01%	0.14%	0.74%	100.00%
Pine Township	97.16%	0.79%	0.07%	1.12%	0.03%	0.16%	0.68%	100.00%
Municipality Total	95.94%	1.02%	0.05%	2.26%	0.01%	0.14%	0.58%	100.00%

TABLE 1b - Families Below Poverty Level – 2000 Census

		Number of Families	**% Families**
Location	**Families**	**Below Poverty Level**	**Below Poverty Level**
United States	72,261,780	6,620,945	9.2%
Pennsylvania	3,225,707	250,296	7.8%
Allegheny County	333,898	26,527	7.9%
Hampton Township	4,917	107	2.2%
McCandless Township	8,001	173	2.2%
Pine Township	2,124	76	3.6%
Municipality Total	15,042	356	2.4%

As can be seen in the above spreadsheets, the immediate project area's minority and low income populations are well below the national, state, and county averages. For example the percent minority population of the three townships is about 4%. The percent minority populations for the country, state and county are approximately 25%, 15%, and 16%, respectively. Similar statistics hold for the percentage of families below the poverty level, i.e., 2.4% for the municipalities near North Park, versus 9.2%, 7.8% and 7.9% for the country, state and county, respectively.

2.9.3 Economics and Employment

In Allegheny County, in 2000, for the employed population 16 years and older, the leading industries were Services (47%) and retail trade (13%). Table 1c below shows, in ascending order, the percent of the population employed in various industries.

TABLE 1c – Employment Summary

Industry	Percent of Employed Population 16 years and over *
Agriculture, Forestry, Fishing, Hunting	0%
Mining and Utilities	1%
Wholesale Trade	4%
Public Administration	4%
Construction	5%
Transportation, Warehousing, Information, Communication	8%
Finance, Insurance, Real Estate, Leasing	8%
Manufacturing	10%
Retail Trade	13%
Services	47%
	100.%

*Source: U.S. Census Bureau

2.9.4 Housing

In 2000, Allegheny County had 583,646 housing units, 9.2% of which were vacant. Of the total housing units, 69% were in single-unit structures, 30% were in multi-unit structures, and 1% were mobile homes. Five percent of the housing units were built since 1990. The median monthly housing costs for specified mortgaged owners was $949, non mortgaged owners, $331 and (specified) renters $519. Twenty five percent of homeowners with mortgages, 12 % of owners without mortgages, and 37% of renters in Allegheny County spent 30% or more of household income on housing.

2.9.5 Transportation

Allegheny County has an intricate network of highways that are increasingly utilized as commercial and residential development expands in suburban areas outside the city limits of Pittsburgh. As shown on the general location maps, PLATES 1 and 2, the primary arteries that carry traffic through the county are the Pennsylvania Turnpike (U.S. Route 76 running east-west) and U.S. Route 79 running north/south. The primary multi-lane access highways to the City of Pittsburgh include Interstate Route 279 (Parkway North), Interstate Route 376 (Parkway East) and (Parkway West). In addition to these primary highways, several very heavily used secondary routes also afford access to the City of Pittsburgh and include State Routes 28, 8, and 19 from the north, State Routes 19 and 51 from the south, and State Route 30 from the east.

The most heavily used highways near the North Park project area are State Route 19 (Perry Highway) and McKnight Road that are located west of the park and run north-south. State Route 910 borders North Park on its north, Babcock Boulevard and Route 8

on its east, and Ingomar Road on its south, all of which (except for Route 8) can be reached via Route 19.

Except for a short stretch of Babcock Boulevard located atop the dam and a portion of Ingomar Road that runs along Pine Creek near the dam, the roads within the park are two lanes wide with a 15 or 25 mile per hour speed limit depending on locations. The heaviest-used access routes within the park are Ingomar Road, Pearce Mill Road and Lake Shore Drive. Further out from the lake, a number of other roads are also used to access sections of the park and include Kummer Road, Walter Road, McKinney Road, Brown Road and North Ridge Road. South of Ingomar/Wildwood Road, South Ridge Road serves a separate segment of the Park containing the swimming pool, several ball fields, and many picnic groves. Most of these roads have wide shoulders, which are separated by lane markers for pedestrian and non-motorized vehicle traffic. See PLATES 1, 3, 4b, and 4c.

2.9.6 North Park Demographics

Based upon information obtained from Allegheny County, the following table provides an estimate of the number of people paying to use various facilities within the Park on an annual basis.

TABLE 2 - Shelter, Building and Field Usage 1997-2005
(Data Provided by Allegheny County Department of Parks and Recreation)

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of Fields Rented	2,347	2,133	1,764	1,014	870	942	1,667	1,556	1,778
Number Using Fields	293,375	266,625	216,692	121,680	104,400	113,040	200,040	186,720	213,360
Number of Facilities Rented	4,221	3,831	3,955	3,815	3,100	3,457	2,781	2,814	2,749
Number Using Facilities	505,698	409,624	305,393	301,385	244,900	237,142	219,778	222,385	217,171

As can be seen in Table 2 there was a dramatic decline in the parameters from 1997 through 2001. County personnel could offer no explanations or obvious reasons why there was such a steady decline at North Park. Data obtained from the County for their other parks for this period did not show a similar trend. The renting and usage of facilities at other County parks for the same period was relatively constant as would be expected. After 2001 the sharp declines in the usage rate moderated. The data in the table above only depicts facilities that were rented; it does not represent total usage of the park by visitors during the year. The County does not have any methodology in place that would permit the recording of what this number would be.

2.9.7 Aesthetics

2.9.7.1 North Park Lake

Determining the aesthetic quality and character of a given area is very subjective and dependent upon personal views. That said, the following discussion, describes, in the view of the author of this report, the general aesthetic character of North Park including the proposed sediment placement and staging areas.

North Park, located amidst dense suburban residential and commercial development, is a popular recreation area not only for North Hills residents, but also for residents of Allegheny and southern Butler Counties. The Park provides an ideal place to escape the congestion of the City of Pittsburgh and its crowded suburbs. Aesthetically, the Park offers a scenic landscape in a relatively calm "country" setting. The sense of rustic seclusion is enhanced at some of the quiet picnic groves in the park that are located beneath maturing hardwoods and softwoods.

Because of ongoing sedimentation, the original 75 acre North Park Lake constructed in the 1930's has today been transformed into a 63 acre shallow, turbid (muddy) lake that is filling with vegetated mudflats and wetlands. The turbid conditions have reduced the quality of the lake's aesthetic appeal especially in the upper reaches of the lake where this condition is more apparent simply because these areas are extremely shallow.

The aesthetics typically associated with wetlands are quite different than open water. Shrub/scrub and bottomland hardwood wetlands (which would eventually manifest at North Park Lake if no action is taken to restore the open water) typically give an area a rough, wild appearance. Placid lakes in rural or landscaped park settings inherently promote an impression of tranquility as seen above in an older photo of North Park Lake looking at the boathouse. The open water of North Park Lake, although turbid, still provides a relaxing focal point for park users. However, without intervention to restore the open water, the lake will eventually succumb to the end product of lake sedimentation, conversion of open water to wetland. From an aesthetic perspective, preservation of open water is critical to maintaining the appealing visual qualities that the lake contributes to the park.

2.9.7.2 Placement and Staging Areas

The Bull Pen Site and County sites have been severely degraded by past construction practices. The Bull Pen site has been partially paved with asphalt and is used for the storage of large piles of discarded leaves collected in the fall from surrounding communities. The County site was used to dispose sediment taken from the lake and was

never properly reclaimed. Today the County site looks like a typical, abandoned vacant lot with grass and weeds growing on it with construction equipment (large pipes) strewn on the ground in various places. The aesthetic quality of both of these areas is poor.

The Mars staging area and Point and Rose barn Access areas adjacent to the lake are typical park-like open areas that are regularly mowed. The Pearce Mill Road access area near the dam is on a much steeper gradient than the other access areas and supports primarily brush with a few trees. Because of the steep slope, the area cannot be mowed. Aesthetically this site appears to be disturbed. The slope acts as a natural vegetative barrier separating Pearce Mill Road from the lake.

The Wildwood Road Mine Site was a gob (coal waste) pile that was covered in fly ash overtopped with a very thin layer of soil and planted with grasses to prevent erosion. The site's present aesthetics are poor being typical of reclaimed strip-mined areas that exhibit broad expanses of land with monocultures of grass. If left alone in its present condition, the site's aesthetic character would likely change little over time due principally to poor, infertile soil. APPENDIX 3 provides photos of the staging and sediment placement areas described above.

2.10 History of Sedimentation

The drainage area of the Pine Creek basin upstream of the dam is approximately 25 square miles. North Park Lake, when originally constructed in 1936 had a capacity of 568 acre-feet of water and a surface area of 75 acres. (The volume of an acre-foot of water is one acre one foot deep.) The runoff and soil erosion associated with the expansive development in the Pine Creek basin greatly increased the sediment load of both Pine Creek and the North Fork of Pine Creek. As sediment-laden waters flowed into North Park Lake, flow velocities significantly decreased, which permitted sediment particles to settle on the lake bottom. This sedimentation process over the last seventy years has virtually eliminated over 12 acres of the lake's original 75 acres of valuable open water habitat. Today, due to sedimentation, the volume has been reduced nearly 50 percent to approximately 297 acre-feet, and the available surface acreage has been reduced to about 63 surface acres of open water. The depth of the lake near the dam when originally constructed was approximately 24 feet. It is now roughly 10 feet deep at it deepest location. See APPENDIX 7, Hydraulics and Hydrology for more detail.

2.11 Sediment Characterization

The District utilized the services of an outside firm (ALTECH Environmental Services, Louisville, KY) to sample and test the sediment within North Park Lake to determine if the sediments contain any chemical contaminants at a concentration that could pose a significant risk to human health or the environment if the dredged sediments were placed in an upland area. To make this determination, ALTECH developed a detailed sampling and analysis plan (SAP) to control the variables that effect data precision, accuracy and representativeness to within prescribed levels. The plan was designed to acquire a sufficient quantity and quality of data to properly characterize the chemical content of the

sediments by direct comparison of the results to the Pennsylvania Department of Environmental Protection [Draft] Dredging Guidelines, Clean Fill, Safe Fill and Act 2 Medium Specific Concentration criteria.

In accordance with the sampling plan, North Park Lake was subdivided into eight hypothetical Management Units (MU-1 through MU-8), representing nearly equal volumes of sediment proposed to be dredged. (PLATE 1 in APPENDIX 5 shows the lake divided up into management units). Four borings were scheduled in each MU for the collection of a variety of samples for geotechnical and chemical analyses. Samples for chemical analysis were subdivided into three categories, Primary, Secondary and Tertiary. All Primary Samples were to be composite samples comprised of representative portions of all four borings in the MU and were scheduled for analysis for the presence of Total Petroleum Hydrocarbons (TPH), Total Extractable Organic Halogens (EOX), Polychlorinated Biphenyls (PCBs), chlordane, total chlorides and Target Analyte List (TAL) metals.

The analysis of Secondary and Tertiary Samples was contingent upon the results of analysis of the Primary Samples. There were four Secondary Samples from each MU for potential analysis; each was a composite of the material from the total length of one of the four borings in the MU. The Tertiary Samples were for potential analysis of USEPA Target Compound List Volatile and/or Semi-Volatile Organic Compounds (VOCs and/or SVOCs) if high values of the indicator parameters TPH and/or EOX were detected.

All field sampling of sediment was accomplished from a floating plant between October 1 and October 11, 2002 in close compliance with the approved SAP. A Corps of Engineers certified laboratory in accord with rigorous quality control requirements conducted all chemical laboratory analyses. Remarkably consistent geotechnical and chemical results were obtained.

A total of 36 borings were drilled, four in each of the Management Units. Depths of the borings into ranged from about 4 feet to 18 feet. The borings were drilled from a small floating plant and were advanced using hollows stem augers and split spoon sampling.

2.11.1 Geotechnical Analysis Results

The Altech field geologist systematically examined and documented the characteristics of the soil and sediment from each boring. An estimate of consistency was made, and the sample color and grain size characteristics were denoted in a field logbook, along with blow count records, percentage of recovery in sample intervals, depth of water and other relevant information and observations.

Fairly consistent subsurface conditions were encountered in the borings in Management Units 1 through 5 of North Park Lake (the Pine Creek Arm of the lake). The sediment was generally very soft, greenish gray, silty clay with organics. It was generally designated as CL type soil according to the Unified Soil Classification System (USCS). Near the sediment surface, soil particles were nearly in suspension. There was apparent

increase in density with depth and measurable decrease in moisture content with depth. Percent recovery in split-spoon samples from each boring also increased with depth of sample interval.

The thickness of these very soft silty clays in Management Units 1 through 5 extended to greater than 11 feet. Very loose silty sand, generally designated as SM according to the USCS, was encountered beneath the very soft silty clay in most of the borings where geotechnical samples were procured. All moisture content values for the underlying sand at these locations were significantly lower than the overlying clays. The consistent greenish gray sediment color indicated the presence of algae and a pervasive reducing environment where anaerobic decomposition of organic matter is occurring.

In Management Units 6 through 8 (North Fork arm of North Park Lake), subsurface conditions were noticeably different from those encountered in Management Units 1 through 5. The thickness of very soft sediment encountered was generally less than two feet before denser, apparently non-lacustrine sediments and soils were encountered. The soils encountered in Management Units 6 through 8 in North Park Lake varied from high plasticity clays with virtually no coarse fraction to silty sands to clayey gravels. USCS designations included; CH, CL, SM, SC and GC type soils. The soils encountered in Management Units 6 through 8 in North Park Lake were generally denser, exhibited more variable grain size distribution characteristics and lower natural moisture content values than the values found for samples from the Management Units up the Pine Creek Arm and in the area adjacent to the dam (Management Units 1-5).

The consistent greenish gray coloring found in all but one surficial sample in Management Units 1 through 8 borings indicated that presence of algae is ubiquitous throughout North Park Lake and that the lake is eutrophic. The yellow-orange clayey sand and gravelly clay encountered in borings AD-7a and AD-7c appear anomalous, but these conditions likely reflect native soil environments near the shore rather than the reducing environment that pervades the lake bottom.

2.11.2 Chemical Analysis Results

Ten Primary Samples were analyzed, one from each of the nine MUs (PS-1 through PS-9), plus one field duplicate from MU-5, labeled PS-10. (Note, Management Unit 9 was in Marshall Lake which will not be dredged) There were no PCBs, chlordane or EOX detected in any of the ten samples, and none of the detected values of TPH, TAL Metals or Chloride indicated the presence of any chemical contaminants at a toxic concentration. However, TPH concentrations detected in samples PS-1, PS-3, MU-5, PS-5 and PS-10 exceeded the “Unrestricted Use” criteria (120mg/kg) specified in the [Draft] Dredging Guideline. Total lead concentrations detected in samples PS-3, PS-5 and PS-10 also exceeded the [Draft] Dredging Guideline of 45 mg/Kg.

The four Secondary Samples from MU-3 and eight from MU-5 were subsequently analyzed for both TPH and total lead, and the four Secondary Samples from MU-1 were analyzed for TPH. Following the [Draft] Dredging Guideline procedure, the mean

concentration for the Primary and four Secondary Sample results from each MU was then calculated and substituted into the original data set for the initial primary Sample value to establish a mean and upper confidence level for the mean concentration of TPH and lead found in the subject sediment. For instance, the mean concentration value of the PS-1, SS-1a, SS-1b, SS-1c and SS-1d results for TPH was substituted into the original set of Primary Sample results for the PS-1 value.

Following this procedure, the mean value of TPH in the combined North Park Lake and Marshall Lake samples was calculated to be 59 mg/Kg, and the 95% upper confidence level for the mean concentration was 95 mg/Kg, well below the "Unrestricted Use" criteria. For North Park Lake alone, the mean TPH value was 63.5 mg/Kg and the 95% upper confidence level value was 104 mg/Kg, still well below the applicable "Unrestricted Use" criteria of 120 mg/Kg.

The mean value of lead in the combined North Park Lake and Marshall Lake samples was calculated to be 36.6 mg/Kg, and the 95% upper confidence level for the mean concentration was 49.3 mg/Kg, which is above the "Unrestricted Use" criteria of 45 mg/Kg. For North Park Lake alone, the mean lead value was 38.2 mg/Kg and the 95% upper confidence level value was 52.7 mg/Kg, again above the applicable criteria. While the lead data reflects levels that may be above naturally occurring lead levels, the results do not indicate significant contamination. The table of, "Trace Chemical Element Content of Natural Soils," published by the USEPA OSWER in 1983 indicates the common range of lead concentrations in soil is 2 mg/Kg to 200 mg/Kg, with an average value of 10 mg/Kg. The numerical standard proposed in the Safe Fill policy is 450 mg/Kg, 8-10 times higher than 95% upper confidence level values calculated for the mean concentration of lead in the subject sediments.

The chemical analyses results corresponded to the boring observations and geotechnical laboratory results, indicating that albeit low, nearly each measured level of each target chemical was consistently higher in MU-1 through MU-5 samples, than in MU-6 through MU-8 or MU-9 samples. The results of the sediment characterization provide defensible quantitative data to indicate that if dredged sediments from North Park Lake or Marshall Lake are placed in upland areas of the park for landscaping or recreational purposes, the in-place sediments will pose no significant risk to human health or the environment.

For More detailed information regarding the characterization of sediment within North Park Lake, see the geotechnical appendix, APPENDIX 5.

2.12 Sedimentation and Aquatic Ecosystem Habitat Degradation

Sediment accumulation in most lakes, ponds, and impoundments is an unavoidable geologic condition. Dams create effective sediment traps where suspended sediment is afforded the opportunity to slowly settle to the bottom. The rate of accumulation is governed by complicated interacting factors, such as, but not limited to: soil conditions around the impoundment, along tributary banks and within a watershed; watershed development; stream flow and weather regimes in a given region; and water retention

time in an impoundment. At North Park Lake, sedimentation has been significant due primarily to continuous urbanization within the watershed. Since the creation of the lake in 1936, over 12 acres of open water have been totally lost in the upper reaches of the Pine Creek arm of North Park Lake due to sediment accumulation. The remaining open water has been adversely affected by the estimated loss of more than half of the lake's original depth due to sedimentation. Major flood events can transport large amounts of sediment and can occur at anytime which may cause an increase in sediment deposition. There are no U.S. Geological Survey sediment gages located in the basin or past sediment studies that provide historical records of sedimentation rates.

Sedimentation negatively affects fish species by smothering the eggs of breeding fish and amphibians, and reducing the ability of sight oriented predator fish, such as largemouth bass, smallmouth bass, channel catfish, and walleye from successfully capturing food. In 1997 and again in 2004, the Pennsylvania Fish and Boat Commission observed through sampling that the bass fishery in the lake was slow growing for all age classes, even though gizzard shad and sunfish were available in abundance for forage. They surmised that the lake's high turbidity levels negatively affected the foraging ability of top predators, such as largemouth and smallmouth bass since they are sight feeders.

As sedimentation progresses there will be a continual loss of open water, a commensurate loss of lake depth and general degradation of the habitat that remains. The loss of habitat negatively affects fish by reducing habitat quality and availability. Habitat variability and complexity within a lake directly influences species diversity. Thus, a range of habitat depths and cover types in a given lake is necessary to support a healthy ecosystem containing a diverse assemblage of aquatic organisms. Conversely when habitat complexity is reduced, such as by sedimentation and high nutrient loading, a lake's ecosystem becomes shallower, vegetation becomes over abundant, temperatures rise and dissolved oxygen is reduced. Such lake's tends to support lower populations of desirable native species and higher populations of more pollution tolerant, undesirable exotic species, such as the ubiquitous common carp.

3.0 PLAN FORMULATION

3.1 Study Goals and Objectives

The primary objective of this study is to prescribe a treatment methodology that will restore aquatic habitat within North Park Lake that has been degraded by silt and sediment deposition. Other objectives include increasing the amount of wetland habitat in various locations around the perimeter of the lake by using COIR logs and to introduce fish structure to further improve the aquatic habitat once the lake is dredged. The ultimate goal of the project is to meet the stated objectives in a manner that will be the most cost effective and least disruptive to the users of North Park during construction. In short, the treatment option ultimately recommended must be effective, economically feasible, environmentally sound, socially acceptable, and fully supported by the local sponsor who is responsible for the costs of continued operation and maintenance.

3.2 Planning Constraints

The primary goals of the local sponsor, Allegheny County, is to restore the aquatic ecosystem of North Park Lake, increase the diversity and productivity of aquatic habitat, and maintain the lake's value as an aesthetic and recreation resource. Considering that the affected lake is within the largest and most heavily used park in Allegheny County, the impetus propelling the sponsor to cost share this effort is clearly recreational. Recreation benefits derived from a given Section 206 ecosystem restoration project can and often do indirectly occur; however, the Section 206 program philosophy and focus is geared not toward recreation, but rather, to ecosystem restoration. The two goals (recreation and ecosystem restoration) may or may not be compatible in every circumstance.

In this case, the local sponsor's recreational management concerns at North Park Lake and the philosophy and purposes of the Section 206 program dovetail. North Park Lake provides lake habitat that is uncommon in Allegheny County. Without some action, this habitat and the aquatic biological community that it supports will be permanently lost. Restoring the lake is, therefore, a worthwhile ecosystem objective that is both environmentally sound and justifiable as a Federally cost shared project under the Corps' Section 206 program. Through the restoration of the lake's aquatic ecosystem, the County will realize its objective of saving an irreplaceable recreational resource.

The planning constraints of ecosystem restoration at North Park Lake require the Corps to formulate a plan that optimizes habitat creation and restoration and minimizes impacts to recreation and, most importantly, maintains public safety during construction. The plan must be acceptable to the local sponsor; must be engineering and economically feasible; must effectively restore the aquatic ecosystem notwithstanding the constraints imposed by continuing human disturbance on and around the lake; and must generate sufficient benefits to justify its costs. The following sections evaluate various measures that the District has considered to meet the planning challenges of this project.

Another planning constraint is the Section 206 program and its restricted cost limitations. The Federal cost share of any 206 project is, by regulation, limited to a maximum of 5 million dollars. When including the 35% local share, this limits any 206 project to a maximum cost of approximately 7.69 million dollars.

3.3 Future Without Project Conditions

Without intervention to alleviate the accumulation of silt and sediment within North Park Lake, the amount of available open water aquatic habitat will continue to decline and the health of the lake's aquatic ecosystem will progressively deteriorate. Silt and sediment deposition will cause the lake to become increasingly shallow resulting in increased water temperatures, decreased dissolved oxygen levels, increased nutrient enrichment and its attendant consequences of unwanted algae blooms and excessive growths of other forms of aquatic vegetation that will clog the lake. As the lake's ecosystem degrades, its ability to support a sustainable, diverse warm-water fishery will commensurately degenerate.

Under the "without project" condition, wetlands will continue to expand in a downstream direction as sediment accumulates on the lake bottom and submerged and emergent vegetation decreases available aquatic habitat. As deposition continues, areas of open water will become braided with the gradual appearance of more sediment "islands" and emergent vegetation. The entire lake area will continue to revert to wetland except in the immediate areas where Pine Creek and the North Fork of Pine Creek wend their way downstream through thickening vegetation.

As soils accumulate and build within the lake, obligate wetland vegetation, such as marsh purslane, swamp rose, bedstraw, and water plantain will gradually be replaced with facultative species tolerant to moist soil conditions, such as various sedges, grasses and mints, jewelweed, boneset, arrow wood, red osier dogwood, and Joe Pye weed. This process of natural vegetative succession will continue until a bottomland hardwood forest complex composed of such species as swamp white oak, sycamore, box elder, silver maple and various willows is established where open water is located today. The loss of open water lake habitat as described above will take many years to occur; however, if no action is taken to restore the present aquatic ecosystem, the end result of the future "without project condition" will be North Park essentially without North Park Lake.

3.4 Alternative Formulation

Since the development of the initial Section 206 preliminary restoration plan, the District has considered alternative methods to preserve and restore the open water aquatic habitat at North Park Lake. The plan formulation process was approached from two varying points of view. To keep project costs down, the District first evaluated methods to reduce ongoing sedimentation and simply preserve what open water remained within the lake. The second, more costly, approach considered alternatives to restore as much open water as practicable to re-establish the lake's aquatic productivity, habitat complexity and long term viability. As required in all Corps studies, the alternative of "No Action" was also evaluated. All of the alternatives considered during the plan formulation process are described below:

3.4.1 Alternative 1 - No Action

The No Action alternative is the least expensive option. In the short term, it will cost the local sponsor nothing. If pursued, this option will permit the open water habitat within North Park Lake to continue to degrade and shrink in size as sediment slowly builds. In place of open water, emergent wetlands that are currently expanding within the lake will continue to mature and extend downstream towards the dam and spillway as the lake grows shallower. As natural plant

succession and soil accumulation continue unabated, vegetation in the lake area will eventually change from emergent wetland species to scrub shrub species then to bottomland hardwoods. (See also Section 3.3) Under these conditions, the flows from Pine Creek and North Fork Pine Creek will form narrow, braided channels in the area that is now open lake. This progression of vegetal growth and loss of open water habitat will admittedly take years to occur, but the process is sure. A perfect picture of what the lake will eventually look like can be seen in the picture above of the upper Pine Creek arm of North Park Lake that has reverted to wetlands.

3.4.2 Alternative 2 – Upstream Sedimentation Basins

Early in the study, the District first considered constructing sedimentation basins in various places to help remove the sediment from feeder streams before they entered the lake. To accomplish this, the areas upstream of the lake on County-owned property were evaluated. A sedimentation basin was planned in a narrow, shallow sloped valley between Ingomar Road and Lake Shore drive within the park. This area along Pine Creek is located just upstream of the original open water area of the lake as it existed when first constructed. The sedimentation basin would have controlled the sediment entering the lake from Pine Creek, which enters the southern portion of the park. Another sedimentation basin was proposed for an area upstream of Marshall Lake along the North Fork of Pine Creek between Pearce Mill Road and Kummer Road. Engineering evaluations of these basins however indicated that they were not sufficiently large enough to trap an appreciable amount of sediment, and that most of the sediment entering the basins would have remained suspended until it entered North Park Lake. Due to this deficiency, this alternative was dropped from further study.

3.4.3 Alternative 3 – In Lake Sedimentation Basins

This second construction alternative considered sacrificing a large portion of the Pine Creek arm of the lake to act as a sedimentation basin. A rock dike constructed across the lake would have permitted about half of the existing arm of the open water area to act as a large sedimentation basin. Wetlands would have been allowed to develop upstream of the dike as sediment settled out within the basin. This alternative would have required regular removal of the accumulated sediment from the basin. Unfortunately, like Alternative 1 above, studies indicated that the basin would not have been large enough to permit the efficient capture of suspended sediment. Like Alternative 1, this plan was also abandoned due to its lack of effectiveness.

3.4.4 Alternative 4 – Total Sediment Removal

After concluding that the first three alternatives were either not feasible or acceptable to the local sponsor, the District and local sponsor pursued a different approach to solving the aquatic habitat loss at North Park Lake. Instead of trying to minimize sedimentation, the District and local sponsor determined that the next most logical approach to aquatic habitat restoration would be to restore the lake to its original contours. This will require

removing approximately 317,000 cubic yards total of accumulated sediment from both arms of the lake.

Since it took 70 years for the lake to reach its current state of open water habitat loss, it can be reasoned that removing the sediment to the original lake bottom contours (minus the wetland areas already developed within the lake) would provide the lake a minimum of 70 years of useful lake life. This assumption is based upon a deposition rate of about 5200 tons per year which is an arithmetic average over the life of the project and is not based upon historical records. (See Appendix 7, Section 5.2). The sediment removal options evaluated to achieve the goal of Alternative 4 are listed in the table below:

TABLE 3 - Sediment Removal Options

Option	Option Description
A	Drain the lake to let the sediment dry sufficiently to allow land based equipment to excavate and remove sediment by truck.
B	Use land-based equipment mounted on floating platforms to mechanically excavate sediment.
C	Hydraulically dredge the sediment using floating equipment and pumping the sediment to an off-lake location.
D	A combination of A and C above: Partially drain the lake to allow land based equipment to access and remove sediment from the shallower sections of the lake, and then hydraulically dredge the deeper portions of the lake near the dam face using floating equipment.

Each sediment removal option has its attendant merits and problems. The section below will first briefly describe each option and then compare and contrast each of them with regard to specific benefits, impacts and costs.

3.4.5 Option A – Lake Draining

Under this sediment removal option, the District would completely drain the lake, allow the sediment to dry sufficiently to permit land-based equipment to enter the lakebed, and excavate the accumulated sediment. The Local Sponsor has determined that the outlet gate located at the dam is operable. Due to age, the Local Sponsor will rehabilitate this gate as well as appurtenant facilities associated with the outlet works and dam prior to the initiation of any Federal project. This gate rehabilitation project will be a 100% locally funded activity and is not a feature of the proposed Section 206 ecosystem restoration project.

It is estimated that the lake would be drained at a rate of approximately one half to one foot per day; however it could be drained faster as shown in APPENDIX 7, TABLE 12 to reduce fishery impacts. The slower a lake is drained the more fish are subject to crowded conditions for longer periods of time, which could cause dissolved oxygen problems. If the lake is drained faster, the fish will move more quickly through the gate downstream

with less impact. This issue will be studied in greater detail in the next phase, Plans and Specifications.

Drying times to allow low-pressure vehicles to enter the lake will vary depending upon the time of year and weather conditions. Drying could take a number of weeks to several months. The sediment would be removed by a front-end loader or hydraulic excavator and placed directly into dump trucks and hauled to selected and approved sediment placement sites. The sediment placement areas would be graded in a manner to allow the moist sediment to further drain and dry. Any runoff water from the drying sediment would be collected into a sediment trap, and then after clarification will be either returned to the lake or released downstream depending upon the location of the sediment placement area. (For more detail on sediment dewatering options, see Section 3.7) After the sediment dries sufficiently, the placement site would be graded and seeded with an approved seed mix. The sponsor, at his discretion, could reuse the dried material as fill for projects within the park. The Commonwealth of Pennsylvania may require that each truck move through an automatic undercarriage wash as it leaves the site to minimize the tracking of mud on local roads. Prior to the initiation of any construction, the District will complete an erosion and sediment control plan and coordinate with the appropriate officials within the Commonwealth to obtain all necessary permits. The development of such a plan and the obtaining of permits are common to all construction alternatives.

3.4.6 Option B - Mechanical Removal of Sediments – No Lake Draining

Option B would utilize land-based equipment to remove accumulated sediments but from floating platforms or shallow draft barges and would eliminate the need to drain the lake. Excavators with long articulated arms would be employed with wide buckets to scrape the sediment from the lake bottom. The wet sediment removed from the bottom would then be loaded into shallow draft barges. After filling, the barges would be towed to shore and the sediment unloaded into trucks by a small front-end loader for upland sediment placement. Under this option, trucks would have to be outfitted with special tailgate seals to keep the extremely wet sediment from draining onto local roadways during transport. After placement, the material and placement site would be treated as in Option A.

3.4.7 Option C - Hydraulic Dredging

This dredging option would employ floating hydraulic dredging equipment to remove the accumulated sediment within the lake. The equipment would most likely consist of a floating hydraulic dredge that utilizes a soil cutter placed at the head of a long boom that can be maneuvered to cut through sediment to a desired depth. One type of cutter head loosely resembles a horizontal drum with teeth mounted on its surface. As the revolving cutter head loosens and removes bottom sediment it is vacuumed away as a water/sediment slurry mixture and pumped through a pipeline to a dewatering area. The efficiency of the hydraulic dredge depends upon a number of factors, which include the type and power of the equipment and the physical properties of material being removed.

Normally hydraulic cutter head dredges remove a water/sediment slurry mixture containing approximately 80 to 90 percent water and 10 to 20 percent solids.

Because of the high volume of water utilized in this method, the sediment placement area would require special treatment. This is described in Section 3.7

3.4.8 Option D – Partial Lake Draining and Hydraulic Dredging

Option D is a combination of Alternatives A and C, noted above. Under this option the lake would be partially drained allowing land based equipment to access and remove sediment from the more shallow portions of the lake. Near the dam, where the lake is deeper, a floating dredge will be employed to hydraulically remove the sediment as in option C.

During the formulation process, it was determined that the lowest elevation of the lake bottom near the dam is 950 feet NGVD. For a dredge to operate optimally, a depth of about 4 to 5 feet would be needed. At a pool elevation of 955 feet NGVD at the dam, shallow water would remain over most of the current lake area designated for dredging. The amount of exposed lake bottom accessible for mechanical removal of sediment by land based equipment with a pool at elevation 955 feet NGVD would be so small as to make this alternative impracticable.

Another partial lake draining option would be to hydraulically dredge near the dam first to remove the deepest sediments. Afterwards, the lake would be partially drained and then the upper portion lake would be mechanically dredged after sufficient drying time. However, the concern in adopting this option is that the sediment at the upper end would likely move or slide back into the previously hydraulically dredged area by the dam. Another problem with this alternative is that costs would increase due to hydraulic dredging (which is more expensive than mechanical dredging) and increased time needed to allow for sediments to dry after the initial hydraulic dredging. As a result, this alternative was eliminated and received no further consideration.

3.5 Sediment Placement, Staging and Access Sites

Studies were conducted during the feasibility study to find and examine potential sediment placement areas that would minimize adverse effects to the park and its environment. To keep sediment transport and real estate costs down, County officials initially felt that dredged material placement sites should be identified solely within the park. Consequently, a number of sites in the park were examined, and three were selected by the Corps and Local Sponsor that were acceptable, namely the County, Bull Pen, and Wildwood Site. (These were previously described briefly in Section 2.2.4.)

In addition to the sediment placement sites, the County and Corps identified staging and access areas that could be used to access the lake and to lay down equipment and supplies during construction. These sites are the Mars site, Gold Star site, Point access, Pearce Mill Road access, Rose Barn access. Photographs of all the sediment placement, access

and staging areas are contained in APPENDIX 3. These sites are also described in Sections 2.2.4.

The brief site descriptions provided below supplement the habitat descriptions contained in Section 2.2.4.

3.5.1 County Site

This 13.1acre site located directly across Babcock Boulevard, is a former sediment placement site that can accommodate approximately 38,000 cubic yards of fill. Only about 3.6 acres of the site can be used for permanent fill. Sediment removed from the lake would be placed within the parcel up to the level of an existing manhole above a municipal sewer line that runs within a swale.

3.5.2 Bull Pen Site

The 8.13 acre Bull Pen site located on a knoll between the two arms of the lake can hold approximately 115,000 yards of material. As previously mentioned, part of the site has been paved with asphalt and is currently used to store leaves collected from surrounding communities.

3.5.3 Wildwood Site

This site is located about 1.5 miles downstream of Pine Creek Dam just off of Wildwood Road. Part of the site abuts North Park at the Round Top picnic grove at the parks southern boundary across (south of) Wildwood Road. The Wildwood site is an approximate 65-acre reclaimed coal waste (gob) pile that could hold all of the sediment to be removed from the lake.

3.5.4 Sediment Placement Area Access

To reach any of the of the sediment placement sites, local park roads will have to be traversed by truck or at least crossed by a pipeline, depending upon the type of sediment removal equipment that will be used.

Access to the Bull Pen site will be along Lakeshore Drive to Walter Drive up to St Paul's Church. The access road to the site is opposite the church. The Bull Pen could also be accessed from a logging road that leads from the "Point" access area. The County site is easily accessed from Babcock Boulevard.

To access the Wildwood site trucks would cross over Ingomar Road and travel south on Babcock Boulevard for a short distance and make a left onto Hemlock Drive that leads into the southern portion of North Park near the swimming pool. Trucks would then turn onto South Ridge Road to the Round Top picnic grove, which is situated directly adjacent

to the northernmost section of the Wildwood Road sediment placement site. See PLATE 4b.

3.5.5 Staging and Access Areas

The 2-acre Mars staging and access site, is located on the right descending bank of the North Fork of Pine Creek immediately adjacent to the uppermost reach of the Lake. See PLATE 4a. To maintain traffic flow and safety, flagmen will be needed to direct traffic as trucks move into and out of the site during construction.

The Gold Star site is located along the left descending bank of Pine Creek near its upstream end. An existing spur from Lakeshore Drive provides access to an asphalt paved parking area that could be used for equipment storage and laydown. Access to and from this site onto Lakeshore Drive would require flagmen or automated traffic control to ensure public safety.

The Pearce Mill Road site , a 0.16-acre area, is located just upstream of the Dam on the left descending bank that will permit trucks to enter the lake area from near the intersection of Babcock Boulevard with Pearce Mill Road. (See PLATE 4a for site location.) Traveling north, trucks will turn left onto Pearce Mill Road, cross the bridge over Irwin Run and then turn left onto the new access leading to the lake. This access road will be temporary and will be removed after the project is completed.

The Rose Barn access is located near the handicapped-fishing pier just downstream from the boathouse. It will also be reached from Pearce Mill Road. This 0.2-acres site would be used by trucks for access to the upper reaches of the North Fork arm of the lake.

The Point access site is located adjacent to Lakeshore Drive on the right descending bank of the North Fork of Pine Creek just upstream from where Pine Creek and the North Fork of Pine Creek merge within the lake. See PLATE 4a and APPENDIX 3. The primary use of this 0.2-acre site will be to access the Bull Pen sediment placement area, which is located on top of the hill above it. Access to the Bull Pen would be from a logging road that leads from the Point access site up the hill. This logging road would have to be improved to permit heavy trucks to travel on it.

PLATES 4a and 4b show the general location of all of the access sites, staging areas and dredged material placement sites.

3.5.6 Alternative Sites Dropped From Consideration

During the formulation process, other alternative access and disposal sites were identified. These were determined to be either unnecessary for the project, or unacceptable due to cultural resource concerns, safety concerns or strong public opposition. The sites included the Deer Pen disposal site near the intersection of Walter Road and Lake Shore Drive, the Babble Brook access area near the intersection of Babcock and Ingomar Roads, and the Latodami disposal site located in the northern-most section of the park above the Latodami Nature Center. Each of the above sites was

examined during earlier phases of this study and information on them is contained in several of the appendices. However, because they would not be used in any Federal project, the sites were given no further consideration in this DPR.

3.6 Real Estate Requirements for Alternatives

Prior to any construction activity proceeding, the District will have to obtain easements to work within the lake itself and to access and use the various staging and sediment placement areas. To complete the project, both temporary road easements and temporary work easements will be obtained from the Local Sponsor who already owns the land needed for the project, which will make obtaining any necessary easements relatively simple. A total of 61.29 acres of temporary work area is located in the lakebed and will be used for dredging of the lake. A total of 26.15 acres of temporary work area easements will be required for a disposal site, staging, and support areas. See APPENDIX 6, Real Estate Plan, for more detail.

3.7 Dewatering Mechanically Removed Sediments

The material removed from the lake by land based equipment will be wet and will, therefore, require time to drain and dry sufficiently to permit it to be properly graded and seeded. The sediment placement areas in the park will be constructed to allow water from the wet sediment to drain through some type of filter material, such as fabric silt barrier fencing. This clarified water will then be allowed to passively drain into either Pine Creek, the North Fork of Pine Creek or into their small-unnamed tributaries so that the drain water eventually returns to the lake. Water from sediment disposed at the County site will be allowed to filter into Pine Creek downstream of the Lake through existing under-drains. These under-drains were constructed when the site was formerly used to dewater sediment removed from the lake.

At the Wildwood, similar State-approved erosion and sediment controls will be constructed to filter runoff before it flows into Pine Creek below North Park Lake.

3.7.1 Dewatering Hydraulically Dredged Sediments - Method 1 Sedimentation Basins

To dewater dredged sediments that are hydraulically removed from the lake will require more extensive sediment placement site preparation than for sediments that are mechanically removed. Hydraulically dredged sediment will be removed from the lake as thin, water/sediment slurry that will consist of approximately 80%/90% water and 10%/20% solids. The high percentage of water is necessary to effectively pump the sediment to a sediment placement area. The water acts as a transport agent that moves the sediment held in suspension through a ten or twelve inch diameter pipeline.

To dewater sediment pumped from a hydraulic dredge would require the construction of large settling basins surrounded by dikes to confine the slurry as shown on FIGURES 1

and 2 below. As material is pumped into the containment areas, coarser materials fall out of suspension quickly. The fine-grained materials (silt and clay) continue to flow through the containment area where they would settle out of suspension at a slower rate.

As water clarifies it would be discharged from the containment area over an adjustable weir. The weir would function to regulate the release of clarified ponded water from the containment areas. The weirs would be designed to provide selective withdrawal of the clarified upper water layers containing low levels of suspended solids. This discharge would then be returned to North Park Lake by either gravity or by pump. Because of the huge volume of water that will require removal during dredging operations, return waters from the sediment placement areas would be necessary to replenish the lake to prevent it from becoming too shallow to support the floating dredging equipment.

When dredged material slurry is disposed in a well-designed, well managed containment area, the vast majority of the solids will settle out of suspension and be retained within the settling basin. However, gravity alone will not remove 100 percent of the suspended solids. Some very fine-grained material suspended in the ponded water above the settled solids will be discharged in the effluent water. Different methods can be employed to enhance the retention of suspended solids within a basin. These include intermittent pumping, temporarily discontinuing operations or coagulation and flocculation.

Coagulation/flocculation is a process where chemicals are added to the water, first to neutralize the charge on the particles and then to aid in making the fine-grained suspended solids collide and adsorb by attractive electrostatic charge so they coalesce, form large particles called flocs and settle to the lake bottom. The charge neutralization is termed coagulation and the building of large flocs from the small particles is called flocculation.

The removal of excess water in a sediment placement area through active management is an important consideration during the life of the dredging project. Although a significant amount of water will run off through the overflow weir of the containment area, the confined fine-grained sediments may (depending upon their physical properties) only consolidate to a semifluid consistency within the containment areas that would still contain large amounts of water. This excess water would prohibit this material from being used as fill. To eliminate this excess water, and make any remaining material more stable, several actions can be employed that are listed below:

a. Allowing the fine material to dry to a crust while gradually lowering the internal water table within the confinement area.
b. Promoting good surface drainage to rapidly remove precipitation and prevent ponding of surface waters.
c. Trenching the fine material within the containment area to promote good drainage.

FIGURE 1- Plan View of Typical Diked Dredged Material Sediment Placement Area

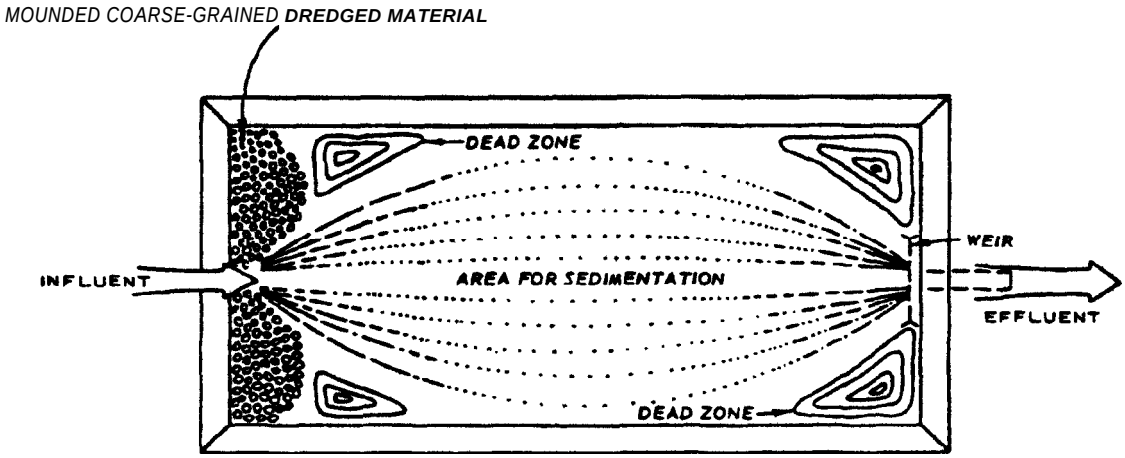
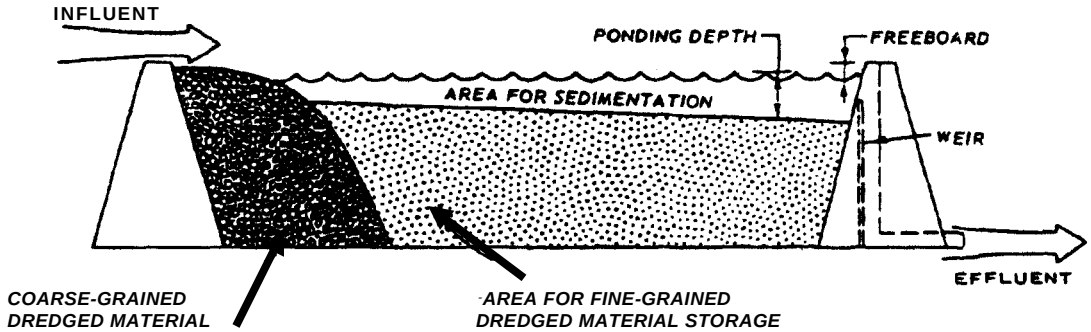


FIGURE 2
Typical Cross Section of Diked Dredged Material Sediment Placement Area



To convey the slurry to the sediment placement areas will require that continuous piping be laid from the operating dredge to each site. The piping would be placed in a manner to cause as little disruption to traffic and pedestrians as possible. Booster pumps will be required to pump the slurry to the Wildwood site. These pumps would operate in conjunction with the pumps located on board the dredging equipment.

3.7.2 Dewatering Method 2 – Geotubes

Using geotubes is another dewatering method that could be used at North Park Lake. Geotubes are large bags constructed of geotextile fabric and are filled with the water/sediment mixture pumped from a hydraulic dredge. Geotubes can be over two hundred feet long and over 12 feet wide by 6 feet high. A picture of a geotube being filled with dredged sediment is shown in APPENDIX 3. Geotubes can easily be custom manufactured to meet site requirements. Geotube fabrics are selected based upon the

type and particle size of material needing to be dewatered. The proper selection of fabric allows the geotubes to act as effective filters to contain the solid dredged materials and permit excess water to drain away.

Because of their effectiveness, geotubes minimize the amount of land needed for dewatering, and could, therefore, be located near the lake to take advantage of the sloping topography at the shoreline that would allow clarified effluent to effectively drain back into North Park Lake. Sedimentation basins require large areas and time to dewater. Complete dewatering within sedimentation basins could take over a year or more before the material is sufficiently dried to support land-based equipment for regrading and seeding. Conversely, geotubes provide a timely method to dewater sediment that does not require the construction of sedimentation basins as described in the above section. Geotubes dewater in several days or weeks depending upon the sediment characteristics. Gravels and sands will dewater within hours; silts, clays and organic materials will take longer due to the much smaller particle sizes. After dewatering, the tubes would be cut open and the sediment would then be removed by front-end loader, placed into trucks and hauled to a sediment placement area where it would be graded and seeded. The sediment may require some working and spreading to encourage additional drying depending upon its moisture content after geotube-dewatering.

3.7.2.1 Hanging Bag Test

To determine if geotubes could be used at North Park Lake, a hanging bag test was conducted in the spring of 2003. This test was designed to simulate filtering and drying of the slurry concentration within a geotube that would be filled from a hydraulic dredge operating in North Park Lake. To conduct the test, water and sediment samples were removed from the lake and taken to a laboratory. Under controlled conditions, the water and sediment samples taken from the lake were mixed together to the concentration of soil solids that would result from hydraulic dredging. The water and sediment were mixed with an industrial mixer in a 55 gallon drum into which a non-toxic polymer was added to help suspended material settle out and allow water to flow through the geotube bag with minimal solids. The same polymer would be added to the geotubes at North Park Lake should this alternative be selected as the recommended plan.

After repeatedly analyzing samples of the slurry contained in the 55-gallon drum to ensure that the solids concentrations were correct, a miniature geotube, hung in a supporting frame beneath the 55-gallon drum, was filled with the slurry by gravity flow. The geotube was constructed of the similar fabric that would be used for the full-scale project. The water seeping from the pores of the geotube was collected in a plastic basin placed beneath it. Samples of the drain water were analyzed for total solids content at predetermined time intervals. The bag was allowed to drain into the container for 35 days.

After 35 days the bag was cut open and the moisture content of the solid material was measured. The test revealed that the material on the outside of the bag was considerably drier than the material in the center. When mixed together, the moisture content was

approximately 12.6 percent, which is about 6 percent drier than optimal. The test concluded that the use of geotubes was feasible. See APPENDIX 5 for more detail.

3.7.3 Beneficial Re-use of Sediments

Late in the feasibility study, discussions with the local sponsors and interested citizens revealed two additional sediment placement options: 1) providing all of the sediment or a portion of it to the Horticultural Society of Western Pennsylvania for their use at a proposed comprehensive botanical garden, and 2) the direct injection of the sediment into inactive/abandoned deep mines.

3.7.3.1 Botanical Garden Placement Site

The botanical garden, now in the planning stages, will be located on a 452-acre tract of land in western Allegheny County near Oakdale at Settlers Cabin Park. The proposed garden will be the region's first comprehensive botanic garden that will display trees, shrubs and flowers in a landscaped setting. Representatives from the Horticultural Society indicated to the Corps that the sediment, after amendment could be used to help fill portions of their site. Since the sediment is primarily inorganic silt, it would have to be amended by the addition of organic material and other soil enhancing elements, such as lime to increase its suitability for landscaping. The costs to amend the soil would be borne by the Society. The shortest haul distance from the lake to the botanical garden is approximately 30 miles. The cost to haul this material over and above what it would cost to haul it to one of the Corps selected sites would be $16 per cubic yard for a total cost of about $1,600,000. Due to the haul distance and limited number of trucks that could be diverted to their site, approximately 360 to 400 cubic yards could be delivered per day. At this pace, it would take approximately one year to deliver the 100,000 cubic yards requested.

The society would incur the total 1.6 million dollar cost over and above that, which will be incurred to take the material to the preferred placement site. Prior to any fill placement, the Society would have to conduct the investigations necessary to meet the requirements of NEPA, Section 106 of the NHPA, Section 7 of the Endangered Species Act and HTRW requirements.

3.7.3.2 Mine Injection

The District coordinated with personnel in the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation to discuss the feasibility of injecting the sediment from the lake directly into an existing abandoned coal mine located in the immediate vicinity of North Park Lake. On the surface this alternative appeared to be a simple and logical solution to the problem of disposing a large volume of sediment. However, after a number of discussions with personnel from the Commonwealth's Bureau of Abandoned Mine Reclamation, serious and insurmountable problems were identified which made this alternative both environmentally and economically infeasible.

The mine that would receive the sediment is the abandoned Wildwood Mine located in the vicinity of North Park. Mine maps obtained indicated that the most of the mine lies east of the park and varies from 225 to 445 feet beneath the surface (The mine bottom elevation varies from elevation 750 to 780 NGVD).

Injection of backfill into underground mines may be accomplished using hand, gravity, mechanical, pneumatic, and hydraulic placement methods. The most popular methods are pneumatic and hydraulic. Hand, gravity and mechanical methods, such as belt or sling packing machines, are restricted to construction of selected supports from within a mine. In pneumatic backfilling operations, backfill material is transported into a mine through a well or pipeline in a stream of continually flowing air, either in a vacuum or under pressure. Hydraulic backfilling is the practice of filling mine voids with backfill material by washing or pumping the backfill material as a slurry through a well or pipeline into the mine.

These various placement methods for depositing the dredged sediments into the abandoned mine have their unique problems. The most logical method, hydraulic backfilling would be conducted in conjunction with hydraulic dredging of the lake. This method would also appear to be the most economical because the sediment slurry would be handled only once. The material would be pumped from the dredger directly to the injection site and into the mine. However this would require extremely large volumes of water, which, as for hydraulic dredging, would eventually make the lake too shallow for floating equipment unless the water removed during dredging is replaced to replenish the lake.

The fact that highly alkaline and metal laden effluent from the Wildwood mine is currently being treated by an active facility located on Pine Creek just downstream of the Wildwood Road sediment placement site shows that at least part of the mine is already flooded. More importantly, hydraulic backfilling the sediment slurry into the mine would increase the flow into the existing treatment facility and overwhelm its capacity. More importantly the increased head created by the placement of additional water in the mine could very well cause mine drainage to blowout in unexpected places. Because of the potential impacts to the existing treatment facility and the high risks and liability associated with of causing mine blowouts elsewhere, hydraulic backfilling was abandoned.

Other methods of mine injection considered included gravity, mechanical and pneumatic filling techniques. To utilize any of these methods would require extensive exploratory drilling to determine and verify where the mine voids exist and to what extent the mine is flooded. The cost for one exploratory borehole is estimated to be approximately $20,000. A complete subsurface geotechnical investigation may require a hundred or more borings, escalating this cost to well over $2,000,000. If after conducting these exploratory borings it was determined that there were areas within the mine large enough to contain the sediment, other problems would have to be overcome. One borehole location cannot be used to inject 317,000 cubic yards of sediment into the mine using the

above systems. Due to the height of the coal seams in this area, (average height is about 6 feet) the sediment, injected by these methods will form cones as it fills the voids and will not spread out evenly. Literally hundreds of injection points would be required to complete the job. Costs to acquire additional real estate to gain access to the injection sites would be required. Other factors, such as compliance with NEPA and Section 106 of the National Historic Preservation Act and additional HTRW investigations would have to be conducted at each exploratory and injection-drilling site driving up the cost even further.

The economic and environmental liabilities described above make injecting the lake sediment into the abandoned Wildwood Mine completely infeasible.

3.7.4 Wetland Habitat Creation and Protection

3.7.4.1 North Fork of Pine Creek

As mentioned in Section 2.2 there are disturbed wetlands located immediately adjacent to the left descending bank of the North Fork of Pine Creek in the northwestern portion of the park adjacent to Pearce Mill Road. Much of this wet area is mown. Because this low-lying area remains wet for a good portion of the year and retains water after storms, its usefulness for picnicking and other recreation is limited. To enhance the diversity and productivity of these areas, the District has recommended that the County stop all mowing along the North Fork of Pine Creek and let wetland vegetation re-establish. This action will have several benefits.

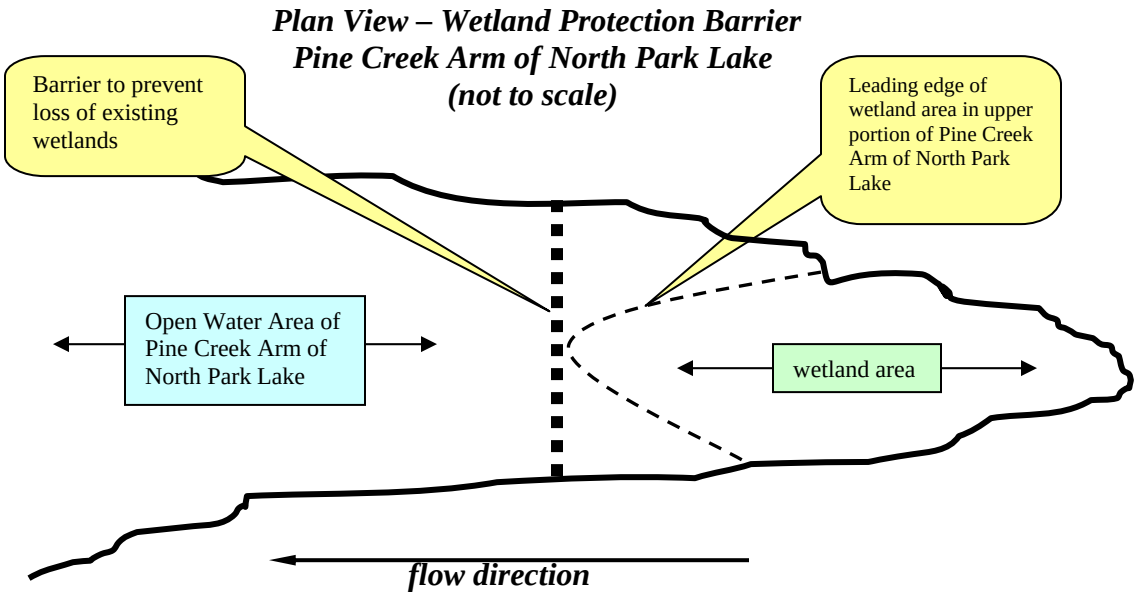
As wetland vegetation begins to reestablish it will provide excellent habitat for native songbirds and wildlife tolerant to nearby human activity. The wetland vegetation will help attenuate storm water runoff and reduce the sediment load entering the North Fork of Pine Creek. It will also help alleviate and arrest the ongoing stream bank erosion that is occurring in several places due principally to mowing to the top of bank.

North Park is a haven for Canada geese, which seek out mown lawn habitat near water for grazing. The reestablishment of wetland vegetation, which is not favored by the geese, will effectively reduce their numbers on the land bordering the stream. This will help reduce the nutrient load entering the North Fork from geese droppings, which is currently at extreme nuisance levels. Along this reach of the North Fork, it is virtually impossible to avoid stepping on goose droppings while walking the mown lawn area adjacent to the stream.

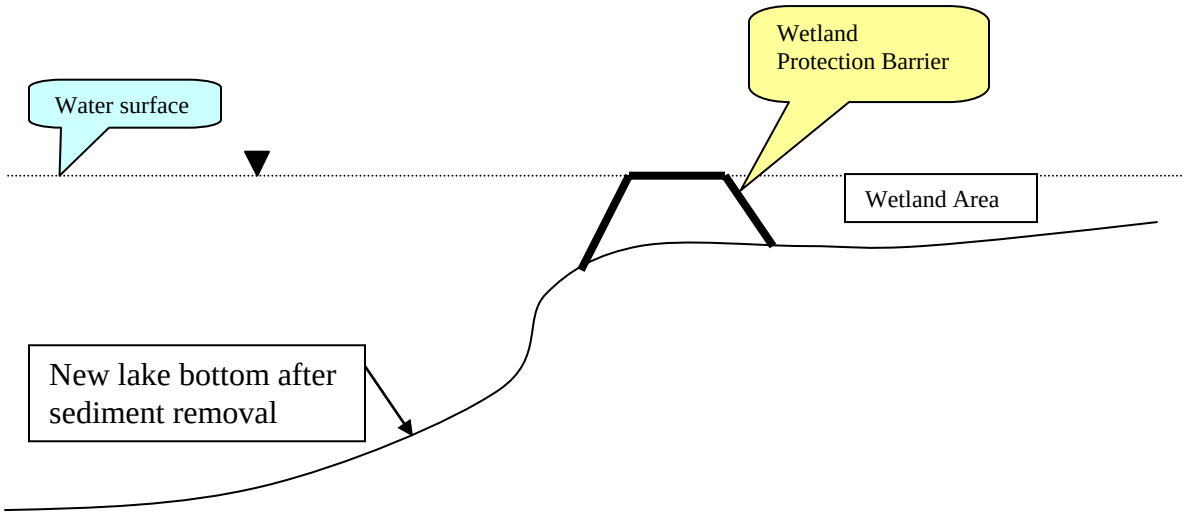
The January 2002, Allegheny County Parks Comprehensive Master Plan also recommends a change to the mowing patterns in this general area to control Canada Geese and limit sheet flow across the slope to minimize erosion.

3.7.4.2 North Park Lake

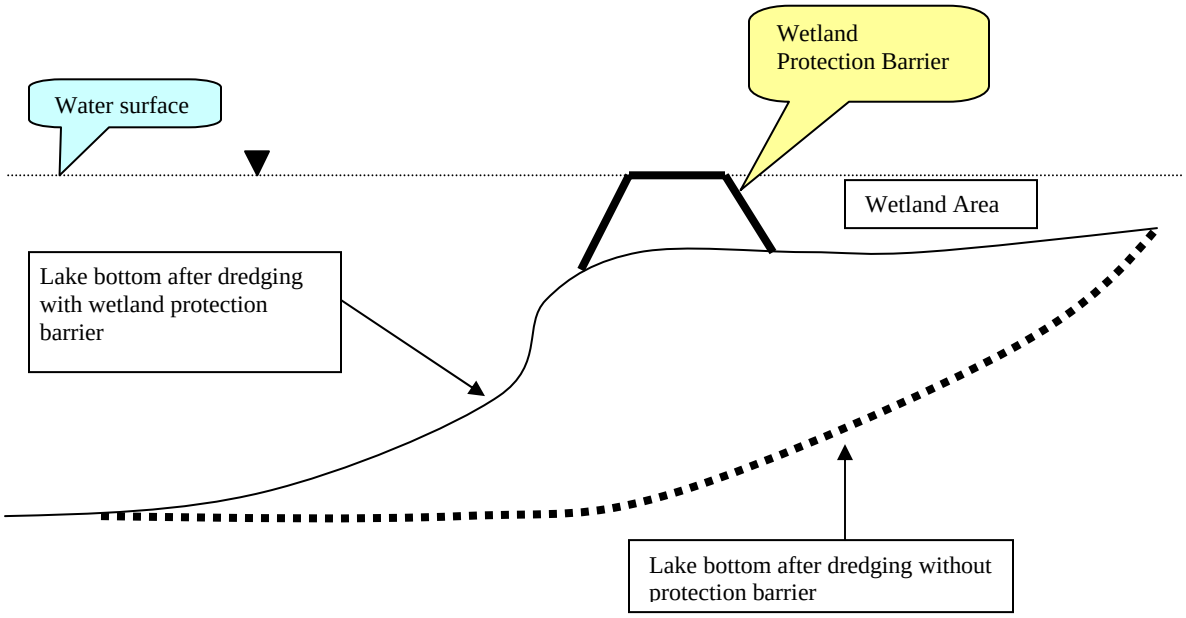
As described earlier in Section 2.2, high quality wetlands have developed in the upper portion of the Pine Creek arm of North Park Lake. Regardless of the sediment removal alternative selected, these wetlands would have to be protected during dredging operations. To maintain the integrity of these wetlands during and after sediment removal, a barrier constructed of rock will be placed across the width of the lake at the downstream leading edge of these wetlands to prevent head cutting. If this were not accomplished, the wetland soils would naturally move downstream into the deepened dredged areas of the lake until the soil slope interface between the dredged area and the higher elevation of the wetland soils becomes stable. The simple line sketches shown below illustrate why this is necessary.



Cross Section - *Wetland Protection Barrier*
Pine Creek Arm of North Park Lake
(Exaggerated for clarification - not to scale)



Cross Section Wetland Protection Barrier
Lake Bottom With and Without Wetland Protection Barrier
Pine Creek Arm of North Park Lake
(Exaggerated for clarification - not to scale)



The wetland barrier would consist of a 10-foot high rock dike 12 feet wide at the top with 1 on 3 side slopes. The top of the rock material will be at elevation 960 NGVD. Approximately 3,450 cubic yards of rock will be needed to construct the barrier. .

3.7.4.3 Coir Logs Placement

To increase wetland habitat and stabilize eroding shoreline from excess foot traffic and mowing, the District is proposing to install coir logs. Coir logs, constructed up to 12 inches in diameter, are manufactured out of specially treated coconut fibers that make them resistant to ultraviolet radiation. They are used as a bioengineering technique to control stream bank erosion. They can be planted with wetland vegetation, which will root through the rolls and into the shoreline. As coir logs deteriorate over time, the wetland vegetation matures and fills in the space left by the slowly decomposing coir logs and, thus, continues to provide natural bank erosion protection.

The District is proposing to install coir logs along the shoreline at North Park in various places to stabilize the lake banks that have been adversely impacted by years of intensive foot traffic. (SEE PLATE 5-20 of APPENDIX 5) The coir logs will allow selected, low growing wetland vegetation to establish. This action will help generate an aesthetically pleasing shoreline with a thin, linear “belt” of attractive wetland vegetation that will help stabilize the lake banks and create habitat beneficial for amphibians, insects, small fish, and wading birds. The coir logs will also help reduce the sediment load of the lake by trapping sediment that enters the lake through overland sheet flow.

3.7.5 Fish Habitat

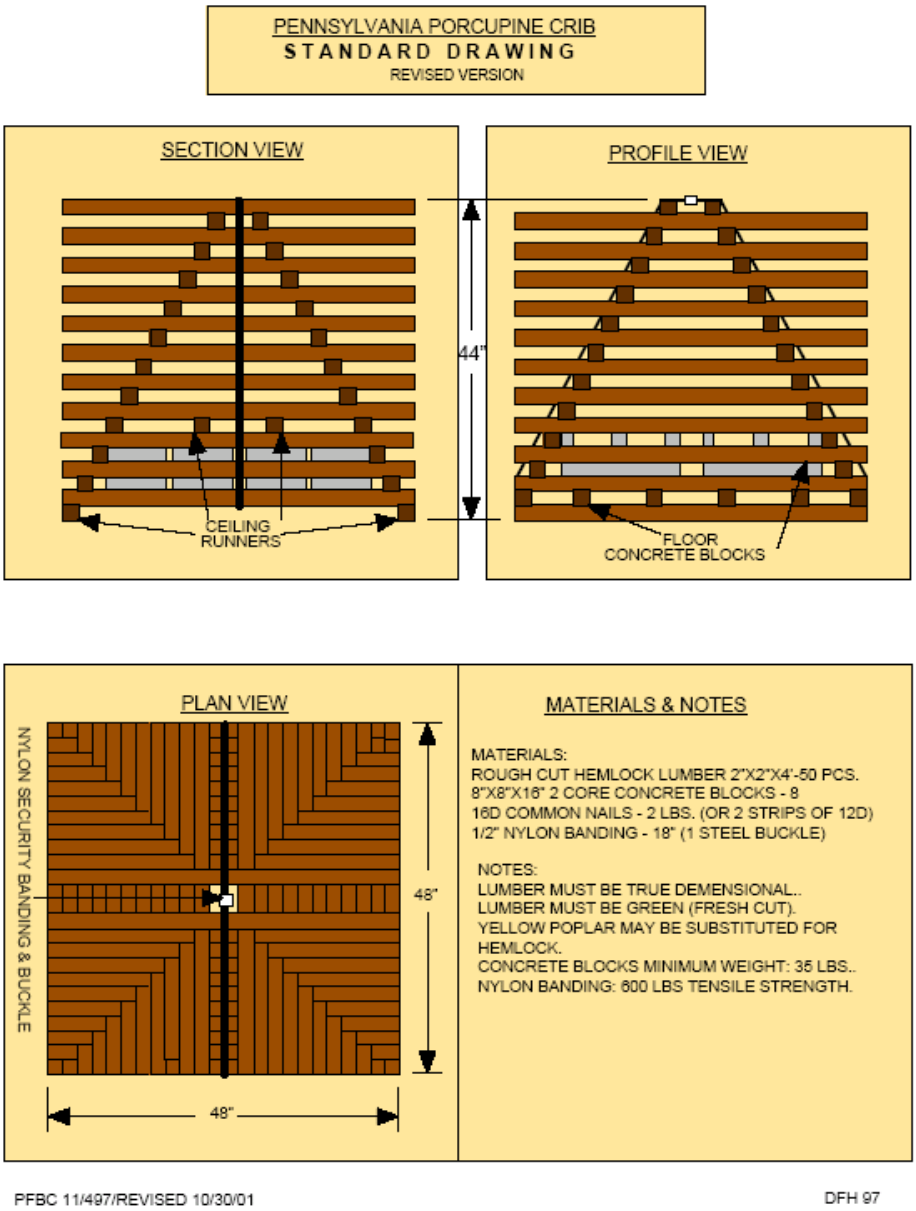
After the dredging project is completed there will be greater depth created within the lake that increases open water habitat but will be devoid of vegetation or bottom structure needed to provide cover. Aquatic plants and weeds will have been removed along with the excess bottom sediment. To provide structure for fish, the District proposes to install wooden "porcupine" cribs in the lake that will create “instant” cover.

Porcupine cribs are types of artificial fish habitat designed by Pennsylvania Fish & Boat Commission (PFBC) for use in lakes and reservoirs. The openings on a crib are only two inches high and provide baitfish and young gamefish protection from predators. These structures described below also make ideal spawning habitat for many species of fish.

3.7.5.1 Full Size Porcupine Cribs

Each full size crib is constructed of fifty 2"x2"x 4' hemlock sticks, and eight - 8" cement blocks. The cribs are built in two sections. When the lower section is completed, it is placed on special rollers on the deck of a work barge, and the blocks are placed inside. After the top section is nailed on, and a nylon strap fastened around the entire crib it is pushed overboard at the appropriate location. See FIGURE 3 below.

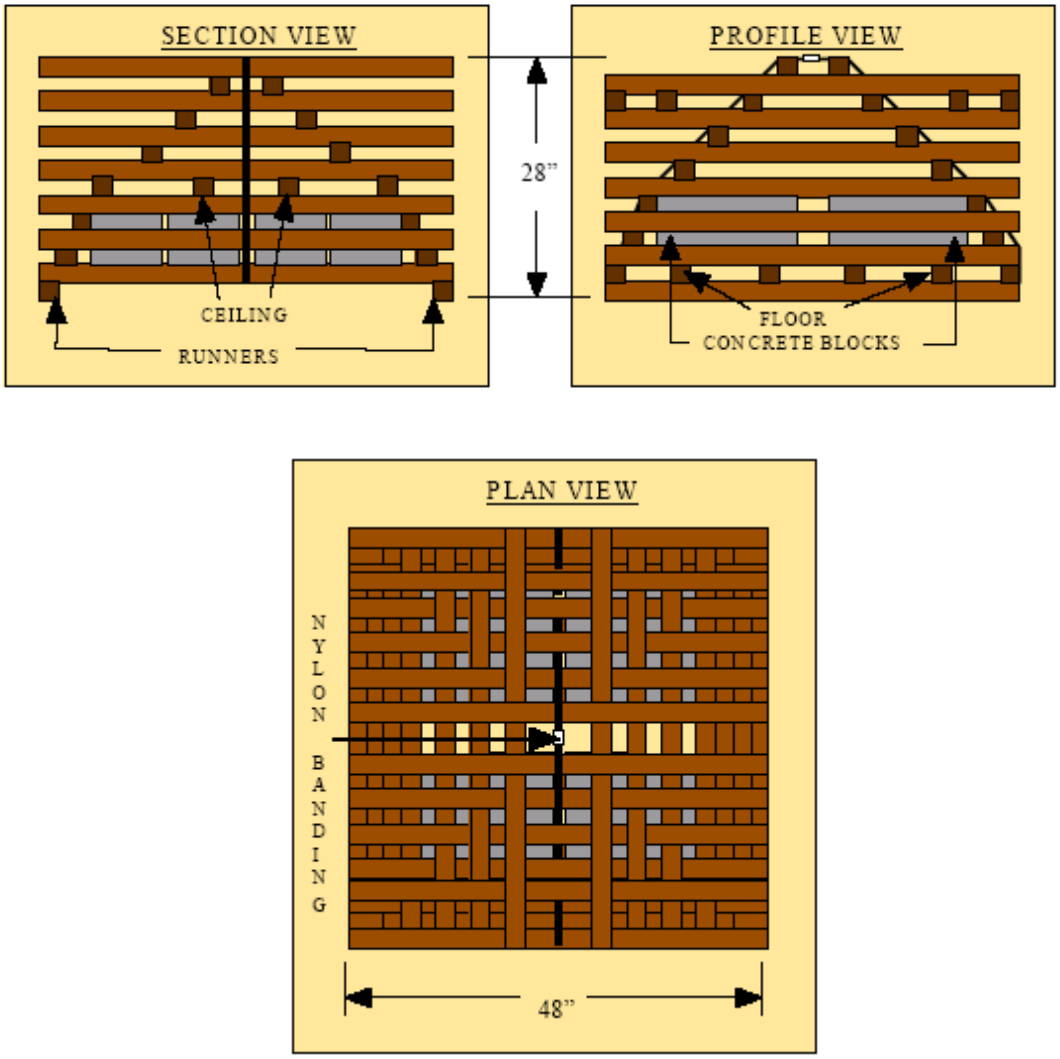
FIGURE 3
FULL SIZE PORCUPINE CRIBS



3.7.5.2 Porcupine Crib Juniors

These structures are very similar to standard "Porcupine" cribs. They are 28" high, compared to 44" for a standard crib, and use about 38 hemlock sticks instead of 52. They were adapted from the standard crib design by PA Fish and Boat Commission PFBC for use in shallow water. See Figure 4 below

FIGURE 4
PORCUPINE CRIB JUNIORS



3.7.5.3 Rock Rubble Piles and Sunken "Christmas" Trees

Two additional, inexpensive but effective methods to increase fish habitat are to place rock rubble humps or piles and weighted "Christmas" trees in the lake. Rock rubble piles will provide good habitat for benthic macroinvertebrates as well as breeding and brooding habitat for forage fish. After the Christmas season, discarded evergreen trees, typically spruce or white pine can be recycled. These make excellent cover for all species of fish. The trees are simply weighted with cement blocks and strategically sunk in the lake. Experience has shown that the trees typically last about 10 years submerged.

To enhance the habitat value of the lake's aquatic ecosystem, the District proposes to place these structures in strategic locations within the deeper areas of the lake and near the lakeshore. At these locations, the habitat structures will consist of a combination of rock rubble humps, porcupine cribs, or the recycling of used "Christmas trees". The rock rubble humps would consist of 1 to 2 tons of rock rubble placed in a pile in various locations at the 4 to 7-foot deep contours around the lake. In addition, rock used for construction activities, such as ramps and roads will be left in place below elevation 960 NGVD to further increase the amount of useful aquatic structure within the lake.

3.7.6 Treatment of Sediment Placement Areas

Regardless of the dredging method selected to remove sediment from the lake, after it is placed, it will need to be planted with vegetation to keep it from eroding and to provide native cover and food sources for wildlife. Final selection of specific species of vegetation to be planted and the patterns of placement will be developed in concert with the local sponsor during the next phase of study, Plans and Specifications. The District's planting plan will maximize benefits for local wildlife and will only employ native vegetation.

3.7.7 Additional Wildlife Habitat Features

Allegheny County Park personnel requested that two osprey nesting platforms be constructed at North Park - one in each arm of the Lake. The Pittsburgh District has previously constructed osprey nesting platforms at its reservoir projects, and Ospreys have successfully used them to fledge their young. A physical description of these platforms is described below:

Each nesting platform would be constructed of steel, circular in shape with a diameter of approximately 40 inches. It would be mounted atop a wooden telephone pole with four braces lag bolted into the top of the poles. The platform would be slightly offset to one side to facilitate climbing access to the side of the structure for checking the nest, banding young, etc. The platforms would be attached to the poles while they were still on the ground in a horizontal position. Each platform, thus attached would be installed as a unit by a utility line vehicle that has an augur. For every 6 feet of pole, one foot will be placed below ground to provide stability. At North Park, two 45-foot poles would be used and sunk 7.5 feet into the lakebed. The platforms should last 15 years or longer without any maintenance. They should, however, be inspected annually to note any deterioration.

To make the nesting platforms more attractive to ospreys, about 12-18 sticks, 4 feet long by 1 inch in diameter will be wired into each platform after they are attached to the top of the utility poles. Due to the constant din of human disturbance at North Park from noise and nearby pedestrian and vehicular traffic, fishermen, dogs, etc, it may take years for ospreys to attempt a nest and successfully raise their young. However, since the cost of these structures is minimal, (about $2,500 each) the potential future use of a nesting platform at North Park by a pair of osprey would be well worth the investment.

3.8 Preliminary Costs of Alternative 4, Options A, B and C.

As described in Section 3.4, Alternatives 1, No Action; 2, Upstream Sedimentation Basins; and 3, In Lake Sedimentation Basins were determined unacceptable. Alternative 4 would meet the ecosystem restoration aspects of the Section 206 program; however, it would also have to fall within the programs cost limitations. The cost any Section 206 project must fall within the established guidelines, i.e. Federal costs cannot exceed $5 million. Therefore for a given cost-shared Section 206 project, its maximum cost must be equal to or less than $7.69 million ($5 million Federal (65%) and $2.69 million local (35%)). To determine if dredging Options A, B or C would meet this constraint, preliminary cost estimates were generated.

TABLE 4 below compares the *construction* costs of each of these plans all of which will restore the lake to original contours. Although the costs shown below in the table are only screening level (preliminary) estimates, they are of sufficient accuracy to compare each option.

TABLE 4 – Preliminary Construction Costs of Alternative 4
(Dredging North Park Lake to Original Contours, Options A, B, and C
October 2004 Cost Level)

Options	**Construction Cost**
A. Mechanical Sediment Removal – Drain the Lake	$8,642,000
B. Mechanical Sediment Removal - No Lake Drainage	$12,792,000
C. Hydraulic Dredging	$10,960,000

The least expensive option is clearly option A. However this represents only the construction cost estimated at October 2004 cost levels. This cost estimate does not include the costs of, Planning Engineering and Design, Construction Management, Real Estate, or the sunk costs of the DPR. All of these costs would add nearly $4,000,000 to the construction cost making each option under Alternative 4 to remove all accumulated sediment economically infeasible.

3.9 Additional Plan Formulation

According to Corps policy, the maximum Federal 65% share of a Section 206 project is $5 million. Adding the local 35% cost share, the maximum total cost of a Section 206 project is approximately $7.69 million. Because the cost of removing the sediment from the entire lake exceeded the limitations of the Section 206 program, the District was tasked with formulating additional alternatives that would fall within cost limits and still provide justifiable ecosystem restoration benefits. With this cost constraint, the reformulated alternatives are described below:

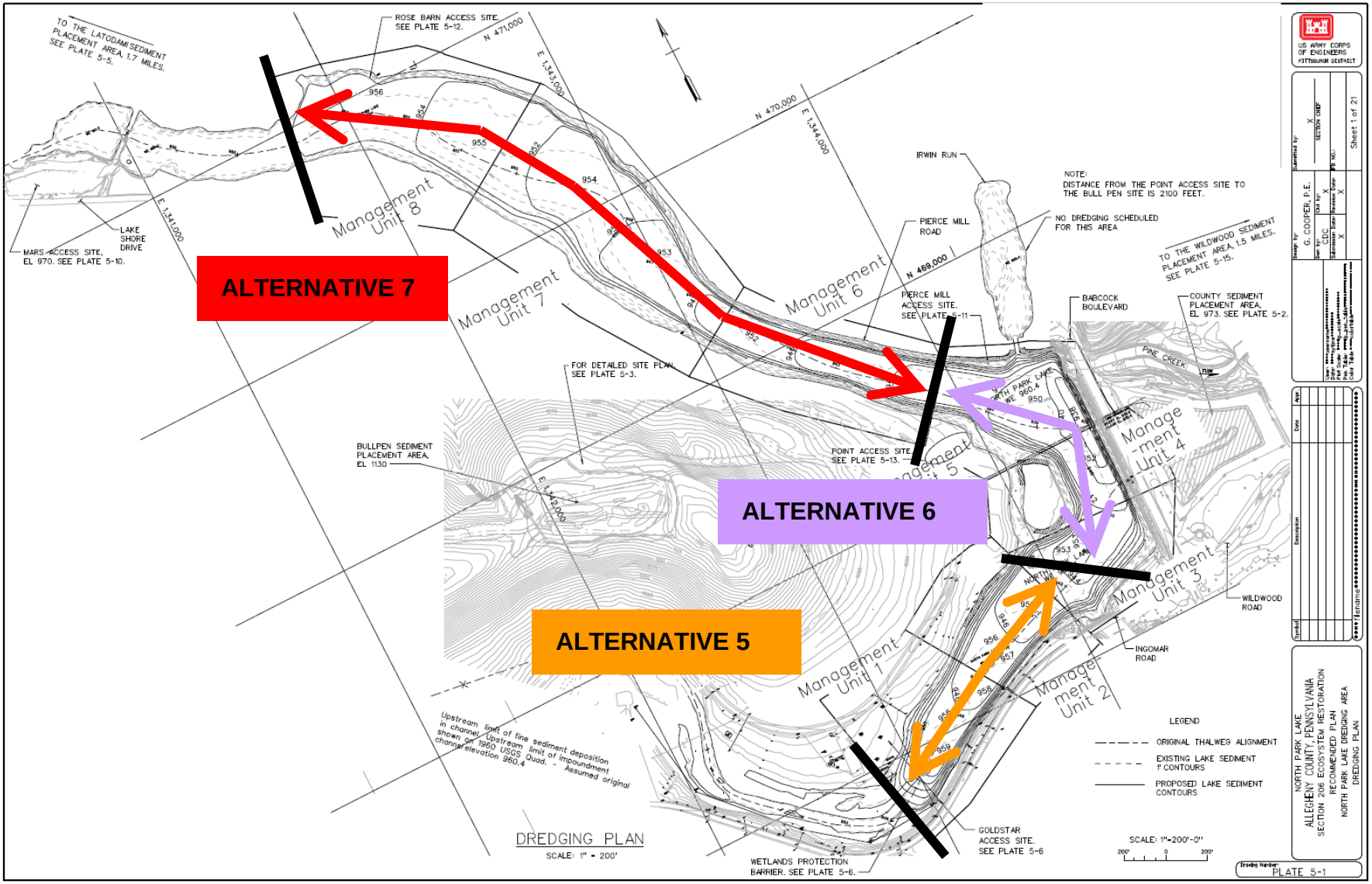
3.9.1 Several additional assumptions and planning constraints were acknowledged during the required formulation of new alternatives. Firstly, it was assumed that any project would involve dredging sediments from the lake simply because no other

restoration options are available. Secondly, any recommended alternative to remove lake sediments would be done mechanically by draining the lake because it was shown to be the least expensive option in Section 3.8. Thirdly, it was assumed that there is no feasible way to remove all of the sediments from the lake and still meet the cost restrictions of the Section 206 program. Fourthly, any acceptable plan must have a high degree of self-sustainability to limit future operation and maintenance costs. Fifthly, due to the high benefits and relatively low cost of the habitat enhancement measures described above in Sections 3.7.4.3 through 3.7.7, they would be included to some degree in the recommended plan.

3.9.2 Considering maximum project costs, the District initially estimated that roughly 140,000 cubic yards of sediment could be removed from the lake with the funds remaining after taking into account the sunk costs of the DPR, and the costs for Real Estate, Plans and Specifications and Construction Management.

At the outset of the re-analysis, the District determined that simply excavating the maximum amount of sediment evenly from the entire lake bottom for the available dollars (140,000 cubic yards) would not be prudent. Removing 140,000 cubic from the entire 63 acres lake bed would deepen the lake less than two feet. This would still leave the lake shallow and more importantly leave nutrient-laden sediment after dredging that would continue to spur excessive aquatic plant growth, degrade water quality and limit habitat diversity.

Given that sufficient funding is not available for a complete lake restoration, the District reasoned that the best approach would be to maximize ecosystem diversity in specific portions of the lake. As shown below on PLATE 5-1, three alternative dredging plans were developed by dividing the lake into separate reaches based upon sediment accumulations.


ALTERNATIVE 7
ALTERNATIVE 6
ALTERNATIVE 5
TO THE LATODAMI SEDIMENT PLACEMENT AREA, 1.7 MILES. SEE PLATE 5-5.
ROSE BARN ACCESS SITE. SEE PLATE 5-12.
N 471,000
E 1,343,000
N 470,000
E 1,344,000
N 469,000
E 1,341,000
MARS ACCESS SITE, EL 970. SEE PLATE 5-10.
LAKE SHORE DRIVE
Management Unit 8
Management Unit 7
Management Unit 6
Management Unit 5
Management Unit 4
Management Unit 3
Management Unit 2
Management Unit 1
IRWIN RUN
NOTE: DISTANCE FROM THE POINT ACCESS SITE TO THE BULL PEN SITE IS 2100 FEET.
PIERCE MILL ROAD
NO DREDGING SCHEDULED FOR THIS AREA
TO THE WILDWOOD SEDIMENT PLACEMENT AREA, 1.5 MILES. SEE PLATE 5-15.
PIERCE MILL ACCESS SITE. SEE PLATE 5-11
BABCOCK BOULEVARD
COUNTY SEDIMENT PLACEMENT AREA, EL 973. SEE PLATE 5-2.
PINE CREEK
FOR DETAILED SITE PLAN SEE PLATE 5-3.
BULLPEN SEDIMENT PLACEMENT AREA, EL 1130
POINT ACCESS SITE. SEE PLATE 5-13.
WILDWOOD ROAD
INGOMAR ROAD
Upstream limit of fine sediment deposition in channel. Upstream limit of impoundment shown on 1960 USGS Quad. - Assumed original channel elevation 960.4
DREDGING PLAN
SCALE: 1" = 200'
WETLANDS PROTECTION BARRIER. SEE PLATE 5-6.
GOLDSTAR ACCESS SITE. SEE PLATE 5-6
LEGEND
ORIGINAL THALWEG ALIGNMENT
EXISTING LAKE SEDIMENT 1' CONTOURS
PROPOSED LAKE SEDIMENT CONTOURS
SCALE: 1"=200'-0"
US ARMY CORPS OF ENGINEERS PITTSBURGH DISTRICT
G. COOPER, P.E.
Sheet 1 of 21
NORTH PARK LAKE
ALLEGHENY COUNTY, PENNSYLVANIA
SECTION 206 ECOSYSTEM RESTORATION
RECOMMENDED PLAN
NORTH PARK LAKE DREDGING AREA
DREDGING PLAN
PLATE 5-1

The reach of Alternative 5 extends from the upper end of the Pine Creek arm of the lake downstream to near the dam (about 14 acres). This reach of the lake suffers the most from sedimentation carried by Pine Creek. The edge of the existing, encroaching wetland is constantly creeping downstream toward the dam. If this area were selected for sediment removal, a wetland protection dike would have to be constructed as noted in section 3.7.4.2.

The reach of Alternative 6 included the immediate area in front of the dam and going up a short distance along each arm (about 16 acres), and the reach of Alternative 7 extended from the upper end of the North Fork of Pine Creek downstream to near the dam (about 33 acres).

The amount of sediment to be removed for each of these re-formulated alternatives and their associated construction costs are noted in TABLE 4a below.

TABLE 4a - Preliminary Construction Costs of Alternatives 5, 6 and 7
October 2007 Cost Level

Alternative	Estimated Surface Acres	Estimated Sediment Volume	Estimated Construction Cost
Alternative 5	14	73,000 Cubic Yards	$2,653,000
Alternative 6	16	140,000 Cubic Yards	$3,400,000
Alternative 7	33	104,000 Cubic Yards	$2,811,000

As noted in the TABLE 4a, the least expensive option is Alternative 5, which as expected removes the least amount of sediment from the lake; it is also the smallest area, 14 acres. The next expensive option is Alternative 7 which removes sediment from the largest portion of the lake, 33 acres and removes an additional 31,000 cubic yards. All dredging will remove sediment down to the original lake bed contour elevations. Because this elevation naturally varies, the different alternatives will have differing depths. The area of the lake after dredging would be shallower for Alternative 7 (5,214 cy/ac for Alternative 5 vs. 3,151 cy/ac for Alternative 7). Alternative 6, which is the most costly, would remove 8,750 cy/ac and is consistent with how sediment accumulated in the lake; the deepest sediment deposit is near the dam. Thus, Alternative 6 would be expected to cost the most because it removes the most sediment.

Empirically, the District felt that Alternative 7 would be the logical choice since it restores the most lake area, 33 acres, and on a cost per acre basis would be less expensive. Using the preliminary cost information above, Alternative 5 cost $189,500/acre; Alternative 6 cost $212,500/acre; and Alternative 7 cost $85,181/acre.

In addition, Alternative 7 had these attributes:

a. This plan would restore the greatest amount of lake area and would, therefore, would likely generate the most ecosystem benefits.

b. Funds needed to construct a wetlands protection dike in the Pine Creek arm of the lake required by Alternative 5 could instead be used for habitat restoration in the

North Fork Pine Creek arm of the lake and strategic placement of aquatic cover on the lake bottom.

c. The North Fork arm of the lake is the largest, most aesthetically pleasing, and most easily accessible portion of the lake.

3.9.3 Further Alternative Analysis

To determine the plan that provides the most benefits for the cost, Alternatives 5, 6 and 7 were further analyzed with respect to cost effectiveness and incremental cost. The cost analysis included using the software "IWR Plan" and is described in Section 5.0.

4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE PLANS

4.1 General Discussion

The environmental effects of Alternatives 5, 6 and 7, are described in this section, which also includes Alternative 1, "No Action." Although the "No Action" alternative does not meet the ecosystem restoration objectives, "No Action" is the least costly alternative and could be implemented. It was therefore included in the environmental effects analysis. Alternative 2, 3 and 4 were not included due to economic infeasibility.

To make comparing the effects of the alternatives easier for the reader, a table at the end of this section has been developed which summarizes each environmental parameter and the impacts (positive and negative) that each alternative is expected to produce.

4.2 Environmental Effects Common to All Alternatives

There are several ecosystem parameters that would not be impacted by any of the above alternatives. These are discussed below:

4.2.1 Threatened and Endangered Species

None of the alternatives considered in this report would cause any impacts to Federally listed, threatened or endangered species or their habitat or state listed species of concern. Letters from the U.S. Fish and Wildlife Service and the Pennsylvania Department of Conservation and Natural Resources, regarding Federally listed and State listed species, respectively, are contained in APPENDIX 1.

4.2.2 Prime Farmland

Although there are prime farmland soils located at the Bull Pen sediment placement site, given that it is County-owned park property and partially paved with asphalt, this site would never be used for future crop production. Its modification by sediment placement would, therefore, not result in any significant adverse prime farmland soil impacts.

4.2.3 Hazardous, Toxic, Radiological Waste

As discussed in Section 2.7 and APPENDIX 5, the sediment to be removed from the lake does not contain any hazardous materials and has been determined to meet state requirements as clean fill. Therefore, its removal and/or placement would not generate hazardous, toxic, or radiological waste within the lake, downstream in Pine Creek, or at any of the proposed sediment placement sites. Moreover, because the material is clean, filtered drain-water runoff from the drying sediment at the disposal sites would not contaminate surface streams or groundwater.

APPENDIX 5 also contains the findings of the environmental site assessment in regards to the sediment placement areas, which states that there are major sources of potential contamination at any of the sites.

4.2.4 Environmental Justice

A proposal must have potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, and Indian tribes in order to have Environmental Justice impacts. The project area is not used by any such groups for subsistence fishing or hunting, and the proposed project would not involve the release of hazardous, toxic, or radioactive materials to which minority or low-income populations could be exposed. In addition the project would not require the construction of any new water treatment facilities or the relocation of roads, utilities, businesses, or residences. Moreover, the minority and low income populations make up a very small percentage of the population that could be affected by the proposed project. Based upon the above, this project will not have any disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes. The project would benefit low-income and minority residents the same as all other segments of the population by increasing the aquatic productivity and lifespan of the lake.

4.2.5 Population and Employment

Because of the nature of the proposed project, it would have no effects on the population of northern Allegheny County in regards to census figures, nor will it significantly impact employment. The project will not require the relocation of any residential, commercial or industrial structures or businesses. Employment opportunities may, in the short term, be provided during construction if the selected construction firm hires personnel to complete the North Park Lake project. The project, once completed, will not increase employment opportunities within the local area.

4.2.6 Cultural Resources

As discussed in this report, none of the laydown, staging or disposal sites selected for use contain any known cultural resources. The selection of any of the alternatives would therefore cause no adverse cultural resource impacts.

4.3 Environmental Effects of the Formulated Alternatives

The primary goal of the project is to restore the aquatic ecosystem of North Park Lake. To accomplish this goal, construction alternatives would be implemented which will unavoidably cause some short-term environmental effects. As previously mentioned, only Alternatives 1, 5, 6, and 7 have been carried forward in the analysis. The environmental consequences of implementing these alternatives are described below.

4.4 Environmental Effects of Alternative 1 - No Action

4.4.1 Aquatic Habitat

4.4.1.1 North Park Lake

No Action, i.e. doing nothing, will result in the eventual loss of most of the open water habitat except possibly for a very small, very shallow pool which may remain near the face of Pine Creek Dam caused by Pine Creek wending its way downstream and being blocked by the dam. If this alternative is pursued, the open lake and the aquatic habitat it provides, even in its degraded state, would eventually be lost and replaced by a combination of emergent, scrub/shrub and forested wetland.

4.4.1.2 Pine Creek Downstream of the Dam

Under the No Action alternative, Pine Creek downstream of North Park Lake will largely remain unaffected until the lake fills with sediment to the level of the spillway. When this occurs the lake's trap efficiency will be significantly reduced and Pine Creek will simply pass sediment downstream of the dam potentially causing the negative effects of sedimentation in the stream, i.e. increased turbidity, smothering of benthic habitat, clogging gills of aquatic organisms, etc.

4.4.2 Wetlands

In the place of open water, wetland vegetation will flourish. Eventually all lentic habitat will grow so shallow that emergent wetlands will develop in the lake area. These wetlands will provide excellent habitat for a large variety of insects, birds, amphibians and other wildlife. Over time the emergent wetlands will be replaced by scrub/shrub and then bottomland hardwood wetlands through the process of uninhibited, natural vegetative succession.

4.4.3 Riparian/Terrestrial Habitat – Lake Area

Under No Action, riparian/terrestrial habitat will expand and improve as emergent wetland in the lake is gradually replaced by scrub/shrub wetland and then by bottomland hardwood forest. This will provide additional habitat for many species of birds, amphibians, reptiles, and small mammals as well as numerous insects.

4.4.4 Terrestrial Habitat – Sediment Placement/Access/Laydown Sites

This alternative will not impact any identified sediment placement or lake access/laydown sites. They will remain essentially unchanged from present conditions except for some possible upland vegetation succession as invasive shrub and tree species slowly move into the areas if they are left un-mowed. If this is permitted by Park management to occur, habitat values for these areas would improve.

4.4.5 Air Quality/Nuisance Odor Problems

Under No Action, these parameters will remain, as they currently exist.

4.4.6 Traffic/Public Safety

Traffic and public safety will be unaffected by No Action.

4.4.7 Noise

Noise levels will be unaffected.

4.4.8 Aesthetics

The aesthetic character of North Park around the lake would be dramatically and permanently altered with the loss of the lake. Open water will largely disappear and be replaced by various forms of wetland vegetation. Under this scenario, the park will lose its focal point for those who appreciate open water. However, for those individuals who are attracted to wetlands for their excellent wildlife habitat value, the loss of the lake would not be considered a degradation of aesthetic value.

4.4.9 Recreation

The park would permanently lose one of its primary recreational assets, which would significantly reduce recreational opportunities for the residents of Allegheny County. All lake-based recreation, such as boating and fishing would be permanently eliminated as the lake disappears. Those who enjoy lakeside picnic groves, as well as walkers/runners and others who value the scenic vista supplied by the lake would permanently lose this recreational resource. For those individuals who are observers of vegetation, birds, insects, amphibians and other wildlife, the wetland habitat created would increase the value of their recreation experience.

4.5 Environmental Effects of Alternatives 5, 6 and 7

Alternative 5, dredging the Pine Creek arm, Alternative 6, dredging near the dam, and Alternative 7, dredging the North Fork Pine Creek arm of the Lake are nearly identical with respect to effects on aquatic and terrestrial habitat and on recreational use of the park. The dredging of the lake would be carried out using the same techniques regardless of the alternative selected and the disposal areas that could be used would be the same. The differences between Alternatives 5, 6, and 7 are few and amount to:

- The locations from within the drained lakebed where dredging would occur,
- Dredging quantities and areal extent of dredging,
- Ecosystem outputs (benefits),
- The use of different staging and access areas, and
- The need for a wetland protection dike on the Pine Creek arm of the lake.

Alternative 5 would primarily utilize the Gold Star site for lake access and staging and would also require the construction of a wetland protection dike. Alternatives 6 and 7 would require neither the wetland protection dike nor the Gold Star site for access and staging. Because of the similarities, the following discussion applies to each of the three construction alternatives. Where there are slight differences these will be noted.

4.5.1 Aquatic Habitat

4.5.1.1 North Park Lake

Draining the lake is required for all three construction alternatives to allow the removal of accumulated bottom sediment. The draining operation would temporarily eliminate all lake aquatic habitat. All fish and any macroinvertebrates present would be lost. Aquatic vegetation would be desiccated. However remnants of aquatic vegetation (seeds, roots, rhizomes), buried in the sediments from the portions of the lake that are not disturbed would survive and re-establish upon lake refilling.

To minimize fish losses, the District in cooperation with the PA Fish and Boat Commission, will take steps as the pool is lowered to net as many fish as possible to transfer them downstream into Pine Creek. As stated previously in this report, the lake contains a stunted panfish population. After the lake refills, the PA Fish and Game Commission will be able to stock the lake with more desirable species to create a more balanced, self sustaining fishery. Macroinvertebrates will naturally repopulate from upstream sources.

After the lake is refilled and after fish attracting structures are placed and vegetation planted, the lake's aquatic habitat will dramatically improve in the dredged areas compared to present conditions. Except for the short-term loss of the lake, no permanent, significant adverse aquatic impacts are expected from implementing this alternative. If the lake is drained long enough, terrestrial vegetation may volunteer and flourish on the

lake bottom, depending upon the time of year. When re-flooded after dredging this vegetation will provide a temporary boom in aquatic cover until it begins to decompose. See also Sections 5.2 and 5.3 for additional detail on North Park Lake.

4.5.1.2 Pine Creek Downstream of the Dam

After the lake is drawn down, Pine Creek and the North Fork of Pine Creek will still wend their way along the lake bottom towards the lake's outlet valve located near the face of the dam. As lake bottom sediments are exposed and disturbed by construction, there is a potential for sediment entering the stream channel within the lakebed and exiting into Pine Creek downstream of the dam via the outlet valve. Excess sediment, if allowed to enter Pine Creek would adversely impact the stream, which, although somewhat degraded by mine drainage and sewage, is still a valuable natural resource because of the fishery it supports. Without proper safeguards to keep re-suspended sediment from moving downstream during construction, the aquatic habitat of Pine Creek could be adversely affected. Such sediment would affect not only sight feeding fish but also benthic organisms. As described previously in this report, sedimentation reduces visibility, smothers eggs and benthic organisms, clogs gills and reduces light penetration that adversely affects vegetation. To minimize the potential for these impacts to occur downstream, a rock filter will be constructed within Pine Creek downstream of the dam to trap sediment. The filter would be cleaned out and removed after excavation is completed.

Normal average flows entering the reservoir will be discharged through the gate. For higher than average flows, discharges will be made through the gate, and pumps will discharge flows over the spillway up to near bank-full capacity downstream. For even higher flows, such as during flood events, water will be stored behind the dam and released through the gate in a controlled manner. During all of these events, the rock filter will help minimize downstream sedimentation. (See APPENDIX 5, (PLATE 5-2). The filter will be cleaned out and removed after construction is complete. During the preparation of Plans and Specifications, the District will conduct additional studies to more accurately define how excess flows will be handled during construction. The District will coordinate this information with the State to help ensure that discharges are controlled to minimize the chances for downstream flooding.

4.5.2 Wetlands

Wetland vegetation will be planted in coir logs in strategic locations around the shoreline in the lake reaches where dredging will occur for Alternatives 5, 6, and 7. In addition, for Alternative 5, the high quality wetland that developed upstream in the Pine Creek arm of the lake will be protected by the construction of a wetland protection dike across the entire width of the lake. Section 3.7.4.2 explains why this dike is necessary for Alternative 5 and how it will benefit the existing wetland. Since no dredging in the upper sections of the Pine Creek arm is associated with Alternatives 6 and 7, the wetland protection dike for these alternatives would not be needed. For these alternatives the

existing wetland in the Pine Creek arm of the lake will continue to expand. See also Section 5.7 for more information on future wetland development.

A small wetland has developed within a swale located at the County sediment placement site. If this site is used for disposal, no sediment will be placed in the swale. Moreover, the wetland area will be clearly marked in the field to preclude any disturbances from construction equipment.

4.5.3 Riparian/Terrestrial Habitat – Lake Area

Draining the lake and removing the sediment by dredging will require the use of the staging areas for access and equipment storage. The habitat at all of the access and staging areas described in Section 2.2.4 have been highly degraded due a combination of lack of vegetation, location near heavily used roadways, constant recreational use, and/or regular mowing and, consequently, provide little useful habitat for wildlife. Any temporary disturbances to these areas caused during the period of construction would be insignificant to local wildlife populations. See also Section 5.7 for more detail.

4.5.4 Terrestrial Habitat – Sediment Placement Areas

The primary sediment placement areas that are being considered include the Bull Pen Site, County Site and Wildwood Site. The Bull Pen Site has been largely paved with asphalt, the County site is an un-reclaimed sediment placement area, and the Wildwood site is a reclaimed gob pile. The habitat value of these areas is poor. The placement of lake bed sediment on these disposal sites would in the long term dramatically improve them by providing more fertile soil better able to support vegetation than the existing soils. The establishment of native vegetation would in turn provide very useful habitat for wildlife.

For Alternative 7, the likely scenario as described in Section 3.9.2, all of the 104,000 cubic yards of sediment to be removed from the lake could be placed on the 8.13 acres of the Bull Pen site. At the Wildwood site the 104,000 cubic yards for this alternative would likely be placed on approximately 5 acres of the site. The use of the County site for disposal of dredged sediment would be limited to 3.6 acres. If the County site were used, some of the material would have to be placed at either the Bull Pen or Wildwood disposal areas. See Sections 5.7 and 6.1.8 for more detail.

There is a 4-acre strip of land on a steep slope that lies between the reclaimed Wildwood gob pile and the Round Top picnic grove. This area contains maturing hardwoods with a low percentage of exotic species. A small portion of this wooded hillside will be disturbed by the construction of a haul road to access the Wildwood site. Because the County recently acquired the Wildwood site and made it a part of the North Park, the haul road would likely be used by the County after construction as a permanent access way. Haul road construction is a minor action that will not cause any significant long term adverse impacts to wildlife. The haul road could be re-graded and planted with native vegetation after the project is completed, should the County not wish to use this

road after construction in favor of another permanent access way. Any species, such as deer, raccoon, opossum, grey squirrel, cotton tail rabbit, and smaller mammals such as voles and shrews, as well as ground nesting birds that may use the mostly grass covered Wildwood site would be temporarily displaced. After construction, with improved soil conditions, the area would be better suited to support a complex mix of vegetation including native trees that would ultimately benefit local wildlife by providing cover and food sources.

4.5.5 Air Quality/Nuisance Odor Problems

Draining the lake will potentially cause some odor problems as enriched lake sediments begin to dry out. The odor problem will be most noticeable to those who are directly adjacent to the lake, i.e. walkers, bikers, and those who may still use picnic groves on the banks of the drained lake. To a lesser extent, odor problems may also occur near the sediment placement areas as sediments initially dry. To help reduce impacts, the initial lake drainage could be done during cooler weather when less recreation occurs.

Fugitive dust could become a problem during construction largely from truck tires picking up sediment from the lakebed and tracking mud onto the roadways used for sediment transport. As the mud dries on the pavement, cars and trucks and wind would tend to pick up the dried sediment and disperse it as dust. To minimize the tracking of mud on local paved roads, all sediment carrying trucks may be required to go through a wheel wash after each loading to remove accumulated mud. On the haul road to be constructed to the Bull Pen site, which is on an old, unimproved logging road, dust could be kept down by periodic sprinkling and the use of mulch.

Some dust may be generated later in the project as lake sediments are excavated at lower levels in the lake. As the excavation gets deeper, the bottom soils layers will tend to dry faster than the upper layers of loose, wet sediment. The amount of dust generated will depend upon climactic conditions, i.e. temperature and rainfall and wind speeds during the periods when this material is exposed. The window for this nuisance impact to occur will be relatively short and would be expected for a few weeks at the end of the project as the last amount of material is excavated from the lakebed prior to refilling.

4.5.6 Traffic/Public Safety

North Park is a very popular, highly used suburban recreational facility, which will unavoidably be affected by the trucking of sediment from the lake to the sediment placement areas. To move approximately 140,000 cubic yards of sediment from the lake will require about 17,500 truck trips (assuming each truck can carry 8 cubic yards of sediment). This translates to approximately 12 trucks per hour for 10 hours per day for 145 days or roughly 5 months. Because of these transport requirements, maintaining traffic/public safety on park and local roads is of supreme and overriding importance and concern both to the Corps of Engineer and the Local Sponsor.

During the construction phase of this project, a steady stream of trucks will be entering and exiting the lake area from the staging and access sites located around the lake's

perimeter. Trucks will have to travel on park roads as well as local roads outside the park to reach the various sediment placement sites. It is estimated that a truck could enter or exit a disposal area as often as every 5 minutes during a 10 to 12-hour workday. Because of the required heavy truck traffic, every practicable traffic control feature will be employed during construction to help ensure the safety of pedestrian and vehicular traffic. Some of the procedures that may be employed include the posting of flagmen with two way radios, putting up temporary traffic signals at key intersections, installing flashing warning lights at access areas, separating trucks from pedestrian and public vehicular traffic by using Jersey barriers, changing traffic patterns to reduce truck travel on park roads and even closing park roads or portions of park roads where necessary during construction. All of the plans for traffic control, to be developed during the next phase of the project (Plans and Specifications), will be closely coordinated with park officials, state, county and local police and Penn Dot to help maintain public safety during project construction. The public will also be notified of proposed traffic pattern changes through preliminary placement of signs and local media including newspapers and radio and television news broadcasts. Every effort will be made to alert park users, local residents and commuters of the traffic pattern changes well in advance of construction.

The following table shows in matrix format all of the truck routes to and from each staging and access area to each sediment placement site. The truck routes were selected to minimize traffic disruptions on Ingomar and Wildwood Roads, which form a heavily used east- west corridor in northern Allegheny County.

The following abbreviations are used in the table to reduce space:
LSD - Lake Shore Drive
PMR - Pearce Mill Road
BAB – Babcock Boulevard
HemDr – Hemlock Drive
SRR – South Ridge Road
WR – Walter Road
UAR – Unnamed Access Road

To locate the routes in relation to the sediment placement areas, access and staging areas please refer to PLATES 4a and 4b and 4c

TABLE 5- Truck Routes from Staging and Access Areas to Sediment Placement Sites

Staging and Access Areas	**County Site**	**Bull Pen Site**	**Wildwood Site**
Mars Staging and Access	1. LSD north to PMR 2. PMR south to BAB Reverse direction to return to lake	1. LSD north to WR 2. WR east to UAR Reverse direction to return to lake	1. LSD north to PMR 2. PMR south to BAB 3. BAB east to HemDr 4. HemDr east to SRR Reverse direction to return to lake
Goldstar Staging and Access	1. LSD north to PMR 2. PMR south to BAB Reverse direction to return to lake	1. LSD north to WR 2. WR east to UAR ***or*** 1. LSD west to WR 2. WR east to UAR Reverse direction to return to lake	1. LSD north to PMR 2. PMR south to BAB 3. BAB east to HemDr 4. HemDr east to SRR Reverse direction to return to lake
Point Access	Not used to travel to the County Site	1. Across LSD up the slope using an improved logging road (one way) Return Trip: 1. UAR west to WR 2. WR north to LSD 3. LSD south to Point access	Not used to travel to the Wildwood Site
Rose Barn Access	1.PMR south to BAB Reverse direction to return to lake	1. PMR north to WR 2. WR east to UAR Reverse direction to return to lake	1. PMR south to BAB 2. BAB south to HemDr 3. HemDr east to SRR Reverse direction to return to lake
Pearce Mill Road Access	1. PMR south to BAB Reverse direction to return to lake	Not used to Access the Bull Pen Site	1. PMR south to BAB 2. BAB east to HemDR 3. Hem east to SRR Reverse direction to return to lake

TABLE 5a - Truck Route Mileage from Staging and Access Areas to Sediment Placement Sites

Staging and Access Areas	**County Site**	**Bull Pen Site**	**Wildwood Site**
Mars Staging and Access	1.9	1.3	4.3
Goldstar Staging and Access	2.0	2.0	3.9
Point Access	Not used to travel to the County Site	0.5 Return Trip: 2.2	Not used to travel to the Wildwood Site
Rose Barn Access	0.7	1.1	3.2
Pearce Mill Road Access	0.1	Not used to Access the Bull Pen Site	2.6

4.5.7 Noise

Trucks traveling on all of the roads identified above and especially along the heavily used Lake Shore Drive, Pearce Mill Road, and Babcock Boulevard around the lake, as well as on South Ridge Road in the southern section of the park, will generate noise during construction. The constant movement of trucks plus the noise generated by the excavators removing sediment from the lake will certainly detract from the recreational experience that the park currently provides. Elevated noise levels will be disturbing, however, they are, unavoidable and must be tolerated by the public during the period of construction. The noise from construction is only a temporary inconvenience and will cease entirely upon completion of the project. As the time for construction nears, the County's use of the media will help prepare the general public to accept the inevitable increase in local noise levels. Except for requiring that all engine exhaust mufflers are in good working order, nothing can practicably be done to reduce noise impacts at the park.

4.5.8 Aesthetics

Draining the lake will degrade the aesthetic character of parkland around the lake's perimeter. Looking at a large, mud-bottomed lakebed with trucks and excavators moving and working in it will be very interesting to watch but will be neither quiet nor aesthetically pleasing. However, once the lake is refilled the aesthetics will rapidly and dramatically improve. Over time as the planted wetland vegetation becomes established and matures, the aesthetic character of the lake area will further improve.

4.5.9 Recreation

Similar to aesthetics, recreation usage of the park near the lake will be noticeably reduced for the period of construction. Fishing and boating in North Park Lake will obviously be suspended until the lake is refilled. This impact would be temporary until the project is completed and the lake refilled. Fish populations and hence the fishing experience

would improve in the lake where it will be dredged through restoration of habitat diversity and habitat quality by the removal of highly enriched sediments and the placement of fish attracting cover.

During construction, the quality of the walking, biking and picnicking experience along the shoreline is expected to be poor due to the presence of the drained lake and the constant drone of engines, the odor of diesel exhaust and movement of trucks carrying sediment. These recreation impacts are unavoidable but temporary and will cease immediately as construction is completed. After dredging, the lake will be refilled and recreation will resume as before.

TABLE 6 below was developed to permit reviewers to easily compare summarized impacts of the "No Action" Alternative and Alternatives 5, 6, and 7.

TABLE 6 - Summary Comparison of Environmental Impacts of Alternative Dredging Plans
[Negative Impacts are underlined]

Environmental Parameters	**Alternative 1 No Action**	**Alternative 5 Dredge Pine Creek Arm of Lake**	**Alternative 6 Dredge Near Dam Area**	**Alternative 7 Dredge North Fork Pine Creek Arm of Lake**
Open Water Habitat	Unabated reduction of open water habitat until the lake is lost to ongoing sedimentation.	Temporary loss of entire pool. Enhancement and restoration of 14 surface acres of open water habitat after project completion	Negative impacts the same as Alternative 5. Enhancement and restoration of 16 surface acres of open water habitat	Negative impacts the same as Alternative 5. Enhancement and restoration of 33 surface acres of open water habitat
Fish/Fish Habitat	Fish habitat will continue to degrade as the lake fills with sediment. The lake will grow increasingly shallow and warmer and, less suitable for fish. Desirable fish populations will continuously decline	Temporary loss of all fish and benthos in the lake. Fish habitat will be restored. Adding depth and structure will increase habitat diversity and optimize habitat suitability for various aquatic species in Pine Creek Arm of Lake.	Negative impacts the same as Alternative 5. Same positive impacts as Alternative 5 except the benefits will be in the area near the dam.	Negative impacts the same as Alternative 5. Same positive impacts as Alternative 5 except the benefits will be in the North Fork arm of lake
Water Quality	Continual degradation due to sedimentation and associated enrichment. Dissolved oxygen will become depleted and water temperatures will increase making the lake less able to sustain fish and benthic macroinvertebrates.	At project completion, water quality will improve in the Pine Creek arm of the Lake. Added depth will provide cooler temperatures which will help improve dissolved oxygen levels and reduce the intensity of lake stratification during warm summer months improving the lake as a fishery. A sediment trap will be constructed to help	Similar benefits as Alternative 5 except that they occur in the area near the dam that is dredged.	Similar benefits as Alternative 5 except that they occur in the North Fork arm of the lake.

Environmental Parameters	Alternative 1 No Action	Alternative 5 Dredge Pine Creek Arm of Lake	Alternative 6 Dredge Near Dam Area	Alternative 7 Dredge North Fork Pine Creek Arm of Lake
		maintain downstream water quality.		
Aquatic Vegetation	Aquatic vegetation will become denser due to sedimentation, enrichment and warmer temperatures. Algal blooms, which are detrimental to fish, will steadily increase in extent.	Aquatic vegetation will be temporarily removed. At project completion, conditions for algal blooms will be minimized in the Pine Creek arm of the lake. Desirable native aquatic vegetation will establish in this area that will enhance the aquatic ecosystem.	Aquatic vegetation will be temporarily removed. The same as Alternative 5 except the benefit will be near the dam.	Aquatic vegetation will be temporarily removed. The same as Alternative 5 but the benefits will be in the North Fork arm of the lake.
Terrestrial/Riparian Habitat				
Lake Area	No Impacts	Temporary loss of 0.5 acres for staging and lake access	Temporary loss of 2.5 acres for staging and lake access	Temporary loss of 2.5 acres for staging and lake access
Dredged Material Placement Areas	No Impacts	Temporary loss of habitat ranging from bare asphalt to mown lawn to early old-field vegetation with a predominance of non-native, invasive species. The loss of habitat would be temporary. Placement areas will be reestablished with native vegetation of the sponsor's choosing.	Negative impacts the same as Alternative 5 Vegetation re-establishment on disposal sites is the same as Alternative 5.	Negative impacts the same as Alternative 5 Vegetation re-establishment on disposal sites is the same as Alternative 5.
Wetlands	Existing wetlands will continue to expand, mature and change over time from emergent wetland to scrub	Existing wetlands in upper reach of Pine Creek arm of lake would be protected by a dike. Installation of COIR logs will enhance wetland development	Installation of COIR logs will enhance wetland development around lakeshore in desirable locations. Wetland in Pine Creek arm of the lake will	Installation of COIR logs will enhance wetland development around lakeshore in desirable locations. Wetland in Pine Creek arm of the lake will

Environmental Parameters	Alternative 1 No Action	Alternative 5 Dredge Pine Creek Arm of Lake	Alternative 6 Dredge Near Dam Area	Alternative 7 Dredge North Fork Pine Creek Arm of Lake
	shrub wetland to bottomland hardwood wetland due to continuous, uncontrolled sedimentation	around lakeshore in desirable locations.	continue to mature and expand downstream.	continue to mature and expand downstream.
Threatened and Endangered Species	No Impact	No Impact	No Impact	No Impact
HTRW	No Impact	No Impact	No Impact	No Impact
Air Quality	No Impact	Temporary air quality reduction due to engine exhaust and odors from drained lake. Potential impacts from dust as lake dries out and from trucks tracking mud on local roads	Same as Alternative 5	Same as Alternative 5
Prime Farmlands	No Impact	No Impact	No Impact	No Impact
Socio Economic Effects				
Noise	No Impact	Noise will be generated by land-based excavators removing sediment from lake and by trucks hauling sediment and by land based equipment spreading the sediment on the sediment placement area.	Same as Alternative 5	Same as Alternative 5
Public Safety	No Impact	Extensive truck traffic hauling sediment will be a hazard to park users and to traffic on local roads.	Impacts same as Alternative 5	Impacts same as Alternative 5

Environmental Parameters	Alternative 1 No Action	Alternative 5 Dredge Pine Creek Arm of Lake	Alternative 6 Dredge Near Dam Area	Alternative 7 Dredge North Fork Pine Creek Arm of Lake
		Drained lake will be a safety hazard to persons trying to walk near or in the muddy lake bottom. Dewatering/sediment placement areas pose a safety hazard if not secured by gated or fence. Flagmen and other traffic controls will be posted at intersections to direct traffic and protect public safety	Traffic safety solutions same as Alternative 5	Traffic safety solutions same as Alternative 5
Nuisance Odor Problems	No Impact	Drained lake will generate strong odors due to sediment enriched with organic matter. Similar problem with sediment placement areas	Same as Alternative 5	Same as Alternative 5
Aesthetics	Lake aesthetics will continue to degrade as the lake slowly fills with sediment	The drained lakebed will be extremely unattractive until the project is completed. Afterwards aesthetics will greatly improve as the lake is refilled.	Same as Alternative 5	Same as Alternative 5
Recreation	Permanent loss of both cool water and warm water fishery and loss of boating opportunities as the lake fills will sediment.	Temporary loss of fishing and boating opportunities and temporary disturbances caused by truck traffic. Temporary odor problems around lake and sediment placement areas where sediments are initially exposed	Same as Alternative 5	Same as Alternative 5

Environmental Parameters	**Alternative 1 No Action**	**Alternative 5 Dredge Pine Creek Arm of Lake**	**Alternative 6 Dredge Near Dam Area**	**Alternative 7 Dredge North Fork Pine Creek Arm of Lake**
		Permanent improvement to lake based recreation. once project is completed		
Cultural Resources	None	No impact	Same as Alternative 5	Same as Alternative 5

4.8 Cumulative Impacts of Alternative Plans

The Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) define cumulative effects as, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR §1508.7)". Cumulative effects assessments focus upon the beneficial and adverse impacts that past present and potential future actions could have on the ecosystem and human community being affected by an action.

In simple terms, a cumulative effects analysis considers the impacts of a proposed action in relation to what else is occurring, has occurred, or potentially may occur in a given project area. To keep a cumulative effect analysis meaningful, bounds must be set to establish a reasonable time frame and impact area. For this project, the impact area considered is North Park Lake and Pine Creek downstream of the lake. A rough time frame for future actions would be 25 years after construction

4.8.1 Past and Present and Future Actions

For the North Park project, past actions relate to the original construction of the park and dam in the late 1930's and the development within the basin that caused the siltation within the lake up until the present time. This report has described how accumulated sediment from past development within the Pine Creek basin has adversely affected the lake's aquatic ecosystem. Present actions relate to the effects of project construction which were described above and summarized in TABLE 6. Reasonably foreseeable future actions refer to those actions that could occur within the park or upstream within the Pine Creek basin. The cumulative impacts described below would be the combined effect of the past present and reasonably foreseeable future actions and how they would affect North Park Lake. This discussion is necessarily qualitative since future actions are based upon a mixture of professional judgment and common sense rather than on specific quantifiable impacts, such as acres of habitat lost or gained.

4.8.2 Cumulative Effects of Proposed Action

Each construction alternative described within this report achieves the project objective, which is improvements to the aquatic ecosystem within North Park Lake. Because the positive and negative impacts of the construction alternatives are fairly similar, the effect of the present action when analyzing cumulative impacts is the effect of a completed project. Consequently, separate discussions of cumulative impacts for each alternative would be nearly identical and therefore unnecessary. The description of the effect of past, present and reasonably foreseeable future actions upon the environmental parameters evaluated in Sections 4.5 through 4.7 is presented below in TABLE 6a in a tabular format to facilitate ease of reading.

TABLE 6a – Cumulative Effects Assessment

Resource	Past Actions +	Present Actions +	Future Actions =	Cumulative Effects
Fish and Benthos	Past development within the Pine Creek basin upstream of Pine Creek Dam has severely degraded North Park Lake's fishery through sedimentation. **Impact – Negative**	Project will remove accumulated sediment, and place fish attracting structures on the lake bottom **Impact - Positive**	Assuming stricter watershed management practices will be enforced, a diverse fishery could be sustainable for longer than the estimated 70-year life of the project. **Impact - Positive**	Habitat for fish and benthos would be improved. **Cumulative impact - Positive**
Water Quality	North Park Lake is a eutrophic lake suffering from past discharges of high levels of nutrients and minerals from excess runoff **Impact - Negative**	Removing nutrient-laden sediment and will help improve water quality. **Impact – Positive**	Enforcement of future watershed management controls will help slow the eutrophication process in the lake and maintain good water quality. **Impact - Positive**	Water quality should not degrade as quickly over time as in the past. **Cumulative impact - Positive**.
Wetlands	High quality wetlands are developing in the upper Pine Creek arm of the lake due to ongoing sedimentation. **Impact – Positive from a wetland resource perspective but negative from an open water habitat perspective.**	The quality wetlands will remain and other near-shore emergent wetlands will be created. **Impact - Positive**	To reach the shoreline, anglers may trample on and adversely impact created near shore emergent wetlands in specific locations. This adverse impact can be ameliorated through public education, signage, and enforcement by park personnel. **Impact - Minimal**	Recreation induced wetland loss would be minor and localized near access points. The amount and quality of wetland acreage will increase over past and present conditions. **Cumulative Impact- Positive**
Riparian/ Terrestrial Habitat	When first constructed there was minimal riparian habitat around the lake. Since creation of the park riparian habitat quality has improved although is still somewhat limited due to regular mowing. **Impact - Positive**	Project construction will not cause any significant long term losses of riparian or terrestrial vegetation. **Impact - None**	Careful management of park land by the County should minimize any impacts to riparian or terrestrial habitat. **Impact - None**	**Cumulative Impact - None**
Noise	The area was formerly agricultural and rural.	Local noise levels generated by operating	Future population growth will place higher demand	**Cumulative Impact - Negative**

Resource	Past Actions +	Present Actions +	Future Actions =	Cumulative Effects
	Since completion of the park and areas upstream of the dam noise levels have increased due to increased population, traffic and associated development. **Impact - Negative**	equipment will temporarily increase, but will cease completely after project is completed. **Impact – Short Term Negative Impacts**	upon North Park. Noise from traffic and day use activities may increase. **Impact - Negative**	
Roads and Traffic	Traffic increased as the population grew. Attendant road construction also expanded with the increase in population to meet traffic demands. I**mpact - None**	Temporary increases in local traffic caused by a steady stream of trucks leaving an entering the park to haul dredged sediment to disposal areas. **Impact – Short Term Negative Impacts**	As population grows, traffic would be expected to increase commensurately within North Park. It is expected that the existing roads will be able to handle increased traffic loads. Increased traffic would require increased road maintenance, and could, if not managed, decrease safety for pedestrians as well as for wildlife. **Impact - Negative**	**Cumulative Impact – Negative**
Air Quality	Past development and growth of commercial and residential areas may have negatively affected air quality within the park since it resides in Allegheny County which is classified as a moderate non-attainment area for the U.S. Environmental Protection Agency's 1-hour ozone standard. **Impact – Minimal**	Exhaust from heavy equipment and increased truck traffic during construction would be temporary and minor. **Impact - Minimal**	Expected increases in local traffic would also result in increased vehicle emissions. Considering that future vehicles will be more efficient and cleaner burning air quality should not decrease. **Impact - None**	**Cumulative Impact - None**
Recreation	Recreational use of the Park has been a focal point for residents since its creation. **Impact - Positive**	Recreation would greatly benefit from a restoration project. Boating, fishing, sightseeing, etc. will be improved. **Impact - Positive**	The restored lake will continue to provide an excellent recreational resource for residents of Allegheny County. At times of heavy use during warm, sunny weekends, the lake may experience	**Cumulative Impact - Positive**

Resource	Past Actions +	Present Actions +	Future Actions =	Cumulative Effects
			temporary overcrowding. **Impact - Positive**	
Aesthetics	Creation of the Park provides a place of refuge from suburban development. **Impact - Positive**	Aesthetics of a completed restoration project would be improved. **Impact - Positive**	As planted lake wetlands mature the aesthetic character of the lake would improve. **Impact - None**	**Cumulative Impact – Positive**

As can be seen in the summary table above, most of the cumulative impacts identified were either positive or were not significant. Noise and traffic, which would be expected to increase over time, could adversely affect park users, pedestrians and wildlife if not managed carefully. Speed restrictions, increased police patrols and the installation of traffic lights at specific intersections may be needed to control future traffic volumes and minimize potential impacts.

4.9 Risk and Uncertainty Analysis

Uncertainty and variability are inherent in water resource planning. Situations of risk are conventionally defined as those in which the potential outcomes can be described in reasonably well-known probability distributions, such as the knowledge that a waterway will on average flood to a specific elevation on regular basis. Uncertainty exists where one cannot describe an outcome on the basis of known probability distributions.

For the North Park Lake project, there is little or no risk that the project upon completion will fail to meets its objectives. Restoration of aquatic habitat will be successful no matter what alternative is selected. The difference between the alternatives is primarily related to the area of the lake that is restored and not with regard to achieving the restoration objectives. From an aquatic habitat perspective, the outcome of each alternative would be similar and the risk of not achieving its objectives is extremely low.

The primary uncertainty is how long the improved habitat within the lake will remain at optimum levels after project completion. This report has described how sedimentation has severely degraded the open water habitat of the lake. Sedimentation within the Pine Creek Basin and North Park Lake will continue to occur after the project is constructed. The specific rate of future sedimentation is unknown since it is dependent upon numerous factors many of which cannot be predicted with certainty, such as future demographics and economic growth and development within the Pine Creek basin, and the potential implementation and strict enforcement, at some future date, of storm water management regulations by local municipalities.

Based upon our general familiarity of the Pine Creek basin, we are aware that development and urbanization upstream of North Park Lake has leveled off. Given the above, although the District has not conducted sedimentation modeling of the basin, it can be assumed that the rate of sedimentation within the lake has also been slowing. Further, given that it has taken about 70 years for the project to degrade to its present conditions due to sedimentation, we expect, with a lower basin sedimentation rate, the lake would maintain a high degree of biological productivity for at least 70 years before it degrades to conditions similar to what now exists. Based upon the estimated project life, the project is a worthwhile and justifiable investment. See Section 6.6 for more detail on operation and maintenance costs.

5.0 COST EFFECTIVENESS AND INCREMENTAL COST ANALYSES

5.1 – Introduction

Corps of Engineers Planning Regulation (ER 1105-2-100) requires that all water resource development projects be evaluated in terms of acceptability, completeness, effectiveness, and efficiency. For ecosystem restoration projects these terms are defined as follows:

Acceptability - An ecosystem restoration plan should be acceptable to State and Federal resource agencies and local government. Two primary dimensions of acceptability are implementability and satisfaction. There should be evidence of broad based public consensus and support for the plan. A recommended plan must be acceptable to the non-Federal cost-sharing partner.

Completeness - A plan must provide and account for all necessary investment or other actions needed to ensure the realization of the planned restoration outputs. This may require relating the plan to other types of public or private plans if these plans are crucial to the outcome of the restoration objective. Real estate, O&M, monitoring, and sponsorship factors must be considered.

Effectiveness - An ecosystem restoration plan must make a significant contribution to addressing the specified restoration problems or opportunities (i.e., restore important ecosystem structure or function to some meaningful degree).

Efficiency - An ecosystem restoration plan must represent the most cost effective means of addressing the restoration problem or opportunity. It must be determined that the plan's restoration outputs cannot be produced more cost effectively by another agency or institution.

All alternatives for North Park Lake were formulated and evaluated throughout the planning study to achieve acceptability and completeness. In addition, alternatives were evaluated at a screening level for efficiency and effectiveness. However, detailed evaluation of ecosystem restoration alternatives for efficiency and effectiveness must be performed once plans are well defined, costs are estimated, and after projection of ecosystem outputs (benefits). This section provides information derived from detailed evaluation of each alternative (No Action and 3 Action Alternatives) using Corps of Engineers accepted procedures.

Cost Effectiveness and Incremental Cost Analysis are two distinct analyses that must be conducted to evaluate the effects of alternative plans. Cost effectiveness means that, for a given level of non-monetary output, no other plan costs less, and no other plan yields more output for less money. Subsequently, through incremental cost analysis, a variety

of implementable alternatives and various-sized alternatives are evaluated to arrive at a "best" level of output within the limits of both the sponsor's and the Corps' capabilities.

5.2 Ecology of North Park Lake

North Park Lake supports a warm water aquatic community. Fishes in the lake include gizzard shad, largemouth bass, panfish (bluegill, pumpkinseed, rock bass, white crappie, and black crappie), smallmouth bass, white sucker, common carp, golden shiner, central stoneroller, channel catfish, brown bullheads, yellow bullheads, walleye, and northern pike. The panfish group is overcrowded and stunted, while largemouth bass densities are above average for the region. Largemouth bass are too small to effectively forage on and control panfish and gizzard shad populations in the lake. Thus, the entire lake is out of balance from a fish community perspective. In large part this condition has resulted directly from deposition of sediment and resulting creation of extensive shallow areas that shelter forage species.

Presence of large predators in sufficient numbers is essential to maintaining a balanced, self-sustaining fish community. Through consumption of significant numbers of stunted panfish, the surviving panfish have less competition for available food (zooplankton, aquatic and terrestrial insects, small fish, etc.) and are able to grow to sizes where they too are more effective predators, especially on small fish. Once predators reach sufficient size to eat adult gizzard shad and exert pressure on shad populations, the average size of gizzard shad decreases thereby making more of the shad available to small predators. Also, by reducing population densities of forage species, increased reproduction is induced. This results in increased numbers of very small fish (suitable forage for juvenile and small adult fish of several species). Extensive shallow water areas now in North Park Lake preclude effective foraging and prevent development of sizes and numbers of large predators.

The two species in the lake that could be expected to serve as large predators (largemouth bass and channel catfish) avoid extensive shallow areas. Largemouth bass are "ambush" feeders that prefer to hide in sheltered spots and quickly capture smaller fish that happen to come close. Channel catfish inhabit relatively deep areas when available and, although more ubiquitous in terms of food choices than largemouth bass, also ambush live prey. Other predatory species (smallmouth bass, walleye, and northern pike) in the lake occur in small numbers due to habitat limitations and could not be expected to exert any meaningful control on forage fish populations.

5.3 Restoration Measures

Key to restoration of the aquatic ecosystem in North Park Lake is reestablishment of habitat complexity. Habitat complexity is defined as a combination of shallow, moderate, and deep water with appropriate structure and cover in each depth zone. Shallow water (0' to 2') is important as fish spawning and nursery areas; moderate depth (2' to 6') is important for growth of juveniles as well as for large predators use in feeding and resting, while deep areas (>6') are important wintering habitat for all species and

sizes (especially important during ice over). In the North Park Lake project, the essential factor in restoration of the aquatic ecosystem is removal of accumulated sediment as discussed in Section 3. Over the course of the study, several methods for sediment removal were considered. From evaluations of cost, environmental, and other factors, it was determined that the preferred method would consist of draining the lake and excavating accumulated material in the dry. Draining the lake would also allow establishment of a more desirable fish community once the lake is refilled.

In conjunction with restoration of habitat through excavation of sediment, other ecosystem restoration features include placement of various types of fish habitat and planting of wetland vegetation. Submerged features placed at various depths of the lake include rock piles, rock humps, two styles of porcupine cribs, and sunken evergreen trees. Coir logs would be placed at selected areas along the shoreline and planted with wetland vegetation for near shore wetland development. Effectiveness of all of these habitat features is dependent on removal of accumulated material prior to installation of habitat structure. These features can be easily installed while the lake is dewatered.

The estimated cost of structural habitat features is approximately $500,000. Because the costs associated with these attendant features are small relative to the cost of excavation, they are included equally in each of the action alternatives. For the Cost Effectiveness and Incremental Cost Analysis performed in the following sections, the primary ecosystem restoration measures evaluated are improvement of habitat complexity in three areas of North Park Lake and options for disposal of excavated material.

5.4 Cost Effectiveness and Incremental Cost Analysis

In cost effectiveness analysis, the goal is to filter out plans that produce the same output level as another plan, but cost more; or cost either the same amount or more than another plan, but produces less output. For North Park Lake, this analysis optimizes the combination of cost and outputs for aquatic ecosystem restoration.

5.5 Alternatives Evaluated

In addition to No Action, three action alternatives were evaluated in detail and are described below.

5.5.1 No Action (Future Without Project Condition)

Aquatic Sites - Inflows into North Park Lake are expected to continue to transport approximately 5,200 tons of suspended sediment per year, of which about 95% will deposit in the lake. As North Park Lake fills, open water in the lake will be displaced by emergent wetlands. Over time, the entire remaining open water area of the lake will be filled with sediment. Sediment particles will continue to deposit in the upper end of both arms of the lake where they will result in a transitional progression from open water to emergent wetland to scrub/shrub wetland to forested wetlands. Eventually the entire lake will undergo this transition. Although sediment inflows are similar in each arm of the lake, surface area of the North Fork Pine Creek arm is much larger than the Pine Creek

arm. Therefore complete loss of open water in the North Fork arm will occur several years later than in the Pine Creek arm. The near dam area will be the last to be completely filled, likely after each of the lake arms have lost nearly all their open water.

Sediment inflow of 5,200 tons/year equates to 10,400,000 pounds/year. At a sediment weight of 90 pounds per cubic foot, the volume added to North Park Lake each year would be 115,556 cubic feet. This would amount to 2.7 acre feet of water volume displaced by sediment per year. Using this rate, North Park Lake volumes are expected to be 294.3 acre feet in 2010, 253.8 acre feet in 2025, 210.6 acre feet in 2040, and 159.3 acre feet in 2060. It was assumed that equal amounts of sediment would deposit in each of the three areas of the lake. Using these estimates, an average of 0.9 acre feet would deposit per year in each area. Table 5-1 shows reductions in water depth (ft/acre) in each of the three areas of North Park Lake over time in the FWOPC.

Table 5-1. Water Depth Reduction (ft) in North Park Lake At Four Evaluation Time Frames Under the FWOPC

Area	2010	2025	2040	2060
Pine Creek	0.06	0.96	2.07	3.45
N Fork Pine Creek	0.03	0.40	0.81	1.35
Near Dam	0.06	0.84	1.68	2.80

At these rates, the Pine Creek arm would probably be completely filled by 2040. The North Fork Pine Creek arm could be expected to retain about half of its surface acreage in 2060. The Near Dam area would remain at 16 acres throughout the 50 year evaluation period.

In the interim between present conditions and eventual complete loss of open water, the lake will become very conducive to further spread of the non-native plant species Eurasian water milfoil. This in turn will provide a source of plant fragments or propagules that can easily be transported by waterfowl or boat to other water bodies, both locally and at considerable distance from North Park Lake. As Eurasian water milfoil is an exotic species, it has few natural enemies to control populations in North America. Its ability to develop a monoculture and displace desirable native aquatic plants such as marsh purslane, swamp rose, bedstraw, and water plantain has been well documented. Eradication of Eurasian water milfoil, once established, has proven to be impractical, and management to achieve acceptable populations of this species is a continual and expensive process.

Disposal Sites - The Bull Pen site would likely continue to be used for disposal of leaves collected by the County. This repetitive disturbance would preclude vegetative succession over most of the site. The small area of the site not subject to disturbance would be expected to undergo succession. The maximum amount of material that could be disposed on this 8.13 acre site is 115,000 CY.

The County site is located immediately east of Pine Creek Dam. This site was previously used for disposal of material dredged from Pine Creek Lake but was not reclaimed following disposal. Vegetation at the County site consists of grasses and forbs typically found on disturbed areas. In addition, the site is being colonized by exotic (non-native) vegetation. In wet years, a small poor quality wetland develops within a swale on-site that follows a sewer line crossing the property. Although the site is 13.1 acres in size, only 3.6 acres could be used for material placement. The maximum amount of material that could be disposed in this area is 25,000 CY.

5.5.2 Alternative 5 – Excavation of the Pine Creek Arm of North Park Lake

Alternative 5 would consist of excavation of the Pine Creek arm of North Park Lake from near the dam upstream to the wetland area. Water depths in the Pine Creek arm currently range from a few inches to about 2 feet. Excavation of this area would create depths that range from shallow shoreline areas to approximately 12 feet at the most downstream end of the lake arm. Following excavation, habitat structures (rock piles, porcupine cribs, evergreen trees, etc.) would be placed to provide cover for fish and to increase benthic production. Coir logs would be placed along portions of the shoreline to prevent erosion and encourage wetland vegetation growth near shore. These habitats are important for fish spawning and provide nursery areas for young fish. A rock barrier would be constructed at the downstream end of the 16 acre wetland area to prevent head cutting into the wetlands. Excavation to the original lake bed would remove approximately 73,000 CY from an area of 14 acres. Excavation would be performed in the dry following dewatering of the lake. Excavated material would be trucked to the Bull Pen site for disposal.

5.5.3 Alternative 6 – Excavation of the Near Dam Area of North Park Lake

Alternative 6 would consist of excavation of an area immediately in front of the dam and for a short distance upstream in each arm of the lake. Water depths in the Near Dam area arm currently range from a few inches to about 10 feet. Excavation of this area would create depths that range from shallow shoreline areas to approximately 26 feet at the most downstream end of the lake. Excavation to the original lake bed would remove approximately 140,000 CY from an area of 16 acres. Excavation would be performed in the dry, and material would be disposed at the Bull Pen site. No rock barrier would be installed downstream of the 16 acre wetland area in the Pine Creek arm. This would allow wetland progression to continue into the future without the need for additional protection. Following excavation, habitat structures (rock piles, porcupine cribs, evergreen trees, etc.) would be placed to provide cover for fish and to increase benthic production. Coir logs would be placed along portions of the shoreline to prevent erosion and encourage wetland vegetation growth near shore. These habitats are important for fish spawning and provide nursery areas for young fish.

5.5.4 Alternative 7 – Excavation of the North Fork Pine Creek Arm of North Park Lake

Alternative 7 would consist of excavation from the upstream end of North Fork Pine Creek arm to an area near the dam. Water depths in the North Fork Pine Creek arm currently range from a few inches to about 2 feet. Excavation of this area would create depths that range from shallow shoreline areas to approximately 12 feet at the most downstream end of the lake arm. Excavation to the original lake bed would remove approximately 104,000 CY from an area of 33 acres. Excavation would be performed in the dry, and material would be disposed at the Bull Pen site. No rock barrier would be installed downstream of the 16 acre wetland area in the Pine Creek arm. This would allow wetland progression to continue into the future without the need for additional protection. Following excavation, habitat structures (rock piles, porcupine cribs, evergreen trees, etc.) would be placed to provide cover for fish and to increase benthic production. Coir logs would be placed along portions of the shoreline to prevent erosion and encourage wetland vegetation growth near shore. These habitats are important for fish spawning and provide nursery areas for young fish.

5.6 Method for Determination of Ecosystem Outputs

This section describes methods used to project ecosystem outputs (benefits) for evaluation purposes. Using the LRD "Standardized Environmental Output Measurement Process" which is an appendix to the "Management Principles and Standard Operating Procedures for the Continuing Authorities Program," ecosystem conditions were determined for the following areas potentially affected by the proposed project:

- North Park Lake
- County Site
- Bull Pen site
- Wildwood site

To evaluate conditions that are expected to undergo transition in terms of habitat type and quality, the following types of habitat were individually evaluated:

- Open water (lake) – subdivided into 3 distinct areas
- Emergent wetland
- Scrub/shrub wetland
- Forested wetland
- Upland – 3 sites

Because conditions will change with time, four points in time were used to project conditions:

- 2010 (Initial)
- 2025 (15 years)
- 2040 (30 years)

- 2060 (50 years)

Outputs were determined under the FWOPC and the FWPC (three alternatives). The LRD Standardized Output Unit (SOU) is determined by considering quantity, quality, and significance of outputs. Quantity is always acres of each habitat type. Quality (SI) is scored on a scale of 1-10 where 1 is completely degraded, and 10 is the highest quality the resource is capable of attaining. Significance (SF) is scored on a scale of 1-5, where 1 is a type of resource common throughout the area, and 5 is a resource of National/International importance. Values of quantity, quality, and significance are multiplied to produce a Standardized Output Unit (SOU) for each resource type under each alternative. SOUs for each resource type are then summed to obtain a total number of SOUs for a given alternative.

5.7 Ecosystem Outputs of Each Alternative

This section describes metrics and scoring of resource types under each alternative.

5.7.1 Alternative 1 – No Action

Open Water (lake) - SI scoring is based upon habitat complexity, which is defined as a combination of shallow, moderate, and deep water with appropriate structure and cover in each depth zone. At present, much of the lake's original habitat complexity has been lost. With extensive areas of uniformly shallow depths and maximum depth of only 10 feet near the dam, initial (2008) SI score for 33 acres of open water habitat in North Fork Pine Creek would be 2. Initial SI score for 14 acres in Pine Creek arm of the lake would also be 2. Initial score for the 16 acres near the dam would be 3. Because sediment has covered much of the bottom of the original lake bed, structure and cover has been essentially lost from the lake.

At 15, 30, and 50 years, SI scores for North Fork Pine Creek arm would be expected to decline from 2 (initial) to 1, 1, and 1 at 15, 30, and 50 years, respectively. This is due to loss of habitat complexity as indicated by increased amount of shallow water of uniform depth, loss of structure, degradation of warm water fish communities, and spread of Eurasian water milfoil. Acreage of North Fork Pine Creek is expected to be reduced over time as sediment deposits begin to transform open water into emergent wetlands. It is expected that 31 acres of open water will be present with the other 2 acres converted to emergent wetland at the 15 year interval. At 30 and 50 years, open water in North Fork Pine Creek should be reduced to 28 and 23 acres.

In the Pine Creek arm of the lake, SI values at 15, 30, and 50 years would be expected to decline from 2 (initial) to 1 as sediment would continue to degrade conditions in this area. Wetland formation is already ongoing in the Pine Creek arm. Acreage of open water habitat would continue to decline from initial amounts (14 acres) to 7, 0, and 0 at 15, 30, and 50 years due to wetland formation progressing from upstream to downstream.

Sediments entering from both arms of the lake would continue to accumulate in front of the dam and would result in decreased depth and ultimately loss of open water in this area. Depth decreases have been on-going for years in the near dam area. Complete loss of open water habitat would not be likely to occur until one or both arms of the lake are nearly filled to capacity. Therefore, it is expected that there will still be 16 acres of open water throughout the 50 year evaluation period. However, deposition would result in continually decreasing depth in this area. In the near dam area, the initial SI would be 3. After 15 years this would degrade to an SI of 2, while at 30 and 50 years the SI would be 1 and 1, respectively.

Significance factor (SF) is based on attributes such as scarcity, representativeness, status and trends, connectivity, limiting habitat, and biodiversity. In its current condition, North Park Lake would receive a SF score of 2 (Local). High quality warm-water lakes that are self sustaining and self regulating are relatively uncommon in western Pennsylvania. Under the FWOPC, the SF of North Park Lake is expected to remain at 2 in all time intervals.

Emergent wetland – Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (Cowardin, et al, 1979). It should be noted that Cowardin is a wetland classification system, whereas the Corps of Engineers 1987 Delineation Manual is used for determination of jurisdictional wetlands. As such, there are differences between the two systems with regard to determining and classifying wetlands. Wetlands in North Park Lake were not delineated in accordance with the 1987 manual. However, wetlands in the lake met the three criteria to be considered wetlands (i.e., hydrophytic vegetation, hydric soils, and wetland hydrology). The vegetation must be present most of the growing season in most years, and these wetlands are dominated by perennial plants. Wetland formation in North Park Lake is a transitional process. Areas of sediment deposition progress from upstream to downstream as well as laterally over time to as velocities rapidly decrease when water from confined channels spreads over larger areas in the lake. Another means of deposition of sediment particles occurs as vegetation develops on previously deposited material. As sediment laden water (especially during high flow events) encounters vegetated areas, velocities are substantially reduced and sediments are increasingly retained. With the additional deposition of dead and decaying vegetation, elevation of the emergent wetland increases. As elevation of the wetland increases, emergent wetlands become displaced by scrub/shrub wetlands.

Initial estimate of emergent wetland in the Pine Creek arm of North Park Lake is 6 acres. Over time total amount of emergent wetland is expected to remain relatively constant. However, the area of emergent wetland will be constantly moving in downstream and lateral directions as these are replaced by scrub/shrub wetlands. Currently there are no emergent wetlands in the North Fork arm; however, it is expected that there will be 2 acres of this habitat at 15 years. At 30 years, there should be 6 acres of emergent wetland, and at 50 years there should be 6 acres as emergent wetlands continue to form and as these begin to mature into scrub/shrub wetlands.

Initial SI of emergent wetlands is 3. Because these are relatively short lived and in continuous transition, SI is expected to remain 3 at 15, 30, and 50 years. SF of emergent wetlands is 2 (Local). This SF is expected to remain constant at all time intervals.

Scrub/shrub wetland – Scrub/shrub wetlands are dominated by woody vegetation less than 20' tall. Species present include true shrubs, young trees or shrubs that are small or stunted because of environmental conditions. As emergent wetlands continue to develop and trap sediments, vegetative changes occur. At some point, emergent wetlands evolve into scrub/shrub wetlands. The period of time a wetland is classified as scrub/shrub in North Park Lake is primarily a function of plant colonization and growth, as opposed to emergent wetlands where rate of sediment build-up is the controlling factor.

It is estimated that emergent wetlands will convert to scrub/shrub wetlands at a rate equivalent to 0.05 acres/year or 1 acre/20 years. It is also estimated that scrub/shrub wetlands will evolve into forested wetlands at a rate equivalent to 0.03 acres per year or 1 acre/30 years. Using these rates, initial estimates in the Pine Creek arm of 6 acres of scrub/shrub wetlands would change to 6.5 acres at 15 years, 7.0 acres at 30 years, and 7.5 acres at 50 years.

In the North Fork Pine Creek arm, there would be 0 acres of scrub/shrub wetlands initially and at 15 years. By 30 years, there would be 1 acre of scrub/shrub wetlands, while at 50 years there should be 6 acres of this habitat type.

SI of scrub/scrub wetlands in North Park Lake is estimated to be 5 initially. As these develop and mature it is estimated that SI will be 6, 6, and 7 at 15, 30, and 50 years, respectively. SF of scrub/shrub wetlands is 3 (State/Tribal) as these have become rare throughout Pennsylvania and are important components of aquatic ecosystems. SF will remain at this level at all time intervals.

Forested Wetlands – Forested wetlands are characterized by woody vegetation 20' tall or taller. This type wetland takes years to establish and is considered very beneficial to aquatic ecosystems. The more mature these wetlands become, the more benefits they provide to aquatic complexes. In the FWOPC, initial forested wetland presence is 2 acres in the Pine Creek arm of North Park Lake. Based on habitat development rates discussed above, it is projected that there will be 2.5 acres at 15 years, 3.0 acres at 30 years, and 3.67 acres of forested wetlands at 50 years. In the North Fork Pine Creek arm there will be no forested wetlands initially or at 15 or 30 years. At 50 years there should be 1 acre of forested wetland.

Initial SI of forested wetlands is 6. At 15 years SI will be 6, while at 30 and 50 years it is projected to be 7 and 8, respectively. These improvements in habitat quality are based on maturation and increased productivity as trees age. SF of forested wetlands initially is 3 (State/Tribal). At 15 years it is expected to remain at 3, whereas, at 30 and 50 years, SF is projected to increase to 4 (Regional). These increases in SF are due to anticipated development pressures throughout Pennsylvania and nearby states. Historically, this development pressure has significantly reduced acreage of forested wetlands. While

there is a Nationwide goal of no net loss of wetland acreage or function, mitigation efforts often strive to restore prior converted wetlands. These restoration efforts usually require acreage ratios considerably greater than 1:1 as newly established wetlands for many years do not provide the full range of functions provided by forested wetlands.

Upland – The 8.13 acre Bull Pen site is used for leaf disposal/composting and is subject to frequent disturbance. As most of this site is paved with asphalt, initial SI is 1. SI is expected to remain at 1 during all time intervals. SF of the Bull Pen site is 1 (Common) and is not expected to change during the period of evaluation.

The 3.16 acres of the County site would continue to be mowed periodically to maintain an appearance consistent with a park setting. SI would be 1 at all time intervals. SF of the County site is 1 (Common) and is not expected to change during the period of evaluation.

5.7.2 Alternative 5 – Dredging the Pine Creek Arm

Open Water (lake) – Initially, 14 acres of lake habitat in the Pine Creek arm would become highly complex and would score an SI of 7. After 15 years, sedimentation would degrade this to a SI of 6. At 30 years, continued sediment deposition would yield a SI of 3, and at 50 years the SI would be 1. Area of the Pine Creek arm would remain at 14 acres at all time intervals. Sediment deposition would accelerate loss of quality of habitat structures due to coating and covering structures as well as filling in of interstitial spaces.

Initial SI for the 33 acre North Fork Pine Creek arm of the lake would be 2. At 15, 30, and 50 years the SI would decline to 1 in this arm as sediment would continue to degrade conditions in this area, and Eurasian water milfoil would colonize large areas of this arm. Also, open water area would be reduced as in the FWOPC in this arm of the lake. At 15 years there should be 31 acres of open water, while at 30 and 50 years, there should be 28 and 23 acres, respectively.

Sediments entering from both arms of the lake would continue to accumulate in the 16 acre area in front of the dam and would result in decreased depth in this area. Initial SI would be 3, whereas after 15 years this would degrade to an SI of 2, and at 30 and 50 years the SI would be 1 and 1, respectively.

SF for North Park Lake is 2 due to its importance as a local resource. SF would be expected to increase to 3 (State/Tribal) initially and decline back to SF of 2 at 15, 30, and 50 years. The initial increase in SF would occur as high quality warm water lakes are relatively uncommon in western Pennsylvania. However, because the lake habitat would steadily degrade, its importance would also decline.

Emergent wetland – Emergent wetlands developing in the Pine Creek arm would be stabilized at the present location by the rock barrier for the first 15 years. Sediments would accumulate in the lake, and additional areas would convert to emergent wetlands during later years. Over time, emergent wetlands would be displaced by scrub/shrub

wetlands, which would eventually become forested wetlands as additional sediment accumulates and organic material is deposited. It is estimated that there would be 6 acres of emergent wetlands initially. Conversion from emergent wetland to scrub/shrub wetland is projected to occur at a rate of 0.05 acres per year or 1 acre in 20 years, while conversion from scrub/shrub to forested wetland would occur at a rate of 0.03 acres per year. At 15 years there would be 4.75 acres of emergent wetlands. At 30 and 50 years, emergent wetland acreage is projected to be 3.25 and 2.0 acres, respectively. The initial SI score of emergent wetland would be 3. SI is expected to remain at a value of 3 throughout the 50 year period. SF for emergent wetlands in this setting is 2 (Local) and is expected to remain at this value throughout the evaluation period.

In the North Fork Pine Creek arm, emergent wetland formation and transformation to scrub/shrub and subsequently forested wetlands would be the same as in the FWOPC. Currently there are no emergent wetlands in the North Fork arm; however, it is expected that there will be 2 acres of this habitat at 15 years. At 30 years, there should be 6 acres of emergent wetland, and at 50 years there should be 6 acres as emergent wetlands continue to form and as these begin to mature into scrub/shrub wetlands.

Scrub/shrub wetland – As discussed previously, emergent wetlands evolve into scrub/shrub wetlands over time. Similarly, scrub/shrub wetlands convert to forested wetlands. Estimates are that emergent wetlands will convert to scrub/shrub wetlands at a rate of 0.05 acres per year, and scrub/shrub wetlands will convert to forested wetlands at a rate of 0.03 acres per year. Using these estimates and with 6.0 acres initially in the Pine Creek arm, acreage of scrub/shrub wetlands would be 6.5 at year 15, 7.0 at year 30, and 7.5 at year 50.

In the North Fork Pine Creek arm, scrub/shrub wetland presence would be the same as under the FWOPC. In the North Fork Pine Creek arm, there would be 0 acres of scrub/shrub wetlands initially and at 15 years. By 30 years, there would be 1 acre of scrub/shrub wetlands, while at 50 years there should be 6 acres of this habitat type.

SI of scrub/scrub wetlands in North Park Lake is estimated to be 5 initially. As these develop and mature it is estimated that SI will be 6, 6, and 7 at 15, 30, and 50 years, respectively. SF of scrub/shrub wetlands is 3 (State/Tribal) as these have become rare throughout Pennsylvania and are important components of aquatic ecosystems. SF will remain at this level at all time intervals.

Forested Wetlands – In the Pine Creek arm, initial acreage of forested wetlands under this alternative is 2.0 acres. At 15 years, acreage would be 2.50 acres, while at 30 and 50 years acreage would be 3.00 acres and 3.5 acres, respectively. In the North Fork Pine Creek arm there will be no forested wetlands initially or at 15 or 30 years. At 50 years there should be 1 acre of forested wetland.

Initial SI of forested wetlands is 6. At 15 years SI will be 6, while at 30 and 50 years it is projected to be 7 and 8, respectively. These improvements in habitat quality are based on maturation and increased productivity as trees age. SF of forested wetlands initially is 3

(State/tribal). At 15 years it is expected to remain at 3, whereas, at 30 and 50 years, SF is projected to increase to 4 (Regional). As previously discussed, these increases in SF are due to anticipated development pressures throughout Pennsylvania and nearby states.

Upland – Use of the 8.13 acre Bull Pen site would change from leaf disposal/composting to disposal of excavated material. The existing layer of asphalt would be removed prior to disposal. Use of the entire site for disposal of 73,000 CY would allow placement of material to an average depth of 5.6 feet. Initial SI of 1 is expected to improve to 3 at 15 years, 6 at 30 years, and 7 at 50 years. SF of the Bull Pen site is 1 (Common) and is not expected to change during the period of evaluation.

The County site would not be used for disposal under this alternative. Therefore site conditions would be the same as in the FWOPC. The 3.16 acres would continue to be mowed periodically to maintain an appearance consistent with a park setting. SI would be 1 at all time intervals. SF of the County site is 1 (Common) and is not expected to change during the period of evaluation.

5.7.3 Alternative 6 – Dredging Near the Dam

Open Water (lake) – Initially 16 acres in the vicinity of the dam would become highly complex and would score a SI of 7. This area is downstream of existing deposits in both arms of the lake, and, through a process known as head cutting, the soft, unconsolidated material is expected to rapidly migrate from both upstream sources into the excavated area. This would be a continual process. Therefore, the SI at year 15 is projected to be 4, while at 30 and 50 years SI would be 3 and 2, respectively.

In the 14 acre Pine Creek arm of the lake, existing sediments would not be directly disturbed. However, material would flow from this arm of the lake into the area in front of the dam. This would temporarily deepen this arm and would improve SI to a small extent. Initial SI in the Pine Creek arm is expected to be 2, and at year 15 it should improve to a 3. However, at 30 and 50 years, SI should decline to 1. Further, acreage of open water would decrease as wetlands continue to form at the upper end of this arm. Acreages of open water habitat are expected to be 8, 4, and 0 at 15, 30, and 50 years, respectively.

In the 33 acre North Fork Pine Creek arm, existing sediments would not be directly disturbed. However, as in the Pine Creek arm, material would flow from this area of the lake into the area in front of the dam. This would temporarily deepen this arm and would improve SI to a small extent. Initial SI in the North Fork Pine Creek arm is expected to be 2, and at year 15 it should improve to a 3. However, at 30 and 50 years, SI should decline to 1. In the North Fork arm, conversion of open water to wetlands should occur at the same rate as in the FWOPC, as the uppermost area of this arm is much further removed from the dam than is the upper end of the Pine Creek arm. At 15 years there should be 31 acres of open water, while at 30 and 50 years, there should be 28 and 23 acres, respectively.

SF for Pine Creek Lake is 2 (Local) due to its importance as a local resource. SF would be expected to increase to 3 (State/Tribal) initially and decline back to SF of 2 at 15, 30, and 50 years. The initial increase in SF would occur as high quality warm water lakes are relatively uncommon in western Pennsylvania. However, because the lake habitat would steadily degrade, its importance would also decline.

Emergent wetland - Wetland formation in the Pine Creek arm of North Park Lake is expected to be somewhat similar to the FWOPC with some exceptions. Because of sediment movement from Pine Creek arm to the area near the dam, wetland formation would be delayed by a few years. This would primarily affect emergent wetlands. It is expected that the initial area of 6 acres would remain at 6 acres at the 15 year interval, although emergent wetlands would continue to migrate laterally and downstream. At 30 and 50 years, emergent wetland acreage should be 5 and 3 acres, respectively.

In The North Fork Pine Creek arm, emergent wetland formation would be the same as in the FWOPC. Currently there are no emergent wetlands in the North Fork arm; however, it is expected that there will be 2 acres of this habitat at 15 years. At 30 years, there should be 6 acres of emergent wetland, and at 50 years there should be 6 acres as emergent wetlands continue to form and as these begin to mature into scrub/shrub wetlands.

Initial SI of emergent wetlands is 3. Because these are relatively short lived and in continuous transition, SI is expected to remain 3 at 15, 30, and 50 years. SF of emergent wetlands is 2 (Local). This SF is expected to remain constant at all time intervals.

Scrub/shrub wetland – Over time emergent wetlands convert into scrub/shrub wetlands. It is estimated that emergent wetlands will convert to scrub/shrub wetlands at a rate equivalent to 0.05 acres/year or 1 acre/20 years. It is also estimated that scrub/shrub wetlands will mature into forested wetlands at a rate equivalent to 0.03 acres per year or 1 acre/30 years. Using these rates, initial estimates of 6 acres of scrub/shrub wetlands in the Pine Creek arm would change to 6.5 acres at 15 years, 7.0 acres at 30 years, and 7.5 acres at 50 years.

In the North Fork Pine Creek arm, scrub/shrub wetland presence would be the same as under the FWOPC. In the North Fork Pine Creek arm, there would be 0 acres of scrub/shrub wetlands initially and at 15 years. By 30 years, there would be 1 acre of scrub/shrub wetlands, while at 50 years there should be 6 acres of this habitat type.

SI of scrub/scrub wetlands in North Park Lake is estimated to be 5 initially. As these develop and mature it is estimated that SI will be 6, 6, and 7 at 15, 30, and 50 years, respectively. SF of scrub/shrub wetlands is 3 (State/Tribal) as these have become rare throughout Pennsylvania and are important components of aquatic ecosystems. SF will remain at this level at all time intervals.

Forested Wetlands – Forested wetlands take years to establish and are considered very beneficial to the aquatic ecosystem. Initial forested wetland presence is 2 acres in Pine

Creek arm of North Park Lake. Based on habitat development rates discussed above, it is projected that there will be 2.5 acres at 15 years, 3.0 acres at 30 years, and 3.67 acres at 50 years in the Pine Creek arm. In the North Fork Pine Creek arm there will be no forested wetlands initially or at 15 or 30 years. At 50 years there should be 1 acre of forested wetland.

Initial SI of forested wetlands is 6. At 15 years SI will be 6, while at 30 and 50 years it is projected to be 7 and 8, respectively. These improvements in habitat quality are based on maturation and increased productivity as trees age. SF of forested wetlands initially is 3 (State/Tribal). At 15 years it is expected to remain at 3, whereas, at 30 and 50 years, SF is projected to increase to 4 (Regional). These increases in SF are due to anticipated development pressures throughout Pennsylvania and nearby states. Historically, this development pressure has significantly reduced acreage of forested wetlands.

Upland – Use of the 8.13 acre Bull Pen site would change from leaf disposal/composting to disposal of excavated material. The existing layer of asphalt would be removed prior to disposal. Use of the entire site for disposal of 115,000 CY would allow placement of material to an average depth of 8.8 feet. Initial SI of 1 is expected to improve to 3 at 15 years, 6 at 30 years, and 7 at 50 years. SF of the Bull Pen site is 1 (Common) and is not expected to change during the period of evaluation.

The County site would be used for disposal of 25,000 CY of material over 3.6 acres. This would result in placement of 4.3 feet of material over existing ground. Following material placement, the area would be seeded with grass and would be maintained by periodic mowing to maintain an appearance consistent with a park setting. SI would be 1 at all time intervals. SF would be 1 (Common) at all time intervals.

5.7.4 Alternative 7 – Dredging the North Fork Pine Creek Arm

Open Water (lake) - Initially, 33 acres of lake habitat in the North Fork Pine Creek arm would become highly complex and would score 7 on the SI. SI after 15 years would remain at 7. At 30 years, sediment deposition would yield a SI of 6, and at 50 years the SI would be 5. Area of open water in North Fork Pine Creek would remain at 33 acres throughout the entire 50 year evaluation period.

Over time, sediment deposition in the Pine Creek arm would result in loss of quality and amount of open water at the same rate as in the FWOPC. Acreage of open water habitat would continue to decline from initial amounts (14 acres) to 7 at 15 years and 0 at 30 and 50 years due to wetland formation progressing from upstream to downstream.

Initial SI for the 14 acre Pine Creek arm of the lake would be 2. At 15, 30, and 50 years the SI would decline to 1 in the Pine Creek arm as sediment would continue to degrade conditions in this area. Sediments entering from both arms of the lake would continue to accumulate in the 16 acre area in front of the dam and would result in decreased depth in this area. Initial and 15 year SI would be 3, whereas this would degrade to an SI of 2 at 15 years and 1 at 30 and 50 years, respectively.

SF for Pine Creek Lake is 2 due to its importance as a local resource. SF would be expected to increase to 3 (State/Tribal) initially and at 15 years. Due to sediment accumulation, SF would be 2 at 30 and 50 years. The initial increase in SF would occur as high quality warm water lakes are relatively uncommon in western Pennsylvania. However, because the lake habitat would steadily degrade, its importance would also decline.

Emergent wetland – Under this alternative, wetlands in the Pine Creek arm would not be affected. Wetland conditions would be the same as under the FWOPC and are summarized as follows. Initial estimate of emergent wetland in the Pine Creek arm is 6 acres. Over time, the total amount of emergent wetland is expected to remain relatively constant. However, the area of emergent wetland will be constantly moving in downstream and lateral directions as these are replaced by scrub/shrub wetlands. Under this alternative no emergent wetlands would form in North Fork Pine Creek.

Initial SI of emergent wetlands is 3. Because these are relatively short lived and in continuous transition, SI is expected to remain at 3 at 15, 30, and 50 years. SF of emergent wetlands is 2 (Local). This SF is expected to remain constant at all time intervals.

Scrub/shrub wetland – It is estimated that emergent wetlands will convert to scrub/shrub wetlands at a rate equivalent to 0.05 acres/year or 1 acre/20 years. It is also estimated that scrub/shrub wetlands will mature into forested wetlands at a rate equivalent to 0.03 acres per year or 1 acre/30 years. Using these rates, initial estimates of 6 acres of scrub/shrub wetlands in the Pine Creek arm would change to 6.5 acres at 15 years, 7.0 acres at 30 years, and 7.5 acres at 50 years. Under this alternative no scrub/shrub wetlands would form in North Fork Pine Creek.

SI of scrub/scrub wetlands in the Pine Creek arm is estimated to be 5 initially. As these develop and mature it is estimated that SI will be 6, 6, and 7 at 15, 30, and 50 years, respectively. SF of scrub/shrub wetlands is 3 (State/Tribal) as these have become rare throughout Pennsylvania and are important components of aquatic ecosystems. SF will remain at this level at all time intervals.

Forested Wetlands – Initial forested wetland presence is 2 acres in the Pine Creek arm of North Park Lake. Based on habitat development rates discussed above, it is projected that there will be 2.5 acres at 15 years, 3.0 acres at 30 years, and 3.67 acres at 50 years. Under this alternative no forested wetlands would form in North Fork Pine Creek.

Initial SI of forested wetlands is 6. At 15 years SI will be 6, while at 30 and 50 years it is projected to be 7 and 8, respectively. These improvements in habitat quality are based on maturation and increased productivity as trees age. SF of forested wetlands initially is 3 (State/Tribal). At 15 years it is expected to remain at 3, whereas, at 30 and 50 years, SF is projected to increase to 4 (Regional). These increases in SF are due to anticipated

development pressures throughout Pennsylvania and nearby states. Historically, this development pressure has significantly reduced acreage of forested wetlands.

Upland – Use of the 8.13 Bull Pen site would change from leaf disposal/composting to disposal of excavated material. The existing layer of asphalt would be removed prior to disposal. Use of the entire site for disposal of 104,000 CY would allow placement of material to an average depth of 7.9 feet. Initial SI of 1 is expected to improve to 3 at 15 years, 6 at 30 years, and 7 at 50 years. SF of the Bull Pen site is 1 (Common) and is not expected to change during the period of evaluation.

The County site would not be used for disposal under this alternative. Therefore site conditions would be the same as in the FWOPC. The 3.16 acres would continue to be mowed periodically to maintain an appearance consistent with a park setting. SI would be 1 at all time intervals. SF of the County site is 1 (Common) and is not expected to change during the period of evaluation.

5.8 Cost of Each Alternative

In addition to projection of ecosystem outputs (benefits) of each alternative, costs must be estimated as input to the analysis. To focus the analysis on distinctions among alternatives, only construction costs are used for this purpose. Other costs such as feasibility study, preconstruction engineering design, and real estate are essentially the same for each of the action alternatives and were not included in the Cost Effectiveness/Incremental Cost Analysis for North Park Lake. Table 5-2 displays average annual construction and average annual maintenance costs for each alternative. Construction costs differ among alternatives due to differences in quantity of material to be removed under each. For a discussion of annual maintenance costs see Section 6.6.

Table 5-2 - Average Annual Construction Costs North Park Lake, October, 2007

Alternative	AV Annual Construction Cost ($000s)	AV Annual O&M Costs ($000s)
No Action	0	0
Alt 5	53	5.84
Alt 6	68	5.84
Alt 7	57	5.84

5.9 Method for Cost Effectiveness/Incremental Cost Analysis

The Corps of Engineers' Institute for Water Resources has developed procedures and software to assist in conducting Cost Effectiveness/Incremental Cost Analysis. One of these procedures was selected for use on the North Park Lake project. The procedure and packaged software is known as IWR-Plan. Although the analysis could have been performed by other methods, IWR-Plan is readily available and is generally accepted throughout the Corps of Engineers.

As described in Section 5.6, outputs for each evaluation period were determined using the standard LRD method. After quantity, quality, and significance are scored, the product of these three scores is expressed as a Standard Output Unit. Prior to input of data to the software, average annual outputs were determined. This was done by averaging outputs of the initial evaluation time frame (2010) with the 15 year (2025) evaluation time frame and multiplying that value by 15. Similarly, the 15 year time frame was averaged with the 30 year time frame, and the 30 year time frame was averaged with the 50 year time frame. Each of those values was then multiplied by the number of years within each time frame. These three values were summed and the total was divided by 50 (years in the evaluation period) to arrive at an average annual output estimate.

Because of the way the IWR-Plan software accepts input variables, average annual net benefits was used as model input. This was the difference between average annual SOU of the No Action alternative and average annual SOU of each Action alternative.

5.10 Results of Cost Effectiveness/Incremental Cost Analysis

Details on scoring of quantity, quality, and significance of the No Action and three Action alternatives are in Table 5-3. Table 5-3 also shows average annual outputs (benefits) of each alternative. Table 5-4 provides results of the Cost Effectiveness/Incremental Cost Analysis of the North Park Lake alternatives. In using the IWR-Plan software, the No Action alternative is always determined to be a best buy alternative, as there are no incremental costs attributed to the No Action alternative. Conversely, there are no incremental benefits from the No Action alternative.

Of the Action alternatives, Alternative 5 (excavate Pine Creek Arm) was determined to be cost effective. Alternative 6 (excavate the Near Dam Area) was not found to be cost effective. Alternative 7 (excavate the North Fork Pine Creek Arm) was found to be a "Best Buy" plan. Alternative 7 costs nearly the same as Alternative 6, but it produces nearly 3 times the average annual benefits. Alternative 5 is less costly than either Alternatives 6 or 7. However, Alternative 7 produces over 2.6 times the benefits as Alternative 5.

Average annual costs ($000s) per average annual SOU was:

- $0.0 for the No Action Alternative
- $0.82 for Alternative 5
- $1.00 for Alternative 6
- $0.34 for Alternative 7

5.11 Summary of Results

Evaluation criteria of acceptability, completeness, effectiveness, and efficiency were applied throughout the course of the study. Action alternatives that failed to satisfy all of these criteria were screened out of consideration during preliminary evaluations. Remaining action alternatives (5, 6, and 7) were carried forward for detailed evaluation.

Alternative 6 was eliminated as not being Cost Effective. Alternative 5 was found to be Cost Effective but was less so than Alternative 7. Therefore, after application of all four evaluation criteria, Alternative 7 (excavate the North Fork Pine Creek Arm of North Park Lake) was determined to best satisfy planning objectives of the study.

Table 5-3 - Scoring of Metrics for Each Alternative

ALTERNATIVE	INITIAL AREA ACRES	15 YEAR AREA	30 YEAR AREA	50 YEAR AREA	INITIAL SI	15 YEAR SI	30 YEAR SI	50 YEAR SI	INITIAL SF	15 YEAR SF	30 YEAR SF	50 YEAR SF	INITIAL SOU	15 YEAR SOU	30 YEAR SOU	50 YEAR SOU	AVERAGE ANNUAL BENEFITS
ALT 1 - FWOPC																	
PINE CREEK ARM	14	7	0	0	2	1	1	1	2	2	2	2	56	14	0	0	
NEAR DAM AREA	16	16	16	16	3	2	1	1	2	2	2	2	96	64	32	32	
N F PINE CREEK ARM	33	31	28	23	2	1	1	1	2	2	2	2	132	62	56	46	
EMERGENT WETLANDS - PC	6	6	6	6	3	3	3	3	2	2	2	2	36	36	36	36	
SCRUB/SHRUB WETLANDS - PC	6	6.5	7	7.5	5	6	6	7	3	3	3	3	90	117	126	157.5	
FORESTED WETLANDS - PC	2	2.5	3	3.67	6	6	7	8	3	3	4	4	36	45	84	117.44	
EMERGENT WETLANDS - NFPC	0	2	6	6	3	3	3	3	2	2	2	2	0	12	36	36	
SCRUB/SHRUB WETLANDS - NFPC	0	0	1	6	5	6	6	7	3	3	3	3	0	0	18	126	
FORESTED WETLANDS - NFPC	0	0	0	1	6	6	7	8	3	3	4	4	0	0	0	32	
BULL PEN	8.13	8.13	8.13	8.13	1	1	1	1	1	1	1	1	8.13	8.13	8.13	8.13	
COUNTY	3.6	3.6	3.6	3.6	1	1	1	1	1	1	1	1	3.6	3.6	3.6	3.6	
TOTAL													457.73	361.73	399.73	594.67	436.018

	INITIAL AREA	15 YEAR AREA	30 YEAR AREA	50 YEAR AREA	INITIAL SI	15 YEAR SI	30 YEAR SI	50 YEAR SI	INITIAL SF	15 YEAR SF	30 YEAR SF	50 YEAR SF	INITIAL SOU	15 YEAR SOU	30 YEAR SOU	50 YEAR SOU	AVERAGE ANNUAL BENEFITS
ALTERNATIVE	ACRES																
ALT 5																	
PINE CREEK ARM	14	14	14	14	7	6	3	1	3	2	2	2	294	168	84	28	
NEAR DAM AREA	16	16	16	16	3	2	1	1	3	2	2	2	144	64	32	32	
N F PINE CREEK ARM	33	31	28	23	2	1	1	1	3	2	2	2	198	62	56	46	
EMERGENT WETLANDS - PC	6	4.75	3.25	2	3	3	3	3	2	2	2	2	36	28.5	19.5	12	
SCRUB/SHRUB WETLANDS - PC	6	6.5	7	7.5	5	6	6	7	3	3	3	3	90	117	126	157.5	
FORESTED WETLANDS - PC	2	2.5	3	3.5	6	6	7	8	3	3	4	4	36	45	84	112	
EMREGENT WETLANDS - NFPC	0	2	6	6	3	3	3	3	2	2	2	2	0	12	36	36	
SCRUB/SHRUB WETLANDS - NFPC	0	0	1	6	5	6	6	7	3	3	3	3	0	0	18	126	
FORESTED WETLANDS - NFPC	0	0	0	1	6	6	7	8	3	3	4	4	0	0	0	32	
BULL PEN	8.13	8.13	8.13	8.13	1	3	6	7	1	1	1	1	8.13	24.39	48.78	56.91	
COUNTY	3.6	3.6	3.6	3.6	1	1	1	1	1	1	1	1	3.6	3.6	3.6	3.6	
TOTAL													809.73	524.49	507.88	642.01	584.9665

ALTERNATIVE	INITIAL AREA ACRES	15 YEAR AREA	30 YEAR AREA	50 YEAR AREA	INITIAL SI	15 YEAR SI	30 YEAR SI	50 YEAR SI	INITIAL SF	15 YEAR SF	30 YEAR SF	50 YEAR SF	INITIAL SOU	15 YEAR SOU	30 YEAR SOU	50 YEAR SOU	AVERAGE ANNUAL BENEFITS
ALT 6																	
PINE CREEK ARM	14	8	4	0	2	3	1	1	3	2	2	2	84	48	8	0	
NEAR DAM AREA	16	16	16	16	7	4	3	2	3	2	2	2	336	128	96	64	
N F PINE CREEK ARM	33	31	28	23	2	3	1	1	3	2	2	2	198	186	56	46	
EMERGENT WETLANDS - PC	6	6	5	3	3	3	3	3	2	2	2	2	36	36	30	18	
SCRUB/SHRUB WETLANDS - PC	6	6.5	7	7.5	5	6	6	7	3	3	3	3	90	117	126	157.5	
FORESTED WETLANDS - PC	2	2.5	3	3.67	6	6	7	8	3	3	4	4	36	45	84	117.44	
EMERGENT WETLANDS - NFPC	0	2	6	6	3	3	3	3	2	2	2	2	0	12	36	36	
SCRUB/SHRUB WETLANDS - NFPC	0	0	1	6	5	6	6	7	3	3	3	3	0	0	18	126	
FORESTED WETLANDS - NFPC	0	0	0	1	6	6	7	8	3	3	4	4	0	0	0	32	
BULL PEN	8.13	8.13	8.13	8.13	1	3	6	7	1	1	1	1					
COUNTY	3.6	3.6	3.6	3.6	1	1	1	1	1	1	1	1	3.6	3.6	3.6	3.6	
TOTAL													780	572	454	596.94	566.888

	INITIAL AREA	15 YEAR AREA	30 YEAR AREA	50 YEAR AREA	INITIAL SI	15 YEAR SI	30 YEAR SI	50 YEAR SI	INITIAL SF	15 YEAR SF	30 YEAR SF	50 YEAR SF	INITIAL SOU	15 YEAR SOU	30 YEAR SOU	50 YEAR SOU	AVERAGE ANNUAL BENEFITS
ALTERNATIVE	ACRES																
ALT 7																	
PINE CREEK ARM	14	7	0	0	2	1	1	1	3	3	2	2	84	21	0	0	
NEAR DAM AREA	16	16	16	16	3	2	1	1	3	3	2	2	144	96	32	32	
N F PINE CREEK ARM	33	33	33	33	7	7	6	5	3	3	2	2	693	693	396	330	
EMERGENT WETLANDS	6	6	6	6	3	3	3	3	2	2	2	2	36	36	36	36	
SCRUB/SHRUB WETLANDS	6	6.5	7	7.5	5	6	6	7	3	3	3	3	90	117	126	157.5	
FORESTED WETLANDS	2	2.5	3	3.67	6	6	7	8	3	3	4	4	36	45	84	117.44	
EMERGENT WETLANDS - NFPC	0	0	0	0	3	3	3	3	2	2	2	2	0	0	0	0	
SCRUB/SHRUB WETLANDS - NFPC	0	0	0	0	5	6	6	7	3	3	3	3	0	0	0	0	
FORESTED WETLANDS - NFPC	0	0	0	0	6	6	7	8	3	3	4	4	0	0	0	0	
BULL PEN	8.13	8.13	8.13	8.13	1	3	6	7	1	1	1	1					
COUNTY	3.6	3.6	3.6	3.6	1	1	1	1	1	1	1	1	3.6	3.6	3.6	3.6	
TOTAL													1086.6	1011.6	677.6	676.54	838.938

Table 5-4 - Results of Cost Effectiveness/Incremental Cost Analysis

ALTERNATIVE	AVERAGE ANNUAL BENEFITS	NET AVERAGE ANNUAL BENEFITS	AVERAGE ANNUAL 1st COSTS ($000s)	AVERAGE ANNUAL MAINT COSTS ($000S)	AVERAGE ANNUAL COSTS ($000S)	COST/SOU ($000)	CE/ICA RESULTS
ALT 1	436.018	0	0	0	0	$0.00	BEST BUY
ALT 5	584.9665	148.9485	53	5.84	58.84	$0.40	COST EFFECTIVE
ALT 6	566.888	130.87	68	5.84	73.84	$0.56	NOT COST EFFECTIVE
ALT 7	838.938	402.92	57	5.84	62.84	$0.16	BEST BUY

6.0 DESCRIPTION OF ALTERNATIVE 7 – THE NER PLAN

6.1 Plan Description

The information presented below supplements the data on Alternative 7, dredging the Pine Creek North Fork arm of the lake.

6.1.1 Mechanical Sediment Removal, Placement, and Heavy Equipment

The lake will be completely drained using the outlet valve near the spillway. Once the lake is drained, access roads will be constructed to the lake to allow machinery to enter and exit the lake at the access areas previously described in this report. The decision to use the access areas identified will be up to the individual contractor who ultimately bids successfully on the job. It is anticipated that low-pressure, crawler (track mounted) hydraulic excavators similar to the one pictured to the left, will be used to remove the sediment from the lake bottom. The contractor will probably start from the shallow end of the lake above the boat house and move in a downstream direction to permit the deeper areas of the lake to dry while the more shallow areas are excavated.

The excavators will directly load tri-axel dump trucks with sediment. Track mounted dozers similar to the one pictured at the right would then be used to rough grade the lake bottom after the excavators remove the sediment.

Under the NER Plan, approximately 104,000 cubic yards of sediment will be removed from the lake. All of the dredged material can be placed in the Bull Pen site. However, the decision as to what sediment placement sites will be used will be up to the Contractor. Sediment will be trucked to these sites via the routes described previously in this report. The sediment will be placed on these sites and worked with a bulldozer to dry it and spread it evenly in 6 to 12 inch lifts. Each lift or layer would then be compacted by the use of a sheep's foot roller similar to the one

shown in the photo to the right. These could be either self propelled or static (pulled by a tractor) as shown in the photograph.

6.1.2 Road Modifications and Safety Precautions

To reduce truck travel time and maintain public safety during construction, traffic flow within the park will be modified in conjunction with the posting of signage, placement of temporary stop lights and deployment of flagmen at key intersections and truck access points.

Because of the frequency of truck traffic anticipated during active construction flagmen or self activating traffic signals will be placed at each access points along Lake Shore Drive, and Pierce Mill Road. Traffic control will be located at the Mars, Point, Rosebarn, and Pierce Mill Road equipment laydown and access areas around the lake as well as along South Ridge Road at the southern boundary of the park near the Round Top Picnic Grove adjacent to the Wildwood sediment placement area (if this site will be used by the contractor). In addition some roads or portions of roads may be blocked entirely to public access or may allow limited access depending upon safety concerns. Concrete Jersey barriers may also be installed on highly traveled roads to keep truck traffic separate. Traffic patterns and direction of traffic flow in the park may also be modified temporarily during construction. Specific traffic planning details will be developed during the Plans and Specifications phase of the project in coordination with the County and Penn DOT .

6.1.3 Daily Operating Schedule

To run machinery in a cost effective manner means that heavy equipment will run at least 10 hours per day. It is anticipated that the contractor will run his equipment from 7:00 AM until at least 5 PM or longer each work day or as long as lighting conditions permit.

6.1.4 Public Safety Precautions

Where there is defined access such as at piers and walkways and construction access, measures, such as erecting orange safety fencing, placing warning signs and putting up construction taping, will be implemented to restrict public access to help avoid encountering unsafe conditions.

6.1.5 Wetlands Creation/Enhancement and Protection

6.1.5.1 Wetlands Creation/Enhancement

The proposed plan would enhance existing wetlands and create additional wetland acreage within North Park. The Corps has suggested to the local sponsor that the regularly mowed, low-lying lands bordering the left descending bank of the North Fork of Pine Creek should be allowed to revegetate naturally. The diversity and productivity of these degraded wetlands would dramatically increase by allowing the growth of a more diverse wetland plant community. APPENDIX 10 contains more specific detail on

the creation of these wetlands.

6.1.5.2 COIR Logs

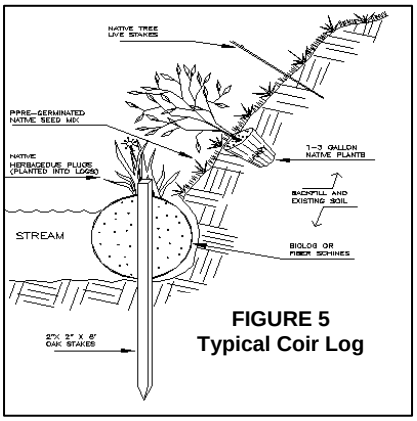


FIGURE 5
Typical Coir Log

Coir logs will be installed along the shoreline of the lake to reduce shoreline erosion and restore wetland vegetation where currently there is bare or nearly bare shoreline. PLATE 5-20 of APPENDIX 5 shows the location of coir logs that will be placed at the shoreline. The coir logs will be placed on the lake bottom in very shallow water. The coir log is about 12 inches in diameter, and half of it will extend above the water line. The logs will be held in place using wooden stakes pounded into the lakebed on both sides of the log. Then a natural rope, such as sisal, is tied between the wooden stakes to stabilize the log. Wetland plants are then planted within the coir log. Over time the wetland plants will establish and the coir log will deteriorate so that only wetland plants will remain. A simple diagram of a staked coir log placed at the toe of a bank is shown in FIGURE 5 above.

APPENDIX 10 also contains more detail on wetland enhancement through placing and planting coir logs. (Note the APPENDIX uses 5,000 feet of coir logs. Since this APPENDIX was created, the proposed length of coir logs has been reduced because the project no longer will affect the entire lake, only the North Fork Pine Creek arm.

6.1.6 Creation of Fish and Benthic Habitat

PLATE 5-21 of APPENDIX 5 shows schematically, in plan view, the placement of individual mixed stone rock piles, rock humps, and porcupine cribs on the lake bottom that will create usable fish habitat after the lake is dredged. The PLATE shows the arrangement of these structures along the various contours of the lake.

6.1.6.1 Mixed Stone Rock Piles and Rock Humps

The mixed stone rock piles will consist of nine, 20-ton piles placed in deep water near the dam. Rock humps will be consist of 1 to 2 tons of rock spaced at 20 ft intervals at the four and seven-foot lake bottom contours. Rock piles will be placed on the lake bottom. As shown on PLATE 5-21 these will be placed throughout the lake and together will provide excellent aquatic habitat for both fish and benthic macrovinertebrates. Both of these structures will last indefinitely as long as they don't silt in. They will be placed in the dry by dump truck after the lake is dredged.

6.1.6.2 Porcupine Cribs

Porcupine cribs and porcupine crib juniors will be placed at the eight to ten-foot deep lake bottom contour in groups of 5-6 in the form of open circles as recommended by the Pennsylvania Fish and Boat Commission.. These will be placed in conjunction with the base of the dam breast, drop-offs, benches, points, islands, overhanging trees, rubble humps etc. For accurate placement, these fish habitat structures will be constructed in the dry while the lake is still down and after the sediment has been removed. The cribs could also be placed in the wet, however the accuracy of placement is comprised. Several photographs of porcupine cribs being placed in a reservoir in the dry and by boat are shown in APPENDIX 3.

6.1.7 Miscellaneous Habitat Creation

As noted in Section 3.7.7 two osprey nesting platforms will be constructed, one on each arm of North Park Lake. For construction details see Section 3.7.7.

In addition to the aquatic habitat features described above in Section 6.1.6, the District will be placing gravel in several locations primarily as part of the access ramp construction activities. The gravel from these access ramps located beneath the surface of the lake could be left to provide additional habitat for fish and benthic macroinvertebrates. This will help reduce construction costs and at the same time increase bottom habitat value.

6.1.8 Sediment Placement Area Construction and Management

The final treatment of the sediment placement areas will consist of final grading and surface modifications to improve its value for the establishment of vegetation and for wildlife. Native vegetation will be selected and planted in cooperation with the local sponsor as noted in Section 3.7.6. APPENDIX 9 contains suggested disposal site treatment options to increase the habitat value of the placement areas. The likely placement site will be the 8.13 acre Bull Pen site. Should the Wildwood site be used the 104,000 cubic yards would likely be placed on approximately 5 acres of the site. The County site is limited to 3.6 acres.

6.2 Plan Implementation

Upon approval of this report by higher authority, the next phase of the project, Plans and Specifications, will be initiated. Once this phase of work is completed and all required state permits are obtained, a contact bid package will be advertised. Once a contactor's bid is selected, the contract will be awarded. Actual construction would then commence within 90 days after contract award. See Table 8 for estimated schedule.

6.3 Monitoring

Monitoring will have to be done by the local sponsor after project construction is completed. Most of this monitoring will involve inspecting the sediment placement and

wetland areas to observe whether planted vegetation survives. As time progresses and vegetation establishes, the need for monitoring will diminish.

6.4 Real Estate

6.4.1 Work Area Access and Easements

Access to the lake will be accomplished on existing park/public roads. The Local Sponsor, Allegheny County owns all of the land needed for access to the lake and for work in the lake. A total of 61.29 acres of temporary work area is located in the lakebed and will be used for dredging of the lake. A total of 26.15 acres of temporary work area easements will be required for a disposal site, staging, and support areas. For details regarding acreage and the type of easements required to implement the project see the Real Estate Plan, APPENDIX 6.

6.5 Total Project Cost

TABLE 7 provides a brief summary breakdown of the total project cost to implement the NER Plan (100% sediment removal from the North Fork Pine Creek arm). The total cost is the cost to construct the project as of October 2007. The fully funded cost is based upon adjustments for inflation over the length of the entire design and construction effort.

TABLE 7 – Total Project Costs and
Fully Funded Cost Breakdown
October 2007

Account No. and Description	**Total Project Cost (Includes Contingencies)**	**Fully Funded Cost Level**
01- Lands and Damages	$132,000	$134,000
12 – Dredging (100%)	$2,811,000	$3,230,000
22 – DPR Sunk Costs	$1,050,000	$1,050,000
30 - Planning, Engineering and Design	$284,000	$326,000
31 - Construction Management	$213,000	$244,000
Total	**$4,490,000**	**$4,984,000**

The construction cost estimate shown above, including appropriate contingencies, has been developed using the MCACES software and is in conformance with the Civil Works Breakdown Structure (CWBS). The unit prices for the construction features have been calculated by estimating the equipment, labor, material, and production rates suitable for the project being developed. A more detailed breakdown is contained in APPENDIX 4 (Project Cost Estimate). The project cost estimate includes costs for code of accounts 01

Lands and Damages; 12 Dredging; 22 DPR sunk costs (costs to date for the DPR); 30 Planning, Engineering and Design; and 31 Construction Management. The actual construction costs are based on October 2007 prices for plant, labor, materials and supplies. The other costs associated with the project are based upon cost information furnished by the appropriate functional areas.

6.6 Operation and Maintenance Requirements

As required under the Section 206 program, the operation and maintenance of the project after construction is completed is a 100 percent local responsibility.

Initial maintenance costs will be associated with possible re-grading and re-seeding any portions of the access, staging and disposal areas that may have eroded due to the failure of vegetation to establish. In addition, any wetland plantings that initially fail would have to be re-planted. Because the lake area is heavily used, maintenance may be required to replant or replace any Coir logs that may be damaged by fisherman attempting to cross them to access the lake.

The District estimates that some of the planted vegetation will fail, but that after two growing seasons, it should be well established. It is estimated that after the first season replanting vegetation will cost approximately $19,000 and after the second year vegetation replanting will cost $9,000. Thereafter the need for vegetation re-planting should be minimal.

We expect some of the linear wetlands planted along the shoreline using Coir logs will need replaced should signage or other information provided by the County fail to keep fisherman from damaging them and the wetland vegetation they support. It is estimated that approximately 100 feet of Coir log will need to be replaced yearly at a cost of $5,500 per year. Combined with the cost to replant vegetation the first two years, the annualized over 50 years cost works out to be approximately $5,840 per year.

6.7 Preliminary Schedule of Future Efforts to Reach Construction

Table 8 below provides a preliminary schedule of the major milestones that need to be met to complete the project.

TABLE 8 - North Park Lake Ecosystem Restoration
Project Milestones
Plans & Specifications and Construction Phases

Milestone	Duration	Begin	End
DPR Approval	3 Months	Jan 2008	Mar 2008
Plans & Specs	12 Months *	Apr 2008	Mar 2009
PCA drafting & execution	5 Months	Jan 2009	May 2009
Issue P&S and Advertise Contract	3 Months	Jun 2009	Aug 2009
Award Contract	1 Month	Sep 2009	Sep 2009
Construction	12 Months	Oct 2009	Sep 2010

*Includes review time

7.0 STATUS OF ENVIRONMENTAL COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES

Table 9 below lists the Federal Statutes with which the Corps of Engineers must comply.

TABLE 9 – Compliance With Federal Statutes

FEDERAL STATUTES	No-action	Recommended Plan
Archeological and Historic Preservation Act as amended, 16 U.S.C. 469, et seq.	FC	FC
Clean Air Act as amended, 42 U.S.C. 7401, et seq.	FC	FC
Clean Water Act (Federal Water Pollution Control Act) as amended, 336 U.S.C. 1251, et seq.	FC	FC*
Endangered Species Act as amended, 16 U.S.C. 1531, et seq.	FC	FC
Federal Water Project Recreation Act as amended, 16 U.S.C. 406-1 (12), et seq.	FC	FC
Fish and Wildlife Coordination Act as amended, 16 U.S.C. 661, et seq.	FC	FC

Land and Water Conservation Fund Act as amended, 16 U.S.C. 4601-4601-11, et seq.	FC	FC
National Environmental Policy Act as amended, 42 U.S.C. 4321, et seq.	FC	FC**
National Historic Preservation Act as amended, 16 U.S.C. 470a, et seq.	FC	FC
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	FC	FC
Rivers and Harbors Act, 91 U.S.C. 122, et seq.	FC	FC
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	FC	FC
Wild and Scenic Rivers Act as amended, 16 U.S.C. 1271, et seq.	NA	NA
EXECUTIVE ORDERS, MEMORANDA, ETC.		
Floodplain Management (E.O. 11988)	FC	FC
Protection of Wetlands (E.O. 11990)	FC	FC
Protection of Children (E.O. 13045)	FC	FC
Environmental Justice in Minority Populations and Low-Income Populations (E.O.12898)	FC	FC
Analysis of Impacts on Prime and Unique Farmland	FC	FC
State And Local Policies	FC	FC

FC - full compliance; NA - not applicable
***Full compliance achieved when the District receives Section 401 Water Quality Certification from the Commonwealth of PA**
****Full compliance achieved after the District Engineer signs the FONSI.**

To meet the requirements of Section 404 of the Clean Water Act, the District has prepared a Section 404(b)(1) evaluation which considers the effects of the discharge of fill materials, i.e. the stone for the wetland protection dike and downstream rock filter, wood used to construct porcupine cribs, and the movement of sediment on the lake bottom during excavation. See APPENDIX 11. The requirements of the Fish and Wildlife Coordination Act and Section 7 of the Endangered Species Act have been met through District communications with the US Fish and Wildlife Service Field office located in State College, PA. The Service elected to not participate in the project stating that it would benefit the environment without causing adverse environmental effects. (SEE APPENDIX 1 Memo of a telephone conversation with the field office). The Service also stated in a letter dated June 6, 2006 that the project would not impact any Federally listed endangered or threatened species or their habitat. See APPENDIX 1. The requirements of Section 106 of the National Historic Preservation Act have been fulfilled by the Districts coordination with the Pennsylvania State Historic Preservation Officer and the consideration of the effects of the project on extant cultural resources.

8.0 LIST OF PREPARERS

The following Corps of Engineers team members participated in the development of this Section 206 ecosystem restoration project:

Kathleen Anderson - (Project Management)
Mike Fowles – Operations Division - Wildlife Specialist
Tom Swor - (Contractor – Former Corps Employee)
Jim Kosky – Technical Services Division -Hydraulics and Hydrology
Rose Reilly – Technical Services Division – Water Quality
Robert Waigand – Technical Services Division – Cost Engineering
Jim Kelly – Technical Services Division - Real Estate
Paula Boren – Technical Services Division – Cost Engineering
Larry Moskovitz – Planning and Environmental Branch

Jeff Horneman – (Former District Employee)
Gary Cooper - (Former District Employee)
Craig Carney – (Former District Employee)
Kirk Piehler – (Former District Employee)
Paul Donahue – (Former District Employee)
Gerald Barczyk – (Former District Employee)
Dilip Kothari – (Former District Employee)
Carmen Rozzi – (Former District Employee)

In addition, representatives of the local sponsor, Allegheny County, provided invaluable input to the genesis and final development of the proposed project:

Tom Donatelli, P.E. – Allegheny County, Director of Public Works
Gene Vaskov, P.E. – Allegheny County, Manager, Geotechnical Division
Andrew Baechle – Allegheny County, Director of Parks and Recreation
Rich Nagel – (Former Employee) Allegheny County, Parks and Recreation

9.0 Independent Technical Review

According to the Pittsburgh District's Quality Management Plan, an independent technical review of all District products is required. Accordingly, an independent technical review (ITR) team headed by a Regional Technical Specialist (RTS) from another District to avoid bias was assembled to review the report and provide comments and corrections where required. Comments on the report were made using "Dr. Checks" software. Copies of the comments and how they were satisfactorily addressed are on file in the Pittsburgh District office.

10.0 Public Involvement

The District has coordinated extensively with its local sponsor in the development of this project. During preparation of this DPR and Environmental Assessment, the District coordinated with the U.S. Fish and Wildlife Service, The U.S. Natural Resources Conservation Service, Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Department of Environmental Protection, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, and the Pennsylvania State Historic Preservation Office. In addition an evening public meeting was held in February 2003 at North Park to brief the public about the project.

In 2006, as part of the review process, the interested Federal, state and local government agencies listed below as well as interested citizens and citizens groups were given copies of a draft report and environmental assessment in computer disc (CD) format for a 30-day review period:

U. S. Fish and Wildlife Service
U. S. Environmental Protection Agency
U.S Department of Agriculture, Natural Resources Conservation Service
Pennsylvania Department of Environmental Protection
Pennsylvania Fish and Boat Commission
Pennsylvania State Historic Preservation Office
Pennsylvania Game Commission
Pennsylvania Department of Transportation
Pennsylvania Department of Conservation and Natural Resources
Allegheny County
Allegheny County Sanitary Authority
Libraries
- Carnegie Library of Pittsburgh – Main Branch – Oakland
- Northland Public Library – 300 Cumberland Road, North Hills

Interested citizens who submitted comments to the District as the report was being developed

Copies of all comments received during the 30 day review period, and the District's responses are contained in APPENDIX 12.
Because the recommended plan is simply a reduced version of the plan described in 2006 the Corps determined that recirculation of a draft report for public review would not be necessary. See APPENDIX 13.

11.0 Conclusions

This ecosystem restoration report and its attendant appendices have presented an in-depth analysis of existing conditions at North Park Lake. To restore the habitat that has been severely degraded by decades of sedimentation stemming from extensive suburban development will require radical ecosystem treatment. The treatment options carefully

considered in this report, if implemented, will restore aquatic habitat and improve the overall ecological, recreational, and aesthetic characteristics of the lake.

12.0 Recommendations

Alternative 7, the NER plan, which is also the locally preferred plan, as presented in this report is the most cost effective alternative that produces maximum benefits for the least cost. Having considered the biological deficiencies of North Park Lake, the District recommends approval of this Feasibility Study and Integrated EA in order to allow the NER plan described herein to move into the next phases, Plans and Specifications and Construction.

Note: The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Continuing Authorities construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are submitted as proposals for implementation funding. The sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

12-21-07

Date

Michael P. Crall
Colonel, Corps of Engineers
District Engineer

Finding of No Significant Impact

Detailed Project Report and Integrated Environmental Assessment
North Park Lake
Section 206
Aquatic Ecosystem Restoration Project

The Pittsburgh District is proposing to restore the open water habitat of North Park Lake that has been severely degraded by sedimentation. This ecosystem restoration project is being conducted under the authority of Section 206 of the Water Resources Development Act of 1996 (WRDA '96), Public Law 104-303.

Since the lake was constructed in the late 1930's it has lost over half its depth due to sedimentation resulting from uncontrolled development that occurred in the Pine Creek basin from the 1940's through the 1990's. Sedimentation has effectively eliminated 12 acres of open water habitat and degraded the remaining lentic habitat within the lake.

In the late summer of 2006, the Pittsburgh District prepared and circulated an Environmental Assessment of the Proposed Action, which was integrated within a Detailed Project Report to meet the requirements of the National Environmental Policy Act. Consultations were undertaken with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act and Fish and Wildlife Coordination Act. The District also coordinated with the Pennsylvania Department of Conservation and Natural Resources to determine potential impacts to state listed species of concern. To fulfill its obligations under Section 106 of the National Historic Preservation Act, this project was coordinated with Pennsylvania Bureau for Historic Preservation, State Historic Preservation Officer, to determine potential impacts to extant cultural resources.

The Detailed Project Report and integrated Environmental Assessment (DPR&EA) presents various alternatives to restore the open water habitat within North Park Lake as well as the no action alternative. Potential impacts were assessed with respect to: public safety, transportation, terrestrial and aquatic habitat, water quality, soils, erosion, air quality, protected species and habitat, demographics, socioeconomics, land use, recreation, cultural resources, environmental justice, aesthetics, and hazardous, toxic, and radioactive contaminants.

Alternative sediment placement areas were examined and analyzed utilizing a Pennsylvania Modified Habitat Evaluation Procedure (PAMHEP) to determine short and long and short-term ecosystem impacts. The sites recommended for sediment placement include a partially asphalt-paved field, (Bull Pen site), a former sediment placement area (County site) and a reclaimed coalmine waste (gob) pile (Wildwood site). The PAM HEP study determined that the use of these sites would in the long term be beneficial and would ultimately increase their habitat value after vegetation is re-established.

To minimize impacts to Pine Creek downstream of North Park Lake during construction, the District will construct a rock filter downstream of the dam to trap sediment. Normal average flows entering the reservoir will be discharged through the gate. For higher than average flows, discharges will be made through the gate, and pumps will discharge flows over the spillway up to near bank-full capacity downstream. For even higher flows, such as during extreme flood events, water will be stored behind the dam and released through the gate in a controlled manner. During all of these events, the rock filter will help minimize downstream sedimentation. During the preparation of Plans and Specifications, additional studies will be made to more accurately define how excess flows will be handled during construction. The District will coordinate this information with the State to help ensure that discharges are controlled to minimize the chances for downstream flooding.

The primary concern identified in the report is public safety and traffic disruption in and around the park during construction. Trucks will have to travel through the park and on local roads to reach the sediment placement areas. To minimize the danger to pedestrian and vehicular traffic, actions will be taken to close portions of local roads to through traffic, separate trucks from public traffic, place traffic lights and signage and or post flagmen where necessary at dangerous intersections. The installation of all appropriate traffic controls will be closely coordinated with Allegheny County and Penn Dot.

The 2006 DPR&EA proposed removing approximately 400,000 cubic yards of sediment from the lake bed to original contours. Due to cost overruns, the project was reformulated in 2007 and reduced in scope to fall within the Section 206 program cost limits. Instead of dredging 400,000 cubic yards of sediment from the entire lake bottom, the Corps will reduce the footprint of the project and remove approximately 104,000 cubic yards of sediment from a 33 acres portion of the lake down to original lake bottom contours.

The method of dredging and project features described in the earlier DPR&EA remains the same. Because there will be less dredging, the amount of disposal area required will also be reduced. The only major difference between the original plan and the revised plan is the reduced level of dredging.

The revised recommended plan includes the following primary features:

1. Draining the lake and mechanically removing approximately 104,000 CY of nutrient-laden sediment from the North Fork Pine Creek arm of the lake.
2. Trucking all sediment for disposal to the Bull Pen site.
3. Establishing near-shore emergent wetlands in strategic places using COIR logs
4. Placing habitat on the lake bottom in the form of porcupine cribs, and rock rubble piles to increase cover for benthic organisms and fish.
5. Constructing two osprey nesting platforms, one on each arm of North Park Lake. All of the above features were discussed in detail in the original draft report. Because the revised plan is simply a reduced version of the original plan, recirculation of a draft FONSI for public review and comment was determined by the Corps to be unnecessary.

Placement of the physical habitat within the lake and the placement of a rock filter in Pine Creek downstream of the dam to trap sediment is a fill activity that falls under the Clean Water Act. A Section 404(b)(1) evaluation prepared for this work determined that the proposed disposal site for discharge of fill material complies with the Section 404(b)(1) guidelines.

Copies of the 2006 draft report on CD were circulated to various interested federal, state and local agencies and organizations, as well as to interested private citizens. Comments made on the 2006 draft report and the District's responses are included in a separate APPENDIX. Those who commented on the 2006 draft report will also receive a copy of the final revised report in CD format. In addition, a copy of the final report and this FONSI will be placed on the District's Web page for public information.

After having carefully evaluated and balanced all beneficial and detrimental aspects of the action proposed in this environmental assessment, including all regulatory agency input, I have reasonably concluded that the proposed project would not constitute a major Federal action significantly affecting the quality of the human environment because, in accordance with 40 C.F.R. § 1508.13 (1) there will be only limited impacts that will not be significant; (2) the aquatic habitat of North Park Lake would be dramatically improved by eliminating sediment buildup, providing additional cover for fish and benthos, and planting near shore emergent wetland, (3) there will be no significant impacts to ground-water resources, prime farmland, geology, soils, wetland resources, noise and air quality, and riparian habitat; and (4) impact on transportation and traffic near the park will only be temporary. Consequently, the preparation of an environmental impact statement under NEPA is not warranted. The public interest will be best served by the implementation of the proposed action. Further, the proposed work is in compliance with all applicable Federal, State, and local laws and regulations and complies with the Section 404(b)(1) guidelines. There are no unresolved issues regarding environmental compliance and coordination and there are no unresolved environmental issues. This Finding of No Significant Impact precedes the Corps of Engineers final decision on the proposed action.

12-21-07

Date

Michael P. Crall
Colonel, Corps of Engineers
District Engineer