Dixon Run
Indiana County
Pennsylvania

Watershed Plan

And

Environmental Assessment

United States Department of Agriculture
Natural Resources Conservation Service
Indiana County, Pennsylvania

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Watershed Plan and Environmental Assessment
For the
Dixon Run Watershed

Abstract:

The Dixon Run Watershed Plan and Environmental Assessment describes a plan for treating mine drainage discharges to improve water quality and restore aquatic habitat. The project area is located in Indiana County, Pennsylvania. Dixon Run drains into Two Lick Creek, a tributary of Blacklick Creek. Alternative plans developed included No Action and the Recommended Plan. Other alternatives were also considered. The recommended plan is to construct three passive treatment systems to treat acid mine drainage. Economic benefits will exceed the costs. The total cost of the project will be $679,169. The project will improve water quality and restore or enhance aquatic habitat on 3.2 miles of the Dixon Run. Other project benefits include increased property values, enhanced aesthetics, improved recreation potential, diversified wildlife habitat, technology transfer, and enhanced environmental educational opportunities. There are no significant adverse environmental impacts from this project.

Summary of the
Dixon Run
Watershed Plan and Environmental Assessment

Project Name: Dixon Run

County: Indiana
State: PA
Townships: Cherryhill, East Mahoning, Grant, Green, and Rayne
Boroughs: Clymer Borough

Description of the Recommended Plan:

The recommended plan will treat acid mine drainage from several drainage discharge points. Successive Alkalinity Producing Systems (SAPS), Anoxic Limestone Drains (ALD), aerobic wetlands, limestone waterways, settling ponds, addition of alkaline materials to abandoned mine land and revegetation will be used to improve water quality.

Resource Information:

Size of watershed (square miles)	10.0
Land Cover –	6400
Cropland (acres)	1024
Pastureland (acres)	512
Woodland (acres)	3456
Mined Land (acres)	1216
Total stream length including tributaries (miles):	15.1
Prime and important farmland (acres):	630
Wetlands (acres):	17

Cultural Resources: The Pennsylvania Historical and Museum Commission needs to be contacted to determine whether the project area has any archaeological significance. (See Appendix A for the Commission's address)

Project Beneficiary Profile: 1990 Census Data

	Project Area (County)	State	Nation
Per-capita a income	$10,260	$14,068	$14,420
Unemployment	7.7%	6.0%	6.3%
Property Value (median)	$50,400	$69,900	$79,100

Problem Identification:

1. Mine drainage from abandoned coal mines is degrading the quality and quantity of aquatic habitat on the lower 3.2 miles of the Dixon Run.

2. Visual quality and aesthetics on Dixon Run is adversely affected by iron staining.

Objectives:

Return Dixon Run to a productive aesthetically pleasing stream that supports a cold water fishery.

Alternative Plans considered:

No Action
Recommended Plan

Project Purpose:

The purpose of this project is aquatic biology restoration through water quality improvement.

Principal Project Measures:

Successive alkalinity producing systems (SAPS), anoxic limestone drains (ALD), Aerobic wetlands, settling ponds, surface water controls, surface addition of alkaline materials, seeding, and access roads.

Project Costs:

Total Costs: $849,668

Project Benefits:

Total Benefits: $858,165

Other Benefits:

Improved fish habitat, improved educational opportunities and technology transfer, and enhanced recreation.

Environmental Values Changed:

Water Quality-	(+) mine drainage contaminants will be controlled, resulting in stream renovation that will support aquatic life in 3.2 miles of the Dixon Run
Flood Plain-	No effect
Wetlands (acres)-	(+) About 1 acre of wetlands will be created
Fish Habitat-	(+) 3.2 miles of Dixon Run will be restored to support a high quality cold water sport fishery
Threatened and Endangered Species-	The following agencies need to be contacted to determine whether any endangered species exist in the project area (Contact information for each of these agencies can be found in Appendix A). -DCNR Bureau of Forestry -Pennsylvania Game Commission -Pennsylvania Fish and Boat Commission -US Department of the Interior Fish and Wildlife Service
Wild Life Habitat	(+) The project will create approximently 1 acre of wetland and open water that will be productive waterfowl habitat.
Erosion and Sediment	(+) Erosion and sediment will be reduced (-)Earth disturbance during construction may cause a temporary increase in erosion and sedimentation
Flood Prevention-	No effect
Agricultural Water Management:	
Irrigation	No effect
Drainage	No effect
Rural Water Supply	(+) Increase in quality
Important Farmland-	No effect
Recreation-	(+) Increase of 3.2 miles of sport fishery in Dixon Run

Cultural Resources-	The Pennsylvania Historical and Museum Commission needs to be contacted to determine whether the project area has any archaeological significance (see Appendix A for contact information on this agency).
Municipal & Industrial Water-	(+) Any Municipal and Industrial uses of the water downstream of the project area will be benefited by the enhanced water quality.
Civil Rights-	(+) All people, including economically disadvantaged groups, minorities, women and persons with disability will be positively benefited by the project
Visual Resources-	(+) There will be a visual enhancement of the stream
Land Use Changes-	(+) 1 acre of woodland will be converted to wetland. A significant amount of the abandoned mine refuse pile land will be converted to grassland.
Information and Education-	(+) The constructed treatment wetlands will enhance educational opportunities for local residents, local school districts and Indiana University of Pennsylvania
Mitigation:	None Required
Major Conclusions:	A feasible project can be installed
Areas of Controversy:	None
Issues to be resolved:	None

Introduction

The Watershed Plan and Environmental Assessment for the Dixon Run project area has been combined into a single document, Plan-EA. The document identifies the problems in the project area, describes plan formulation, discloses the expected impacts, and provides the basis for acquiring assistance for implementation. The purpose of the Plan-EA is aquatic biology restoration and water quality improvement through the establishment of Successive Alkalinity Producing Systems (SAPS), Anoxic Limestone Drains (ALD), aerobic wetlands, limestone waterways, and settling ponds. A significant amount of abandoned mine refuse pile land will be treated with alkaline materials to neutralize acid and promote permanent vegetative cover. Riparian forest buffers will be maintained to protect water quality and aquatic habitat.

Project Setting

The Dixon Run Watershed constitutes a portion of the northern reaches of the Blacklick Creek Watershed. The Blacklick Creek Watershed appears on the *States High Priority List of Degraded Watershed*, as published in April 1996 by the PA Department of Environmental Protection. Today, the lower 3.2 miles of Dixon Run is nearly devoid of aquatic life. Previous coal mining efforts dating back as far as the late 1800's have rendered the water highly acidic, ladened with toxic metals, and created substantial "dead zones" within the watershed.

Several federal, state and local government agencies including the USDA, Natural Resources Conservation Service, the Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation and the Indiana County Conservation District have come together to mutually work toward remediating the natural resource problems in the watershed.

The Blacklick Creek Watershed Association had been the local forum for bring together these agencies with local groups interested in enhancing and preserving the local natural resources. The local groups that have provided extensive assistance in this watershed planning effort include:

Indiana University of Pennsylvania
Americorp, Pennsylvania Mountain Service Corp
Kensink Chapter, Trout Unlimited
West Virginia Univeristy
Other assisting groups can be listed here

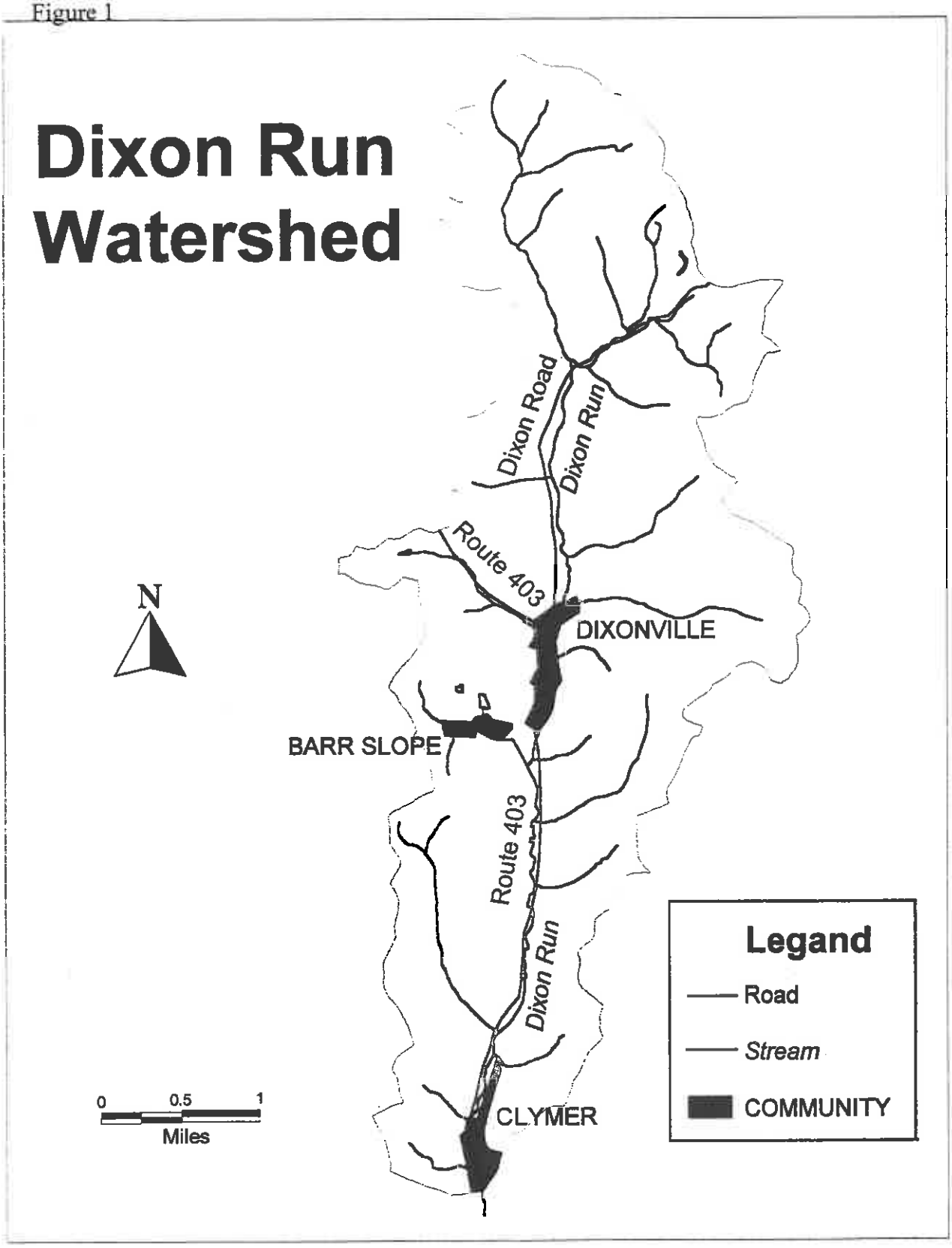
Location and Size (See figure 1)

Dixon Run is a 7.5-mile stream that originates north of Dixonville and flows in a southerly direction until it discharges into Two Lick Creek in the Borough of Clymer. The total length of the stream including all of its tributaries is 15.1 miles. The total area of the watershed is approximately 10.0 square miles. The watershed encompasses parts of East Mahoning, Grant, Rayne, Green, and Cherryhill Townships.

Geology

The area encompassing the Dixon Run Watershed is situated within the Allegheny Mountain section of the Appalachian Plateau. The rock strata of this area consist of terrestrial sedimentary sandstone, shale, and coal. These various strata occur in the Conemaugh formation, Allegheny Group, and Pottsville Group of Pennsylvanian age. The first two groups of rock strata are the most common to occur in outcroppings throughout the area.

Figure 1


Dixon Run Watershed
Dixon Road
Dixon Run
Route 403
DIXONVILLE
BARR SLOPE
Route 403
Dixon Run
CLYMER
N
0
0.5
1
Miles
Legand
Road
Stream
COMMUNITY

The coal seams mined within the watershed are primarily the Upper Freeport, Lower Freeport, and Lower Kittanning.

The mining of coal and the disturbance of the associated acidic sandstone, clay and shale have led to the water quality degradation that is apparent within the watershed today.

Climate

The climate is Humid Continental with a wide range of temperatures between cold winters and warm humid summers. The continentality of the climate is attributed to the prevailing winds coming from the west; hence the area receives very little influence from the Atlantic Ocean. The county total annual precipitation is 44 inches. Monthly precipitation varies considerably with July being the wettest month with an average of 5.18 inches of rain and September the driest month with an average of 2.35 inches of rain. The average length of the growing season is 151 days. The average annual temperature is 49 degrees Fahrenheit. Again this fluctuates widely with January having an average temperature of 26 degrees and July have an average temperature of 71 degrees.

Socioecomomics

The total number of residents in Indiana County in 1990 was 89,994. The median income per household in 1989 was $22,966. The unemployment rate in 1990 was 7.7%. That was 1.7% higher than the unemployment rate for the entire state.

Minority Populations

According to the 1990 census, Indiana County had the following population percentages, 97.8% were white, 1.3% were African Americans, and 0.9% were other races and Hispanic origin.

Problems and Opportunities

Two problems have been identified in the Dixon Run project area.

1. Mine drainage from abandoned coal mines is degrading the quality and quantity of aquatic habitat in 3.2 miles of Dixon Run Watershed.

2. Visual quality and aesthetics on Dixon Run is adversely affected by iron staining of Dixon Run.

Impaired Water Quality

Water quality and quantity was sampled at 5 locations in July of 1998 at mine drainage sites along Dixon Run (see figure 2) by the NRCS with assistance from the Bureau of Mining and Reclamation, and the Indiana County Conservation Office. The sampling provides quality and quantity data on all mine water discharges points on Dixon Run. (Note: Sampling at these locations at various times over an extended period of time and averaging the results would account for seasonal variations in flow)

The following chemical parameters were tested: pH, acidity, alkalinity, sulfate, total iron, manganese, and aluminum, (see table 1). The quantities of acidity, iron, and aluminum substantially exceeded habitat thresholds as evidenced by the lack of aquatic life in significant reaches of Dixon Run.

Using the Pennsylvania Department of Environmental Protection's methodology for Rapid Assessment of Aquatic Habitat, values for two reaches of Dixon Run were calculated. One reach was upstream of Dixonville were the stream is considered clean and visual observation revealed several brook trout. The second reach was down stream of Dixonville where the stream is considered polluted and no aquatic life was noted during the visual observation. Both reaches yielded values in the optimal range for aquatic habitat.

The Rapid Assessment indicates that in the absence of pollution the down stream reach has the same potential to support life, as does the upstream reach. This means that if the problems identified above are addressed, the lower portion of Dixon Run would be capable of supporting aquatic life.

As part of a comprehensive watershed plan, other water quality problems have been identified. One problem is the sedimentation of the stream from sediment generated on the many dirt and gravel roads that cross the stream. This problem can be addressed under the PennDot funded and State Conservation Commission administered Dirt and Gravel Road Program.

Another water quality concern is the failure of septic systems in the communities of Dixonville and Barr Slope. This is adversely affecting water quality in Dixon Run. This problem is currently being addressed by the planning of a sewage system in this area.

Figure 2

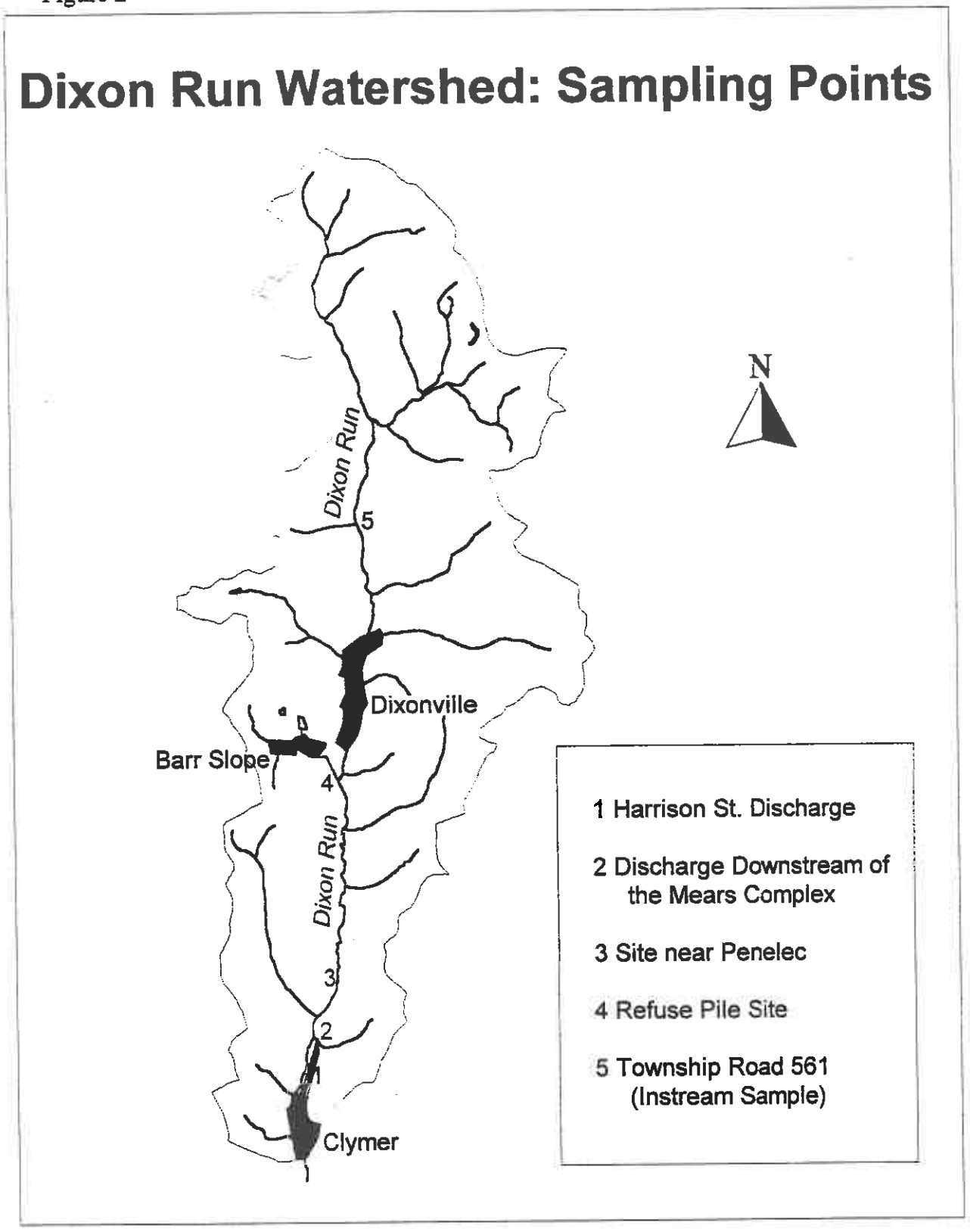

Dixon Run Watershed: Sampling Points
Dixon Run
5
Dixonville
Barr Slope
4
Dixon Run
3
2
1
Clymer
N
1 Harrison St. Discharge
2 Discharge Downstream of the Mears Complex
3 Site near Penelec
4 Refuse Pile Site
5 Township Road 561 (Instream Sample)

Table 1 (Sampling Site Data)

Site	Flow (GPM)	Acidity (mg/l)	Iron (mg/l)	Aluminum (mg/l)
Harrison Street Discharge	45	342	13.5	41.4
Discharge Downstream of the Mears Complex	90	338	15	28.8
Site near Penelec	1	382	22.5	32
Refuse Pile Site	5	102	1.5	1.4
Township Road 561 (In stream sample above project area)	225	0	<.3	<.5

(Note: The amount of flow from the Penelec site was so small that it would be impractical to treat)

Visual Resource Problems

A dramatic, visually displeasing event occurs at each of the mine water discharge points when iron and acid laden waters flow across the earth surface, kills vegetation, and turns the streams red with iron precipitate. The heavy iron deposits coat the stream bottom and smother aquatic life.

Problem Sites

There are three acid mine water discharge sites flowing into Dixon Run that need to be treated. Three treatment sites will be used to treat these discharges. The discharges are the result of seepages and direct flows from abandoned deep mines and abandoned mining refuse piles.

The treatment sites have been identified as follows (see Appendix B):

1. Refuse Pile Site
2. Site Downstream of the Mears Complex
3. Harrison Street Site

Refuse Pile Site

This site is upstream of the other two sites. The problem here is a large abandoned refuse pile composed of highly acidic materials from a coal cleaning plant. A small amount of water runs in a ditch from the refuse pile into the stream. The water quality on this small ditch was listed above in Table 1.

However this ditch is not the main source of contamination from this site. The top of the pile is fairly level and rain water that falls there percolates into the pile. From there the water flows, within the pile, toward the stream. This water emerges on the stream bank in the form of a seep several hundred feet long. Along this area the bank and stream show heavy staining from iron and aluminum. Flow measurements taken above and

below this seep show that 135 gallons of water per minute are added to Dixon Run in this area. That is the same amount of water that is added to Dixon Run from the other two project sites combined.

In many places, the sides of this pile are barren and eroding. This introduces the acidic material directly into the stream.

Site Downstream of the Mears Complex

This discharge is downstream of the Refuse Pile Site. Water flows from an abandoned mine opening at a rate of 90 gallons per minute. Water chemistry for this discharge is pH 2.9, acidity 338 mg/l, iron 15 mg/l, and aluminum 28.8 mg/l. This average acid production for this site is 66.5 tons of acid per year.

Harrison Street Site

This abandoned mine discharge is the farthest downstream of the three problem sites. In the spring of 1998, work was being done in the area around the discharge. This work caused the bank to collapse, allowing a large quantity of acidic water to escape and flow into Dixon Run. Since that time a pipe has been installed to prevent the water from backing up again. This discharge flows at a rate of 45 gallons per minute. Water chemistry for this discharge is pH 3.3, acidity 342 mg/l, iron 13.5 mg/l, and aluminum 41.4 mg/l. The average acid production for this site is 33.7 tons of acid per year.

Educational Opportunities

Several opportunities exist to use the Dixon Run watershed restoration project as an educational tool. These opportunities exist currently in the monitoring of existing conditions to document baseline conditions in the watershed. During the implementation phase of this project there will be opportunities to expand monitoring to document changes in water quality. Once the watershed plan is completely implemented there will be educational opportunities to document and evaluate changes in water quality, stream biology, wildlife habitat and diversity and geologic influences.

~~The~~ Indiana University of Pennsylvania has been active in the creation of this Plan-EA. Many students and faculty are highly involved with Dixon Run and the entire Blacklick Creek Watershed. The completed project will also provide an excellent outdoor classroom for many of the majors at the University.

High schools throughout the county could benefit from using this project as a teaching tool.

Other Opportunities

Solutions to the water quality problems will provide many incidental effects. These effects include increased property values, economic development, enhanced educational and recreational opportunities, and improved aesthetics. Experience has shown that mine reclamation also stimulates community provide. This pride is often reflected in improved property maintenance.

The development of wetlands for the treatment of mine drainage will enhance wetland habitats for waterfowl, migratory birds and amphibians and upland wildlife.

Scope of the Environmental Assessment

The purpose of this section is to document the range of issues and impacts considered in developing the Resource Plan and Environmental Assessment. The table below outlines the concerns identified during project preparation.

Identified Concerns

Economic, Social Environmental and Cultural Concerns	Degree Of Concern	Degree of Significance To Decision Making	Remarks
Public Health & Safety	High	High	
Surface Water Quality	High	High	Principal objective, severe degradation
Ground Water Quality	High	High	Determines treatment methodology
Aquatic Biology	High	High	
Flood Water Damages	Medium	Low	
Sediment Damages	Medium	Medium	
Threatened & Endangered Species	High	?	Contact needed with several agencies
Cultural Resources	High	?	Contact needed with Historical and Museum Commission
Wild and Scenic River	High	Low	
Water Conservation	Low	Low	
Important Farmland	High	High	It needs to be determined whether any Prime or important farmland falls within the project area
Wetlands	High	High	Project will enlarge and enhance
Flood Plains	High	Medium	
Air Quality	High	Low	
Soil Resources Base	High	Medium	
Fish & Wildlife	High	High	
Visual & Aesthetics	High	High	
Water Quantity	High	High	
Socioeconomics	High	High	
Land Use Changes	High	High	
Civil Rights	High	High	

Formulation of Alternatives

Formulation Process

The Blacklick Creek Watershed Association along with the cooperating agencies and groups provided resource data, analysis, and evaluation needed to make decisions on alternative plans.

The formulation process involved evaluation of alternatives to solve the principal problems of degraded aquatic habitat due to impaired water quality primarily caused by acid mine drainage. Economic, environmental, social, cultural and civil rights issues were considered in the analysis. In compliance with Executive Order 11988, Flood Plain Management, alternatives were developed which avoid adverse effects and incompatible development in the base flood plain. In compliance with Executive Order 11990, Protection of Wetlands, alternatives were developed which avoid adverse effects to wetlands. Effects on water quality, ground water recharge and discharge, maintenance of natural systems and the recreational, scientific and educational uses of wetlands were considered. Few viable alternatives were identified.

Physical Chemical Treatment Plants

Installation of a physical/chemical treatment plant with a stream discharge at each site would be impractical. High initial construction costs along with annual operation and maintenance costs, which would include labor, electricity, chemicals, equipment repair, and other costs would be prohibitive. This alternative may require additional discharge permits and would entail the costs of sludge removal.

The Pennsylvania Department of Environmental Protection has used physical/chemical treatment facilities in the past to treat mine drainage discharges. In the early 1960's Operation Scarlift was established by the Pennsylvania Legislature to reclaim abandoned mine land and water. A bond issue was used to fund Operation Scarlift. One of the major endeavors of Operation Scarlift was the construction of physical/chemical mine drainage treatment plants. These treatment plants generally were effective in removing pollutants but the yearly maintenance costs were excessive and the State has abandoned all but two of these facilities due to the excessive operating costs.

Some of the major treatment plants that have been abandoned due to excessive operating costs include: Hawk Run in Clearfield County, the Carl White plant on Crooked Creek in Indiana County, Slippery Rock Creek in Butler County, Glenwhite and Kittanning Runs in Blair County, and Smith Run in Washington County. Operating cost for these plants ranged between $90,000 and $500,000 per year.

Excessive yearly operation and maintenance costs associated with chemical/physical treatment plants make the construction of a treatment plant and unacceptable alternative.

Remining

The concept of remining represents a potential technology for eliminating the source of the mine drainage and the resulting polluted discharges. In some situations, improved strip mining techniques, methods and equipment utilized in areas that have been previously deep mined, have allowed the reduction and/or elimination of mine drainage discharges.

The barriers for a timely implementation of this technology include: 1. The coal operators cost of exploratory drilling, 2. Coal market limitations, and 3. Uncertainty about the geologic response of the geologic overburden on water quality and quantity.

At this time the uncertainties listed above do not allow this alternative to be utilized in this plan.

Passive Treatment Technologies

Once the quantity and quality of the water needing treatment was determined and the chemical/physical alternative was eliminated, the consideration of viable alternatives centered around the evaluation of methodologies for capturing the acid mine water, treatment and preventing clean surface water from entering the passive treatment system.

Treatment alternatives were evaluated at each discharge location. The treatments were assessed in relation to the water quality benefit vs. cost, effectiveness and appropriateness for treating the discharge water chemistry and flow rate. The environmental impacts of each alternative were considered. The treatment methodologies and components that were evaluated at each discharge include Successive Alkalinity Producing Systems (SAPS), Anoxic Limestone Drains (ALD), aerobic wetlands, alkaline addition, settling ponds, limestone drains and seeding.

Successive Alkalinity Producing Systems (SAPS) are water filled ponds that have limestone rock placed in them to react with the acid in the mine water and neutralize it. An organic layer is placed over the rock to convert all iron in the discharge water to a ferrous form that will not coat the limestone and allow the acid to readily react with the limestone.

Three to five feet of water is maintained above the compost to provide head pressure to move the water through the compost and limestone and into the outlet pipes located below the limestone. Once the water has traveled through the SAPS it has acquired increased alkalinity and pH, which allows the iron and aluminum to precipitate.

Anoxic Limestone Drains (ALD) are similar to SAPS except the limestone is placed under ground and the mine water flows through limestone rock. They have somewhat limited application because water with high levels of ferric iron and aluminum will tend to clog the drains, coat the rock with precipitate and make them less effective. Water

with ferrous iron and low aluminum levels can be effectively treated with ALD technology.

When the above water quality conditions can be met, the water quality improvement potentials for ALD's are similar to SAPS.

Aerobic wetlands can only fully treat water that is net alkaline. This does not preclude their use in systems that incorporate other treatment components to generate alkalinity to treat acid water. They can be used to enhance the effectiveness of other treatment measures. Wetlands will promote oxidation, precipitation and settling of iron and aluminum. They accomplish these tasks by generating alkalinity, especially in summer months, filtering the water flowing through them, and slowing the flow of water.

Water quality improvements achieved by aerobic wetlands are variable. They do enhance the function of other treatment components by acting as a filter for precipitates. Aerobic wetlands can add some alkalinity through sulfate reduction.

Settling ponds provide many of the same functions as wetlands, but provide a much larger capacity for collecting and storing precipitates. Most often, settling ponds are placed to collect the flow from SAPS and ALDs where precipitation is most likely to occur.

Limestone drains are used to provide oxygen to the water and add small amounts of alkalinity to the water. As the water flows down a limestone drain, the velocity of the water causes riffles that bring about increases in the dissolved oxygen content in the water. The water flow over the limestone also causes dissolution of calcium from the rock, which results in increased alkalinity in the water. The increased oxygen and alkalinity levels promote the precipitation of the metals in the water.

Limestone drains provide variable treatment results depending on the velocity of the water flow. Experience has shown that limestone drains can remove 25% of aluminum levels and reduce acidity if the water is flowing at eight feet per second or faster.

Alkaline addition is used to neutralize acid producing rocks and minerals associated with some seams of coal. Adding sufficient quantities of ground limestone to areas will bring the pH of the material to seven or higher. This will stop the production of acid and add alkalinity to runoff water.

Summary of Alternatives Considered

Physical Chemical Treatment Plants

This alternative was not chosen due to excessive operation and maintenance costs.

Passive Treatment Technologies

The mechanics of using the only viable alternative, passive treatment technology, produced many treatment scenarios at each site. Extensive data gathering and technical evaluation of the data reduced the number of potential treatment methodologies at each site to the most economical and effective treatments.

Description of the Alternative Plans

As a result of the formulation process, two alternatives were evaluated, the No Action Alternative and the Recommended Plan.

No Action Alternative

This alternative represents conditions that will likely prevail 25 years in the future, if no project action is taken. The identified mine discharges will continue to impair water quality and aquatic habitat.

The local communities will be denied the positive economic, environmental, social and cultural benefits, which could be realized by improved water quality in Dixon Run

In short, conditions will remain much the same as they exist today. Only slight improvements in water quality could be expected with time.

Recommended Plan

This alternative is being evaluated over a 25-year period. Chemical and biological treatment via passive treatment technology will be utilized to improve water quality. Design of the treatment system will be based on experience from other sites. An effort will be made to research design data and use the most current technology at the time of design of each component. Components that may be used at each site, depending on water chemistry are: Successive Alkalinity Producing Systems (SAPS), Anoxic Limestone Drains (ALD), aerobic wetlands, alkaline addition, settling ponds, limestone drains and seeding. The passive treatment systems will remove acid, iron, aluminum, and reduce manganese from the water by promoting chemical and microbial processes. Oxidation and precipitation will continually increase as the drainage water flows through

the treatment systems. Wetland vegetation will be planted to promote oxidation and prevent channelized flow through constructed wetlands. Treated water will then be released through diversions and rock-lined waterways to the receiving streams.

The total cost of the Recommended Plan is $ 679,169. The average cost is $78,400. The total operation and maintenance cost is estimated to be $3,000per year.

Effects of Alternative Plans

Water Quality

No Action – Without the project, the water quality in Dixon Run in and below the planned project area is expected to improve only slightly due to a slow natural depletion of iron and acid-bearing materials. The 3.2 miles of the stream that is currently degraded by mine drainage would continue to be contaminated and have impaired water quality.

Alternative 1 (Recommended) – The implementation of this technology would reduce iron, acid and aluminum levels entering Dixon Run by 90-95% percent. These projections are made based on research and experiences of the Natural Resources Conservation Service gained through constructing passive treatment systems on RAMP (Rural Abandoned Mine Program) sites and PL-566 (Watershed Protection and Flood Prevention Program) sites.

Aquatic Habitat

No Action – The lower portion of Dixon Run will continue to be severely degraded and nearly void of aquatic life. The 3.2 miles reach of the stream that is currently degraded will continue to have a reduced quality of benthic organisms.

Alternative 1 (Recommended) – Reduction of mine water pollution in Dixon Run will allow the return of aquatic life to the stream. The improvement will allow the return of sustained aquatic life and an enhanced cold water fishery.

Wildlife Habitat

No Action – Without the project there will be no change in wildlife habitat.

Alternative 1 (Recommended) – With the project, there would be a diversity of wildlife present that does not currently exist. The project will create approximently 1 acre of wetland and open water that will be a productive waterfowl habitat.

Threatened and Endangered Species

No Action – Without the project, there will be no change in wildlife species that utilize the Dixon Run Watershed area as a habitat.

Alternative 1 (Recommended) - The following agencies need to be contacted to determine whether any endangered species exist in the project area (Contact information for each of these agencies can be found in Appendix A).

-DCNR Bureau of Forestry
-Pennsylvania Game Commission
-Pennsylvania Fish and Boat Commission
-US Department of the Interior Fish and Wildlife Service

Cultural Resources

No Action – Without the project no cultural resources will be impacted.

Alternative 1 (Recommended) – The Pennsylvania Historical and Museum Commission needs to be contacted to determine whether the project area has any archaeological significance (see Appendix A for contact information on this agency).

Wetlands

No Action – There will be no new wetlands within any of the proposed treatment sites.

Alternative 1 (Recommended) – There are no existing wetlands within any of the proposed project areas. The project when fully implemented will create approximently one acres of constructed wetlands. The Recommended Plan is in compliance with Executive Order 11990, Protection of Wetlands.

Flood Plains

No Action – Without the project, the existing flood plain will continue to provide a natural flooding area for Dixon Run.

Alternative 1 (Recommended) – The Recommended Plan would have no significant impact on the Dixon Run flood plain or downstream flooding. The Recommended Plan is in compliance with Executive Order 11988, Flood Plain Management.

Visual Resources

No Action – The degraded visual resources associated with the iron deposits on the stream bottom of Dixon Run, will continue to have a negative impact if the project is not completed.

Alternative 1 (Recommended) – The visual appearance of 3.2 miles of Dixon Run will be returned to a natural condition.

Land Use

No Action – Without the project, it is anticipated that the existing land use will continue as it currently exists.

Alternative 1 (Recommended) – With the project one acre of woodland would be converted to wetland and open water. The abandoned mine refuse pile area would be converted to grassland.

Socioeconomic

No Action – Without the project, Dixon Run would remain contaminated by mine drainage and no recreational fishing opportunities would be available. Economic opportunities associated with a restored trout fishery would continue to be absent. Fishing and other related outdoor activities would continue to be adversely affected.

Land values will continue to be depressed due to the adverse effects of mine drainage.

All of these negative impacts will be shared equally by all local residents including any economically disadvantaged groups, minorities, women, and persons with disabilities.

Alternative 1 (Recommended) – The economic benefits of improving water quality and restoring aquatic habitat to the impacted area is displayed on Table 2.

Table 2 - Economic Benefits
Recommended Plan

Defined Area	Miles of Stream Restored	Annual Value
Dixon Run	3.2	$79,000
Total	3.2	$79,000

The Dollar value is obtained from increased economic activity, i.e., sales of goods and services in the area. The project will allow a more intensive use of the area for recreation, drawing more people to use the commercial services in the area.

The positive impacts of the Recommended Plan will benefit all local residents including any economically disadvantaged groups, minorities, women and persons with disabilities.

Educational Opportunities

No Action – Without the project the potential for educational use will be limited. The area will be a good outdoors learning area for showing the impacts of acid mine drainage on streams. The educational use of the area to show the impacts of passively treating the mine water will not be present.

Alternative 1 (Recommended) – Implementation of the Recommended Plan will create educational opportunities. The passive treatment systems will be easily accessed for field studies. The passive treatment systems will have a more diverse plant community that will enhance and expand the animal community, creating enhanced opportunities for ecological studies.

Other Effects

No Action – All of the short term and temporary impacts of increased noise, air and water disturbances normally associated with a project action will not occur in the No Action Alternative. Other short-term effects that would be impacted in a project action that will not be impacted with this alternative include disruption to wildlife resources, traffic delays and potential minor disruption of utilities.

Enhancements and improvements that would be realized through the Recommended Plan will not occur with this alternative. No irreversible or irretrievable uses to the resource base will occur in this alternative.

Alternative 1 (Recommended) – Some temporary effects could occur involving usual short-term increased noise, air and water disturbance. Wildlife resources may experience temporary disturbance during the installation of the works of improvement. These wildlife values will be restored or enhanced in value within one growing season. Additional short-term effects may involve traffic delays and minor disruption of utility services in and around the construction areas.

By altering the short-term uses of man's environment, the project will retain and enhance the environments long-term productivity. None of the works of improvement associated with the Recommended Plan will cause any irreversible or irretrievable uses of the existing resource base.

Relationship to Local and Regional Plans

No Action – Implementing the No Action Alternative will prevent the local area from realizing the objective of restoring aquatic habitat by improving water quality in Dixon Run.

Alternative 1 (Recommended) – The County Planning Office as well as the boroughs and townships that are effected by this project need to be contacted to ensure that this plan is compatible this their comprehensive plans. This project supplements the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation's Title IV, mine reclamation program and the Title IV, 10% set aside program.

Comparison of Alternative Plans

Table 3 - Comparison of Alternative Plans presents the impacts of each alternative on key economic social and cultural concerns.

Table 3 - Comparison of Alternative Plans

No Action Alternative	Recommended Plan
Measures None	Measures 1 acre of new constructed wetlands 12 ac mine land reclaimed 32 ac seeding 5000 ft. runoff controls 19 ac. clearing and grubbing 4 SAPS 1000 ft access roads 1 ac constructed wetlands .03 ac settling basins 400 ft. limestone channels
Project Investment $0	Project Investment $849,668
Average Annual Benefit $0	Average Annual Benefit $79,000
Average Annual Cost $0	Average Annual Cost $78,400
Net Economic Benefit $0	Net Annual Economic Benefit $600
Water Quality Mine Drainage continues to pollute Dixon Run.	Water Quality Mine drainage is treaded, and 3.2 miles of Dixon Run has improved water quality.
Wetlands NONE	Wetlands 1 acre of wetland will be constructed to enhance pollutant removal.

No Action Alternative (continued)	**Recommended Plan** (continued)
Habitat 3.2 miles of riverine aquatic habitat remain severely degraded.	Habitat 3.2 miles of riverine aquatic habitat enhanced.
Erosion and Sedimentation No change	Erosion and Sedimentation Erosion and sedimentation will be reduced by 118 tons per year.
Land Use No change	Land Use One acre of woodland will be converted to wetland and open water. A significant amount of abandoned mine refuse pile land will be converted to grassland.
Recreation Sport fishing opportunities severely impacted by mine drainage	Recreation Sport fishing opportunities enhanced on 3.2 miles of stream
Aesthetics No change	Aesthetics The visual appearance of 3.2 miles of stream will be returned to a natural condition.
Civil Rights All people, including economically disadvantaged groups, minorities, women and persons with disabilities will continue to be adversely impacted by degraded water quality.	Civil Rights All people, including economically disadvantaged groups, minorities, women and persons with disabilities will be positively benefited by the project.

Risks and Uncertainty

The treatment of acid mine drainage water using passive technology is a relatively basic concept that is well proven. The criteria used in sizing the wetlands were developed from monitoring of systems built during the last few years.

The chemistry of the mine water in the Dixon Run watershed has not changed dramatically over the past 25 years. Future changes in water chemistry are not expected to be significant.

Deep mine subsidence within the watershed in not apparent at this time. Future subsidence within deep mine workings may alter ground water hydrology along with chemical reactions within the mine. These potential changes may cause current discharge flow rates to increase or decrease with time.

Rationale for Plan Selection

All of the identified mine water pollution sources will need to be treated by passive treatment systems to reach a water quality threshold in Dixon Run which will allow restoration of the sport fishery. This level of treatment will also substantially increase local property values, improve aesthetics, and enhance educational opportunities. Non-water based recreation would also be enhanced.

Many different alternatives for treatment were considered. Measures such as conventional mechanical treatment are costly to construct and maintain. Water collection for this type of treatment would also be costly and difficult to achieve. This treatment methodology, although considered, was discarded as an alternative due to high cost.

The selected plan meets the objectives and solves the identified resource problems with the combined ecological, social and economic benefits clearly exceeding the costs.

Consultation and Public Participation

The total resource management approach to water resource planning in the Blacklick Creek Watershed (of which Dixon Run is a part) began with the establishment of the Blacklick Creek Watershed Association (BCWA). The BCWA has actively pursued the collection and interpretation of resource information to quantify and qualify the resource problems of the Blacklick Creek Watershed. Initially the BCWA gathered land use, chemical, biological, and flow information in the watershed to determine the kind and extent of all water quality problems. The major resource problem in the watershed is due to acid mine drainage.

The following organizations have assisted the BCWA:

Indiana County Conservation District
Americorp, Pa Mountain Service Corp
Indiana University of Pennsylvania
USDA, Natural Resources Conservation Service
DEP, Bureau of Mining and Reclamation
Kensink Chapter, Trout Unlimited
Department of Energy, Office of Surface Mining
Indiana County Planning Office

These groups and agencies were very supportive of the comprehensive planning concept.

Recommended Plan

Purpose and Summary (See Site Location Map, Appendix B)

This plan is designed to meet the objective of improving water quality in 3.2 miles of Dixon Run. The recommended Plan will improve the water quality and restore or enhance aquatic habitat in the stream which are now impaired due to acid mine drainage. The planned action will treat three acid mine drainage sites. The most current technology available at the time of implementation will be utilized to insure the most effective and efficient treatment of mine water.

Measure to be Installed

Refuse Pile Site
This site is more complex than the other two because of its hydrology and size. Engineers at the Somerset Technical Office of the NRCS estimated the cost of a treatment plan for this site. Expected measures include regrading parts of the refuse pile, addition of alkaline materials, seeding, and diversionary ditches to keep clean water away from the site.

Site Downstream of Mears Complex
A sequential treatment process will be used here. This will include 2 SAPS, 2 wetlands, and 3 settling basins. Perimeter pollution control will be used to prevent sediment from reaching the stream during construction. All disturbed areas will be limed, fertilized, seeded and mulched.

Harrison Street Site
A sequential treatment process will also be used to treat this site. This will include 2 SAPS, 2 wetlands, and 3 settling basins. Perimeter pollution control will be used to prevent sediment from reaching the streams during construction. All disturbed areas will be limed, fertilized, seeded and mulched.

Permits and Compliance

Any necessary deed restrictions, permits and water rights must be acquired in order to install the project. Applications for permits will need to be filed with the Pennsylvania Department of Environmental Protection (PADEP), Bureau of Water Quality Protection, the Bureau of Watershed Conservation, and other agencies.

Installation and Financing

Installation of the works of improvement described in this plan consists of three project sites. The sites are proposed to be constructed in the following order. The Refuse Pile Site first, the Site Downstream of the Mears Complex second, and the Harrison Street Site third. This project sequence from the top of the watershed to the bottom provides a logical sequence for construction that will allow a sequential cleaning of Dixon Run. However in the event that an unforeseen problem would arise that would alter this sequence of project implementation no adverse consequences are expected.

Operation and Maintenance

The components of the passive treatment system will be designed to minimize maintenance. The treatment wetlands will be sized to maximum size based on existing available treatment areas. It is anticipated that a minimum 25-year life span is expected for all treatment areas.

Periodic maintenance will be needed to reseed and or repair parts of diversions and dikes that may be damaged by severe storms. Rock riprap in outlet structures that may be dislodged during severe storms will need to be replaced. Cutting of unwanted vegetation on the dikes is also anticipated. Total annual maintenance cost is estimated at $3,000 per year.

Cost / Benefit Analysis

The Recommended Plan has a positive benefit to cost ratio of:

Benefit to Cost Ratio
1.01 : 1.00

Estimated Installation Cost

Dixon Run, Indiana County, Pennsylvania

(Dollars)

Table 3

Project Site	**Estimated Costs**
Refuse Pile Site	420,500
Site Downstream of the Mears Complex	279,532
Harrison Street Site	279,532
Total	849,668

Estimated Cost Distribution

Dixon Run, Indiana County, Pennsylvania

(Dollars)

Table 4

Site	Construction	Engineering	Project Administration	Land Rights	Total
Refuse Pile Site	350,000	35,000	28,000	7,500	420,500
Downstream of Mears Complex	230,104	23,010	18,408	8,000	279,523
Harrison Street Site	123,429	12,343	9,874	4,000	149,646
Total	703,533	70,353	56,282	19,500	849,668

References

Kimball, Robert Consulting Engineers, 1971, Two Lick Creek Mine Drainage Pollution Abatement Project: SL-109: A Part of Operation Scarlift, Kimball Consulting Engineers, Ebensburg, PA

PA Department of Environmental Protection, 1996, Water Quality Assessment: 305 (b) Report, Commonwealth of Pennsylvania, Harrisburg, PA

U.S. Department of Agriculture NRCS, 1997, Glennwhite Run Watershed Plan and Environmental Assessment, NRCS, Somerset, PA

List of Preparers

Name	Present Title	Years in Position	Education
Daniel Seibert	Resource Conservationist, NRCS	26	BS-Agronomy
Don Bowers	Field Conservationist, NRCS	23	BS-Agronomy
Louis Kopczyk	District Manager, Indiana County Conservation Service	9	BS-Agricultural Engineering
Christian Black	Intern, NRCS	< 1	BA-Geography

Appendix A
Addresses

Pennsylvania Historical and Museum Commission
William Penn Memorial Museum and Archives Building
Box 1026
Harrisburg, PA 17108-1026

Pennsylvania Fish and Boat Commission
Division of Fisheries Management
450 Robinson Lane
Bellefonte, PA 16823-9620

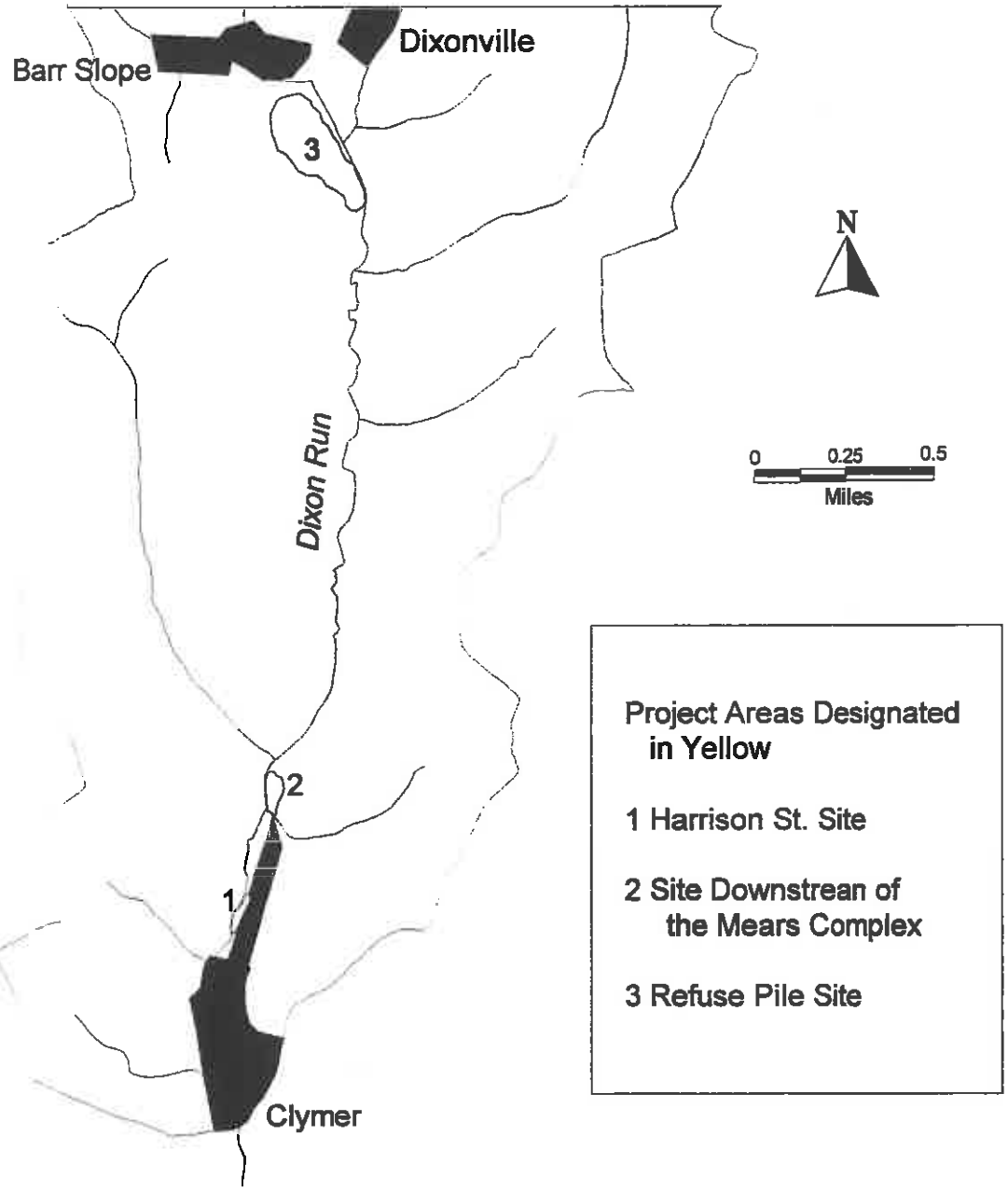
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110-9797

Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
Rachel Carson State Office Building
P.O. Box 8552
Harrisburg, PA 17105-8552

United States Department of the Interior
Fish and Wildlife Service
Suite 322
315 South Allen Street
State College, PA 16801-4850

Appendix B

Lower Portion Dixon Run Watershed: Project Areas



Appendix C (System and Cost Summery)

Site Downstream of Mears Complex Dixon Run

PROPOSED TREATMENT
Treatment: 3 settling basins, 2 wetlands, 2 SAPs

SYSTEM SUMMARY

SAP:	Surface Area=	0.27 acres
	Limestone =	1925 tons
	Compost =	107 tons
AEROBIC WETLAND:	Surface Area=	0.40 acres
	Compost =	160 tons
SETTLING BASIN:	Surface Area=	0.02 acres

COST SUMMARY

Major Bid Items	Quantity	Unit	Unit Price	Cost
Mobilization/Demobilization	1	JOB	$9,783	$9,783
Clearing & Grubbing	10	AC	$500	$5,000
Structure Removal		EACH	$0	$0
Pollution Control	2000	FT	$2.75	$5,500
Seeding	12.00	AC	$1,500	$18,000
Access	1	JOB	$5,000	$5,000
Excavation & Fill-SAP	2	EACH	$16,257	$32,513
Rockfill-SAP	3850	TONS	$20	$77,005
Compost-SAP	2567	YD2	$4	$10,267
Pipe (6")-SAP	1200	FT	$5	$6,000
Excavation & Fill-Settling Basin	3	EACH	$893	$2,679
Excavation & Fill-Wetland	2	EACH	$3,850	$7,701
Compost Wetland	3850	YD2	$4	$15,401
Limestone Channel	200	FT	$28	$5,600
Diversion	2000	FT	$2.50	$5,000
Cattails	0	YD2	$2	$0
Subtotal-CONSTRUCTION				$205,450
CONSTRUCTION COST w/ cont			12 percent	$230,104
ENGINEERING - % of const			10 percent	$23,010
PROJECT ADMIN - % of const			8 percent	$18,408
LAND RIGHTS				$8,000
TOTAL COST				$279,523

Harrison Street Site

Dixon Run

PROPOSED TREATMENT
Treatment: 3 settling basins, 2 wetlands, 2 SAPs

SYSTEM SUMMARY

SAP:	Surface Area=	0.13 acres
	Limestone =	963 tons
	Compost =	53 tons
AEROBIC WETLAND:	Surface Area=	0.20 acres
	Compost =	80 tons
SETTLING BASIN:	Surface Area=	0.01 acres

COST SUMMARY

Major Bid Items	Quantity	Unit	Unit Price	Cost
Mobilization/Demobilization	1	JOB	$5,248	$5,248
Clearing & Grubbing	5	AC	$500	$2,500
Structure Removal		EACH	$0	$0
Pollution Control	1000	FT	$2.75	$2,750
Seeding	8.00	AC	$1,500	$12,000
Access	1	JOB	$5,000	$5,000
Excavation & Fill-SAP	2	EACH	$8,128	$16,257
Rockfill-SAP	1925	TONS	$20	$38,503
Compost-SAP	1283	YD2	$4	$5,134
Pipe (6")-SAP	800	FT	$5	$4,000
Excavation & Fill-Settling Basin	3	EACH	$554	$1,663
Excavation & Fill-Wetland	2	EACH	$1,925	$3,850
Compost Wetland	1925	YD2	$4	$7,701
Limestone Channel	200	FT	$28	$5,600
Cattails	0	YD2	$2	$0
Subtotal-CONSTRUCTION				$110,204
CONSTRUCTION COST w/ cont			12 percent	$123,429
ENGINEERING - % of const			10 percent	$12,343
PROJECT ADMIN - % of const			8 percent	$9,874
LAND RIGHTS				$4,000
TOTAL COST				$149,646

Refuse Pile Site

Dixon Run

PROPOSED TREATMENT
Treatment: Regrading of Refuse Pile, Water Diversions, Addition of Alkaline Materials, Seeding, Limestone Cutoff Trench

CONSTRUCTION	$350,000
ENGINEERING	$35,000
PROJECT ADMIN	$28,000
LAND RIGHTS	$7,500
TOTAL COST	$849,668